2024 Annual Monitoring Report
Hickey Road Waste Disposal Site
Environmental Compliance Approval
No. A362301

Prepared for:

The Corporation of the Municipality of Hastings Highlands
P.O. Box 130
33011 Highway No. 62
Maynooth, ON K0L 2S0

Prepared by:

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

Project Number: 240205-05
March 28, 2025

BluMetric.ca

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(Provided on USB Drive for Hard Copy)

1 Introduction

This report provides a summary and analysis of environmental monitoring activities at the Hickey Road Waste Disposal Site (WDS), in Maynooth, Ontario. The WDS as shown in Figure 01 is herein referred to as the "Site".

This report is being prepared for the Corporation of the Municipality of Hastings Highlands (the Municipality, or MHHs). The Municipality has been in the process of purchasing the Crown land from the Ministry of Natural Resources and Forestry (MNRF) for the past few years. In January of 2020, it was thought that ownership of the 4.0 hectares (ha) waste site had been transferred from the Crown to the Municipality, however as of March 2024, it remains in the final stages of documentation processing. The Site is operated under Environmental Compliance Approval (ECA) No. A362301, dated December 20, 2018, which is included in **Appendix A.**

This report covers all work and activities carried out for the period of January 1, 2024, to December 31, 2024. BluMetric Environmental Inc. (BluMetric®) was retained by the Municipality to conduct the 2024 environmental monitoring and sampling program and prepare the 2024 Annual Monitoring Report.

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 throughout 2024.

1.1 Location

The WDS is located on the eastern end of Hickey Road East, approximately 850 m from the intersection with Highway 62 in the community of Hickey Settlement (Figure 01). The civic address is 202 Hickey Road, and it is located approximately 8.5 km south of Maynooth, Ontario. The total Site area is 4.0 ha located on Part of Lot 30, Concession 8 (formerly Wicklow Township), and now part of the MHHs. The facility layout, road network, and site features are shown on Figure 02 – Site Plan.

The Site includes a 3.0 ha approved footprint. There is a 30 meter (m) buffer around the footprint and a proposed Contaminant Attenuation Zone (CAZ) of 1.12 ha to the south of the 4.0 ha WDS area.

1.2 Site Ownership and Key Personnel

The facility is owned and operated by the MHHs, with the Municipal office located in Maynooth, Ontario.

The transfer of the land from MNRF to MHHs is in the final stages. It is anticipated that the final documentation for the 4.0 ha WDS property will be completed and registered on title in 2025. We understand that the transfer of the easement from the Crown for the 1.12 ha CAZ area shown on Figure 04 is also still in progress and should also be completed in 2025. The Municipality initiated consultations with MNRF with respect to the WDS property in 2015. Over the past eight years several steps (e.g. Environmental Assessment, Indigenous and Public Consultations) were required to be completed for the Municipality to purchase the property and secure the easement for the CAZ.

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

Contact information is outlined in the following Table 1:

Table 1: Contact Information

	Name	Address	Phone Number	Email
Site Owner/ Contact	The Corporation of the Municipality of Hastings Highlands CAO – David Stewart	P.O. Box 130 33011 Highway No. 62 Maynooth, ON K0L 2S0	(613) 338 – 2811 ext. 289	dstewart@hastingshighlands.ca
CEP	Mark Somers, P.Eng., BluMetric Environmental	1682 Woodward Dr, Ottawa, ON K2C 3R8	(877) 487 – 8436 ext. 246	msomers@blumetric.ca

1.3 Description and Development of the Site

The Site has a total site area of 4.0 ha with a 3-ha landfilling area. In addition to domestic waste, Hickey Road WDS includes recycling bins for metal, plastic, paper/cardboard products, as well as segregated areas for scrap metal, tires, large bulky items, and brush. The Ontario Electronic Stewardship (OES) has approved the Hickey Road 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 new 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 is in a former sand and gravel pit within a forested area, surrounded by Crown land to the north, east, and south. It is believed that the first waste was placed in the 1960's or early 1970's. It is our understanding that the MECP has records dating back to 1971. Historically, domestic wastes were disposed of in trenches; however, the Site is currently using an area fill method of operation.

1.4 Monitoring and Reporting Program and Objectives and Requirements

The objectives of the monitoring and reporting program are to identify and mitigate impacts to the environment caused by the municipal solid WDS. In addition, the monitoring and reporting program are designed to adhere to the WDS Technical Guidance and the ECA for the Site. The ECA specifies routine monitoring for explosive methane gas under Section 8(1). Groundwater and surface water parameters are to be monitored in accordance with Schedule A and B of the ECA (pages 22 and 23).

2 Physical Setting

2.1 Geology and Hydrogeology

2.1.1 Surficial Geology

The surficial geology underlying the Site is sand with some gravel as determined from the monitoring well logs which are provided in **Appendix C**. There are 10 monitoring well locations on-site with each being drilled to depths ranging from approximately 6.7 to 9.14 m below ground surface (mbgs) in a sand unit. The surficial geology of the area is described as glaciofluvial outwash deposits (MNDM, 2556).

2.1.2 Overburden Hydrogeology

On October 23, 2019, slug-bail testing was carried out on two of the new monitoring wells (HR7-19 and HR8-19). The results of the field testing were analyzed using the Hvorslev analyses for the overburden sand unit at HR7-19, and the sand unit at HR8-19. The results of these analyses for the sand unit at HR7-19 were 9.62×10^{-4} m/s and 9.10×10^{-4} m/s. The results of these analyses at HR8-19 for the sand unit were 2.28×10^{-3} m/s and 3.14×10^{-4} m/s.

2.1.3 Bedrock Geology

The bedrock geology of the area is predominantly clastic rocks (for example, conglomerate, wake, quartz arenite, arkose, limestone) (MNDM, Map 2544). There are minor metavolcanic rocks in the area (MNDM, Map 2544).

2.1.4 Bedrock Hydrogeology

A groundwater well information search indicates there are ten domestic wells within 1.5 km of the Site. Seven of the wells are located to the north-west of the Site and not in the direction of groundwater flow. Of these seven wells, one well is drilled to a depth of 26 mbgs, while the other six are at depths of 50 mbgs or more. Six of the seven well intakes are in bedrock.

Two of the wells are located to the south-west of the Site and are not in the direction of groundwater flow. These wells are drilled to a depth of 48 mbgs and 60 mbgs and both intakes are in bedrock.

One well is located south-east of Site and in the direction of groundwater flow. This well is drilled to a depth of 23 mbgs and the intake is in gravel. The groundwater well search did not result in well information for the two closest residences; however, it is presumed there are wells at these locations.

2.2 Surface Water Features

Based on topography, surface water and groundwater flowing from the Site likely travels towards an un-named tributary to the south-east which eventually enters Bird Creek located approximately 0.7 km to the south.

2.3 Potential Receptors

Potential groundwater and surface water receptors in the area surrounding the Site include:

- Residential houses that comprise what is known as Hickey Settlement, 1.3 km west of the Site (low potential based on groundwater and surface water flow direction);
- Domestic well located 1.2km south-east of the Site;
- Bird Creek Junction, 0.7 km south of the Site; and
- Un-named tributary of Bird Creek directly south/south-east of the Site.

Site personnel confirmed the flow of Bird Creek in the fall of 2016 to be southward at Hickey Road, therefore O'Shaughnessy Lake is not a potential receptor.

3 Monitoring Program

3.1 Site Inspections and Operational Monitoring

Site visits to the Hickey Road WDS were conducted on April 16 and October 28, 2024. The detailed site checklists are provided in **Appendix D-1**. Generally, the Site was in good condition and the following concerns were noted:

During the spring 2024 site visit, the working active/trench area was noted as not covered/packed. During the fall 2024 site visit, the monitoring well HR2-03R was noted as requiring extension soon as it is in the waste area. No other concerns were identified.

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

3.2 Monitoring Locations, Frequency, and Monitoring Parameters

3.2.1 Groundwater Monitoring

The Hickey Road WDS is monitored on a semi-annual basis (spring and fall) for groundwater. There are currently 10 groundwater monitoring wells located at the Site. Four groundwater monitoring well drilling events have occurred at the Site. The first drilling program was initiated in 2003, with the completion of HR1-03, HR2-03, and HR3-03. In 2010, HR4-10 and HR5-10 were drilled and installed. In 2019, HR6-19, HR7-19, and HR8-19 were added to the groundwater monitoring program. In the summer of 2021, HR9-21 and HR10-21 were drilled and installed. The monitoring wells at the Site are drilled to bottom depths ranging from 6.7 to 9.14 mbgs. The groundwater sampling locations are illustrated on the Site Plan (Figure 02). Table 2 summarizes the GPS co-ordinates and location description of the groundwater monitoring wells. Monitoring well logs are provided in **Appendix C**.

Table 2: Groundwater Monitoring Well Details

Sample Location	Northing (m)	Easting (m)	Location Description	Screened Interval
HR1-03	5005344	273269	5 m upgradient of WDS	Slot 10 PVC screen – from 3.7 to 6.7 metres below ground surface (mbgs)
HR2-03R	5005293	273292	Middle of waste area	Slot 10 PVC screen – from 4.3 to 7.3 mbgs
HR3-03	5005374	273160	West section of WDS	Slot 10 PVC screen – from 3.7 to 6.7 mbgs
HR4-10	5005251	273247	Directly downgradient of active waste area	Slot 10 PVC screen – 4.57 to 7.62 mbgs
HR5-10	5005256	273280	Directly downgradient of historical trench area	Slot 10 PVC screen – 5.18 to 8.22 mbgs

Sample Location	Northing (m)	Easting (m)	Location Description	Screened Interval
HR6-19	5005336	273359	East area of WDS	Slot 10 PVC screen – 4.47 to 7.52 mbgs
HR7-19	5005201	273298	70 m south-southeast of HR5-10 (footprint toe)	Slot 10 PVC screen – 4.57 to 7.62 mbgs
HR8-19	5005213	273243	45 m south of HR4-10 (footprint toe)	Slot 10 PVC screen – 4.23 to 7.28 mbgs
HR9-21	5005132	273305	130 m from south toe of footprint, 10 m from south CAZ Boundary	Slot 10 PVC screen – 4.42 to 7.48 mbgs
HR10-21	5005129	273239	130 m from southwest toe of footprint, 8 m from west CAZ Boundary	Slot 10 PVC screen – 6.1 to 9.14 mbgs

Note: Site Survey October 21, 2021, NAD 83, and Zone 18.

During the monitoring events in 2024, 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 Ontario Regulation 903 and are locked to provide protection against vandalism and are in line with industry best practices.

Groundwater samples were collected on April 16 and October 28, 2024. The laboratory reports and chain of custody records are included in **Appendix D-2**. Table 3 lists the groundwater quality parameters tested as per Schedule B of the ECA. Field measurements of groundwater pH, temperature, and conductivity are collected at the time of sampling.

Table 3: Groundwater Quality Monitoring Parameters

Category	Parameters
Organic Parameters	Dissolved Organic Carbon (DOC)
Inorganic Parameters	Alkalinity, Ammonia (N)-Total, Calcium, Chloride, Sodium, Potassium, Magnesium, Nitrate, Sulphate
Metals	Aluminum, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Silicon, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc
Physical/Chemical Parameters	Chemical Oxygen Demand (COD), Conductivity, pH, Total Dissolved Solids (TDS)

3.2.1.1 Groundwater Gradients and Flow Direction

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

Table 4: Groundwater Elevation Data

Groundwater Monitor	Elevation (TPVC)* (masl)	Water Level (m) 16-April-24	Groundwater Elevation (masl) 16-April-24	Water Level (m) 28-Oct-24	Groundwater Elevation (masl) 28-Oct-24
HR1-03	363.06	5.31	357.746	6.33	356.73
HR2-03R	363.02	6.23	356.791	6.85	356.17
HR3-03	363.49	5.62	357.872	5.79	357.70
HR4-10	362.93	7.06	355.871	6.81	356.12
HR5-10	363.22	7.36	355.856	7.19	356.03
HR6-19	363.35	4.85	358.501	6.34	357.01
HR7-19	362.12	6.5	355.622	6.32	355.80
HR8-19	360.89	5.17	355.720	4.87	356.02
HR9-21	360.51	5.18	355.328	5.03	355.48
HR10-21	362.62	7.17	355.450	6.915	355.71

Notes:
Elevation survey was completed on October 21, 2021, NAD 83, and Zone 18.
*TPVC – Elevation (m) at top of PVC casing

Using the spring 2024 groundwater elevation data, the groundwater flow direction is inferred to flow towards the south with a slight east component at a horizontal gradient 0.010 m/m.

Using the fall 2024 groundwater elevation data, the groundwater flow direction is also determined to be towards the south with a slight east component at an estimated gradient of 0.007 m/m. These directions and gradients are similar to recent historic flow direction data. The overall predominant flow direction is inferred to flow southward. The spring and fall groundwater elevation contours are presented on Figures 04 and 05, respectively.

3.2.2 Surface Water Monitoring

The Hickey Road WDS is monitored on a semi-annual basis (spring and fall) for surface water, which was conducted on April 16 and October 28, 2024. The details for all four surface water samples are described in Table 5.

Table 5: Surface Water Monitoring Locations

Sample Location	Northing* (m)	Easting* (m)	Location Description
HR-SW1	5005328	273480	125 m east and upgradient of WDS (approximate 368 m elevation**)
HR-SW2	5005204	273329	70 m downgradient of waste disposal site
HR-SW3	5005096	273326	175 m downgradient of waste disposal site
HR-SW4	5005482	273450	Approximately 167 m northeast and upgradient of WDS (approximate 382 m elevation**)

Note: *NAD 83 and Zone 18, **Based on Google Earth, 2019 imagery.

Surface water was analyzed for the parameters listed in Table 6.

Table 6: Surface Water Quality Monitoring Parameters

Category	Parameters
Organic Parameters	Biochemical Oxygen Demand (BOD_5), Phosphorous (total), Total Kjeldahl Nitrogen (TKN),
Inorganic Parameters	Alkalinity, Ammonia (N)-Total, Calcium, Chloride, Nitrite, Nitrate, Sulphate, Potassium, Sodium, Magnesium
Metals	Aluminum (dissolved), Barium, Boron, Cobalt, Copper, Iron, Lead, Manganese, Zinc
Physical/Chemical Parameters	Chemical Oxygen Demand (COD), Conductivity, Hardness, pH, Total Dissolved Solids (TDS), Total Suspended Solids (TSS)

Surface water flow velocity measurements were collected by using a Global Flow Probe for open channel flow. The flow velocity in meters per second (m/s) was recorded along with the width and depth of flow. Table 7 summarizes the collected flow velocity and channel measurements and presents the calculated discharge for each location.

Table 7: Surface Water Sampling Observations

Location	Date	Discharge[1] (m^3/s)	Flow & Channel Measurements & Observations
HR-SW1 (upgradient)	April 16, 2024	0.033	Depth: 0.15 m, Width: 1.10 m, Flow Velocity: 0.20 m/s Water clear
	October 28, 2024	-	Location dry
HR-SW2	April 16, 2024	0.034	Depth: 0.15 m, Width: 2.25 m, Flow Velocity: 0.10 m/s The water is clear with light brown colour tinge. Blown/dragged garbage in creek upstream at staked location.
	October 28, 2024	-	Location dry

Location	Date	Discharge[1] (m^3/s)	Flow & Channel Measurements & Observations
HR-SW3	April 16, 2024	N/A	Depth: 0.2 m, Width: 4.5 m, Flow Velocity: <0.10 m/s The water is clear with a light brown tinge. Large wide drainage path, small areas with visible flow (trickle)
	October 28, 2024	-	Location dry
HR-SW4	April 16, 2024	0.005	Depth: 0.12 m, Width: 0.40 m, Flow Velocity: 0.10 m/s Water clear, small amount of visible flow (trickle)
	October 28, 2024	-	Location dry

Note: [1] Calculated assuming a simple channel with a rectangular cross-section.

Dry conditions were observed during the October 28, 2024, site visit at all locations.

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. Regulation 232/98 methane concentration limits are:

- Less than 2.5% methane gas (25,000 ppm, LEL=50%) in the subsurface at the property boundary;
- 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 Monitoring Procedures and Methods

3.3.1 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, conductivity, and oxidation reduction potential (ORP) measurements were recorded at the time of sampling using a YSI Professional Series multi-meter. The instrument was calibrated and/or checked 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 in Ontario for analyses. Bureau Veritas is an accredited member of the Canadian Association of Laboratory Accreditation (CALA). Groundwater samples were stored at approximately 4° Celsius during shipment to Bureau Veritas for chemical analyses. Holding times for samples conformed to CCME Standards where applicable (CCME, 1993). Chain of custody forms accompanied the samples from submittal to the laboratory until the chemical results were provided to BluMetric. Laboratory reports and chain of custody forms are compiled in **Appendix D-2**.

3.3.2 Surface Water Monitoring

Field parameters are recorded at the time of sampling, these include temperature, pH, and conductivity measurements. During the sampling event, the field parameters were measured using a multi-meter calibrated as per the manufacturer's instructions and checked against known calibration standards. Surface water samples were field filtered for dissolved aluminum analysis.

Surface water samples were collected in laboratory prepared and supplied bottles and submitted to Bureau Veritas in Ontario for analyses. Surface water samples were stored at approximately 4° Celsius during shipment to Bureau Veritas for chemical analyses. Holding times for samples conformed to CCME Standards where applicable (CCME, 1993). Chain of custody forms accompanied the samples from submittal to the laboratory until the chemical results were provided to BluMetric. Laboratory reports and chain of custody forms are compiled in **Appendix D-3**.

3.3.3 Landfill Gas Monitoring

There are no sampling valves, ports, or vapour monitors on-site. Gas monitoring measurements were collected from the on-site attendant's building and the groundwater monitoring wells during 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 structures while these structures remain 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.

3.3.4 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. One field duplicate was collected for groundwater parameters and one field duplicate was collected for surface water parameters during the spring event. One field duplicate was collected for groundwater parameters during the fall event.

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:

$$RPD = 2 \times \left[\frac{(S - D)}{(S + D)}\right] \times 100$$

Where: S = parameter concentration of the original sample
D = parameter concentration of 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 reported 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, 20% for metals and inorganics, and 30% for BTEX and PHC. 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.

All equipment for field parameter testing and gas monitoring are calibrated in the field during each sampling event, or by the supplier.

4 Monitoring Results

4.1 Groundwater Quality

Groundwater quality has been compared to the Ontario Drinking Water Standards and Operational Guidelines (ODWSOG), the calculated Reasonable Use Values (RUVs), and the Provincial Water Quality Objectives (PWQO).

Field Measurements

The summary of the 2024 field measurements for groundwater pH, temperature, and conductivity are presented in Table 8.

Table 8: Groundwater Quality Field Measurements

Groundwater Monitor	pH		Temperature (°C)		Conductivity (µS/cm)	
	16-Apr-24	28-Oct-24	16-Apr-24	28-Oct-24	16-Apr-24	28-Oct-24
HR1-03	5.91	-	7.8	-	318	-
HR2-03R	6.20	6.21	8.7	10.0	964	882
HR3-03	5.97	7.40	6.4	8.3	303	193.9
HR4-10	6.59	6.59	8.1	8.6	1111	1171
HR5-10	6.43	6.44	8.7	9.5	1136	1008
HR6-19	6.42	6.26	5.1	10.4	986	260.2
HR7-19	6.23	6.26	7.3	8.1	1188	927
HR8-19	5.93	6.32	6.9	8.4	327	229.2
HR9-21	6.10	5.61	7.0	8.5	240	40.3
HR10-21	6.80	6.20	7.7	8.7	272	45.0

Note: Insufficient water to sample HR1-03 during the fall 2024 sampling event.

Ontario Drinking Water Standards and Operational Guidelines (ODWSOG)

The summary of the 2024 groundwater results exceeding the ODWSOG criteria is summarized in Table 9. The full results are presented in Table 15 at the end of the text.

Table 9: Groundwater Quality Results Exceeding ODWSOG

Location	Parameters Exceeding
HR1-03	None
HR2-03R	DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall)
HR3-03	None
HR4-10	DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (fall)
HR5-10	DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (fall)
HR6-19	Iron (spring and fall), Manganese (spring and fall)
HR7-19	DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall)
HR8-19	None
HR9-21	Alkalinity (below criteria, spring and fall), pH (below criteria, spring)
HR10-21	Alkalinity (below criteria, spring and fall)

Reasonable Use Values (RUVs)

Reasonable Use Values (RUVs) are based on the median background groundwater (HR3-03) results from 2003 to 2024 and using the following calculation.

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

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 MOE 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 10 below provides a summary of the parameters in groundwater with RUV exceedances for the Site during 2024. The results for all the chemical parameters tested are presented in Table 15 at the end of the text. It should be noted that the RUVs are used to assess compliance at the property boundary but have been used as an assessment tool at all monitoring wells.

Table 10: Groundwater Quality Results Exceeding RUV Criteria

Location	Parameters Exceeding
HR1-03	Aluminum (spring)
HR2-03R	Alkalinity (fall), Aluminum (fall), DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (spring and fall)
HR3-03	Aluminum (fall)
HR4-10	Alkalinity (spring and fall), Barium (fall), DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (spring and fall)
HR5-10	Alkalinity (fall), Barium (fall), DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (spring and fall)
HR6-19	Alkalinity (spring), DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (spring)
HR7-19	Alkalinity (spring and fall), Barium (spring and fall), DOC (spring and fall), Iron (spring and fall), Manganese (spring and fall), TDS (spring and fall)
HR8-19	DOC (fall)
HR9-21	None
HR10-21	None

Provincial Water Quality Objectives (PWQO)

Groundwater has the potential to discharge to surface water at the Hickey Road WDS, therefore groundwater has also been compared to the PWQO criteria; the results are presented in Table 15 at the end of the text. Table 11 below summarizes the groundwater parameters that exceeded PWQO in 2024.

Table 11: Groundwater Quality Results Exceeding PWQO

Location	Parameters Exceeding
HR1-03	Aluminum (fall)
HR2-03R	Cobalt (spring and fall), Iron (spring and fall)
HR3-03	Cobalt (spring and fall)
HR4-10	Boron (spring and fall), Cobalt (spring and fall), Iron (spring and fall)
HR5-10	Boron (fall), Cobalt (spring and fall), Iron (spring and fall)
HR6-19	Iron (spring and fall)
HR7-19	Boron (spring and fall), Cobalt (spring and fall), Copper (fall), Iron (spring and fall)
HR8-19	None
HR9-21	Copper (fall)
HR10-21	Copper (fall)

4.2 Surface Water Quality

Surface water quality results were compared to PWQO, and the MECP Table A and Table B criteria of the WDS Technical Guidance. The following Table 12 summarizes the parameters that exceeded the criteria. All the surface water results are summarized in Table 16 at the end of the text.

Table 12: Surface Water Quality Results Exceeding Criteria

Surface Water Monitoring Location	Parameter Exceeding	Criteria	2024 Sampling Event
HR-SW1 (background)	None		
HR-SW2	None		
HR-SW3	Aluminum (dissolved)	PWQO	April
HR-SW4 (further upstream of background)	Aluminum (dissolved), Copper (total)	PWQO	April

4.3 Landfill Gas Monitoring

Gas readings collected on April 16, 2024, are as follows: 5 ppm at HR1-03, 650 ppm at HR2-03R, 0 ppm at HR3-03, HR4-10, HR5-10, HR7-19, and HR8-19, 410 ppm at HR6-19, 35 ppm at HR9-21, and 25 ppm at HR10-21. A gas reading of 5 ppm was collected from the attendant's building.

Gas readings collected on October 28, 2024, are as follows: 0 ppm at HR1-03, HR3-03, HR4-10, HR7-19, and HR10-21, 10 ppm at HR5-10, and 5 ppm at HR8-19, and HR9-21. The reading at HR2-03R was over the LEL (lower explosive limit) and the reading at HR6-19 was 73% LEL. A gas reading of 0 ppm was collected from the attendant's building.

4.4 QA/QC Results

The consistency of the analytical results was evaluated based on the relative percentage difference (RPD) of each field duplicate pair (see QAQC comparisons in **Appendix D-4**). The only field duplicate pair which had higher RPD than what is considered acceptable was the following:

- Total Dissolved Solids for the spring surface water event (34%)

The maximum RPD parameter by season for groundwater was total dissolved solids in the spring (8%) and sulphate in the fall (9%). The maximum duplicate pair by season for surface water was total dissolved solids (34%) in the spring and no samples were taken in the fall.

5 Assessment, Interpretation, And Discussion

5.1 Groundwater Assessment

As mentioned previously, Table 15 at the end of the text provides the 2024 groundwater chemistry data in comparison to groundwater and surface water criteria. Historical groundwater chemistry up to and including 2024 is provided in **Appendix E-1.**

The results from HR3-03 are being used as the background monitoring location for RUV calculations. In 2024, HR3-03 had no RUV exceedances and no ODWSOG exceedances.

Monitoring well HR1-03 is located adjacent to the western side of the attendant's shack, located to the west and upgradient of the waste mound. This well has no exceedances and is not considered impacted.

Monitoring well HR6-19 was installed in the east portion of the Site to obtain information on the groundwater chemistry between the Site and surface water station HR-SW1. In 2024, the parameters iron and manganese were elevated at monitoring well HR6-19 compared to cross-gradient location HR1-03 and up-gradient location HR3-03 (background) and exceeded the ODWSOG and RUV criteria. HR6-19 also exceeded the RUV criteria for Alkalinity, DOC, and TDS. HR6-19 is considered to be impacted by the WDS.

Monitoring well HR2-03R is located within the waste footprint and between the recent active fill area and the current active fill area. This well had ODWSOG and RUV exceedances for concentrations of DOC, iron, and manganese as well as RUV exceedances for alkalinity, aluminum, and TDS. This well is considered leachate impacted.

The groundwater chemistry results from 2024 indicate that HR4-10 and HR5-10, located immediately downgradient and to the south of the waste mound, are impacted by leachate. This is consistent with results from previous monitoring events. Parameters such as DOC, iron, manganese, and TDS are elevated when compared to upgradient locations HR1-03 and HR3-03 (background) and the ODWSOG. Monitoring locations HR4-10 and HR5-10 continue to show elevated concentrations of several parameters and exceeded RUVs for alkalinity, barium, DOC, iron, manganese, and TDS.

Monitoring wells HR7-19 and HR8-19, located downgradient of HR4-10 and HR5-10, were installed in 2019 to monitor downgradient impacts and to assess the natural attenuation which is occurring at the Site. Monitoring well, HR8-19 is located within the 4.0 ha waste site, while HR7-19 was installed just south of the northern limit of the CAZ boundary. The results from these wells indicate that they have been impacted by leachate – particularly HR7-19, which was found to exceed the ODWSOG and RUVs for DOC, iron, and manganese as well as the RUVs for alkalinity, barium, and TDS. Results from HR8-19 found to exceed the RUVs for DOC with no other exceedances for the ODWSOG or RUVs in 2024.

Monitoring wells HR9-21 and HR10-21 are located within the CAZ, approximately 10 m and 30 m, respectively, north and upgradient of the southern CAZ boundary. The results from these wells indicate results below ODWSOG for alkalinity for both monitoring wells and below the ODWSOG for pH at HR9-21 in the fall only. There were no other exceedances for the ODWSOG or RUVs in 2024. Due to low concentrations of other site leachate indicator parameters, and the observed exceedance being potentially naturally occurring in the wetland and/or temporal variation in water quality rather than an indication of WDS impacts at the southern CAZ boundary, the WDS is considered to be compliant with Guideline B-7 along the south and west CAZ boundaries. There is also insufficient data to assess trends at HR9-21 and HR10-21 which were installed in 2021. It is anticipated that at least five years of semi-annual data will be required prior to analyzing trends at these newer wells.

Select trend graphs for groundwater (Graphs 1 to 5) are presented at the end of the text after the Site photographs. Based on historical data for the groundwater results and since chloride is considered a conservative parameter, parameters of chloride, DOC, iron, manganese, and sodium were selected to characterize the leachate groundwater trends. Chloride concentrations show some evidence of seasonal variation at HR2-03R, HR3-03, and HR4-10, as well as a gradual upwards trend at HR5-10; DOC concentrations are showing an upward trend at HR5-10 and HR4-10, although concentrations at HR4-10

remain below the historic maximums reported in 2016 and 2017. HR2-03R concentrations have decreased since the historical high recorded in spring 2023. HR5-10 concentrations have also decreased from the historical high in fall 2023 however the fall 2024 results remain elevated compared to previous DOC concentrations recorded before the 2023 historic maximum. Iron concentrations at HR4-10 appear to be trending downward since 2021/2022; however, additional data is needed to confirm this trend. While recent iron concentrations at HR2-03R, and HR5-10 from 2019 to 2024 appear to have a slight upwards trend; manganese concentrations are showing an upward trend at HR2-03R and HR5-10, with a historic maximum occurring at HR5-10 in fall 2024. Manganese concentrations at HR7-19 appear to be trending downwards. Sodium concentrations are generally stable at all monitoring locations other than a potential slight upward trend at HR5-10.

Based on the inferred groundwater flow direction towards the south with a slight east component, the current groundwater monitoring network may not be adequately addressing potential groundwater impacts along the east and southeast property limit. The installation of an additional groundwater monitoring well is recommended. It is unknown if the WDS is compliant with Guideline B-7 along the east and southeast property boundaries.

Based on the above, we recommend that a reduced semi-annual groundwater program be implemented. This will include a full round of water levels during both spring and fall events, a partial spring groundwater monitoring event, and a full fall monitoring event. The proposed groundwater monitoring program is summarized below in Table 13. Until approval is received, groundwater monitoring should continue on a semi-annual basis for the Hickey Road WDS (spring and fall) for the parameters identified in Table 3.

Table 13: Proposed Groundwater Monitoring Program

Monitoring Event	Task	Locations
Spring	Water Levels	All locations (HR1-03, HR2-03R, HR3-03, HR4-10, HR5-10, HR6-19, HR7-19, HR8-19, HR9-21, HR10-21)
	Groundwater Sampling	HR1-03, HR3-03, HR6-19, HR9-21, HR10-21
Fall	Water Levels & Groundwater Sampling	All locations (HR1-03, HR2-03R, HR3-03, HR4-10, HR5-10, HR6-19, HR7-19, HR8-19, HR9-21, HR10-21)

5.2 Surface Water Assessment

The 2024 surface water chemistry results are shown in Table 16 (end of the text). The surface water chemistry results were compared to the PWQO, and Table A and Table B from the WDS Technical Guidance (MECP, 2010). Historical surface water chemistry up to 2023 is included in **Appendix E-2.**

Three surface water monitoring stations, HR-SW1 (upgradient of the Site), and HR-SW2 and HR-SW3 (downgradient) are located along the intermittent unnamed tributary to Bird Creek, located directly east and south of the waste disposal area. Surface water monitoring was established at HR-SW1 and HR-SW2 in the spring of 2007, and at HR-SW3 in the spring of 2014. Location HR-SW4 was added in 2018 as a further upgradient monitoring location due to HR-SW1 (background location) showing more parameters exceeding than the downgradient locations. The 2018 results indicated that HR-SW4 had greater concentrations for some parameters than HR-SW1; therefore, it was not sampled in 2019. During 2019, an alternate background location was investigated but none were found. Monitoring location HR-SW4 was reintroduced in 2020 at the request of the MECP.

The 2024 data collected from HR-SW1 had no exceedances during 2024. The more upgradient background location HR-SW4 had PWQO exceedances for aluminum and copper during 2024. Monitoring well HR6-19, which was installed in the east portion of the Site to obtain information on the groundwater chemistry between the Site and surface water station HR-SW1, did not have a PWQO exceedance for aluminum but rather had a PWQO exceedance for iron only. The ground surface elevation at HR6-19 is 363.35 masl with the groundwater elevation between 357.0 masl and 358.5 masl. Background surface water location HR-SW1 is at an elevation of approximately 368 masl. Based on these elevations and the 2024 results, it is unlikely that groundwater impacted at the WDS is discharging to the location of HR-SW1.

Historically, HR-SW1 proved to have better water quality than HR-SW4 (BluMetric, 2021) which supported the conclusion made in prior reports that HR-SW1 is the preferred choice for a background surface-water benchmark. While the 2024 results support using HR-SW1 as a background surface-water benchmark, results from HR-SW1 in 2023 demonstrated higher concentrations compared to HR-SW4 with HR-SW4 having no PWQO exceedances, and results from 2022 were variable with which parameters had the higher concentrations between locations. Considering historic fluctuations between the water chemistry at both HR-SW1 and HR-SW4, there is

insufficient evidence to determine which upstream location is a better background monitoring location. As a result, both HR-SW1 and HR-SW4 should continue to be used to assess background surface water quality. A detailed comparison between chemistry results at these two locations can be found in **Appendix E-3**.

A comparison of surface water chemistry at upstream location HR-SW1 to HR-SW2 and HR-SW3 (downstream and south of the Site) for the 2024 results was completed for all chemical parameters tested (**Appendix E-3**). A comparison of the spring results indicates that six parameters (sodium, COD, TDS, TKN, aluminum (diss), and copper) had higher concentrations at HR-SW2, and six parameters (chloride, sodium, COD, TKN, and aluminum (diss)) had higher concentrations at HR-SW3. When accounting for only differences that are more than 5X the RDL, this reduces to three parameters: sodium, TDS, and aluminum for HR-SW2, and three parameters: sodium, COD, and aluminum for HR-SW3. The elevated concentrations of these parameters downstream from HR-SW1 are attributed to impacts from the WDS; with the aluminum concentration at HR-SW2 exceeding the PWQO. All results were below the MECP Table A and B.

It should be noted that surface water may be influenced by groundwater at the Site. Groundwater has been observed discharging from a bedrock outcrop near HR-SW4, upgradient of the other surface water locations. Groundwater interaction with surface water at HR-SW2 and HR-SW3 seems unlikely due to the water table depth in proximal wells: approximately 6.5 mbgs at HR7-19 and approximately 5.2 mbgs at HR9-21. It follows that the impacts observed at these surface water locations can be attributed to the current, or cumulative effects of surface runoff from the Site.

Surface water trend graphs for select parameters are shown on Graphs 6, 7, 8, 9 and 10 respectively. Spatial and/or temporal variation in water quality is observed at all surface water monitoring locations but no evidence of increasing or decreasing trends is observed.

5.3 Landfill Gas Assessment

The RKI Eagle gas results in 2024 indicate methane concentrations are generally below the concentrations of concern as identified for the subsurface (25,000 ppm, LEL = 50%) and structures on-site (10,000 ppm, LEL = 20%). An elevated methane reading was detected at monitoring well HR6-19, where gas levels were 73% LEL during the fall sampling event. Monitoring well HR6-19 is located in the east portion of the Site, between the Site and surface water station HR-SW1. HR2-03 also had an elevated methane reading, where gas levels were >100% LEL during the fall sampling event. This concentration exceeds the subsurface methane concentration limit, however, monitoring well HR2-03 is in the centre of the property. All other surrounding monitoring wells that are located closer to the property boundary have methane concentrations below the concentrations of concern. In addition, there are no structures with basements on or near the Site, so the elevated gas concentration is not considered an immediate concern. Landfill gas should continue to be monitored at the on-site structure and wells during semi-annual monitoring. Should any excavation work be carried out within the waste mound, health and safety procedures should include measures for landfill gas concerns.

5.4 Trigger Mechanisms and Contingency Plan

A Draft Surface Water and Groundwater Trigger Mechanism and Contingency Plan was developed and submitted in March 2020. The surface water plan was later revised based on MECP review comments and was finalized in November 2020. The final surface water trigger mechanism and contingency plan is provided in **Appendix F-1.** The surface water trigger plan is assessed using HR-SW2 and HR-SW3. The surface water chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for surface water.

The draft groundwater Trigger Mechanism and Contingency Plan was revised in March 2021, and is provided in **Appendix F-2.** As of yet, additional MECP comments have not been received for the revised proposed groundwater plan. The groundwater assessments points are described as the future west and south CAZ boundaries, as these assessment points did not exist in March 2021. Based on the current monitoring network, the groundwater assessment points are monitoring wells HR9-21 (south CAZ boundary) and HR10-21 (west CAZ boundary). The proposed groundwater Trigger Mechanism and Contingency Plan was intended to act as a starting point for discussions with the MECP, therefore groundwater results from 2024 have been voluntarily assessed against the draft plan. The groundwater chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for groundwater.

6 On-Site Operations

6.1 Annual Waste Summary

Although access to the Site is controlled via a locked security steel gate, some residents deposit garbage at the disposal site outside of the landfill's normal operating hours. 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 14. The tonnages below include recyclables and waste from both the residential and commercial sources within the municipality. Based on the estimated numbers, a total of 13.3% of residential waste was recycled in 2024, which was very similar to the 13.4% recycled in 2023.

Table 14: Annual Recycling and Waste Tonnages

Q1		Q2		Q3		Q4		Year end	
2023									
R	**W**	**R**	**W**	**R**	**W**	**R**	**W**	**R**	**W**
6.2	31.4	5.6	38.9	6.4	46.4	5.0	32.0	**23.1**	**148.7**
2024									
R	**W**	**R**	**W**	**R**	**W**	**R**	**W**	**R**	**W**
4.6	28.8	5.1	36.3	9.6	49.7	4.0	36.5	**23.3**	**151.3**

The 2024 numbers indicate a 0.87% increase over 2023 in the residential and commercial recycling of mixed fibres and commingled containers at the Hickey Road WDS. There was a 2% increase in the amount of waste placed at the Site in 2024 over 2023. The 2024 residential and commercial waste calculations are based on bag counts at the waste site. There were 10,087 bags recorded to be deposited at the Hickey Road WDS in 2024 and an assumed 15 kg/bag (MHHs) was used in the tonnage calculations.

6.1.1 Summary of Segregated Materials Removed

In addition, there were segregated materials collected at the nine waste disposal sites in the MHHs. The breakdown of these wastes for the Hickey Road WDS in 2024 was 7.4 tonnes of bulky waste, 1.73 tonnes of electronic waste, and 9.24 tonnes of scrap metal was collected from the Hickey Road Site in 2024. Battery quantities were not tracked by site, but a total of 975 kg was received at all nine sites. No tires were collected in 2024.

Household hazardous waste is not collected at the Hickey Road WDS. The Municipality, however, does ensure household batteries left at the WDS are disposed of properly. No batteries were collected in 2024 at the Site.

6.2 Annual Complaints Summary

There were no documented complaints at the Hickey Road WDS and there were no emergency situations in 2024.

6.3 Capacity

The ECA approves a total Site volume of 74,100 m^3, including historic waste, daily cover, and intermediate cover (excluding final cover). According to the most recent topographical survey conducted in June 2023, as shown by Figure 06, the volume remaining was 29,573 m^3.

Waste quantities for the Site were estimated based on bag counts and an estimated mass per bag. Total waste quantities for 2024 were calculated to be approximately 303 m^3, based on an assumed 500 kg/m^3 for the waste. The amount for the second half of 2023 (July to December) is estimated to be 156 m^3. Taking weekly cover into account, assuming 75% of waste to 25% cover material, the total volume of waste and cover placed from July 2023 to the end of 2024 is estimated to be approximately 574 m^3. The remaining capacity at the end of 2024 is estimated to be 28,999 m^3. Using a 5-year waste quantity average (2020 to 2024) of 289.2 m^3/year and taking weekly cover into account, the life expectancy of the WDS was calculated to be 80 years.

A Closure Plan must be submitted three years prior to the anticipated closure of the Site as identified in Condition 9 of the ECA.

7 Summary Statements, Conclusions, and Recommendations

The following summary statements are based on the observations and results from the 2024 monitoring program:

7.1 Site Operations

- Site operations, site conditions and the order and the management of debris have greatly improved in recent years, the Municipality should continue these efforts.
- The active face should be maintained regularly with compacted weekly cover. General maintenance and operations should include maintaining a limited amount of exposed and active landfilling area.
- Material segregation areas should be kept orderly to prevent comingling of material and should be removed from site as needed to maintain space within the segregation boundaries.
- Wind-blown litter should be cleaned up on a regular basis.
- It is recommended that waste transferred to the Site continue to be accounted for and documented by tracking the number of bags and/or vehicle loads of waste deposited at the Site. Detailed descriptions and quantities of rejected waste should continue to be documented for the Hickey Road WDS.
- Public education with respect to waste reduction and recycling should be an ongoing effort by the Municipality.
- The Site Attendant should ensure metal containers coming into the Site do not contain any hazardous materials or liquids.

7.2 Groundwater

- The groundwater flow direction is primarily to the south with a slight east component.
- Based on the groundwater quality at HR3-03, HR9-21, and HR10-21, the WDS is considered to be compliant with Guideline B-7 along the north, west, and south property/CAZ boundaries.
- The installation of an additional groundwater monitoring well is recommended. The current groundwater monitoring network may not be adequately addressing potential groundwater impacts along the east and southeast property limit. It is unknown if the WDS is compliant with Guideline B-7 along the east and southeast property boundaries.

7.3 Surface Water

- Surface water monitoring should continue on a semi-annual basis for the Hickey Road WDS (spring and fall) for the parameters identified in Table 6.

- Based on the 2024 surface water chemistry results, there is insufficient evidence to determine which upstream location is a better background monitoring location. As a result, both HR-SW1 and HR-SW4 should continue to be used to assess background surface water quality.
- All surface water locations were dry during the October 2024 site visit. The fall site visit should be conducted earlier in the season or during the late summer season to ensure a second surface water sampling event is possible.
- The elevated concentrations of parameters at HR-SW2 and HR-SW3 compared to upstream HR-SW1 are attributed to impacts from the WDS; with the dissolved aluminum concentration at HR-SW3 exceeding the PWQO. All results were below the MECP Table A and B. Impacts observed at these surface water locations can be attributed to the current, or cumulative effects of surface runoff from the Site.

7.4 Trigger Mechanisms and Contingency Plan

- The draft groundwater Trigger Mechanism and Contingency Plan was revised in March 2021. As of yet, additional MECP comments have not been received for the revised proposed groundwater plan. Based on the current monitoring network, the groundwater assessment points are monitoring wells HR9-21 (south CAZ boundary) and HR10-21 (west CAZ boundary). The groundwater chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for groundwater.
- The Site Trigger Mechanisms and Contingency Plan for surface water was approved by the MECP in November 2020. The surface water trigger plan is assessed using HR-SW2 and HR-SW3. The surface water chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for surface water.

7.5 Landfill Gas

- The RKI Eagle gas results for most locations in 2024 indicate methane concentrations are below the concentrations of concern.
- Landfill gas should continue to be monitored during semi-annual monitoring.

7.6 Landfill Capacity

- The remaining volumetric capacity of the landfill based on the 2023 survey and estimated waste generation rate is estimated to be 28,999 m^3.

- The life expectancy of the WDS was calculated to be 80 years.
- A Closure Plan must be submitted three years prior to the anticipated closure of the Site as identified in Condition 9 of 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.

Emily Fletcher, B.Sc, MAOT, GIT
Environmental Scientist

Lauren Hamilton, B.Eng.
Engineering Intern

Mark Somers, M.Eng., P.Eng.
Senior Environmental Engineer

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Tables

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR1-03	HR2-03R	HR-QAQC-GW1 (HR2-03R)	HR2-03R	HR-QAQC-GW1 (HR2-03R)	HR3-03	HR3-03	HR4-10	HR4-10	HR5-10	HR5-10	HR6-19	HR6-19	HR7-19	HR7-19
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2024-Apr-16	2024-Apr-16	2024-Apr-16	2024-Oct-28	2024-Oct-28	2024-Apr-16	2024-Oct-28	2024-Apr-16	2024-Oct-28	2024-Apr-16	2024-Oct-28	2024-Apr-16	2024-Oct-28	2024-Apr-16	2024-Oct-28
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	1	<1	69	74	64	64	<1	15	22	49	76	51	2.2	<1	48	24
Nitrate as N	mg/L	3.32125	10	-	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	0.87	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.25
Sulphate	mg/L	-	500	-	-	1	8	45	45	3.6	3.4	7.1	9.8	41	28	15	53	75	4.8	25	37
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.2	21	97	98	82	81	12	22	59	64	87	110	130	34	72	90
Magnesium (diss)	mg/L	-	-	-	-	0.05	3.1	9.1	9.4	9.2	9.3	1.1	1.8	9.8	12	7.6	13	4.8	1.4	8.6	9.1
Potassium (diss)	mg/L	-	-	-	-	0.2	0.92	14	14	18	18	1.1	1.5	25	50	11	21	4	1.2	24	19
Sodium (diss)	mg/L	104.495	200	-	-	0.1	1.6	18	18	47	48	10	13	51	60	35	42	6.4	1.4	49	35
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	65	180	180	310	310	53	58	290	420	230	330	280	130	310	350
Ammonia as N	mg/L	-	-	-	-	0.05	<0.05	0.62	0.64	3.6	3.5	<0.05	<0.05	12	41	11	11	3.6	0.92	17	12
Chemical Oxygen Demand	mg/L	-	-	-	-	4	13	38	39	81	77	6.1	6.2	62	130	62	120	27	35	73	74
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	2	7.1	7	18	19	2.2	2.9	17	41	15	31	4.9	4.1	23	17
Electrical Conductivity	uS/cm	-	-	-	-	1	130	610	620	810	820	110	190	690	1100	700	910	640	250	760	820
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.96	6.94	6.96	7.21	7.22	7.23	7.65	7.12	7.42	7.1	7.34	7.1	7.26	7.06	7.73
Total Dissolved Solids	mg/L	314	500	-	-	10	45	400	435	500	480	50	145	415	510	390	525	360	180	405	460
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.055	0.1	-	Calculated	0.0049	0.0079	0.031	0.031	0.072	0.071	<0.0049	0.0062	0.016	0.04	0.031	0.025	0.014	0.023	0.022	0.022
Barium (diss)	mg/L	0.301375	1	-	-	0.002	0.038	0.16	0.16	0.19	0.19	0.031	0.065	0.25	0.89	0.26	0.43	0.066	0.018	0.38	0.37
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	<0.01	0.074	0.075	0.11	0.11	0.011	0.024	0.26	0.5	0.14	0.73	0.099	0.023	0.28	0.66
Cadmium (diss)	mg/L	0.0012875	0.005	-	Calculated	0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Chromium (diss)	mg/L	0.013625	0.05	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.0005	0.0061	0.0062	0.0052	0.0055	0.0012	0.0041	0.037	0.037	0.033	0.048	<0.0005	0.00053	0.055	0.03
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	0.0013	<0.0009	<0.0009	<0.0009	<0.0009	0.0018	0.0029	<0.0009	<0.0009	0.0024	0.0021	<0.0009	0.002	0.0042	0.0062
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.1	<0.1	24	24	32	32	<0.1	<0.1	30	58	23	47	26	7.7	50	26
Lead (diss)	mg/L	0.002875	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	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	<0.002	2.7	2.7	3.1	3.2	<0.002	0.0042	0.92	2.2	1.5	4.4	0.41	0.18	2.3	1.7
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	0.0011	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005	0.00072	0.00065	<0.0005	<0.0005	0.0011	0.00054
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.001	0.003	0.0029	0.0027	0.0028	<0.001	0.0013	0.012	0.01	0.0052	0.0093	0.001	0.0012	0.012	0.0082
Silicon (diss)	mg/L	-	-	-	-	0.05	4.6	9	9	7.5	7.4	4.7	4.3	7.6	8.3	5.5	5.6	3.6	5	9.9	7.4
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Strontium (diss)	mg/L	-	-	-	-	0.001	0.095	0.42	0.43	0.41	0.42	0.04	0.077	0.26	0.36	0.67	0.49	0.45	0.12	0.32	0.35
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00011	0.000076	<0.00005	<0.00005	0.000074	0.00011
Titanium (diss)	mg/L	-	-	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.0005	0.0019	0.002	0.0049	0.005	<0.0005	<0.0005	0.0034	0.005	0.002	0.002	<0.0005	0.00087	0.0031	0.0018
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<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-HR	Reasonable Use Values Hickey Road
Concentration exceeds ODWQS	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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR8-19	HR8-19	HR9-21	HR9-21	HR10-21	HR10-21
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2024-Apr-16	2024-Oct-28	2024-Apr-16	2024-Oct-28	2024-Apr-16	2024-Oct-28
Anions						Detection Limit						
Chloride	mg/L	128.5	250	-	-	1	4.6	3	<1	1.1	2.4	1.1
Nitrate as N	mg/L	3.32125	10	-	-	0.1	1.25	0.18	0.55	0.58	1.51	0.46
Sulphate	mg/L	-	500	-	-	1	9.7	8.2	5.6	4.9	4.3	4.1
Cations												
Calcium (diss)	mg/L	-	-	-	-	0.2	15	36	3.4	2.9	7.5	4.1
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.7	3.5	0.51	0.45	1.5	0.78
Potassium (diss)	mg/L	-	-	-	-	0.2	1.2	1.8	1.2	1.1	1.2	0.89
Sodium (diss)	mg/L	104.495	200	-	-	0.1	5.2	14	1.6	1.8	3	2.1
General Chemistry												
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	35	99	7.5	6.7	26	15
Ammonia as N	mg/L	-	-	-	-	0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	9.3	20	7.9	19	5.7	13
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	2	4.1	2.1	1.7	1.9	1.6
Electrical Conductivity	uS/cm	-	-	-	-	1	110	240	34	37	67	23
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.77	7.45	6.45	6.89	6.77	7.32
Total Dissolved Solids	mg/L	314	500	-	-	10	55	180	<10	75	45	110
Metals												
Aluminum (diss, 0.45 µm)	mg/L	0.055	0.1	-	Calculated	0.0049	0.0087	0.0076	0.01	0.019	0.032	0.051
Barium (diss)	mg/L	0.301375	1	-	-	0.002	0.022	0.033	0.012	0.01	0.0065	0.0048
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.012	0.078	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	0.0012875	0.005	-	Calculated	0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Chromium (diss)	mg/L	0.013625	0.05	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	<0.0009	0.005	<0.0009	0.0051	0.0016	0.0019
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.0022	0.0089	0.015	0.0078	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silicon (diss)	mg/L	-	-	-	-	0.05	4.5	4.8	4.4	4.6	4.5	4.1
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Strontium (diss)	mg/L	-	-	-	-	0.001	0.1	0.26	0.045	0.042	0.069	0.038
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Titanium (diss)	mg/L	-	-	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

-LEGEND-

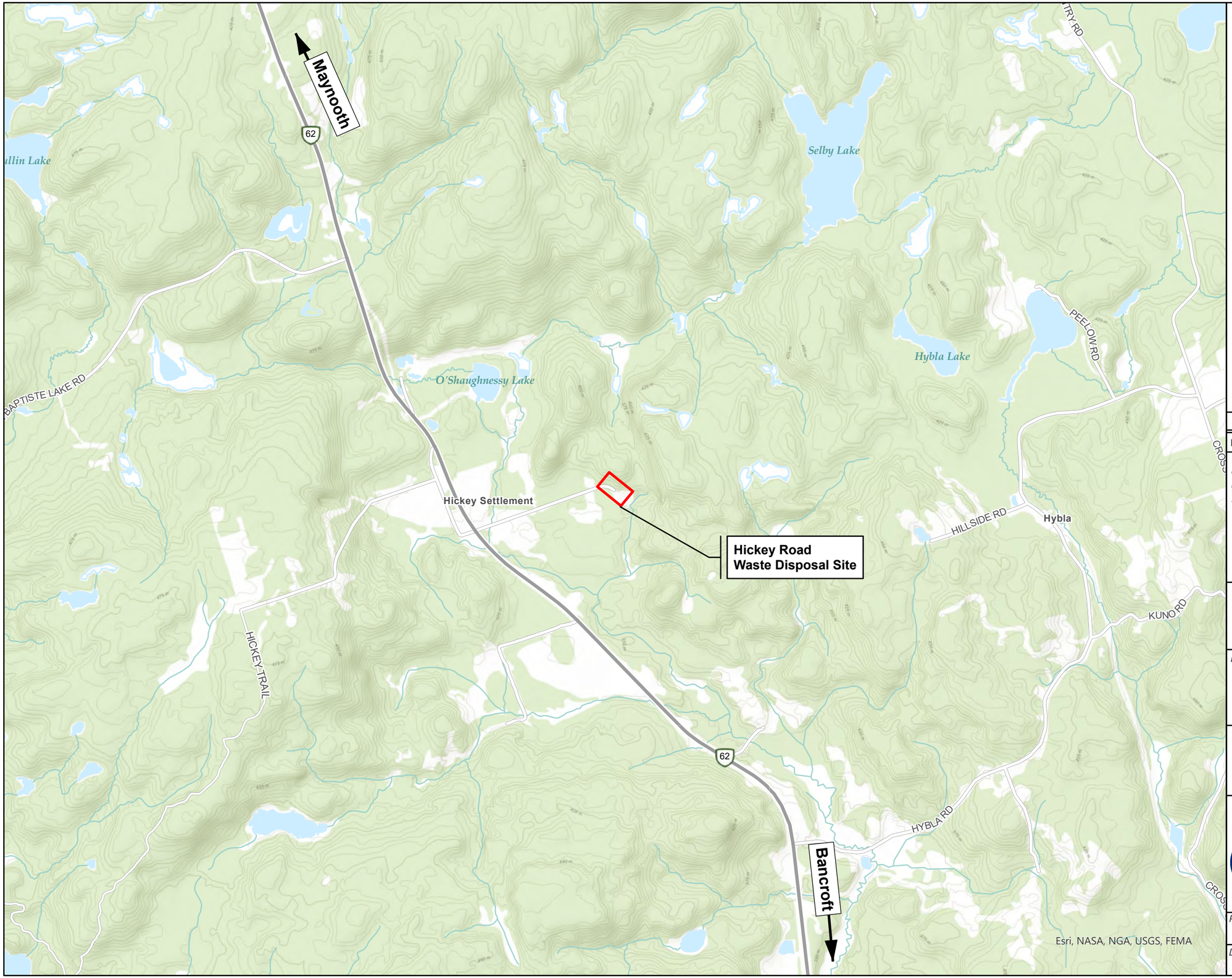
Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
Concentration exceeds ODWQS	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim

Hastings Highlands Analytical Chemistry Results: Anions, Cations, FPs, GenChem, Met in Surface Water						Sample ID	HR-SW1	HR-SW2	HR-QAQC-SW1 (HR-SW2)	HR-SW3	HR-SW4
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2024-Apr-16	2024-Apr-16	2024-Apr-16	2024-Apr-16	2024-Apr-16
Anions						Detection Limit					
Chloride	mg/L	-	-	180	128	1	<1	<1	<1	1.3	1.2
Nitrate + Nitrite	mg/L	-	-	-	-	0.1	0.29	<0.1	<0.1	<0.1	<0.1
Nitrate as N	mg/L	-	-	-	-	0.1	0.29	<0.1	<0.1	<0.1	<0.1
Nitrite as N	mg/L	-	-	-	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	mg/L	-	-	100	-	1	6.3	5.6	5.5	6.9	5.6
Cations											
Calcium (tot)	mg/L	-	-	-	-	0.2	13	8.3	7.9	6.2	2.8
Magnesium (tot)	mg/L	-	-	-	-	0.05	1.2	1	1	0.81	0.91
Potassium (tot)	mg/L	-	-	-	-	0.2	0.78	0.71	0.7	0.59	0.87
Sodium (tot)	mg/L	-	-	-	-	0.1	0.8	0.87	0.81	0.85	0.81
Field Parameters											
pH (Field)	pH units	-	-	-	-		7	6.79	7	5.68	6.47
Temperature	deg. C	-	-	-	-		7.3	6.6	7.3	7.8	3.9
General Chemistry											
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	35	22	27	27	8.2
Ammonia as N	mg/L	-	-	-	-	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	-	-	-	-	4	7.9	11	13	21	12
Electrical Conductivity	uS/cm	-	-	-	-	1	80	54	55	45	29
Hardness (as CaCO3)	mg/L	-	-	-	-	1	39	26	27	21	12
pH	pH units	6.5 - 8.5	-	6 - 9	-		7.35	7.03	7.37	7.18	6.59
Total Dissolved Solids	mg/L	-	-	-	-	10	30	60	85	20	40
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	<0.1	0.1	0.11	0.2	<0.1
Total Phosphorus	mg/L	0.03	-	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Suspended Solids	mg/L	-	-	-	-	10	<10	<10	<10	<10	<10
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.00061	<0.00061	<0.00061	<0.00061	<0.00061	<0.00061
Metals											
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.005	0.024	0.048	0.048	0.087	0.082
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.011	0.011	0.011	0.01	0.0097
Boron (tot)	mg/L	-	0.2	3.55	1.5	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	0.0012	0.0013	0.0012	0.0016	0.0016
Iron (tot)	mg/L	0.3	-	1	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (tot)	mg/L	-	-	-	-	0.002	<0.002	<0.002	<0.002	0.0062	0.0064
Zinc (tot)	mg/L	-	0.02	0.089	0.03	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 PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Figures



LEGEND

Waste Disposal Site

NOTE: THE ONLY WELL RECORDS AVAILABLE WITHIN 500 m OF THE SITE ARE MONITORING WELLS.

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 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Hickey Road
Waste Disposal Site

TITLE

Site Location Map

BluMetric Environmental

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

PROJECT #	DATE
240205-05	February 11, 2025

DRAWN	CHECKED	FIG NO.	REV
PB	LH	01	0

LEGEND

- Groundwater Monitoring Location
- Benchmark
- Surface Water Sampling Locations
- GPS Coordinates
- Site Features
- Surveyed Boundary (4.0 ha) (PA Miller, 2018)
- Surveyed CAZ (1.12 ha) (PA Miller, 2018)

NOTES:
- Site Property Boundary: 4.0 ha
- Ortho Image taken by a UAV flight in 2017
- UTM zone used is CSRS 18

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

N, W, E, S

0 25 50 Meters

1:1,500

CLIENT

Municipality of Hastings Highlands

PROJECT

Hickey Road
Waste Disposal Site

TITLE

Site Plan

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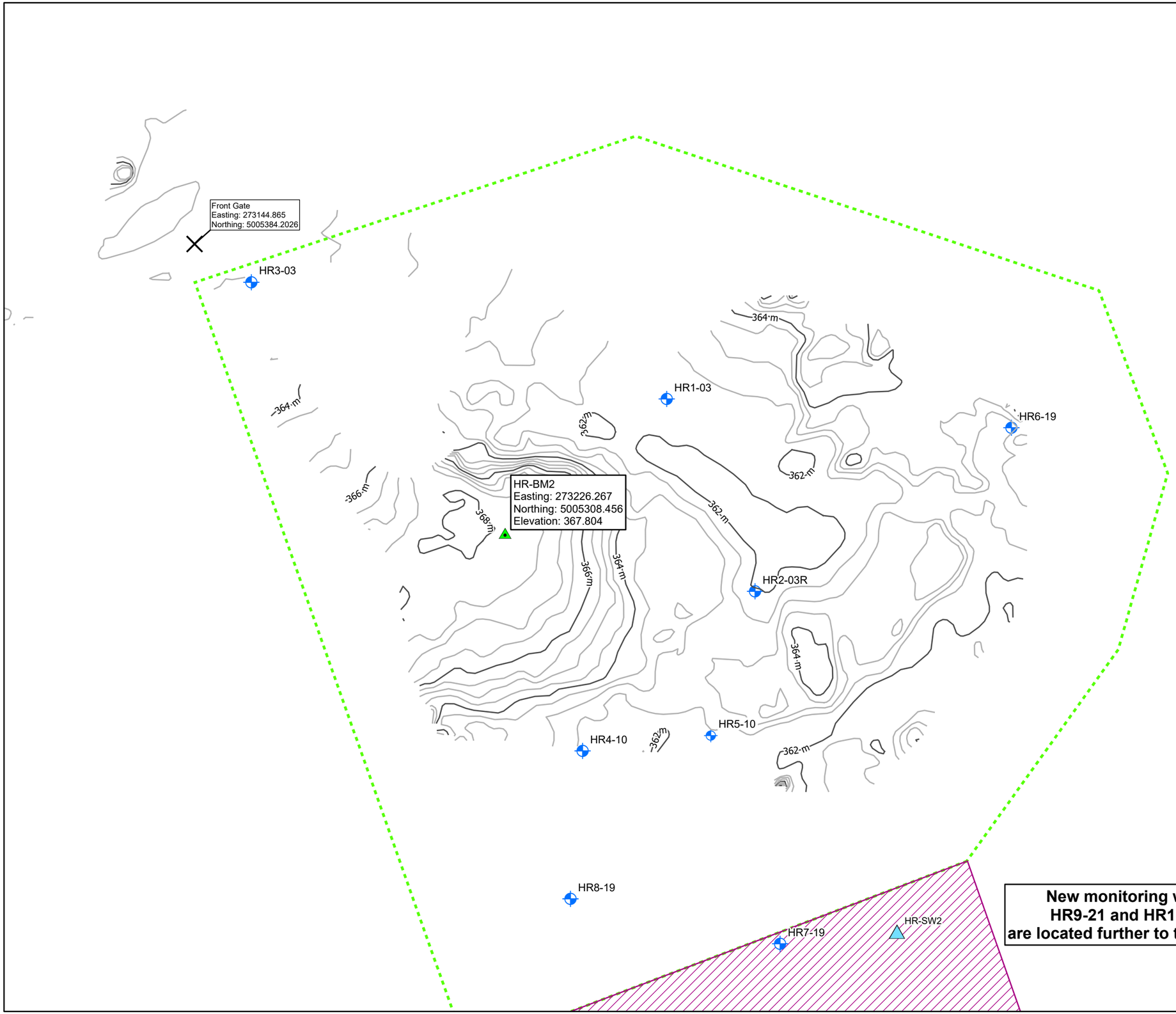
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
240205-05	February 11, 2025

DRAWN	CHECKED	FIG NO.	REV
PB	LH	02	0



LEGEND

- Groundwater Monitoring Location
- Benchmark
- Surface Water Sampling Locations
- GPS Coordinates
- Surveyed Boundary (4.0 ha) (PA Miller, 2018)
- Surveyed CAZ (1.12 ha) (PA Miller, 2018)

2023 Elevation

- Minor Contour (0.5 masl)
- Major Contour (2.0 masl)

NOTES:
- Site Property Boundary: 4.0 ha
- All well and benchmark elevation data based on 2019 data, except for HR5-10, which is based on 2016 Survey

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

N W E S

0 20 40 Meters

1:1,000

CLIENT

Municipality of Hastings Highlands

PROJECT

Hickey Road
Waste Disposal Site

TITLE

Site Topography
and Monitoring Locations

BluMetric Environmental

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
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PROJECT #	DATE
240205-05	February 11, 2025

DRAWN	CHECKED	FIG NO.	REV
PB	LH	03	0

LEGEND

- Groundwater Monitoring Location
- Benchmark
- Surface Water Sampling Locations
- GPS Coordinates
- Site Features
- Surveyed Boundary (4.0 ha) (PA Miller, 2018)
- Surveyed CAZ (1.12 ha) (PA Miller, 2018)
- Groundwater Contour (masl)
- Inferred Direction of Groundwater Flow

NOTES:
- Site Property Boundary: 4.0 ha
- All well Elevation Data Based on 2021 Survey Data
- Ortho Image taken by a UAV flight in 2017
- UTM zone used is CSRS 18

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

N W E S

0 25 50 Meters

1:1,500

CLIENT

Municipality of Hastings Highlands

PROJECT

Hickey Road
Waste Disposal Site

TITLE

Monitoring Locations and Water Levels - 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
240205-05	February 12, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	LH	04	0

LEGEND

- Groundwater Monitoring Location
- Benchmark
- Surface Water Sampling Locations
- GPS Coordinates
- Site Features
- Surveyed Boundary (4.0 ha) (PA Miller, 2018)
- Surveyed CAZ (1.12 ha) (PA Miller, 2018)
- Groundwater Contour (masl)
- Inferred Direction of Groundwater Flow

NOTES:
- Site Property Boundary: 4.0 ha
- All well Elevation Data Based on 2021 Survey Data
- Ortho Image taken by a UAV flight in 2023
- UTM zone used is CSRS 18

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

1:1,500

CLIENT

Municipality of Hastings Highlands

PROJECT

Hickey Road
Waste Disposal Site

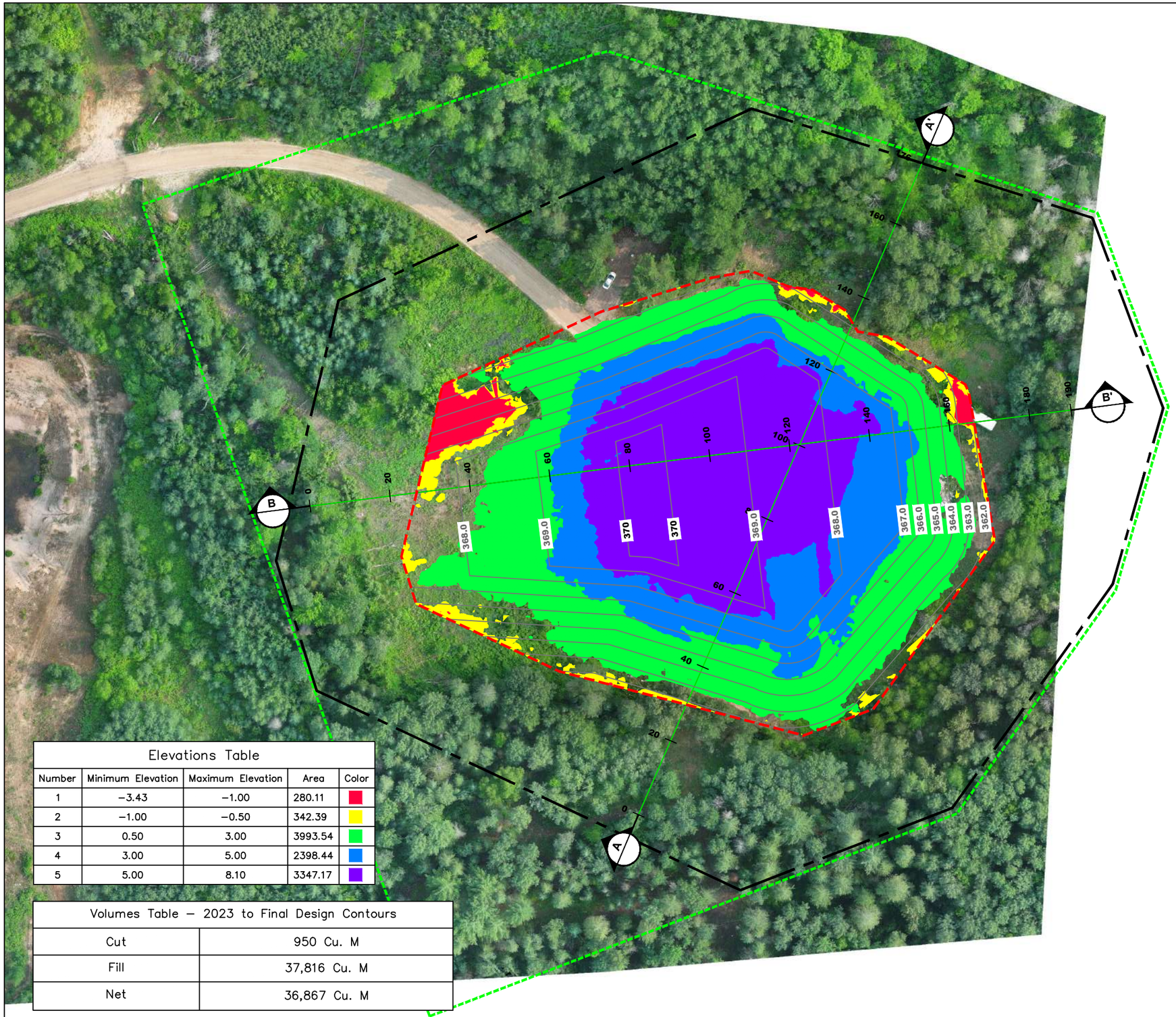
TITLE

Monitoring Locations and Water Levels - 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
240205-05	February 12, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	LH	05	0



Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−3.43	−1.00	280.11	
2	−1.00	−0.50	342.39	
3	0.50	3.00	3993.54	
4	3.00	5.00	2398.44	
5	5.00	8.10	3347.17	

Volumes Table – 2023 to Final Design Contours	
Cut	950 Cu. M
Fill	37,816 Cu. M
Net	36,867 Cu. M

LEGEND

110 FINAL DESIGN CONTOURS (1.0 m)

FINAL FOOTPRINT DESIGN

MINIMUM 30m BUFFER AROUND WASTE

APPROXIMATE LOCATION OF PROPERTY BOUNDARY

NOTE: VOLUME OF 600 mm CAP TO COVER THE SURFACE OF THE WASTE SITE IS 7293.01 CUBIC METRES. FINAL DESIGN CONTOURS ARE TO TOP OF CAP / UNDERSIDE OF TOP SOIL.

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

0 25 50 Meters 1:1000

N W E S

THIS SCALE TO BE USED TO OBTAIN APPROXIMATE DIMENSIONS FOR INFORMATION

CLIENT

Municipality of Hastings Highlands

PROJECT

Hickey Road Waste Disposal Site

TITLE

Remaining Fill Capacity as of June 2023

BluMetric Environmental

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

PROJECT #	DATE
240205-05	2025-02-11

DRAWN	CHECKED	DWG NO.	REV
PB	LH	06	0

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Site Photographs

Photo 1: Signage at Front Entrance– April 16, 2024

Photo 2: Front Entrance with Signage – April 16, 2024

Photo 3: Attendant's Building and Recycling Bins – April 16, 2024

Photo 4: Bulk Waste Area – April 16, 2024

Photo 5: Scrap Metal Area – April 16, 2024

Photo 6: Household Waste Landfilling Area – April 16, 2024

Photo 7: Household Waste Landfilling Area – April 16, 2024

Photo 8: HR2-03R in Household Waste Landfilling Area – April 16, 2024

Photo 9: HR-SW1 monitoring location – April 16, 2024

Photo 10: HR-SW2 monitoring location – April 16, 2024

Photo 11: HR-SW3 monitoring location – April 16, 2024

Photo 12: HR-SW4 monitoring location – April 16, 2024

Photo 13: Signage at Front Entrance – October 28, 2024

Photo 14: Front Entrance with Signage – October 28, 2024

Photo 15: Attendant's Building and Recycling Bins – October 28, 2024

Photo 16: Bulk Waste Area – October 28, 2024

Photo 17: Scrap Metal Area – October 28, 2024

Photo 18: Waste Segregation Areas – October 28, 2024

Photo 19: Household Waste Landfilling Area – October 28, 2024

Photo 20: Household Waste Landfilling Area – October 28, 2024

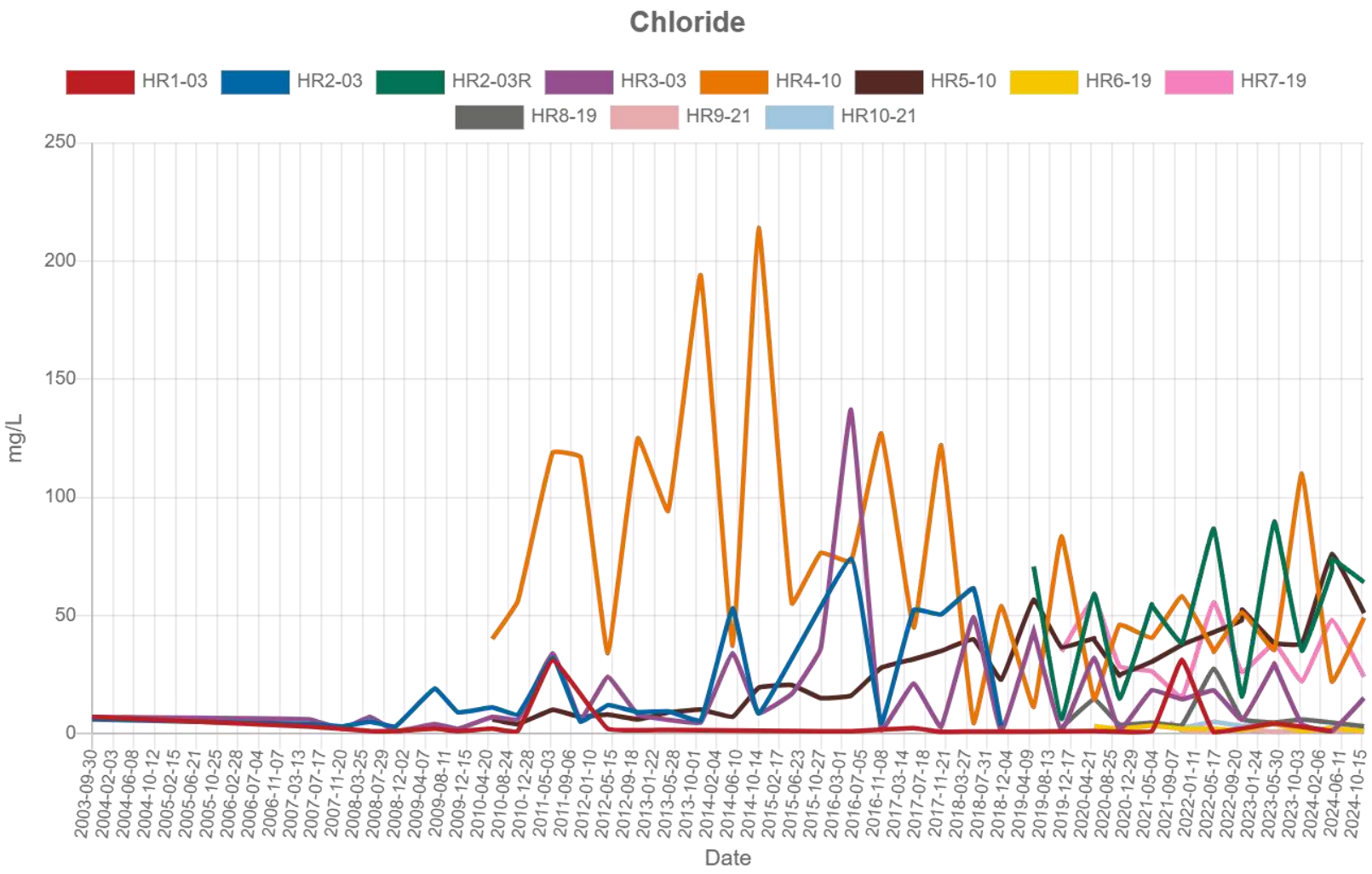
Photo 21: HR-SW1 monitoring location – October 28, 2024

Photo 22: HR-SW2 monitoring location – October 28, 2024

Photo 23: HR-SW3 monitoring location – October 28, 2024

Photo 24: HR-SW4 monitoring location – October 28, 2024

Chemistry Trend Graphs

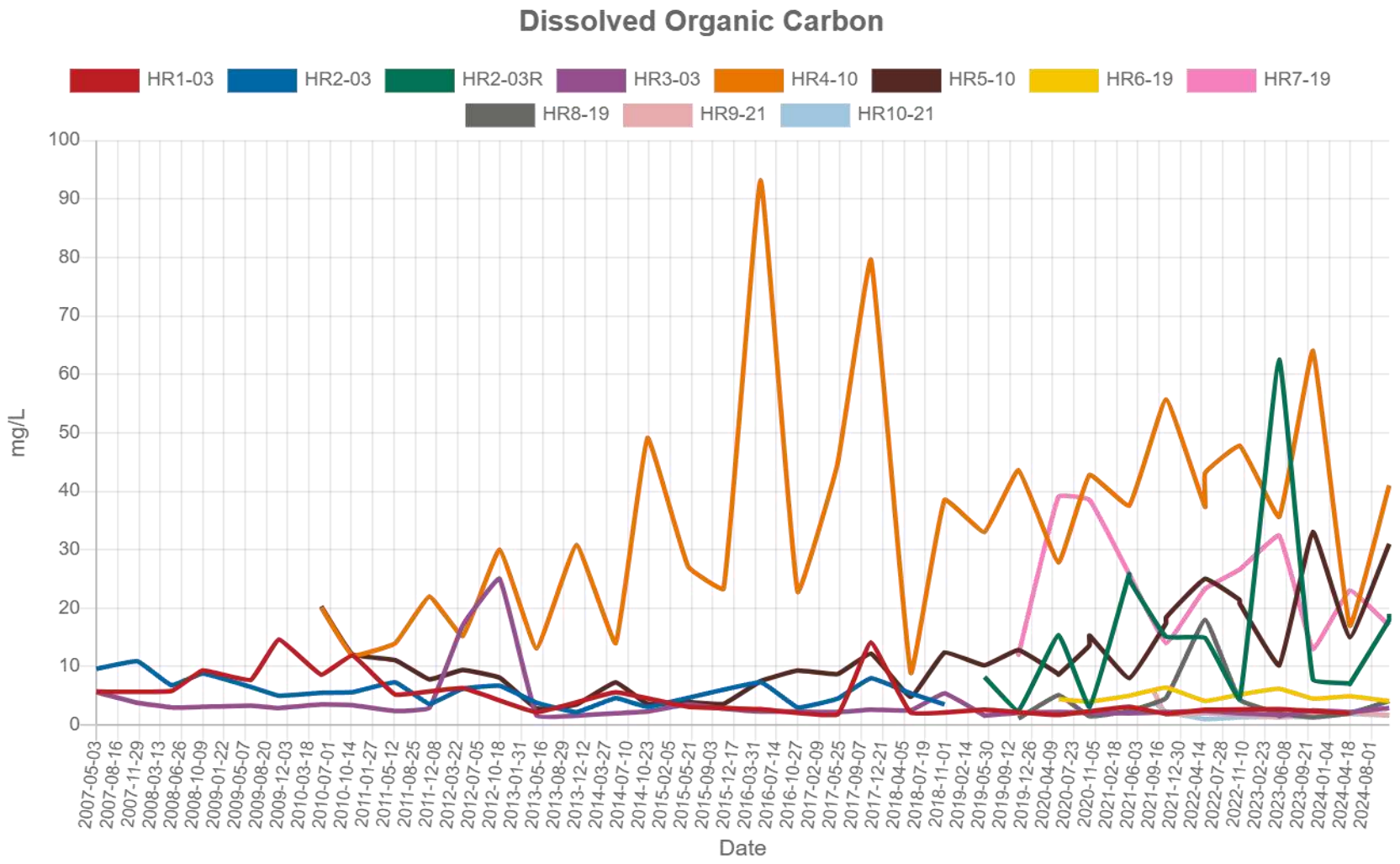


Hickey Road WDS
Municipality of Hasting's Highlands

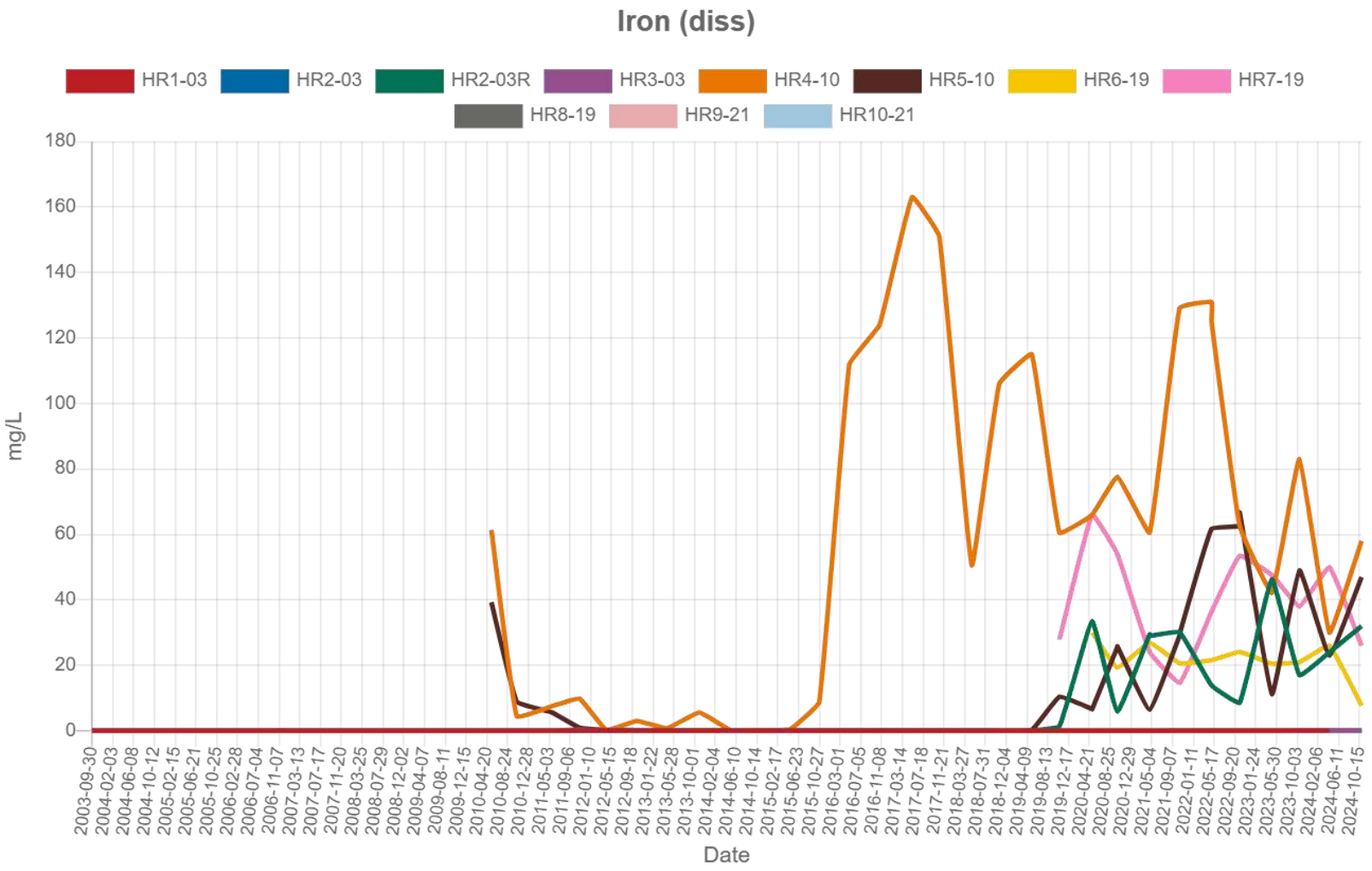
BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 1
Chloride in Groundwater

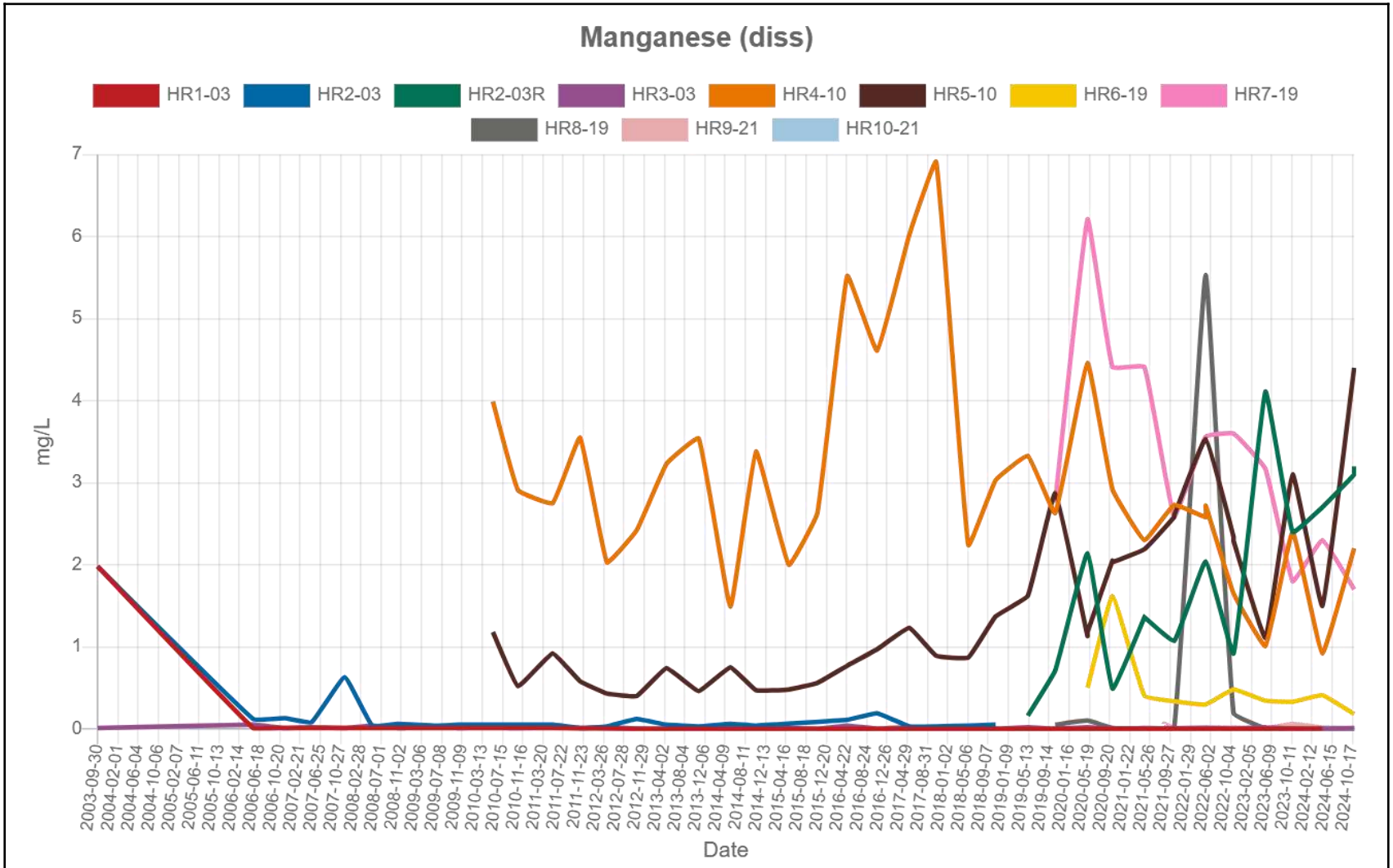
Created by: Lauren Hamilton
Checked by: Emily Fletcher



Hickey Road WDS **Municipality of Hasting's Highlands**	**Graph 2** **Dissolved Organic Carbon in Groundwater**
BluMetric Project No: 240205-05 **Date: February 14, 2025**	**Created by: Lauren Hamilton** **Checked by: Emily Fletcher**



Hickey Road WDS **Municipality of Hasting's Highlands**	**Graph 3** **Dissolved Iron in Groundwater**
BluMetric Project No: 240205-05 **Date: February 14, 2025**	**Created by: Lauren Hamilton** **Checked by: Emily Fletcher**

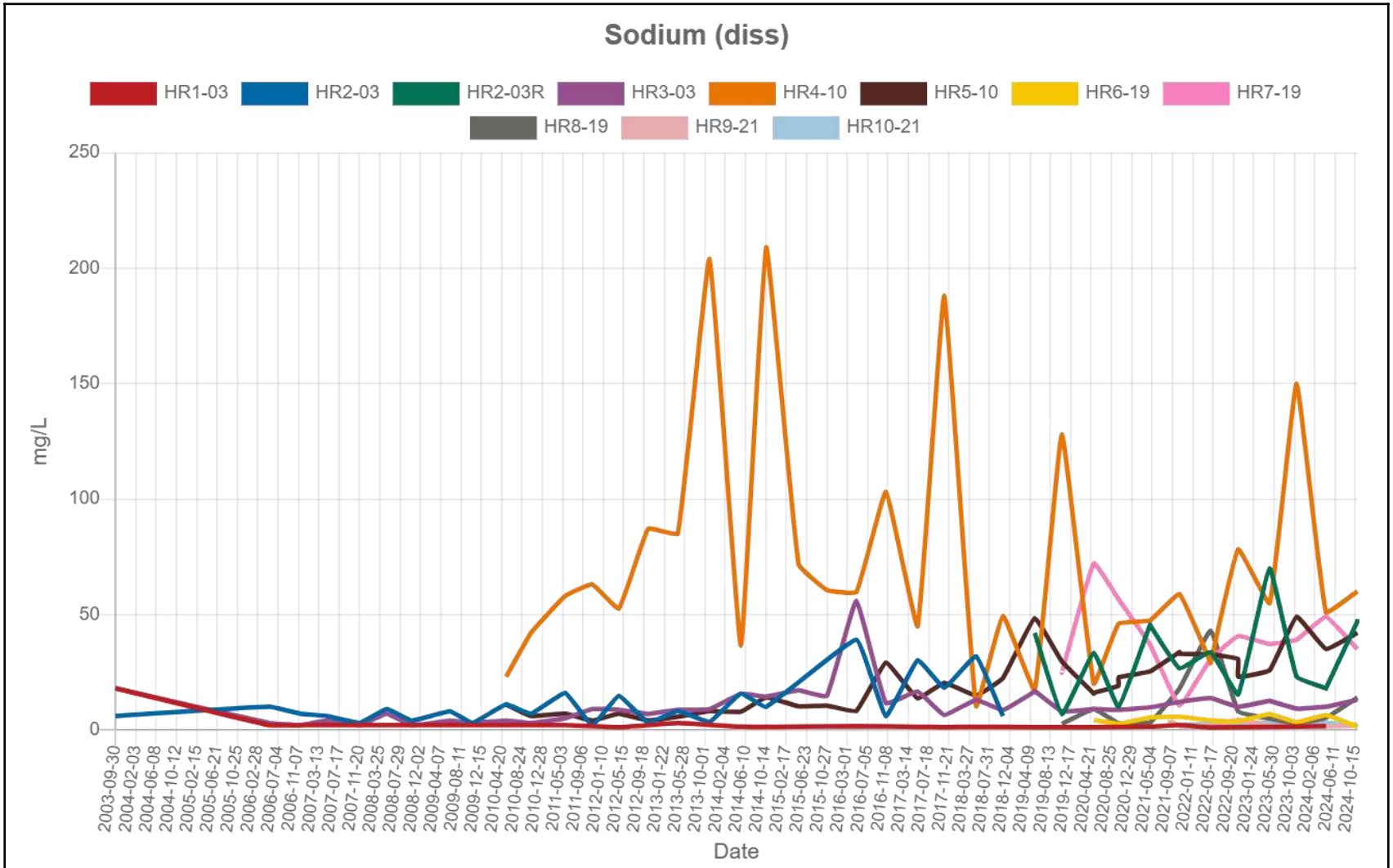


Hickey Road WDS
Municipality of Hasting's Highlands

BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 4
Dissolved Manganese in Groundwater

Created by: Lauren Hamilton
Checked by: Emily Fletcher

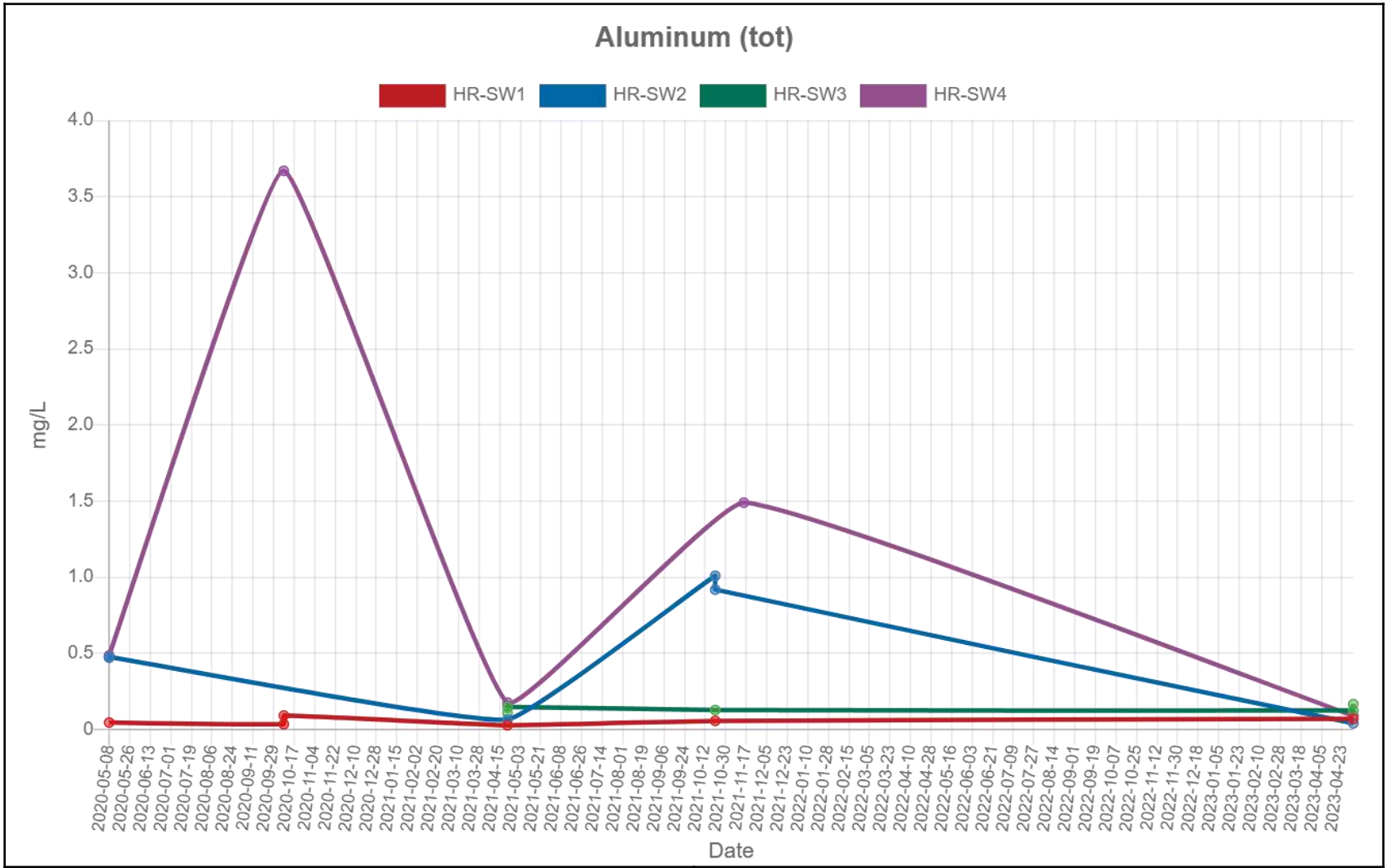


Hickey Road WDS
Municipality of Hasting's Highlands

BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 5
Dissolved Sodium in Groundwater

Created by: Lauren Hamilton
Checked by: Emily Fletcher

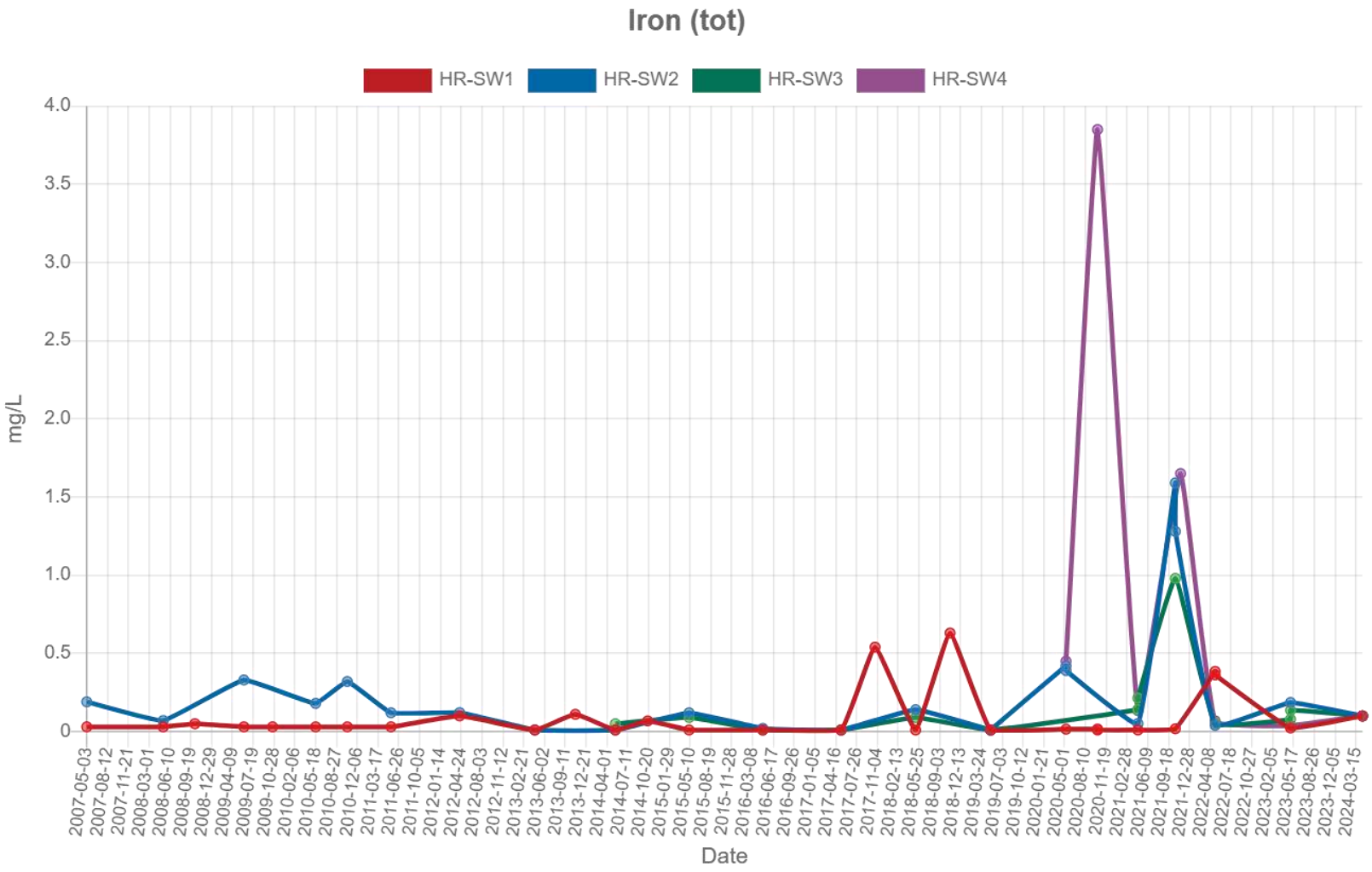


Hickey Road WDS
Municipality of Hasting's Highlands

BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 6
Total Aluminum in Surface Water

Created by: Lauren Hamilton
Checked by: Emily Fletcher

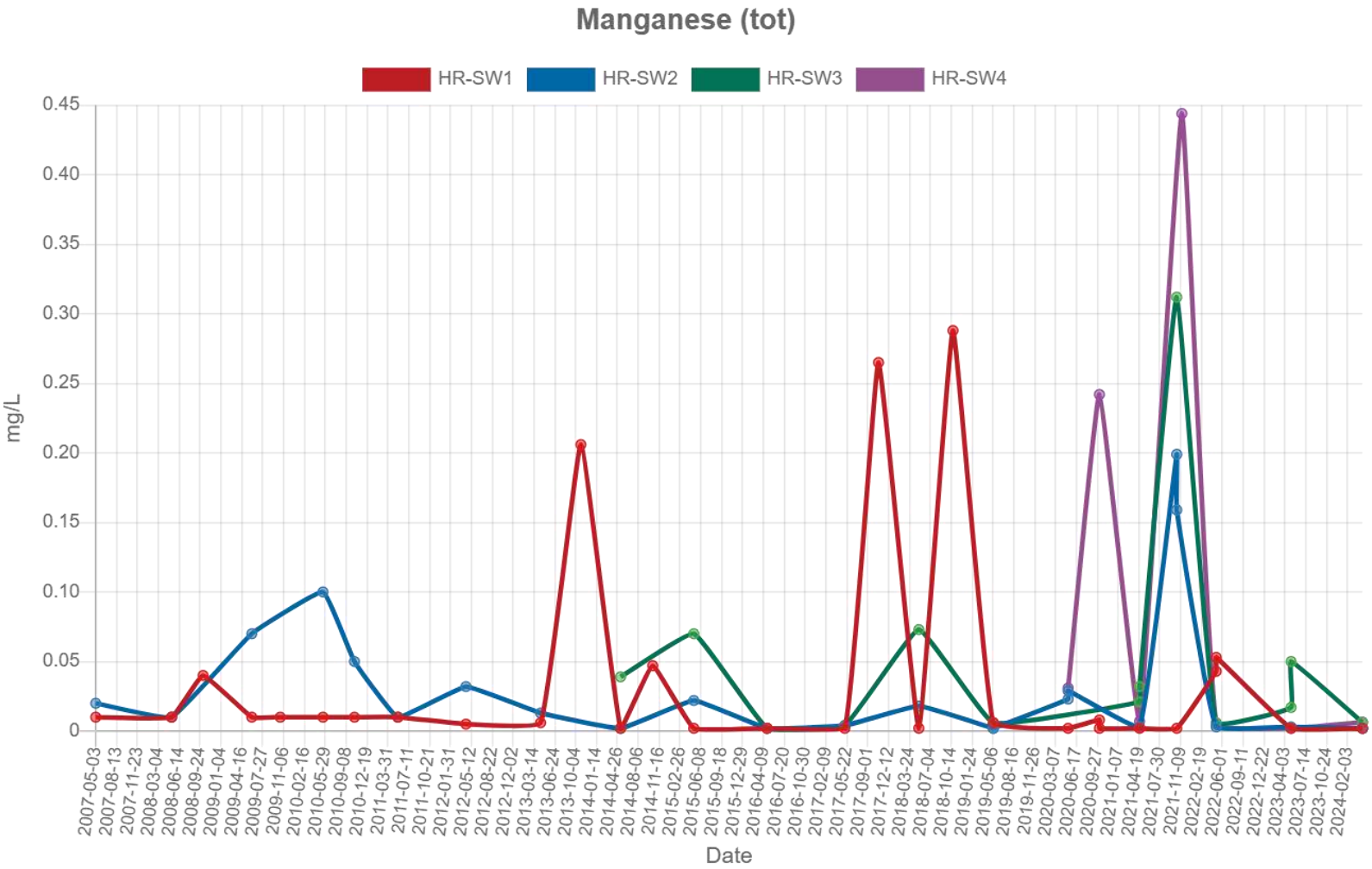


Hickey Road WDS
Municipality of Hasting's Highlands

BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 7
Total Iron in Surface Water

Created by: Lauren Hamilton
Checked by: Emily Fletcher

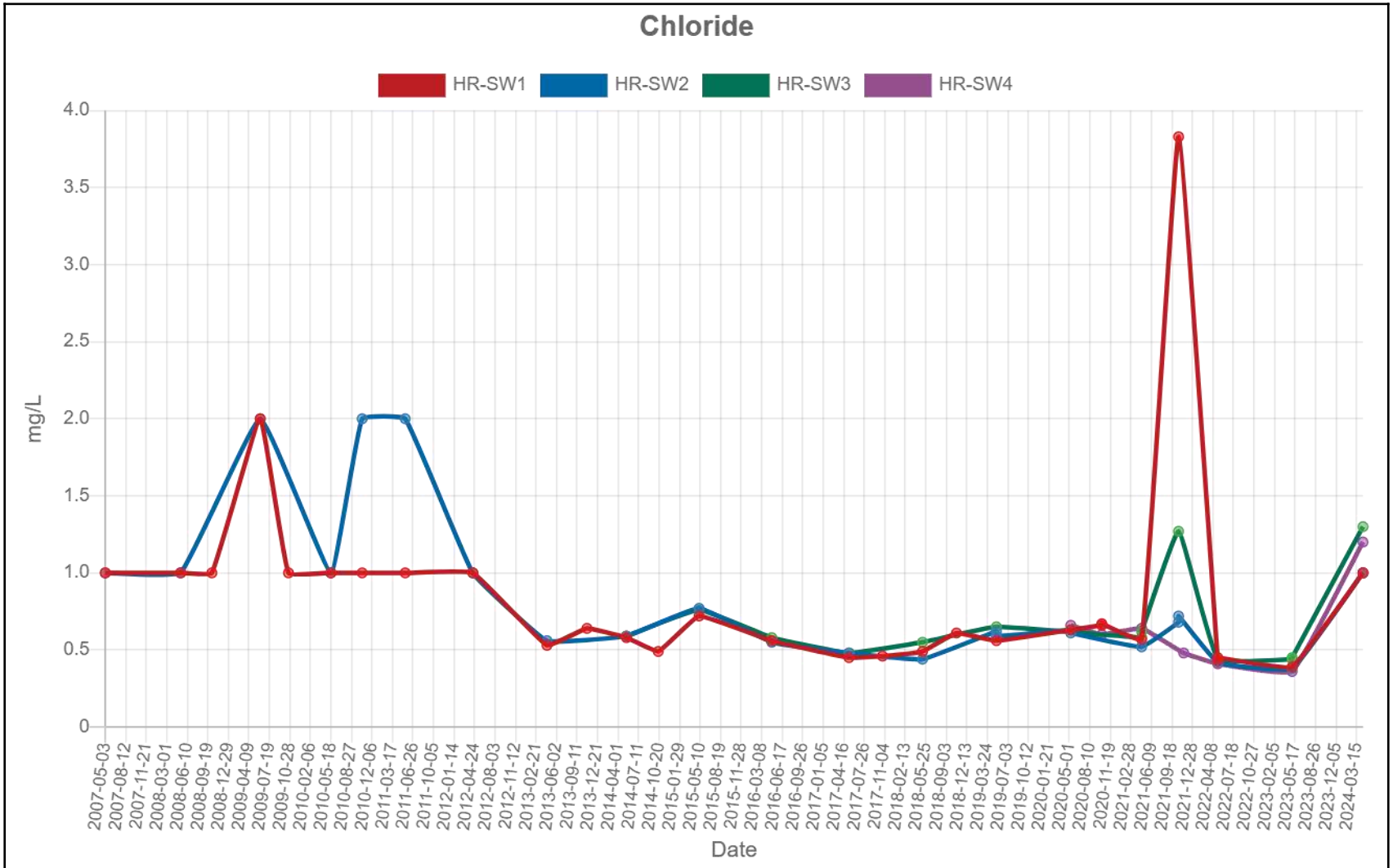


Hickey Road WDS
Municipality of Hasting's Highlands

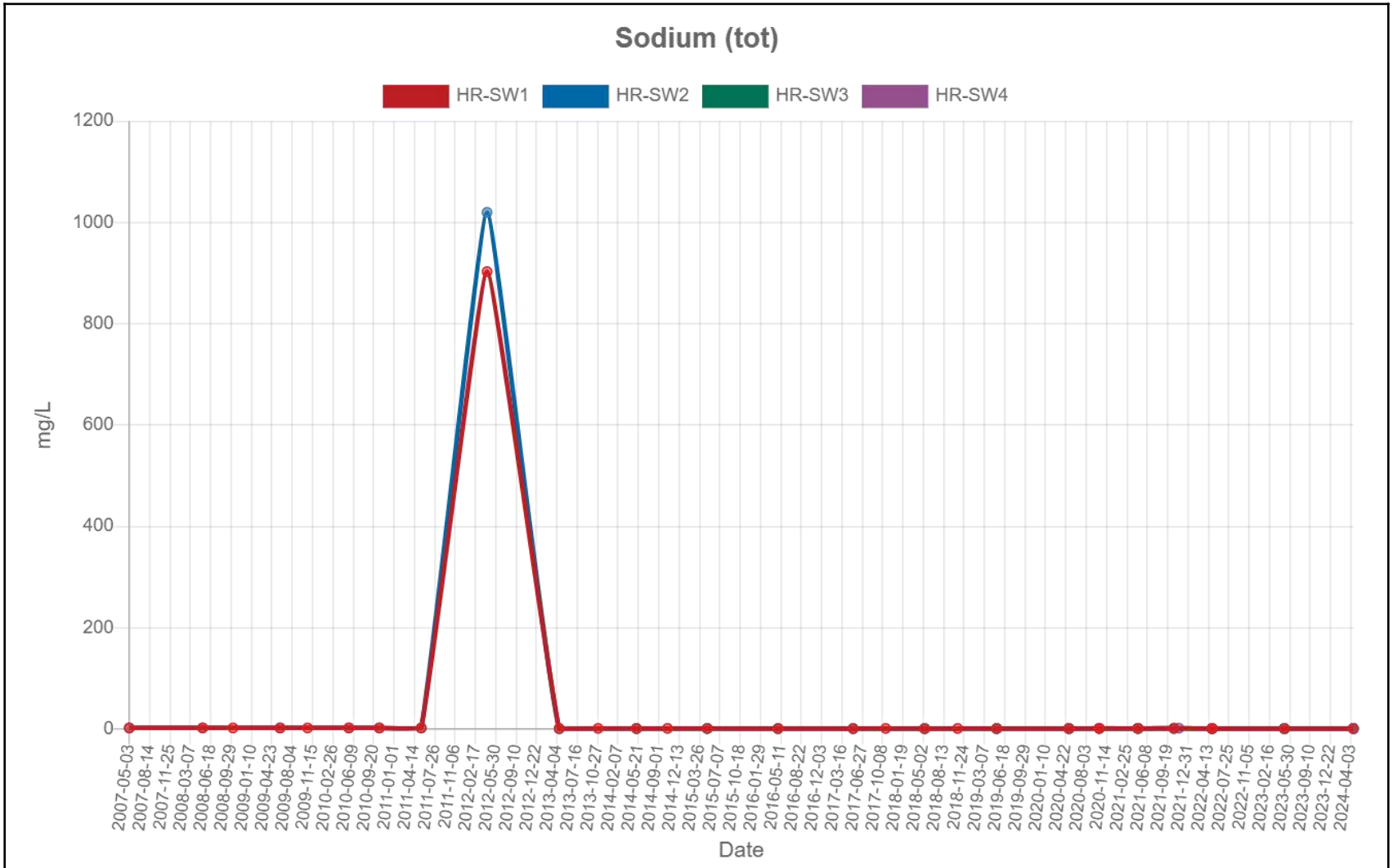
BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 8
Total Manganese in Surface Water

Created by: Lauren Hamilton
Checked by: Emily Fletcher



Hickey Road WDS **Municipality of Hasting's Highlands**	**Graph 9** **Chloride in Surface Water**
BluMetric Project No: 240205-05 **Date: February 14, 2025**	**Created by: Lauren Hamilton** **Checked by: Emily Fletcher**



Hickey Road WDS
Municipality of Hasting's Highlands

BluMetric Project No: 240205-05
Date: February 14, 2025

Graph 10
Total Sodium in Surface Water

Created by: Lauren Hamilton
Checked by: Emily Fletcher

Appendix A

Environmental Compliance Approval

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A362301
Issue Date: December 20, 2018

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

Site Location: Hickey Road WDS
Lot Part of 30, Concession 8
Hastings Highlands Municipality, County of Hastings

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the use and operation of 3.0 hectare waste disposal/transfer site within a total site area of 4.0 hectares.

For the purpose of this environmental compliance approval, the following definitions apply:

- *"Approval"* means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A";
- *"Contaminating Life Span"* means contaminating life span as defined in Ontario Regulation 232/98;
- *"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 II.1 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, Conservation and Parks;

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

- *"Ontario Drinking Water Quality Standards"* means Ontario Regulation 169/03 (Ontario Drinking Water Quality Standards) as amended;

- *"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 *Approval,* and includes the Corporation of the Municipality of Hastings Highlands and 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;

- *"Provincial Officer"* means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the *OWRA,* Section 5 of the *EPA,* Section 17 of the *PA,* Section 4 of the *NMA,* or Section 8 of the *SDWA;*

- *"Refrigerant Appliances"* means household appliances which use, or may use refrigerants, and which include, but is not restricted to, refrigerators, freezers and air-conditioning systems;

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

- *"Regulation 232"* means Ontario Regulation 232/98 (New Landfill Standards) made under the *EPA* , as amended from time to time;

- *"Regulation 347"* means Regulation 347, R.R.O. 1990, made under the EPA, as amended;

- *"Regulation 903"* means Regulation 903, R.R.O. 1990, made under the *OWRA,* as amended;

- *"SDWA"* means *Safe Drinking Water Act,* 2002, S.O. 2002, c. 32, as amended;

- *"Site"* means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone at 202 Hickey Road, Municipality of Hastings Highlands, County of Hastings; and

- *"Trained Personnel"* means personnel knowledgeable in the following through instruction and/or practice:
  - relevant waste management legislation, regulations and guidelines;
  - major environmental concerns pertaining to the waste to be handled;
  - occupational health and safety concerns pertaining to the processes and wastes to be handled;

- o management procedures including the use and operation of equipment for the processes and wastes to be handled;
- o emergency response procedures;
- o specific written procedures for the control of nuisance conditions;
- o specific written procedures for refusal of unacceptable waste loads; and
- o the requirements of this *Approval.*

You are hereby notified that this environmental compliance 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 *Approval* and shall ensure that any person authorized to carry out work on or operate any aspect of the *Site* is notified of this *Approval* 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 *Approval.*

In Accordance

(3) Except as otherwise provided by this *Approval,* 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 *Approval,* and the conditions of this *Approval,* the conditions in this *Approval* 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 *Approval* are severable. If any condition of this *Approval,* or the

application of any condition of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

Other Legal Obligations

(8) The issuance of, and compliance with, this *Approval* 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 *Approval.*

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 *Approval* the person remains responsible for any contravention of any other condition of this *Approval* 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 municipality, the *Owner* shall notify the successor of and provide the successor with a

copy of this *Approval*, and the *Owner* shall provide a copy of the notification to the *District Manager* and the *Director*.

Registration on Title Requirement

(14) Prior to dealing with the property in any way, the *Owner* shall provide a copy of this *Approval* and any amendments, to any person who will acquire an interest in the property as a result of the dealing.

(15) a. By March 31, 2019, the *Owner* shall submit to the *Director* a completed Certificate of Requirement which shall include:

i. a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the *Site* where waste has been or is to be deposited at the *Site;*

ii. proof of ownership of the *Site;*

iii. a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the *Director*, verifying the legal description provided in the Certificate of Requirement;

iv. the legal abstract of the property; and

v. any supporting documents including a registerable description of the *Site*.

b. By March 31, 2019, the *Owner* shall:

i. register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and

ii. submit to the *Director* and the *District Manager*, written verification that the Certificate of Requirement has been registered on title.

Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)

(16) By March 31, 2019, the *Owner* shall, submit to the *Director* documents confirming that a contaminant attenuation zone (CAZ) has been established, in either fee simple or by way of a groundwater easement.

(17) By March 31, 2019, the *Owner* shall submit to the *Director* a completed Certificate of Requirement which shall include:

a. If rights are obtained in fee simple, the *Owner* shall provide:

i. documentation evidencing ownership of the CAZ obtained in compliance with

O.Reg. 232/98, as amended;

ii. a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and

iii. a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the *Director*, verifying the legal description of the CAZ.

b. By February 28, 2019, the *Owner* shall:

i. register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and

ii. submit to the *Director* and the *District Manager*, written verification that the Certificate of Requirement has been registered on title.

c. If rights are obtained by way of a groundwater easement, the Applicant shall:

i. provide a copy of the easement;

ii. provide a plan of survey signed and sealed by an Ontario Land Surveyor for the CAZ;

iii. submit proof of registration on title of the groundwater easement to the *Director;*

d. The *Owner* shall not amend or remove or consent to the removal of the easement or CAZ from title without the prior written consent of the *Director*.

Inspections by the *Ministry*

(18) 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 *Approval* 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 *Approval* are kept;

b. to have access to, inspect, and copy any records required to be kept by the conditions of this *Approval;*

c. to inspect the *Site*, related equipment and appurtenances;

d. to inspect the practices, procedures, or operations required by the conditions of this

Approval; and

e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Approval* or the *EPA*, the *OWRA*, the *PA*, the *SDWA* or the *NMA*.

Information and Record Retention

(19) a. Except as authorized in writing by the *Director*, all records required by this *Approval* shall be retained at the Municipality of Hastings Highlands Office for a minimum of two (2) years from their date of creation.

b. The *Owner* shall retain all documentation listed in Schedule "A" for as long as this *Approval* is valid.

c. All monthly summary reports of waste records collected are to be kept at the Municipality of Hastings Highlands Office until they are included in the Annual Report.

d. The *Owner* shall retain employee training records as long as the employee is working at the Municipality of Hastings Highlands Office.

e. The *Owner* shall make all of the above documents available for inspection upon request of *Ministry* staff.

(20) 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 *Approval* 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 *Approval* or any statute, regulation or other legal requirement; or

b. acceptance by the *Ministry* of the information's completeness or accuracy.

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

(22) Any information related to this *Approval* and contained in *Ministry* files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

2. SITE OPERATION

Operation

(1) The *Site* shall be operated and maintained at all times including management and disposal of all waste, in accordance with the *EPA*, *Regulation 347*, and the conditions of this *Approval*. 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* which legibly display the following information:

a. the name of the *Site* and *Owner;*

b. the number of the *Approval;*

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 area informing users what materials are acceptable and directing users to appropriate storage areas.

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:

Summer (Victoria Day to Thanksgiving)

Tuesday and Friday :12:00 p.m. - 5:00 p.m.

Winter (Thanksgiving to Victoria Day)

Friday :12:00 p.m. - 5:00 p.m.

(8) On-site equipment used for site preparation and closing activities may be operated between 7 a.m. and 5 p.m. Monday to Friday.

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

(10) Waste/recyclables may be relocated on-site or removed off-site by registered/licensed waste haulers during the hours of 7 a.m. and 5 p.m. Monday to Friday. These activities shall only be carried out by trained personnel of registered/licensed waste haulers.

Site Security

(11) No waste shall be received, landfilled or removed from the *Site* unless a site supervisor or an 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.

(12) 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 *Owner* or the *Operator*. Only *Trained Personnel* shall operate any aspect of the *Site* or carry out any activity required under this *Approval* .

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 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) All Spills as defined in the *EPA* shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book as to the nature of the emergency situation, and the action taken for clean-up, correction and prevention of future occurrences.

(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 *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. INSPECTIONS, RECORD KEEPING AND REPORTING

Daily Log Book

(1) A daily log shall be maintained in written or electronic format and shall include the following information:

a. the type, date and time of arrival, hauler, and quantity (tonnes) of all 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 *Approval,* including but not limited to any records required to be kept by this *Approval* shall be provided to the *Ministry,* upon request.

Daily 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 *Approval.* 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 daily log book that includes:

a. the name and signature of person that conducted the inspection;

b. the date and time of the inspection;

c. the list of any deficiencies discovered;

d. the recommendations for remedial action; and

e. the date, time and description of actions taken.

(5) A record shall be kept in the daily 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 March 31st of the year following the period being reported upon.

(7) The Annual Report shall include but not be limited to the following information:

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; facilities existing, added or removed 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;* and

k. any other information with respect to the *Site* which the *District Manager* may require from time to time.

7. LANDFILL DESIGN AND DEVELOPMENT

Approved Waste Types

(1) Only municipal waste as defined under *Reg.* 347 being solid non-hazardous 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 *Approval.*

(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) Maximum volumetric capacity approved for the *Site,* consisting of the waste, daily cover and intermediate cover, but excluding the final cover is 74,100 cubic meters. This volume includes the historical waste volume of 32,300 cubic meters as of 2016.

(5) This approval is for the design, operation and use of 41,800 cubic meters of the calculated theoretical maximum volumetric capacity of the *Site* as described in documents in Schedule "A".

Service Area

(6) Only waste that is generated within the boundaries of the Municipality of Hastings Highlands may be accepted at the *Site.*

Cover

(7) 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 *Approval.* 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.

(8) Cover material shall be applied as follows:

a. Weekly Cover - Weather permitting, deposited waste shall be covered **weekly** 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 150 millimetres of top soil (vegetative cover) shall be placed. Fill areas shall be progressively completed and rehabilitated as landfill development reaches final contours.

(9) Approved wastes from Universal Seal Incorporated shall be placed in an excavation in an area remote from burning areas and covered with clean earth fill immediately

(10) When frozen ground conditions do not permit excavation, all approved wastes from Universal Seal Incorporated may be disposed on in trenches prepared ahead of time and cover immediately.

(11) No waste from Universal Seal Incorporated shall be burned.

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 to prevent methane concentration reaching the levels within its explosive range. 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 Groundwater

(3) The *Owner* shall monitor surface water and ground water in accordance with the monitoring programs outlined in the attached Schedule "B" and the documents in Schedule "A".

(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 is 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*, to 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 *Approval*, 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 *Approval*, 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 any trigger mechanism.

(9) In the event of a confirmed exceedance 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 exceedances;

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 *Director* for approval; and

c. The contingency measures shall be implemented by the *Owner* upon approval by the *Director*.

(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 *Approval.*

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 a 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 *Approval* 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 *Approval.*

Action Plan

(15) The Owner shall adhere to the action plan proposed in the e-mail dated December 10, 2018 (9:04 AM) from Iris O'Connor, Blumetric, to Ranjani Munasinghe, Ministry of the Environment, Conservation and Parks.

9. CLOSURE PLAN

(1) At least three (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 but not be limited to the following information:

a. a plan showing *Site* appearance after closure;

b. a description of the proposed end use of the *Site;*

c. a description 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 high wind events; and

c. if necessary to prevent litter, waste storage areas shall be covered during 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) Household batteries shall be kept at the attendant's shed in leak-proof, non-metallic or lined metal containers, in a manner which prevents contact with stormwater.

(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) Collection, storage and transfer of Waste Electrical and Electronic Equipment shall be in accordance with the documents in the Schedule "A". If there is any discrepancy between the guideline titled "Collection Site Organizing & Operating Waste Electrical and Electronic Equipment (WEEE) Guidebook" dated November 2012 as amended prepared by Ontario Electronic Stewardship and the documents in Schedule "A", the guideline shall take precedence.

SCHEDULE "A"

1. Application for Provisional Certificate of Approval for a Waste Disposal Site dated September 27, 1989 and the supporting information submitted therewith.

2. Letter from J,W, Tooley, MOE, to E,N. Tully, Township of Monteagle, dated November 21, 1989.

3. Letter from E.N. Tully, Township of Monteagle, to J.W. Tooley, MOE, dated December 8, 1989.

4. Agreement dated August 4, 1992, between The Centre & South Hastings Waste Management Board and The Corporation of the Township of Monteagle of the Province of Ontario, Re·: Recycling facility.

5. Letter dated February 18, 1993, from Eleanor N. Tully, Monteagle Township, to Jim Mulder, Ministry of Environment and Energy, Re: Application for· a Transfer Site to .allow recycling site at landfill and site plan entitled "Land Use Permit Area, situate in part of the N.W. Portion of Lot 30, Con. VIII Monteagle Twp. Hastings County".

6. Letter dated March 3, 1993, from Eleanor N. Tully, Monteagle Township, to Brian Nickel, Ministry of Environment and Energy, Re:Reply to Brian Nickel's faxed letter of March 3, 1993.

7. Ministry of Natural Resources Land Use Permit No. LUP 5201075 dated March 26, 1,993.

8. Letter dated July 20, 1993, from Eleanor N. Tully, Monteagle Township, to D.E.Graham, Ministry of Environment and Energy, Re: Submission of application requirements as requested by D.E. Graham's letter of May 7, 1993.

9. Application form for a Certificate of Approval for a Waste Disposal Site (Transfer) dated July 20, 1993.

10. Letter dated July 26, 1994, from Eleanor N . Tully, Monteagle Township, to Ed Tarvicz, Ministry of Environment and .Energy, Re: Withdrawal of application.

11. Letter dated November 6, 1996, from Eleanor N . Tully, Monteagle Township, to D.E.Graham, Ministry of Environment and Energy, Re:Re-submission of application package previously returned by the Ministry.

12. Letter and application form dated December 13, 1996, from Eleanor N. Tully, Monteagle Township, to Jim Mulder, Ministry .of Environment and Energy, Re: Submission of application form to amend certificate of Approval.

13. Application for amendment to Environmental Compliance Approval dated March 22, 2016 prepared by Blumetric Environmental

14. Email dated September 15, 2016 from Iris O'Connor, Senior Engineer, Blumetric Environmental to

Hirva Vyas, P.Eng, Senior Review Engineer MOECC.

15. Environmental Compliance Approval Application dated February 9, 2018 and signed Pat Pilgrim, CAO, the Corporation of the Municipality of Hastings Highlands, including the attached supporting documentation.

16. Report titled "Development and Operations Plan, Hickey Road Waste Disposal Site, Environmental Compliance Approval No. A362301" dated January 2018 and prepared by BluMetric Environmental Inc.

17. Electronic mail dated December 10, 2018 (9:04 AM) from Iris O'Connor, Blumetric, to Ranjani Munasinghe, Ministry of the Environment, Conservation and Parks responding to comments from Technical Support Section, Ministry of the Environment, Conservation and Parks.

Schedule "B"

Surface water and Groundwater Monitoring Program

Table 1: Spring and Fall Surface Water Analysis

Category	Parameters
Organic Parameters	Biological Oxygen Demand (BOD_5), Total Phosphorus, Total Kjeldahl Nitrogen (TKN)
Inorganic Parameters	Ammonia, Chloride, Nitrate, Nitrite, Major Ions (Sodium, Calcium, Magnesium, Sulphate, Alkalinity, Potassium)
Metals	Aluminum (dissolved), Barium, Boron, Cobalt, Copper, Iron, Lead, Manganese, Zinc
Physical/Chemical Parameters	Chemical Oxygen Demand (COD), Conductivity, pH, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Hardness

Schedule "B" Continued next page...

Schedule "B"

Table 2: Spring and Fall Groundwater Analysis

Category	Parameters
Organic Parameters	Dissolved Organic Carbon (DOC)
Inorganic Parameters	Ammonia, Chloride, Nitrate, Major Ions (Sodium, Potassium, Calcium, Magnesium, Sulphate, Alkalinity)
Metals	Aluminum, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Silicon, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc
Physical/Chemical Parameters	Chemical Oxygen Demand (COD), Conductivity, pH, Total Dissolved Solids (TDS)

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

- The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9), (10), (19), (20) and (21) is to clarify the legal rights and responsibilities of the *Owner* and *Operator* under this *Approval.*

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

- The 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.

- 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 *Approval.*

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

- The reasons for Conditions 1(14), 1(15), 1(16) and 1(17) are that the Part II.1 *Director* is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the *Approval* to any person who will acquire an interest in the property as a result of the dealing.

- The reason for Condition 1(18) 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

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*.

- Condition 1 (22) has been included in order to clarify what information may be subject to the *Freedom of Information Act*.

SITE OPERATION

- 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.

- 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 *Approval*.

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

- The reasons for Condition 2(7), 2(8), 2(9) and 2(10) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.

- The reasons for Condition 2(11) and 2(12) 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

- 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

- 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

- 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.

- 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

- 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 *Approval* (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the *EPA* and its regulations.

- 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.

- 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

- The reason for Conditions 7(1) to 7(6) 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.

- Condition 7(7) is to provide the *Owner* the process for getting the approval for alternative daily and intermediate cover material.

- The reasons for Condition 7(8) are to ensure that daily/weekly 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*.

- The reasons for Condition 7(9), 7(10) and 7(11) are to ensure that waste from Universal Seal Incorporated is properly managed in order to prevent environmental detriment and to ensure the safety of the general public and site personal.

LANDFILL MONITORING

- 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*.

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

- 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.

- 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.

- 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.

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

- Condition 8(15) was included to ensure the *Owner* complete the tasks and work towards bringing the Site into compliance as proposed by the *Owner*.

CLOSURE PLAN

- 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

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

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A362301 issued on October 6, 1997

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, Conservation and Parks
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 20th day of December, 2018

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

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

Appendix B

Monitoring and Screening Checklist

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

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

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

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

Monitoring Report and Site Information	
Waste Disposal Site (WDS) Name	Hickey Rd. Waste Disposal Site
Location (e.g. street address, lot, concession)	202 Hickey Road
GPS Location (taken within the property boundary at front gate/ front entry)	273138 m E, 5005376 m N
Municipality	Municipality of Hastings Highlands
Client and/or Site Owner	Municipality of Hastings Highlands
Monitoring Period (Year)	2024
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval (ECA) Number (formerly "Certificate of Approval" (C of A)) :	A362301
Director's Order No.:	
Provincial Officer's Order No.:	

Other:			
Report Submission Frequency	(•) **Annual** ( ) **Other**	Due on March 31st in the year following the reporting period.	
The site is: **(Operation Status)**	(•) **Open** ( ) **Inactive** ( ) **Closed**		
Is there an active waste transfer station at the site?	(•) **Yes** ( ) **No**		
Does this WDS have a Closure Plan?	(•) **Not yet submitted** ( ) **Submitted and under review** ( ) **Submitted and approved**		
Total Approved Capacity	74100	*Units*	Cubic Metres
Maximum Approved Fill Rate	0	*Units*	
Total Waste Received within Monitoring Period (Year)	148.7	*Units*	Tonnes
Total Waste Received within Monitoring Period (Year) *Describe the methodology used to determine this quantity*	Estimated based on bag counts and assumed mass per bag and contracting tonnages.		
Estimated Remaining Capacity	28,999	*Units*	Cubic Metres
Estimated Remaining Capacity *Describe the methodology used to determine this quantity*	UAV topographic survey in June 2023 with estimated bag counts and assumed mass per bag and c		
Estimated Remaining Capacity *Date Last Determined*	31-Dec-2024		
Non-Hazardous Approved Waste Types	[X] Domestic [X] Industrial, Commercial & Institutional (IC&I) [X] Source Separated Organics (Green Bin) [X] Tires	[X] Contaminated Soil [X] Wood Waste [X] Blue Box Material [ ] Processed Organics [X] 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**	20-Dec-2018
Is your Site required to submit Financial Assurance?		○ **Yes** ◉ **No**	
Describe how your WDS 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 ECA, control or authorizing document closure date:		Select 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**	Based on the inferred groundwater flow direction towards the south with a slight east component, the current groundwater monitoring network may not be adequately addressing potential groundwater impacts along the east and southeast property limit. An additional groundwater monitoring well is recommended. All monitoring wells are in good condition and secure.
2) All groundwater, leachate and landfill gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by ECA 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**
HR1-03	Insufficient water to sample	28-Oct-2024

3) a) Some or all groundwater, leachate and landfill gas sampling and monitoring requirements have been established or defined outside of a ministry ECA, authorizing, or control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	○ **Yes** ○ **No** ◉ **Not Applicable**	If no, list exceptions 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 (SOP) as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	(●) **Yes** ( ) **No**	If no, specify (Type Here):
Sampling and Monitoring Program Results/WDS Conditions and Assessment:		
5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/ or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(●) **Yes** ( ) **No**	The current CAZ appears to be of adequate size; however, groundwater quality along the east and southeast property boundaries is unknown and must be investigated prior to further assessing the CAZ.
6) The site meets compliance and assessment criteria.	(●) **Yes** ( ) **No**	The WDS is considered to be compliant with Guideline B-7 along the south and west CAZ boundaries. It is unknown if the WDS is compliant with Guideline B-7 along the east and southeast property boundaries.
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**	Minor trends are observed and discussed in the report.

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 draft groundwater Trigger Mechanism and Contingency Plan was revised in March 2021. As of yet, additional MECP comments have not been received for the revised proposed groundwater plan. The groundwater chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for 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 Environmental Compliance 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:

26-Mar-2025

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:**	The current groundwater monitoring network may not be adequately addressing potential groundwater impacts along the east and southeast property limit. An additional groundwater monitoring well is recommended.
◉ **No Changes to site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/are recommended:**	
Name:	Mark Somers, P.Eng
Seal:	

Signature:		**Date:**	28-Mar-2025
CEP Contact Information:			
Company:	BluMetric Environmental Inc.		
Address:	1682 Woodward Drive, Ottawa, ON K2C 3R8		
Telephone No.:	(877)-487-8436 ext. 246	Fax No. :	
E-mail Address:	msomers@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)	Bird Creek, Un-named tributary

Distance(s)	0.7 km to the south, 0.125 km southeast

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**	
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the ECA or relevant authorizing/control document(s) (if applicable):	○ **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**
HR-SW1, HR-SW2, HR-SW3, HR-SW4	Dry conditions were observed on October 28, 2024.	Fall 2024

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry ECA 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 SOP, 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 on the following page 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. ECA limit, PWQO, background	e.g. X% above PWQO
Dissolved Aluminum at HR-SW3 and HR-SW4	Calculated PWQO	15% (HR-SW3) and 9% (HR-SW4) above PWQO
Copper at HR-SW4	Calculated PWQO	176% 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**	Two exceedances listed above are at a background location (HR-SW4). It is unlikely that impacted groundwater at the WDS is discharging to the location of HR-SW4 based on the respective water elevations at HR-SW4 and closest monitoring well HR6-19. As a result, these exceedances are likely related to non-WDS influences.

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**	Spatial and/or temporal variation in water quality is observed at all surface water monitoring locations but no evidence of increasing or decreasing trends is observed.
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	It is unlikely that impacted groundwater at the WDS is discharging to the locations of HR-SW1 and HR-SW4 based on the respective water elevations at HR-SW1, HR-SW4 and nearby HR6-19. Groundwater interaction with surface water at HR-SW2 and HR-SW3 seems unlikely due to the water table depth in proximal wells: approximately 6 mbgs at HR7-19 and approximately 5 mbgs at HR9-21.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (●) **No** ( ) **Not Applicable**	The surface water chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for surface water.

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 Environmental Compliance 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:

26-Mar-2024

Recommendations:

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

◉ **No Changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended** ○ **The following change(s) to the site design and operation is/ are recommended:**	

CEP Signature	
Relevant Discipline	Environmental Engineer
Date:	28-Mar-2025
CEP Contact Information:	Mark Somers, P.Eng
Company:	BluMetric Environmental Inc.
Address:	1682 Woodward Drive, Ottawa, ON K2C 3R8
Telephone No.:	(877) 487 - 8436 ext. 246
Fax No. :	
E-mail Address:	msomers@blumetric.ca

Save As **Print Form**

Appendix C

Groundwater Monitoring Well Logs

Project No: KB1946-5

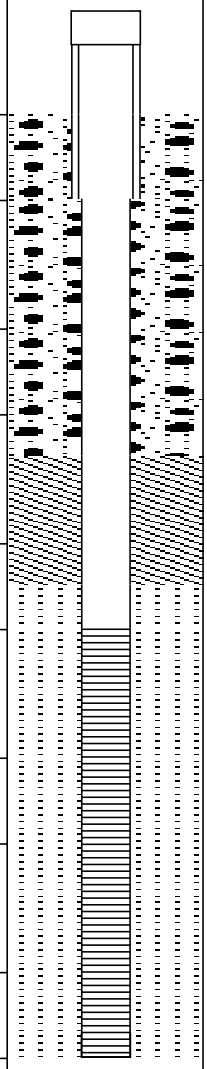
Project: Hickey Road WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5005343, East 273268

Log of Borehole: HR1-03

Field Personnel: B. M.

SUBSURFACE PROFILE				SAMPLE				WELL INSTALLATION	
Depth (ft / m)	Elevation	Symbol	Description	Number	Type	SPT N-Value	Recovery	Well Construction	Comments
0 / 0	100.49		Ground Surface						Steel locking protective cover and casing Stick-up: 0.73m
0 – 3 / 0 – 1			Brown SAND, trace small gravel, dry.	SS1	SS	7	16"		
3 – 6 / 1 – 2				SS2	SS	29	16"		51mm (2") I.D. Sch. 40 PVC pipe Native backfill
6 – 10 / 2 – 3	97.44								3/8" Bentonite holeplug
10 – 14 / 3 – 4	95.92		Brown SAND, dry.	SS3	SS	14	18"		#3 Silica sand pack
14 – 16 / 4 – 5			Brown SAND to grey SILTY SAND, wet to saturated.	SS4	SS	7	11"		10' Slot 10 PVC screen (2")
16 – 20 / 5 – 6	94.39								
20 – 22 / 6	93.78		Grey Silty SAND to SAND and GRAVEL, wet to saturated.	SS5	SS	32	10"		
22 / 7			End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: July 21/03

Datum: Elevation TPVC - 101.22 m

Checked by:

Sheet: 1 of 1

Project No: KB1946-5

Project: Hickey Road WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5005299, East 273288

Log of Borehole: HR2-03

Field Personnel: B. M.

SUBSURFACE PROFILE				SAMPLE				WELL INSTALLATION	
Depth (ft / m)	Elevation	Symbol	Description	Number	Type	SPT N-Value	Recovery	Well Construction	Comments
0	99.64		Ground Surface						Steel locking protective cover and casing Stick-up: 0.58m
0 – 3			SAND mixed with GARBAGE (plastic, metal).						51mm (2") I.D. Sch. 40 PVC pipe Native backfill 3/8" Bentonite holeplug
10	96.59								
10 – 14			Brown SAND with trace Gravel, dry.	SS1	SS	13	16"		#3 Silica sand pack
14	95.07								
15 – 19			Brown SAND with trace Gravel, wet to saturated.	SS2	SS	14	10"		10' Slot 10 PVC screen (2")
20	93.54								
20 – 21			Brown SAND, saturated.	SS3	SS	13			
21	92.93								
22 – 23			End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: July 21/03

Datum: Elevation TPVC - 100.22 m

Checked by:

Sheet: 1 of 1

Project No: KB5082-05

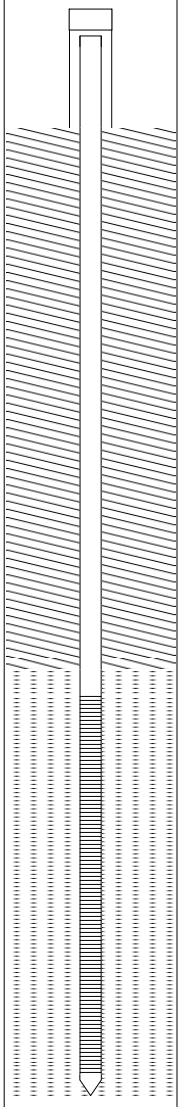
Project: Hickey Road WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5005259, East 273284

Log of Borehole: HR2-03 R

Field Personnel: B. M.

SUBSURFACE PROFILE				SAMPLE				WELL INSTALLATION	
Depth (ft / m)	Elevation	Symbol	Description	Number	Type	SPT N-Value	Recovery	Well Construction	Comments
-3 / -1	0.00		Ground Surface						Steel locking protective cover and casing PVC S/U - 0.60m
1 / 3 / 5 / 7 / 9 / 11 / 13 / 15 / 17 / 19 / 21 / 23 / 25			HR2-03 damaged by vehicle traffic. Replacement Monitor Drilling Detail: Protective casing and top section of PVC pipe removed. Centred augers over existing hole and overdrilled to depth. Drilled to refusal at 24'6" on assumed bedrock/boulder. Original bottom depth was 22'. Replacement Monitor installed as detailed. Protective cement barrier installed around monitor. MOE Well Tag A163241						51mm (2") I.D. Sch. 40 PVC pipe Bentonite Holeplug #3 Silica sand pack 10' Slot 10 PVC screen (2")
2 / 4 / 6									
	-7.41		End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: January 5, 2016

Ground Elevation: 0

T.O.P.:

Static WL:

Checked by:

Sheet: 1 of 1

Project No: KB1946-5

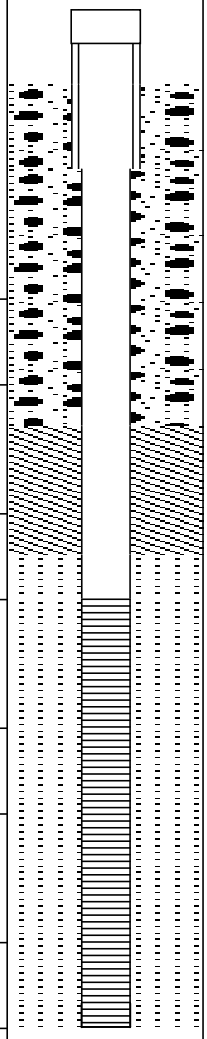
Project: Hickey Road WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5005379, East 273159

Log of Borehole: HR3-03

Field Personnel: B. M.

SUBSURFACE PROFILE				SAMPLE				WELL INSTALLATION	
Depth (ft / m)	Elevation	Symbol	Description	Number	Type	SPT N-Value	Recovery	Well Construction	Comments
0 / 0	101.11		Ground Surface						Steel locking protective cover and casing Stick-up: 0.53m
0 – 3 / 0 – 1			Brown SAND, trace Gravel, dry.						51mm (2") I.D. Sch. 40 PVC pipe
5 – 6 / 1 – 2				SS1	SS	15	15"		Native backfill
7 – 10 / 2 – 3	98.06								3/8" Bentonite holeplug
10 – 11 / 3			Brown SAND, dry.	SS2	SS	18	17"		
12 – 15 / 4	96.54								#3 Silica sand pack
15 – 16 / 5			Brown SAND, wet to saturated.	SS3	SS	18	15"		10' Slot 10 PVC screen (2")
17 – 20 / 5 – 6	95.01								
20 – 21 / 6	94.40		Brown SAND, saturated.	SS4	SS	9	18"		
22 / 7			End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: July 21/03

Datum: Elevation TPVC - 101.64 m

Checked by:

Sheet: 1 of 1

Project No: KB1946-5

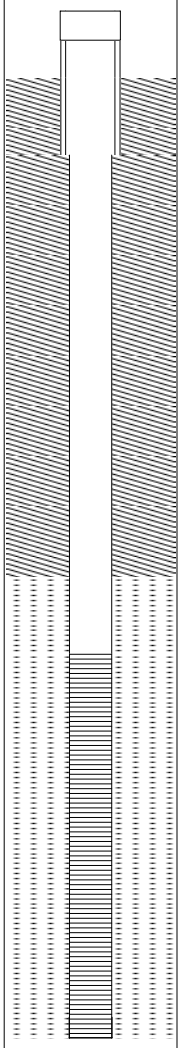
Project: Hickey Road WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5005255, East 273244

Log of Borehole: HR4-10

Field Personnel: B. M.

SUBSURFACE PROFILE				SAMPLE				WELL INSTALLATION	
Depth (ft / m)	Elevation	Symbol	Description	Number	Type	SPT N-Value	Recovery	Well Construction	Comments
-3 / -1	100.39		Ground Surface						Steel locking protective cover and casing PVC S/U - 0.72m
1	99.78		Brown Sandy TOPSOIL - some organics						
3 / 5 / 7 / 2			Brown SAND, dry.						51mm (2") I.D. Sch. 40 PVC pipe Bentonite Holeplug
9	97.34								
11 / 13 / 4			Brown SAND, dry to moist						
15	95.82								
17	95.21		Brown SAND, moist to wet						#3 Silica sand pack
19 / 6	94.29		Brown SAND, trace small gravel, wet to saturated						10' Slot 10 PVC screen (2")
21 / 23			Grey/Brown SAND, trace small gravel, saturated						
25	92.77		End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: April 21, 2010

Ground Elevation: 100.39

T.O.P.:

Static WL:

Checked by:

Sheet: 1 of 1

Project No: KB1946-5

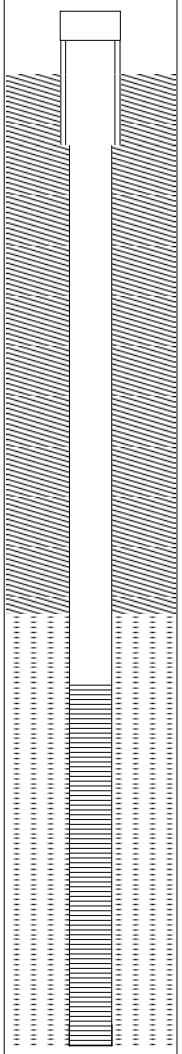
Project: Hickey Road WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5005259, East 273284

Log of Borehole: HR5-10

Field Personnel: B. M.

SUBSURFACE PROFILE				SAMPLE				WELL INSTALLATION	
Depth (ft / m)	Elevation	Symbol	Description	Number	Type	SPT N-Value	Recovery	Well Construction	Comments
-3 / -1	100.59		Ground Surface						Steel locking protective cover and casing PVC S/U - 0.78m
1 / 3	99.06		Brown SAND - trace organics near surface, dry						51mm (2") I.D. Sch. 40 PVC pipe
5 / 7 / 2	97.54		Brown SAND, dry.						Bentonite Holeplug
9 / 11 / 13 / 4	96.02		Grey/Brown SAND, dry to moist						
15 / 17 / 19 / 6	94.49		Grey/Brown SAND - trace small gravel, moist to wet						#3 Silica sand pack
21 / 23 / 25 / 8	92.36		Grey/Brown SAND, trace gravel, saturated						10' Slot 10 PVC screen (2")
27			End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: April 21, 2010

Ground Elevation: 100.588

T.O.P.:

Static WL:

Checked by:

Sheet: 1 of 1

Well ID: HR6-19

Project No.: 190495-03
Client: Municipality of Hastings Highlands
Report: 2019 Monitoing well Installations
Site Address: Hickey Road W.D.S.
202 Hickey Rd. East, Maynooth, Ontario

Elevation Ground: *362.57 m*
TOP: *363.34 m*
MOECC Well Tag: A259052
UTM NAD83 (Zone 18T): 5005336 N
273359 E

SUBSURFACE PROFILE | SAMPLE | WELL COMPLETION

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)
	Ground Surface	0.00 / 362.57
0	**Sand Fill** Light brown, dry.	
1		
2	- medium browm, dry, trace waste (wood, plastic).	
3		3.05 / 359.52
	Waste Dry, sand and waste (wood, plastic, metal).	
4		
5	- plastic waste. - wet.	
6		
7		7.52 / 355.05
	End of well at 7.52 m	
8	Well Completion Details: Screened interval from 4.47 m to 7.52 m below surface Elevation at top of pipe (TOP) = 363.34 m	

Sample ID | Type | Blow Counts | Recovery (%) | Lab Analysis

Headspace Vapour Level (ppm): 10 | 100 | 1000 | 10000

Construction

Notes:
- 4 in. sq. steel monument with lock
- PVC Stickup = 0.79m
- bentonite gravel seal
- 3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack

Drill Date: 2019 July 15
Drilled By: Canadian Environmental Drilling
Drilling Method: Hollow Stem Auger
Hole Diameter: 0.2 m (OD)
Datum: HR-BM2 367.80 m
Logged By: B.M.
Checked By: I.O'C.

Notes: AUGER SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-03 HICKEY ROAD.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Well ID: HR7-19

Project No.: 190495-03
Client: Municipality of Hastings Highlands
Report: 2019 Monitoing well Installations
Site Address: Hickey Road W.D.S.
202 Hickey Rd. East, Maynooth, Ontario

Elevation Ground: *361.30 m*
TOP: *362.09 m*

UTM NAD83 (Zone 18T): 5005201 N
273298 E

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)	Notes
			4 in. sq. steel monument with lock
			PVC Stickup = 0.78m
	Ground Surface	0.00 / 361.30	
0	**Sand** Light brown, dry.		
1			
	- medium brown, dry.		
2			bentonite gravel seal
3	- moist		
4			
	- wet		
5			
6	- brown/grey, saturated.		3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
7		7.62 / 353.68	
	End of well at 7.62 m		
8	Well Completion Details: Screened interval from 4.57 m to 7.62 m below surface Elevation at top of pipe (TOP) = 362.09 m		

SUBSURFACE PROFILE | SAMPLE | WELL COMPLETION

Sample ID | Type | Blow Counts | Recovery (%) | Lab Analysis | Headspace Vapour Level (ppm) 10 100 1000 10000 | Construction

Drill Date: 2019 July 15
Drilled By: Canadian Environmental Drilling
Drilling Method: Hollow Stem Auger
Hole Diameter: 0.2 m (OD)
Datum: HR-BM2 367.80 m
Logged By: B.M.
Checked By: I.O'C.

Notes: AUGER SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-03 HICKEY ROAD.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Well ID: HR8-19

Project No.: 190495-03
Client: Municipality of Hastings Highlands
Report: 2019 Monitoing well Installations
Site Address: Hickey Road W.D.S.
202 Hickey Rd. East, Maynooth, Ontario

Elevation Ground: *360.11 m*
TOP: *360.89 m*

UTM NAD83 (Zone 18T): 5005213 N
273243 E

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)	Notes
	Ground Surface	0.00 / 360.11	4 in. sq. steel monument with lock PVC Stickup = 0.77m
0	**Sand** Light brown, dry, trace roots fibres.		
1			
2			bentonite gravel seal
3			
4			
5	- light brownish grey, saturated.		
6			3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
7			native soil collaspe
	End of well at 7.62 m	7.62 / 352.49	
8	Well Completion Details: Screened interval from 4.23 m to 7.28 m below surface Elevation at top of pipe (TOP) = 360.89 m		

SUBSURFACE PROFILE | SAMPLE | WELL COMPLETION

Sample ID | Type | Blow Counts | Recovery (%) | Lab Analysis | Headspace Vapour Level (ppm) 10 100 1000 10000 | Construction

Drill Date: 2019 July 15
Drilled By: Canadian Environmental Drilling
Drilling Method: Hollow Stem Auger
Hole Diameter: 0.2 m (OD)
Datum: HR-BM2 367.80 m
Logged By: B.M.
Checked By: I.O'C.

Notes: AUGER SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-03 HICKEY ROAD.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Monitoring Well ID: HR9-21

Project No.: 210217-02
Client: Municipality of Hastings Highlands
Report: Hickey Road WDS
Site Address: 202 Hickey Road East
Maynooth, ON

Elevation Ground: *359.67 m*
TOP: *360.51 m*

UTM NAD-83 (Zone 18): 5005132.000 N
273305.000 E

SUBSURFACE PROFILE					SAMPLE						WELL COMPLETION	
Depth (m)	Elevation (m)	Symbol	Description	Depth (m) / Elev. (m.a.s.l.)	Type	Recovery (%)	Blow Counts	Sample ID	Lab Analysis	Headspace Vapour Level PID IBL ▲ ppm 0 0 0 0	Construction	Notes
0	360		Ground Surface	0.0 / 359.7								J-Plug; Monument Well Casing Stickup
			GRAVELLY SAND Brown medium coarse sand with trace amounts of gravel									Granular Drainage Layer
1	359											
2	358											Bentonite Seal
3	357											
4	356			[7.6]								
5	355											4.75 m bgs (354.92 m)
6	354		Saturated ▼ 5.5 m: Saturated soils									Silica Sand Filter; 50 mm 010 Slot PVC Screen
7	353											
8	352		Observations made from auger. EOH at 7.62 mbgs.	7.6 / 352.1								Cuttings Backfill

Drill Date: 2021 August 19
Drilled By: Canadian Environmental Drilling
Drilling Method: Tri-Cone
Hole Diameter (OD):
Logged By: BM
Checked By: IO

▽ Perched Groundwater Strike / Unstabilized Groundwater Level
▼ True Groundwater Strike / Stabilized Groundwater Level

Monitoring Well ID: HR10-21

Project No.: 210217-02
Client: Municipality of Hastings Highlands
Report: Hickey Road WDS
Site Address: 202 Hickey Road East, Maynooth, ON

Elevation Ground: *361.81 m*
TOP: *362.62 m*

UTM NAD-83 (Zone 18): 5005129.000 N, 273239.000 E

SUBSURFACE PROFILE					SAMPLE						WELL COMPLETION	
Depth (m)	Elevation (m)	Symbol	Description	Depth (m) / Elev. (m.a.s.l.)	Type	Recovery (%)	Blow Counts	Sample ID	Lab Analysis	Headspace Vapour Level PID IBL ▲ ppm 0 0 0 0	Construction	Notes
-1	362		Ground Surface	0.0								J-Plug; Monument Well Casing Stickup
0			**GRAVELLY SAND** Brown coarse sand with trace amounts of gravel	361.8								
1	361											Granular Drainage Layer
2	360											
3	359											
4	358											Bentonite Seal
5	357		Saturated ▼ 4.9 m: Saturated soils	[9.1]								
6	356											
7	355											6.66 m bgs (355.15 m); Silica Sand Filter; 50 mm 010 Slot PVC Screen
8	354											
9	353			9.1								
			Observations made from auger. EOH at 9.14 mbgs.	352.7								

Drill Date: 2021 August 19
Drilled By: Canadian Environmental Drilling
Drilling Method: Tri-Cone
Hole Diameter (OD):
Logged By: SD
Checked By: IO

▽ Perched Groundwater Strike / Unstabilized Groundwater Level
▼ True Groundwater Strike / Stabilized Groundwater Level

Appendix D

Field Forms, Laboratory Reports, and Chain of Custody Records

Appendix D

D-1 Site Observation Forms

SMALL LANDFILL
OPERATION AND INSPECTION FORM

Site Name: Hickey Road WDS, MHHs	Date: April 16, 2024	Weather:
Project #: 240205-05	BluMetric Staff: BM / SN	Sunny 8-14°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 ✓	Not covered / packed
❑ Designated waste areas are properly signed and easily accessed by public	Yes ✓	No _	

RECYCLING OPERATION (if applicable)

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

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

❑ Metals neat and appropriate size	Yes ✓	No _	
❑ Tires neat and appropriate size	Yes ✓	No _	No tires noted
❑ Bulky Items neat and appropriate size	Yes ✓	No _	
❑ Brush pile neat and appropriate size	Yes _	No _	NA ✓
❑ 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 = 5ppm
❑ 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:

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

BluMetric Environmental

Site Name: Hickey Road WDS, MHHs	Date: 2024/10/28	Weather: Sun/Cloud 5°C
Project #: 240205-05	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 _	
❑ 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 _	
❑ Tires neat and appropriate size	Yes _	No _	NA ✓
❑ Bulky Items neat and appropriate size	Yes ✓	No _	
❑ Brush pile neat and appropriate size	Yes _	No _	NA ✓
❑ Construction debris neat and appropriate size	Yes _	No _	NA ✓

MONITORING WELL CONDITION

❑ Casing conditions (frost heave, lock, cap)	Yes ✓	No _	HR2-03R will require extension soon as its in the waste area
❑ 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:

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 #: 240205-05
Site Location: Hickey Road
Your C.O.C. #: 880131

Attention: MHH Distribution

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

Report Date: 2024/04/24
Report #: R8121517
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4B3878
Received: 2024/04/17, 15:09

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	9	N/A	2024/04/20	CAM SOP-00448	SM 24 2320 B m
Alkalinity	2	N/A	2024/04/21	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	11	N/A	2024/04/23	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	11	N/A	2024/04/23	CAM SOP-00416	SM 24 5220 D m
Conductivity	11	N/A	2024/04/22	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	11	N/A	2024/04/19	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	11	N/A	2024/04/19	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	11	N/A	2024/04/21	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	11	N/A	2024/04/19	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	9	2024/04/18	2024/04/20	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	2	2024/04/18	2024/04/21	CAM SOP-00413	SM 24th - 4500H+ B
Sulphate by Automated Turbidimetry	11	N/A	2024/04/23	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	11	2024/04/19	2024/04/20	CAM SOP-00428	SM 24 2540C m

Remarks:

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

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

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

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

Your Project #: 240205-05
Site Location: Hickey Road
Your C.O.C. #: 880131

Attention: MHH Distribution

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

Report Date: 2024/04/24
Report #: R8121517
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4B3878

Received: 2024/04/17, 15:09

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

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

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

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

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

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bureauveritas.com
Phone# (519)652-9444

==========

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

Bureau Veritas Job #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		YXQ094			YXQ094			YXQ095		
Sampling Date		2024/04/16 11:10			2024/04/16 11:10			2024/04/16 11:30		
COC Number		880131			880131			880131		
	UNITS	HR1-03	RDL	QC Batch	HR1-03 Lab-Dup	RDL	QC Batch	HR2-03R	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9341440				0.62	0.050	9341440
Total Chemical Oxygen Demand (COD)	mg/L	13	4.0	9342406				38	4.0	9342406
Conductivity	umho/cm	130	1.0	9341271				610	1.0	9341271
Total Dissolved Solids	mg/L	45	10	9344349				400	10	9344349
Dissolved Organic Carbon	mg/L	2.0	0.4	9341950	2.0	0.4	9341950	7.1	0.4	9341950
pH	pH	6.96		9341266				6.94		9341266
Dissolved Sulphate (SO4)	mg/L	8.0	1.0	9341265				45	1.0	9341265
Alkalinity (Total as CaCO3)	mg/L	65	1.0	9341255				180	1.0	9341255
Dissolved Chloride (Cl-)	mg/L	ND	1.0	9341260				69	1.0	9341260
Nitrate (N)	mg/L	ND	0.10	9341278				ND	0.10	9341278

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		YXQ095			YXQ096		YXQ097	YXQ098		
Sampling Date		2024/04/16 11:30			2024/04/16 10:55		2024/04/16 14:00	2024/04/16 13:50		
COC Number		880131			880131		880131	880131		
	UNITS	HR2-03R Lab-Dup	RDL	QC Batch	HR3-03	QC Batch	HR4-10	HR5-10	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L				ND	9341440	12	11	0.050	9341440
Total Chemical Oxygen Demand (COD)	mg/L	41	4.0	9342406	6.1	9342406	62	62	4.0	9342406
Conductivity	umho/cm				110	9341271	690	700	1.0	9341271
Total Dissolved Solids	mg/L				50	9344349	415	390	10	9344349
Dissolved Organic Carbon	mg/L				2.2	9341950	17	15	0.4	9341950
pH	pH				7.23	9341266	7.12	7.10		9341266
Dissolved Sulphate (SO4)	mg/L				7.1	9341265	41	15	1.0	9342307
Alkalinity (Total as CaCO3)	mg/L				53	9341255	290	230	1.0	9341255
Dissolved Chloride (Cl-)	mg/L				ND	9341260	22	76	1.0	9342298
Nitrate (N)	mg/L				0.12	9341278	ND	ND	0.10	9341278

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 #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		YXQ099			YXQ100		YXQ101		
Sampling Date		2024/04/16 11:40			2024/04/16 13:00		2024/04/16 13:35		
COC Number		880131			880131		880131		
	UNITS	HR6-19	RDL	QC Batch	HR7-19	RDL	HR8-19	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	3.6	0.050	9341440	17	0.10	ND	0.050	9341440
Total Chemical Oxygen Demand (COD)	mg/L	27	4.0	9342406	73	4.0	9.3	4.0	9342406
Conductivity	umho/cm	640	1.0	9341271	760	1.0	110	1.0	9341271
Total Dissolved Solids	mg/L	360	10	9344349	405	10	55	10	9344349
Dissolved Organic Carbon	mg/L	4.9	0.4	9341950	23	0.4	2.0	0.4	9341950
pH	pH	7.10		9341266	7.06		6.77		9341266
Dissolved Sulphate (SO4)	mg/L	75	1.0	9341265	25	1.0	9.7	1.0	9342307
Alkalinity (Total as CaCO3)	mg/L	280	1.0	9341255	310	1.0	35	1.0	9341255
Dissolved Chloride (Cl-)	mg/L	2.2	1.0	9341260	48	1.0	4.6	1.0	9342298
Nitrate (N)	mg/L	ND	0.10	9341278	ND	0.10	1.25	0.10	9341278

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

Bureau Veritas ID		YXQ102			YXQ102			YXQ103		
Sampling Date		2024/04/16 12:30			2024/04/16 12:30			2024/04/16 12:50		
COC Number		880131			880131			880131		
	UNITS	HR9-21	RDL	QC Batch	HR9-21 Lab-Dup	RDL	QC Batch	HR10-21	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.13	0.050	9341440				ND	0.050	9341440
Total Chemical Oxygen Demand (COD)	mg/L	7.9	4.0	9342406				5.7	4.0	9342406
Conductivity	umho/cm	34	1.0	9341271	34	1.0	9341271	67	1.0	9341271
Total Dissolved Solids	mg/L	ND	10	9344349				45	10	9344349
Dissolved Organic Carbon	mg/L	2.1	0.4	9341950				1.9	0.4	9341950
pH	pH	6.45		9341266	6.38		9341266	6.77		9341266
Dissolved Sulphate (SO4)	mg/L	5.6	1.0	9341265				4.3	1.0	9341265
Alkalinity (Total as CaCO3)	mg/L	7.5	1.0	9341255	7.1	1.0	9341255	26	1.0	9341255
Dissolved Chloride (Cl-)	mg/L	ND	1.0	9341260				2.4	1.0	9341260
Nitrate (N)	mg/L	0.55	0.10	9341278				1.51	0.10	9341278

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 #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		YXQ103			YXQ104		
Sampling Date		2024/04/16 12:50			2024/04/16 11:30		
COC Number		880131			880131		
	UNITS	HR10-21 Lab-Dup	RDL	QC Batch	HR-QAQC-GW1	RDL	QC Batch
Inorganics							
Total Ammonia-N	mg/L				0.64	0.050	9341440
Total Chemical Oxygen Demand (COD)	mg/L				39	4.0	9342406
Conductivity	umho/cm				620	1.0	9341271
Total Dissolved Solids	mg/L	40	10	9344349	435	10	9344349
Dissolved Organic Carbon	mg/L				7.0	0.4	9341950
pH	pH				6.96		9341266
Dissolved Sulphate (SO4)	mg/L				45	1.0	9341265
Alkalinity (Total as CaCO3)	mg/L				180	1.0	9341255
Dissolved Chloride (Cl-)	mg/L				74	1.0	9341260
Nitrate (N)	mg/L				ND	0.10	9341278

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 #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		YXQ094	YXQ095	YXQ096	YXQ096	YXQ097	YXQ098	YXQ099		
Sampling Date		2024/04/16 11:10	2024/04/16 11:30	2024/04/16 10:55	2024/04/16 10:55	2024/04/16 14:00	2024/04/16 13:50	2024/04/16 11:40		
COC Number		880131	880131	880131	880131	880131	880131	880131		
	UNITS	HR1-03	HR2-03R	HR3-03	HR3-03 Lab-Dup	HR4-10	HR5-10	HR6-19	RDL	QC Batch
Metals										
Dissolved Aluminum (Al)	ug/L	7.9	31	ND	ND	16	31	14	4.9	9344077
Dissolved Barium (Ba)	ug/L	38	160	31	30	250	260	66	2.0	9344077
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.40	9344077
Dissolved Boron (B)	ug/L	ND	74	11	11	260	140	99	10	9344077
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.090	9344077
Dissolved Calcium (Ca)	ug/L	21000	97000	12000	12000	59000	87000	130000	200	9344077
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9344077
Dissolved Cobalt (Co)	ug/L	ND	6.1	1.2	1.1	37	33	ND	0.50	9344077
Dissolved Copper (Cu)	ug/L	1.3	ND	1.8	1.7	ND	2.4	ND	0.90	9344077
Dissolved Iron (Fe)	ug/L	ND	24000	ND	ND	30000	23000	26000	100	9344077
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.50	9344077
Dissolved Magnesium (Mg)	ug/L	3100	9100	1100	1100	9800	7600	4800	50	9344077
Dissolved Manganese (Mn)	ug/L	ND	2700	ND	ND	920	1500	410	2.0	9344077
Dissolved Molybdenum (Mo)	ug/L	1.1	ND	ND	ND	0.70	0.72	ND	0.50	9344077
Dissolved Nickel (Ni)	ug/L	ND	3.0	ND	ND	12	5.2	1.0	1.0	9344077
Dissolved Potassium (K)	ug/L	920	14000	1100	1100	25000	11000	4000	200	9344077
Dissolved Silicon (Si)	ug/L	4600	9000	4700	4700	7600	5500	3600	50	9344077
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.090	9344077
Dissolved Sodium (Na)	ug/L	1600	18000	10000	10000	51000	35000	6400	100	9344077
Dissolved Strontium (Sr)	ug/L	95	420	40	40	260	670	450	1.0	9344077
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	ND	0.11	ND	0.050	9344077
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9344077
Dissolved Vanadium (V)	ug/L	ND	1.9	ND	ND	3.4	2.0	ND	0.50	9344077
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9344077

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 #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		YXQ100	YXQ101	YXQ102	YXQ103	YXQ104		
Sampling Date		2024/04/16 13:00	2024/04/16 13:35	2024/04/16 12:30	2024/04/16 12:50	2024/04/16 11:30		
COC Number		880131	880131	880131	880131	880131		
	UNITS	HR7-19	HR8-19	HR9-21	HR10-21	HR-QAQC-GW1	RDL	QC Batch
Metals								
Dissolved Aluminum (Al)	ug/L	22	8.7	10	32	31	4.9	9344077
Dissolved Barium (Ba)	ug/L	380	22	12	6.5	160	2.0	9344077
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	ND	0.40	9344077
Dissolved Boron (B)	ug/L	280	12	ND	ND	75	10	9344077
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	ND	0.090	9344077
Dissolved Calcium (Ca)	ug/L	72000	15000	3400	7500	98000	200	9344077
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	ND	5.0	9344077
Dissolved Cobalt (Co)	ug/L	55	ND	ND	ND	6.2	0.50	9344077
Dissolved Copper (Cu)	ug/L	4.2	ND	ND	1.6	ND	0.90	9344077
Dissolved Iron (Fe)	ug/L	50000	ND	ND	ND	24000	100	9344077
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	0.50	9344077
Dissolved Magnesium (Mg)	ug/L	8600	1700	510	1500	9400	50	9344077
Dissolved Manganese (Mn)	ug/L	2300	2.2	15	ND	2700	2.0	9344077
Dissolved Molybdenum (Mo)	ug/L	1.1	ND	ND	ND	ND	0.50	9344077
Dissolved Nickel (Ni)	ug/L	12	ND	ND	ND	2.9	1.0	9344077
Dissolved Potassium (K)	ug/L	24000	1200	1200	1200	14000	200	9344077
Dissolved Silicon (Si)	ug/L	9900	4500	4400	4500	9000	50	9344077
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	ND	0.090	9344077
Dissolved Sodium (Na)	ug/L	49000	5200	1600	3000	18000	100	9344077
Dissolved Strontium (Sr)	ug/L	320	100	45	69	430	1.0	9344077
Dissolved Thallium (Tl)	ug/L	0.074	ND	ND	ND	ND	0.050	9344077
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	ND	5.0	9344077
Dissolved Vanadium (V)	ug/L	3.1	ND	ND	ND	2.0	0.50	9344077
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	5.0	9344077

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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TEST SUMMARY

Bureau Veritas ID: YXQ094
Sample ID: HR1-03
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ094 Dup
Sample ID: HR1-03
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz

Bureau Veritas ID: YXQ095
Sample ID: HR2-03R
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ095 Dup
Sample ID: HR2-03R
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat

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TEST SUMMARY

Bureau Veritas ID: YXQ096
Sample ID: HR3-03
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ096 Dup
Sample ID: HR3-03
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti

Bureau Veritas ID: YXQ097
Sample ID: HR4-10
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/21	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9342298	N/A	2024/04/23	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/21	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9342307	N/A	2024/04/23	Alina Dobreanu
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ098
Sample ID: HR5-10
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/21	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9342298	N/A	2024/04/23	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat

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TEST SUMMARY

Bureau Veritas ID: YXQ098
Sample ID: HR5-10
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/21	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9342307	N/A	2024/04/23	Alina Dobreanu
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ099
Sample ID: HR6-19
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ100
Sample ID: HR7-19
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9342298	N/A	2024/04/23	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9342307	N/A	2024/04/23	Alina Dobreanu
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

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Bureau Veritas Job #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: YXQ101
Sample ID: HR8-19
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9342298	N/A	2024/04/23	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9342307	N/A	2024/04/23	Alina Dobreanu
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ102
Sample ID: HR9-21
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ102 Dup
Sample ID: HR9-21
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil

Bureau Veritas ID: YXQ103
Sample ID: HR10-21
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil

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Bureau Veritas Job #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: YXQ103
Sample ID: HR10-21
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ103 Dup
Sample ID: HR10-21
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

Bureau Veritas ID: YXQ104
Sample ID: HR-QAQC-GW1
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9341255	N/A	2024/04/20	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9342406	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9341271	N/A	2024/04/22	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9341950	N/A	2024/04/19	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9344077	N/A	2024/04/19	Prempal Bhatti
Total Ammonia-N	LACH/NH4	9341440	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341278	N/A	2024/04/19	Jinal Chavda
pH	AT	9341266	2024/04/18	2024/04/20	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani

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GENERAL COMMENTS

Results relate only to the items tested.

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Bureau Veritas Job #: C4B3878
Report Date: 2024/04/24

QUALITY ASSURANCE REPORT

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
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
9341255	Alkalinity (Total as CaCO3)	2024/04/20			100	85 - 115	ND, RDL=1.0	mg/L	5.9	20
9341260	Dissolved Chloride (Cl-)	2024/04/23	NC	80 - 120	98	80 - 120	ND, RDL=1.0	mg/L	7.0	20
9341265	Dissolved Sulphate (SO4)	2024/04/23	NC	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	2.8	20
9341266	pH	2024/04/20			101	98 - 103			1.1	N/A
9341271	Conductivity	2024/04/22			100	85 - 115	ND, RDL=1.0	umho/cm	0.59	10
9341278	Nitrate (N)	2024/04/19	94	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	3.0	20
9341440	Total Ammonia-N	2024/04/21	96	75 - 125	103	80 - 120	ND, RDL=0.050	mg/L	2.4	20
9341950	Dissolved Organic Carbon	2024/04/19	93	80 - 120	94	80 - 120	ND, RDL=0.4	mg/L	0.098	20
9342298	Dissolved Chloride (Cl-)	2024/04/23	94	80 - 120	97	80 - 120	ND, RDL=1.0	mg/L	NC	20
9342307	Dissolved Sulphate (SO4)	2024/04/23	95	75 - 125	96	80 - 120	ND, RDL=1.0	mg/L	0.71	20
9342406	Total Chemical Oxygen Demand (COD)	2024/04/23	98	80 - 120	97	80 - 120	ND, RDL=4.0	mg/L	6.4	20
9344077	Dissolved Aluminum (Al)	2024/04/19	100	80 - 120	98	80 - 120	ND, RDL=4.9	ug/L	NC	20
9344077	Dissolved Barium (Ba)	2024/04/19	103	80 - 120	96	80 - 120	ND, RDL=2.0	ug/L	2.4	20
9344077	Dissolved Beryllium (Be)	2024/04/19	104	80 - 120	97	80 - 120	ND, RDL=0.40	ug/L	NC	20
9344077	Dissolved Boron (B)	2024/04/19	100	80 - 120	94	80 - 120	ND, RDL=10	ug/L	4.7	20
9344077	Dissolved Cadmium (Cd)	2024/04/19	103	80 - 120	98	80 - 120	ND, RDL=0.090	ug/L	NC	20
9344077	Dissolved Calcium (Ca)	2024/04/19	102	80 - 120	102	80 - 120	ND, RDL=200	ug/L	1.2	20
9344077	Dissolved Chromium (Cr)	2024/04/19	102	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC	20
9344077	Dissolved Cobalt (Co)	2024/04/19	103	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L	3.1	20
9344077	Dissolved Copper (Cu)	2024/04/19	105	80 - 120	99	80 - 120	ND, RDL=0.90	ug/L	4.8	20
9344077	Dissolved Iron (Fe)	2024/04/19	105	80 - 120	101	80 - 120	ND, RDL=100	ug/L	NC	20
9344077	Dissolved Lead (Pb)	2024/04/19	101	80 - 120	99	80 - 120	ND, RDL=0.50	ug/L	NC	20
9344077	Dissolved Magnesium (Mg)	2024/04/19	104	80 - 120	101	80 - 120	ND, RDL=50	ug/L	1.2	20
9344077	Dissolved Manganese (Mn)	2024/04/19	101	80 - 120	96	80 - 120	ND, RDL=2.0	ug/L	NC	20
9344077	Dissolved Molybdenum (Mo)	2024/04/19	106	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L	NC	20
9344077	Dissolved Nickel (Ni)	2024/04/19	102	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L	NC	20
9344077	Dissolved Potassium (K)	2024/04/19	104	80 - 120	99	80 - 120	ND, RDL=200	ug/L	1.7	20
9344077	Dissolved Silicon (Si)	2024/04/19	103	80 - 120	100	80 - 120	ND, RDL=50	ug/L	1.1	20
9344077	Dissolved Silver (Ag)	2024/04/19	101	80 - 120	97	80 - 120	ND, RDL=0.090	ug/L	NC	20
9344077	Dissolved Sodium (Na)	2024/04/19	104	80 - 120	102	80 - 120	ND, RDL=100	ug/L	1.2	20
9344077	Dissolved Strontium (Sr)	2024/04/19	103	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L	0.25	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
9344077	Dissolved Thallium (Tl)	2024/04/19	103	80 - 120	102	80 - 120	ND, RDL=0.050	ug/L	NC	20
9344077	Dissolved Titanium (Ti)	2024/04/19	102	80 - 120	99	80 - 120	ND, RDL=5.0	ug/L	NC	20
9344077	Dissolved Vanadium (V)	2024/04/19	105	80 - 120	100	80 - 120	ND, RDL=0.50	ug/L	NC	20
9344077	Dissolved Zinc (Zn)	2024/04/19	102	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC	20
9344349	Total Dissolved Solids	2024/04/20			95	80 - 120	ND, RDL=10	mg/L	12	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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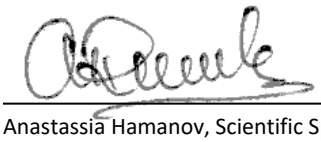
Bureau Veritas Job #: C4B3878
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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Your Project #: 240205-05
Site Location: Hickey Road
Your C.O.C. #: 971296

Attention: MHH Distribution

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

Report Date: 2024/11/06
Report #: R8392814
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4Y1987
Received: 2024/10/30, 09:37

Sample Matrix: Ground Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	6	N/A	2024/11/04	CAM SOP-00448	SM 24 2320 B m
Alkalinity	4	N/A	2024/11/05	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	10	N/A	2024/11/05	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	9	N/A	2024/11/04	CAM SOP-00416	SM 24 5220 D m
Chemical Oxygen Demand	1	N/A	2024/11/05	CAM SOP-00416	SM 24 5220 D m
Conductivity	6	N/A	2024/11/04	CAM SOP-00414	SM 24 2510 m
Conductivity	4	N/A	2024/11/05	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	9	N/A	2024/11/04	CAM SOP-00446	SM 24 5310 B m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2024/11/05	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	10	N/A	2024/11/01	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	10	N/A	2024/11/04	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	10	N/A	2024/11/04	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	6	2024/10/31	2024/11/04	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	4	2024/10/31	2024/11/05	CAM SOP-00413	SM 24th - 4500H+ B
Sulphate by Automated Turbidimetry	10	N/A	2024/11/05	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	6	2024/11/01	2024/11/05	CAM SOP-00428	SM 24 2540C m
Total Dissolved Solids	4	2024/11/02	2024/11/05	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

Your Project #: 240205-05
Site Location: Hickey Road
Your C.O.C. #: 971296

Attention: MHH Distribution

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

Report Date: 2024/11/06
Report #: R8392814
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4Y1987

Received: 2024/10/30, 09:37

otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Elora Di Bratto, Project Manager
Email: Elora.Di-Bratto@bureauveritas.com
Phone# (905) 817-5700

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Bureau Veritas Job #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AHLD02			AHLD02			AHLD03		
Sampling Date		2024/10/28 15:28			2024/10/28 15:28			2024/10/28 14:53		
COC Number		971296			971296			971296		
	UNITS	HR2-03R	RDL	QC Batch	HR2-03R Lab-Dup	RDL	QC Batch	HR3-03	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	3.6	0.050	9737752				ND	0.050	9737752
Total Chemical Oxygen Demand (COD)	mg/L	81	4.0	9741832				6.2	4.0	9743088
Conductivity	umho/cm	810	1.0	9737470				190	1.0	9738663
Total Dissolved Solids	mg/L	500	10	9741635				145	10	9741635
Dissolved Organic Carbon	mg/L	18	0.4	9744822	18	0.4	9744822	2.9	0.4	9744822
pH	pH	7.21		9737477				7.65		9738665
Dissolved Sulphate (SO4)	mg/L	3.6	1.0	9738695				9.8	1.0	9739829
Alkalinity (Total as CaCO3)	mg/L	310	1.0	9737479				58	1.0	9738662
Dissolved Chloride (Cl-)	mg/L	64	1.0	9738693				15	1.0	9739825
Nitrate (N)	mg/L	ND	0.10	9738676				0.87	0.10	9738676

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		AHLD04			AHLD05		AHLD06		
Sampling Date		2024/10/28 15:43			2024/10/28 15:36		2024/10/28 16:42		
COC Number		971296			971296		971296		
	UNITS	HR4-10	RDL	QC Batch	HR5-10	QC Batch	HR6-19	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	41	0.25	9737752	11	9737752	0.92	0.050	9737752
Total Chemical Oxygen Demand (COD)	mg/L	130	4.0	9741309	120	9741832	35	4.0	9741832
Conductivity	umho/cm	1100	1.0	9737470	910	9737470	250	1.0	9737470
Total Dissolved Solids	mg/L	510	10	9740361	525	9740361	180	10	9740361
Dissolved Organic Carbon	mg/L	41	0.4	9744822	31	9744822	4.1	0.4	9744822
pH	pH	7.42		9737477	7.34	9737477	7.26		9737477
Dissolved Sulphate (SO4)	mg/L	28	1.0	9738695	53	9738695	4.8	1.0	9739829
Alkalinity (Total as CaCO3)	mg/L	420	1.0	9737479	330	9737479	130	1.0	9737479
Dissolved Chloride (Cl-)	mg/L	49	1.0	9738693	51	9738693	ND	1.0	9739825
Nitrate (N)	mg/L	ND	0.10	9738671	ND	9738671	ND	0.10	9738676

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 #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AHLD07		AHLD08		AHLD09	AHLD10		
Sampling Date		2024/10/28 16:31		2024/10/28 15:59		2024/10/28 16:20	2024/10/28 16:07		
COC Number		971296		971296		971296	971296		
	UNITS	HR7-19	QC Batch	HR8-19	QC Batch	HR9-21	HR10-21	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	12	9737752	ND	9737752	ND	ND	0.050	9737752
Total Chemical Oxygen Demand (COD)	mg/L	74	9741832	20	9741832	19	13	4.0	9741832
Conductivity	umho/cm	820	9738663	240	9737470	37	23	1.0	9738663
Total Dissolved Solids	mg/L	460	9741635	180	9740361	75	110	10	9740361
Dissolved Organic Carbon	mg/L	17	9744822	4.1	9744822	1.7	1.6	0.4	9744822
pH	pH	7.73	9738665	7.45	9737477	6.89	7.32		9738665
Dissolved Sulphate (SO4)	mg/L	37	9739829	8.2	9738695	4.9	4.1	1.0	9739829
Alkalinity (Total as CaCO3)	mg/L	350	9738662	99	9737479	6.7	15	1.0	9738662
Dissolved Chloride (Cl-)	mg/L	24	9739825	3.0	9738693	1.1	1.1	1.0	9739825
Nitrate (N)	mg/L	1.25	9738676	0.18	9738671	0.58	0.46	0.10	9738676

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

Bureau Veritas ID		AHLD11			AHLD11		
Sampling Date		2024/10/28 15:28			2024/10/28 15:28		
COC Number		971296			971296		
	UNITS	HR-QAQC-GW1	RDL	QC Batch	HR-QAQC-GW1 Lab-Dup	RDL	QC Batch
Inorganics							
Total Ammonia-N	mg/L	3.5	0.050	9737752	3.4	0.050	9737752
Total Chemical Oxygen Demand (COD)	mg/L	77	4.0	9741832			
Conductivity	umho/cm	820	1.0	9737470			
Total Dissolved Solids	mg/L	480	10	9741635			
Dissolved Organic Carbon	mg/L	19	0.4	9744822			
pH	pH	7.22		9737477			
Dissolved Sulphate (SO4)	mg/L	3.4	1.0	9738695			
Alkalinity (Total as CaCO3)	mg/L	310	1.0	9737479			
Dissolved Chloride (Cl-)	mg/L	64	1.0	9738693			
Nitrate (N)	mg/L	ND	0.10	9738671			

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 #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Bureau Veritas ID		AHLD02	AHLD02	AHLD03	AHLD04	AHLD05	AHLD06	AHLD07		
Sampling Date		2024/10/28 15:28	2024/10/28 15:28	2024/10/28 14:53	2024/10/28 15:43	2024/10/28 15:36	2024/10/28 16:42	2024/10/28 16:31		
COC Number		971296	971296	971296	971296	971296	971296	971296		
	UNITS	HR2-03R	HR2-03R Lab-Dup	HR3-03	HR4-10	HR5-10	HR6-19	HR7-19	RDL	QC Batch
Metals										
Dissolved Aluminum (Al)	ug/L	72	72	6.2	40	25	23	22	4.9	9739088
Dissolved Barium (Ba)	ug/L	190	190	65	890	430	18	370	2.0	9739088
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.40	9739088
Dissolved Boron (B)	ug/L	110	110	24	500	730	23	660	10	9739088
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.090	9739088
Dissolved Calcium (Ca)	ug/L	82000	81000	22000	64000	110000	34000	90000	200	9739088
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9739088
Dissolved Cobalt (Co)	ug/L	5.2	5.3	4.1	37	48	0.53	30	0.50	9739088
Dissolved Copper (Cu)	ug/L	ND	ND	2.9	ND	2.1	2.0	6.2	0.90	9739088
Dissolved Iron (Fe)	ug/L	32000	31000	ND	58000	47000	7700	26000	100	9739088
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.50	9739088
Dissolved Magnesium (Mg)	ug/L	9200	9400	1800	12000	13000	1400	9100	50	9739088
Dissolved Manganese (Mn)	ug/L	3100	3100	4.2	2200	4400	180	1700	2.0	9739088
Dissolved Molybdenum (Mo)	ug/L	ND	ND	ND	ND	0.65	ND	0.54	0.50	9739088
Dissolved Nickel (Ni)	ug/L	2.7	3.0	1.3	10	9.3	1.2	8.2	1.0	9739088
Dissolved Potassium (K)	ug/L	18000	18000	1500	50000	21000	1200	19000	200	9739088
Dissolved Silicon (Si)	ug/L	7500	7500	4300	8300	5600	5000	7400	50	9739088
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.090	9739088
Dissolved Sodium (Na)	ug/L	47000	48000	13000	60000	42000	1400	35000	100	9739088
Dissolved Strontium (Sr)	ug/L	410	420	77	360	490	120	350	1.0	9739088
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	0.076	ND	0.11	0.050	9739088
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9739088
Dissolved Vanadium (V)	ug/L	4.9	5.0	ND	5.0	2.0	0.87	1.8	0.50	9739088
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9739088

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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ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Bureau Veritas ID		AHLD08	AHLD09	AHLD10	AHLD11		
Sampling Date		2024/10/28 15:59	2024/10/28 16:20	2024/10/28 16:07	2024/10/28 15:28		
COC Number		971296	971296	971296	971296		
	UNITS	HR8-19	HR9-21	HR10-21	HR-QAQC-GW1	RDL	QC Batch
Metals							
Dissolved Aluminum (Al)	ug/L	7.6	19	51	71	4.9	9739088
Dissolved Barium (Ba)	ug/L	33	10	4.8	190	2.0	9739088
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	0.40	9739088
Dissolved Boron (B)	ug/L	78	ND	ND	110	10	9739088
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	0.090	9739088
Dissolved Calcium (Ca)	ug/L	36000	2900	4100	81000	200	9739088
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	5.0	9739088
Dissolved Cobalt (Co)	ug/L	ND	ND	ND	5.5	0.50	9739088
Dissolved Copper (Cu)	ug/L	5.0	5.1	1.9	ND	0.90	9739088
Dissolved Iron (Fe)	ug/L	ND	ND	ND	32000	100	9739088
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	0.50	9739088
Dissolved Magnesium (Mg)	ug/L	3500	450	780	9300	50	9739088
Dissolved Manganese (Mn)	ug/L	8.9	7.8	ND	3200	2.0	9739088
Dissolved Molybdenum (Mo)	ug/L	ND	ND	ND	ND	0.50	9739088
Dissolved Nickel (Ni)	ug/L	ND	ND	ND	2.8	1.0	9739088
Dissolved Potassium (K)	ug/L	1800	1100	890	18000	200	9739088
Dissolved Silicon (Si)	ug/L	4800	4600	4100	7400	50	9739088
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	0.090	9739088
Dissolved Sodium (Na)	ug/L	14000	1800	2100	48000	100	9739088
Dissolved Strontium (Sr)	ug/L	260	42	38	420	1.0	9739088
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	0.050	9739088
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	5.0	9739088
Dissolved Vanadium (V)	ug/L	ND	ND	ND	5.0	0.50	9739088
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	5.0	9739088

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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TEST SUMMARY

Bureau Veritas ID: AHLD02 **Collected:** 2024/10/28
Sample ID: HR2-03R **Shipped:**
Matrix: Ground Water **Received:** 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9737479	N/A	2024/11/04	Gurparteek KAUR
Chloride by Automated Colourimetry	SKAL	9738693	N/A	2024/11/05	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9737470	N/A	2024/11/04	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738676	N/A	2024/11/04	Chandra Nandlal
pH	AT	9737477	2024/10/31	2024/11/04	Gurparteek KAUR
Sulphate by Automated Turbidimetry	SKAL	9738695	N/A	2024/11/05	Alina Dobreanu
Total Dissolved Solids	BAL	9741635	2024/11/02	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD02 Dup **Collected:** 2024/10/28
Sample ID: HR2-03R **Shipped:**
Matrix: Ground Water **Received:** 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen

Bureau Veritas ID: AHLD03 **Collected:** 2024/10/28
Sample ID: HR3-03 **Shipped:**
Matrix: Ground Water **Received:** 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9738662	N/A	2024/11/05	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9739825	N/A	2024/11/05	Massarat Jan
Chemical Oxygen Demand	SPEC	9743088	N/A	2024/11/05	Shivani Shivani
Conductivity	AT	9738663	N/A	2024/11/05	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738676	N/A	2024/11/04	Chandra Nandlal
pH	AT	9738665	2024/10/31	2024/11/05	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9739829	N/A	2024/11/05	Massarat Jan
Total Dissolved Solids	BAL	9741635	2024/11/02	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD04 **Collected:** 2024/10/28
Sample ID: HR4-10 **Shipped:**
Matrix: Ground Water **Received:** 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9737479	N/A	2024/11/04	Gurparteek KAUR
Chloride by Automated Colourimetry	SKAL	9738693	N/A	2024/11/05	Alina Dobreanu

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Bureau Veritas Job #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AHLD04
Sample ID: HR4-10
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	9741309	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9737470	N/A	2024/11/04	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738671	N/A	2024/11/04	Chandra Nandlal
pH	AT	9737477	2024/10/31	2024/11/04	Gurparteek KAUR
Sulphate by Automated Turbidimetry	SKAL	9738695	N/A	2024/11/05	Alina Dobreanu
Total Dissolved Solids	BAL	9740361	2024/11/01	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD05
Sample ID: HR5-10
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9737479	N/A	2024/11/04	Gurparteek KAUR
Chloride by Automated Colourimetry	SKAL	9738693	N/A	2024/11/05	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9737470	N/A	2024/11/04	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738671	N/A	2024/11/04	Chandra Nandlal
pH	AT	9737477	2024/10/31	2024/11/04	Gurparteek KAUR
Sulphate by Automated Turbidimetry	SKAL	9738695	N/A	2024/11/05	Alina Dobreanu
Total Dissolved Solids	BAL	9740361	2024/11/01	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD06
Sample ID: HR6-19
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9737479	N/A	2024/11/04	Gurparteek KAUR
Chloride by Automated Colourimetry	SKAL	9739825	N/A	2024/11/05	Massarat Jan
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9737470	N/A	2024/11/04	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738676	N/A	2024/11/04	Chandra Nandlal
pH	AT	9737477	2024/10/31	2024/11/04	Gurparteek KAUR
Sulphate by Automated Turbidimetry	SKAL	9739829	N/A	2024/11/05	Massarat Jan
Total Dissolved Solids	BAL	9740361	2024/11/01	2024/11/05	Razieh Tabesh

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Bureau Veritas Job #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AHLD07
Sample ID: HR7-19
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9738662	N/A	2024/11/05	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9739825	N/A	2024/11/05	Massarat Jan
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9738663	N/A	2024/11/05	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738676	N/A	2024/11/04	Chandra Nandlal
pH	AT	9738665	2024/10/31	2024/11/05	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9739829	N/A	2024/11/05	Massarat Jan
Total Dissolved Solids	BAL	9741635	2024/11/02	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD08
Sample ID: HR8-19
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9737479	N/A	2024/11/04	Gurparteek KAUR
Chloride by Automated Colourimetry	SKAL	9738693	N/A	2024/11/05	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9737470	N/A	2024/11/04	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738671	N/A	2024/11/04	Chandra Nandlal
pH	AT	9737477	2024/10/31	2024/11/04	Gurparteek KAUR
Sulphate by Automated Turbidimetry	SKAL	9738695	N/A	2024/11/05	Alina Dobreanu
Total Dissolved Solids	BAL	9740361	2024/11/01	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD09
Sample ID: HR9-21
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9738662	N/A	2024/11/05	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9739825	N/A	2024/11/05	Massarat Jan
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9738663	N/A	2024/11/05	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738676	N/A	2024/11/04	Chandra Nandlal
pH	AT	9738665	2024/10/31	2024/11/05	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9739829	N/A	2024/11/05	Massarat Jan

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Bureau Veritas Job #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AHLD09
Sample ID: HR9-21
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	9740361	2024/11/01	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD10
Sample ID: HR10-21
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9738662	N/A	2024/11/05	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9739825	N/A	2024/11/05	Massarat Jan
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9738663	N/A	2024/11/05	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/04	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738676	N/A	2024/11/04	Chandra Nandlal
pH	AT	9738665	2024/10/31	2024/11/05	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9739829	N/A	2024/11/05	Massarat Jan
Total Dissolved Solids	BAL	9740361	2024/11/01	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD11
Sample ID: HR-QAQC-GW1
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9737479	N/A	2024/11/04	Gurparteek KAUR
Chloride by Automated Colourimetry	SKAL	9738693	N/A	2024/11/05	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9741832	N/A	2024/11/04	Shivani Shivani
Conductivity	AT	9737470	N/A	2024/11/04	Gurparteek KAUR
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9744822	N/A	2024/11/05	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9739088	N/A	2024/11/01	Thuy Linh Nguyen
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9738671	N/A	2024/11/04	Chandra Nandlal
pH	AT	9737477	2024/10/31	2024/11/04	Gurparteek KAUR
Sulphate by Automated Turbidimetry	SKAL	9738695	N/A	2024/11/05	Alina Dobreanu
Total Dissolved Solids	BAL	9741635	2024/11/02	2024/11/05	Razieh Tabesh

Bureau Veritas ID: AHLD11 Dup
Sample ID: HR-QAQC-GW1
Matrix: Ground Water

Collected: 2024/10/28
Shipped:
Received: 2024/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	SKAL/NH4	9737752	N/A	2024/11/04	Jinal Chavda

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GENERAL COMMENTS

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

Package 1	4.7°C
Package 2	5.7°C

Results relate only to the items tested.

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Bureau Veritas Job #: C4Y1987
Report Date: 2024/11/06

QUALITY ASSURANCE REPORT

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9737470	Conductivity	2024/11/03			102	85 - 115	ND, RDL=1.0	umho/cm	0.51	10
9737477	pH	2024/11/03			102	98 - 103			0.29	N/A
9737479	Alkalinity (Total as CaCO3)	2024/11/03			96	85 - 115	ND, RDL=1.0	mg/L	1.0	20
9737752	Total Ammonia-N	2024/11/04	91	75 - 125	96	80 - 120	ND, RDL=0.050	mg/L	1.9	20
9738662	Alkalinity (Total as CaCO3)	2024/11/05			97	85 - 115	ND, RDL=1.0	mg/L	3.4	20
9738663	Conductivity	2024/11/05			102	85 - 115	ND, RDL=1.0	umho/cm	0.19	10
9738665	pH	2024/11/05			102	98 - 103			0.74	N/A
9738671	Nitrate (N)	2024/11/04	91	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	NC	20
9738676	Nitrate (N)	2024/11/04	91	80 - 120	97	80 - 120	ND, RDL=0.10	mg/L	NC	20
9738693	Dissolved Chloride (Cl-)	2024/11/05	101	80 - 120	98	80 - 120	ND, RDL=1.0	mg/L	0.89	20
9738695	Dissolved Sulphate (SO4)	2024/11/05	99	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	0.48	20
9739088	Dissolved Aluminum (Al)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=4.9	ug/L	0.39	20
9739088	Dissolved Barium (Ba)	2024/11/01	89	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L	1.8	20
9739088	Dissolved Beryllium (Be)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=0.40	ug/L	NC	20
9739088	Dissolved Boron (B)	2024/11/01	88	80 - 120	94	80 - 120	ND, RDL=10	ug/L	3.0	20
9739088	Dissolved Cadmium (Cd)	2024/11/01	89	80 - 120	98	80 - 120	ND, RDL=0.090	ug/L	NC	20
9739088	Dissolved Calcium (Ca)	2024/11/01	NC	80 - 120	97	80 - 120	ND, RDL=200	ug/L	0.56	20
9739088	Dissolved Chromium (Cr)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L	NC	20
9739088	Dissolved Cobalt (Co)	2024/11/01	88	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	2.3	20
9739088	Dissolved Copper (Cu)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=0.90	ug/L	NC	20
9739088	Dissolved Iron (Fe)	2024/11/01	NC	80 - 120	99	80 - 120	ND, RDL=100	ug/L	1.3	20
9739088	Dissolved Lead (Pb)	2024/11/01	90	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L	NC	20
9739088	Dissolved Magnesium (Mg)	2024/11/01	92	80 - 120	100	80 - 120	ND, RDL=50	ug/L	1.6	20
9739088	Dissolved Manganese (Mn)	2024/11/01	NC	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	0.79	20
9739088	Dissolved Molybdenum (Mo)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	NC	20
9739088	Dissolved Nickel (Ni)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L	11	20
9739088	Dissolved Potassium (K)	2024/11/01	97	80 - 120	95	80 - 120	ND, RDL=200	ug/L	0.16	20
9739088	Dissolved Silicon (Si)	2024/11/01	90	80 - 120	94	80 - 120	ND, RDL=50	ug/L	0.28	20
9739088	Dissolved Silver (Ag)	2024/11/01	67 (1)	80 - 120	95	80 - 120	ND, RDL=0.090	ug/L	NC	20
9739088	Dissolved Sodium (Na)	2024/11/01	NC	80 - 120	99	80 - 120	ND, RDL=100	ug/L	0.23	20
9739088	Dissolved Strontium (Sr)	2024/11/01	94	80 - 120	98	80 - 120	ND, RDL=1.0	ug/L	0.74	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
9739088	Dissolved Thallium (Tl)	2024/11/01	93	80 - 120	99	80 - 120	ND, RDL=0.050	ug/L	NC	20
9739088	Dissolved Titanium (Ti)	2024/11/01	89	80 - 120	97	80 - 120	ND, RDL=5.0	ug/L	NC	20
9739088	Dissolved Vanadium (V)	2024/11/01	91	80 - 120	100	80 - 120	ND, RDL=0.50	ug/L	2.0	20
9739088	Dissolved Zinc (Zn)	2024/11/01	90	80 - 120	99	80 - 120	ND, RDL=5.0	ug/L	NC	20
9739825	Dissolved Chloride (Cl-)	2024/11/05	NC	80 - 120	97	80 - 120	ND, RDL=1.0	mg/L	8.3	20
9739829	Dissolved Sulphate (SO4)	2024/11/05	NC	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	2.2	20
9740361	Total Dissolved Solids	2024/11/05			98	80 - 120	ND, RDL=10	mg/L	1.6	20
9741309	Total Chemical Oxygen Demand (COD)	2024/11/04	101	80 - 120	103	80 - 120	ND, RDL=4.0	mg/L	5.5	20
9741635	Total Dissolved Solids	2024/11/05			100	80 - 120	ND, RDL=10	mg/L	0.49	20
9741832	Total Chemical Oxygen Demand (COD)	2024/11/04	101	80 - 120	103	80 - 120	ND, RDL=4.0	mg/L	NC	20
9743088	Total Chemical Oxygen Demand (COD)	2024/11/05	103	80 - 120	102	80 - 120	ND, RDL=4.0	mg/L	7.0	20
9744822	Dissolved Organic Carbon	2024/11/04	91	80 - 120	94	80 - 120	ND, RDL=0.4	mg/L	0.84	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).

(1) Matrix Spike exceeds acceptance limits, probable matrix interference

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Bureau Veritas Job #: C4Y1987
Report Date: 2024/11/06

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: BM

VALIDATION SIGNATURE PAGE

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

Louise Harding, Scientific Specialist

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

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Custody Tracking Form

T971296

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: HR1-03
Last Sample: HR-QAQC-GW1
Sample Count: 11

Relinquished By				Received By			
Brad McCallum	Brad McCall	Date	2024/10/29	[illegible]	[illegible]	Date	2024/10/30
		Time (24 HR)	08:00			Time (24 HR)	09:37
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): BM / NW

# of Coolers/Pkgs: 2

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At: Mississauga

Labeled By: [illegible]

Verified By:

Lab Comments: CUJ1083.

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

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

COR FCD-00383/4

Page 1 of 1

Appendix D

D-3 Surface Water Laboratory Reports

Your Project #: 240205-05
Site Location: Hickey Road
Your C.O.C. #: 880132

Attention: MHH Distribution

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

Report Date: 2024/04/24
Report #: R8121941
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4B3920
Received: 2024/04/17, 10:00

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dissolved Aluminum (0.2 u, clay free)	1	N/A	2024/04/22	CAM SOP-00447	EPA 6020B m
Dissolved Aluminum (0.2 u, clay free)	4	N/A	2024/04/23	CAM SOP-00447	EPA 6020B m
Alkalinity	5	N/A	2024/04/19	CAM SOP-00448	SM 24 2320 B m
Biochemical Oxygen Demand (BOD)	5	2024/04/18	2024/04/23	CAM SOP-00427	SM 24 5210B m
Chloride by Automated Colourimetry	5	N/A	2024/04/23	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	5	N/A	2024/04/23	CAM SOP-00416	SM 24 5220 D m
Conductivity	5	N/A	2024/04/19	CAM SOP-00414	SM 24 2510 m
Hardness (calculated as CaCO3)	1	N/A	2024/04/22	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3)	4	N/A	2024/04/24	CAM SOP 00102/00408/00447	SM 2340 B
Total Metals Analysis by ICPMS	5	2024/04/22	2024/04/23	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	5	N/A	2024/04/21	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (1)	5	N/A	2024/04/18	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (2)	5	2024/04/18	2024/04/19	CAM SOP-00413	SM 24th - 4500H+ B
Field Measured pH (3)	5	N/A	2024/04/17		Field pH Meter
Sulphate by Automated Turbidimetry	5	N/A	2024/04/23	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	2	2024/04/19	2024/04/20	CAM SOP-00428	SM 24 2540C m
Total Dissolved Solids	3	2024/04/19	2024/04/22	CAM SOP-00428	SM 24 2540C m
Field Temperature (3)	5	N/A	2024/04/17		Field Thermometer
Total Kjeldahl Nitrogen in Water	5	2024/04/18	2024/04/19	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	5	2024/04/18	2024/04/19	CAM SOP-00407	SM 24 4500-P I
Total Suspended Solids	5	2024/04/18	2024/04/19	CAM SOP-00428	SM 24 2540D m
Un-ionized Ammonia (4)	5	2024/04/17	2024/04/23	Auto Calc.	PWQO

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

Your Project #: 240205-05
Site Location: Hickey Road
Your C.O.C. #: 880132

Attention: MHH Distribution

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

Report Date: 2024/04/24
Report #: R8121941
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4B3920
Received: 2024/04/17, 10:00

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.

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

(3) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.
(4) Un-ionized ammonia is calculated using the total ammonia result and field data provided by the client for pH and temperature.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bureauveritas.com
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		YXQ264			YXQ264			YXQ265		
Sampling Date		2024/04/16 14:15			2024/04/16 14:15			2024/04/16 13:15		
COC Number		880132			880132			880132		
	UNITS	HR-SW1	RDL	QC Batch	HR-SW1 Lab-Dup	RDL	QC Batch	HR-SW2	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	39	1.0	9338394				26	1.0	9338394
Total Un-ionized Ammonia	mg/L	ND	0.00061	9338763				ND	0.00061	9338763
Field Measurements										
Field Temperature	Celsius	7.3	N/A	ONSITE				6.6	N/A	ONSITE
Field Measured pH	pH	7		ONSITE				6.79		ONSITE
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9341424				ND	0.050	9341424
Total BOD	mg/L	ND	2	9340789				ND	2	9340789
Total Chemical Oxygen Demand (COD)	mg/L	7.9	4.0	9344824	7.1	4.0	9344824	11	4.0	9344824
Conductivity	umho/cm	80	1.0	9342140				54	1.0	9342140
Total Dissolved Solids	mg/L	30	10	9344349				60	10	9345497
Total Kjeldahl Nitrogen (TKN)	mg/L	ND	0.10	9342424				0.10	0.10	9342424
pH	pH	7.35		9342159				7.03		9342159
Total Phosphorus	mg/L	ND	0.020	9342355				ND	0.020	9342355
Total Suspended Solids	mg/L	ND	10	9341557				ND	10	9341557
Dissolved Sulphate (SO4)	mg/L	6.3	1.0	9341265				5.6	1.0	9341265
Alkalinity (Total as CaCO3)	mg/L	35	1.0	9342122				22	1.0	9342122
Dissolved Chloride (Cl-)	mg/L	ND	1.0	9341260				ND	1.0	9341260
Nitrite (N)	mg/L	ND	0.010	9341272				ND	0.010	9341272
Nitrate (N)	mg/L	0.29	0.10	9341272				ND	0.10	9341272
Nitrate + Nitrite (N)	mg/L	0.29	0.10	9341272				ND	0.10	9341272

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.
N/A = Not Applicable

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		YXQ265			YXQ266		YXQ267		
Sampling Date		2024/04/16 13:15			2024/04/16 12:40		2024/04/16 14:25		
COC Number		880132			880132		880132		
	UNITS	HR-SW2 Lab-Dup	RDL	QC Batch	HR-SW3	QC Batch	HR-SW4	RDL	QC Batch
Calculated Parameters									
Hardness (CaCO3)	mg/L				21	9338394	12	1.0	9338394
Total Un-ionized Ammonia	mg/L				ND	9338763	ND	0.00061	9338763
Field Measurements									
Field Temperature	Celsius				7.8	ONSITE	3.9	N/A	ONSITE
Field Measured pH	pH				5.68	ONSITE	6.47		ONSITE
Inorganics									
Total Ammonia-N	mg/L				ND	9341424	ND	0.050	9341424
Total BOD	mg/L				ND	9340789	ND	2	9340789
Total Chemical Oxygen Demand (COD)	mg/L				21	9344824	12	4.0	9344824
Conductivity	umho/cm	55	1.0	9342140	45	9340761	29	1.0	9340761
Total Dissolved Solids	mg/L				20	9344349	40	10	9345497
Total Kjeldahl Nitrogen (TKN)	mg/L	0.10	0.10	9342424	0.20	9342424	ND	0.10	9342424
pH	pH	7.07		9342159	7.18	9340760	6.59		9340760
Total Phosphorus	mg/L				ND	9342355	ND	0.020	9342355
Total Suspended Solids	mg/L				ND	9341557	ND	10	9341557
Dissolved Sulphate (SO4)	mg/L				6.9	9342307	5.6	1.0	9342307
Alkalinity (Total as CaCO3)	mg/L	23	1.0	9342122	27	9340759	8.2	1.0	9340759
Dissolved Chloride (Cl-)	mg/L				1.3	9342298	1.2	1.0	9342298
Nitrite (N)	mg/L				ND	9340782	ND	0.010	9340782
Nitrate (N)	mg/L				ND	9340782	ND	0.10	9340782
Nitrate + Nitrite (N)	mg/L				ND	9340782	ND	0.10	9340782

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.
N/A = Not Applicable

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		YXQ267			YXQ268			YXQ268		
Sampling Date		2024/04/16 14:25			2024/04/16 13:15			2024/04/16 13:15		
COC Number		880132			880132			880132		
	UNITS	HR-SW4 Lab-Dup	RDL	QC Batch	HR-QAQC-SW1	RDL	QC Batch	HR-QAQC-SW1 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L				27	1.0	9338394			
Total Un-ionized Ammonia	mg/L				ND	0.00061	9338763			
Field Measurements										
Field Temperature	Celsius				7.3	N/A	ONSITE			
Field Measured pH	pH				7		ONSITE			
Inorganics										
Total Ammonia-N	mg/L				ND	0.050	9341424			
Total BOD	mg/L				ND	2	9340789	ND	2	9340789
Total Chemical Oxygen Demand (COD)	mg/L				13	4.0	9344824			
Conductivity	umho/cm	30	1.0	9340761	55	1.0	9342140			
Total Dissolved Solids	mg/L				85	10	9345497			
Total Kjeldahl Nitrogen (TKN)	mg/L				0.11	0.10	9342424			
pH	pH	6.54		9340760	7.37		9342159			
Total Phosphorus	mg/L				ND	0.020	9342355			
Total Suspended Solids	mg/L				ND	10	9341557			
Dissolved Sulphate (SO4)	mg/L				5.5	1.0	9341265			
Alkalinity (Total as CaCO3)	mg/L	7.7	1.0	9340759	27	1.0	9342122			
Dissolved Chloride (Cl-)	mg/L				ND	1.0	9341260			
Nitrite (N)	mg/L				ND	0.010	9341272			
Nitrate (N)	mg/L				ND	0.10	9341272			
Nitrate + Nitrite (N)	mg/L				ND	0.10	9341272			

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.
N/A = Not Applicable

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		YXQ264			YXQ264			YXQ265	YXQ266		
Sampling Date		2024/04/16 14:15			2024/04/16 14:15			2024/04/16 13:15	2024/04/16 12:40		
COC Number		880132			880132			880132	880132		
	UNITS	HR-SW1	RDL	QC Batch	HR-SW1 Lab-Dup	RDL	QC Batch	HR-SW2	HR-SW3	RDL	QC Batch
Metals											
Dissolved (0.2u) Aluminum (Al)	ug/L	24	5	9345362	23	5	9345362	48	87	5	9347131
Total Barium (Ba)	ug/L	11	2.0	9347311				11	10	2.0	9347311
Total Boron (B)	ug/L	ND	10	9347311				ND	ND	10	9347311
Total Calcium (Ca)	ug/L	13000	200	9347311				8300	6200	200	9347311
Total Cobalt (Co)	ug/L	ND	0.50	9347311				ND	ND	0.50	9347311
Total Copper (Cu)	ug/L	1.2	0.90	9347311				1.3	1.6	0.90	9347311
Total Iron (Fe)	ug/L	ND	100	9347311				ND	ND	100	9347311
Total Lead (Pb)	ug/L	ND	0.50	9347311				ND	ND	0.50	9347311
Total Magnesium (Mg)	ug/L	1200	50	9347311				1000	810	50	9347311
Total Manganese (Mn)	ug/L	ND	2.0	9347311				ND	6.2	2.0	9347311
Total Potassium (K)	ug/L	780	200	9347311				710	590	200	9347311
Total Sodium (Na)	ug/L	800	100	9347311				870	850	100	9347311
Total Zinc (Zn)	ug/L	ND	5.0	9347311				ND	ND	5.0	9347311

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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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		YXQ267		YXQ268		
Sampling Date		2024/04/16 14:25		2024/04/16 13:15		
COC Number		880132		880132		
	UNITS	HR-SW4	QC Batch	HR-QAQC-SW1	RDL	QC Batch
Metals						
Dissolved (0.2u) Aluminum (Al)	ug/L	82	9348560	48	5	9347131
Total Barium (Ba)	ug/L	9.7	9347311	11	2.0	9347311
Total Boron (B)	ug/L	ND	9347311	ND	10	9347311
Total Calcium (Ca)	ug/L	2800	9347311	7900	200	9347311
Total Cobalt (Co)	ug/L	ND	9347311	ND	0.50	9347311
Total Copper (Cu)	ug/L	1.6	9347311	1.2	0.90	9347311
Total Iron (Fe)	ug/L	ND	9347311	ND	100	9347311
Total Lead (Pb)	ug/L	ND	9347311	ND	0.50	9347311
Total Magnesium (Mg)	ug/L	910	9347311	1000	50	9347311
Total Manganese (Mn)	ug/L	6.4	9347311	ND	2.0	9347311
Total Potassium (K)	ug/L	870	9347311	700	200	9347311
Total Sodium (Na)	ug/L	810	9347311	810	100	9347311
Total Zinc (Zn)	ug/L	ND	9347311	ND	5.0	9347311

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 #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: YXQ264
Sample ID: HR-SW1
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	9345362	N/A	2024/04/22	Nan Raykha
Alkalinity	AT	9342122	N/A	2024/04/19	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	9340789	2024/04/18	2024/04/23	Amrutha Anilkumar
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9344824	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9342140	N/A	2024/04/19	Nachiketa Gohil
Hardness (calculated as CaCO3)		9338394	N/A	2024/04/22	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9347311	2024/04/22	2024/04/23	Arefa Dabhad
Total Ammonia-N	LACH/NH4	9341424	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341272	N/A	2024/04/18	Chandra Nandlal
pH	AT	9342159	2024/04/18	2024/04/19	Nachiketa Gohil
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Total Kjeldahl Nitrogen in Water	SKAL	9342424	2024/04/18	2024/04/19	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9342355	2024/04/18	2024/04/19	Sachi Patel
Total Suspended Solids	BAL	9341557	2024/04/18	2024/04/19	Razieh Tabesh
Un-ionized Ammonia	CALC/NH3	9338763	2024/04/23	2024/04/23	Automated Statchk

Bureau Veritas ID: YXQ264 Dup
Sample ID: HR-SW1
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	9345362	N/A	2024/04/22	Nan Raykha
Chemical Oxygen Demand	SPEC	9344824	N/A	2024/04/23	Arshdeep Jagayat

Bureau Veritas ID: YXQ265
Sample ID: HR-SW2
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	9347131	N/A	2024/04/23	Prempal Bhatti
Alkalinity	AT	9342122	N/A	2024/04/19	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	9340789	2024/04/18	2024/04/23	Amrutha Anilkumar
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9344824	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9342140	N/A	2024/04/19	Nachiketa Gohil
Hardness (calculated as CaCO3)		9338394	N/A	2024/04/24	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9347311	2024/04/22	2024/04/23	Arefa Dabhad
Total Ammonia-N	LACH/NH4	9341424	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341272	N/A	2024/04/18	Chandra Nandlal
pH	AT	9342159	2024/04/18	2024/04/19	Nachiketa Gohil

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: YXQ265
Sample ID: HR-SW2
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9345497	2024/04/19	2024/04/22	Razieh Tabesh
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Total Kjeldahl Nitrogen in Water	SKAL	9342424	2024/04/18	2024/04/19	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9342355	2024/04/18	2024/04/19	Sachi Patel
Total Suspended Solids	BAL	9341557	2024/04/18	2024/04/19	Razieh Tabesh
Un-ionized Ammonia	CALC/NH3	9338763	2024/04/23	2024/04/23	Automated Statchk

Bureau Veritas ID: YXQ265 Dup
Sample ID: HR-SW2
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9342122	N/A	2024/04/19	Surinder Rai
Conductivity	AT	9342140	N/A	2024/04/19	Nachiketa Gohil
pH	AT	9342159	2024/04/18	2024/04/19	Nachiketa Gohil
Total Kjeldahl Nitrogen in Water	SKAL	9342424	2024/04/18	2024/04/19	Rajni Tyagi

Bureau Veritas ID: YXQ266
Sample ID: HR-SW3
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	9347131	N/A	2024/04/23	Prempal Bhatti
Alkalinity	AT	9340759	N/A	2024/04/19	Nachiketa Gohil
Biochemical Oxygen Demand (BOD)	DO	9340789	2024/04/18	2024/04/23	Amrutha Anilkumar
Chloride by Automated Colourimetry	SKAL	9342298	N/A	2024/04/23	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9344824	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9340761	N/A	2024/04/19	Nachiketa Gohil
Hardness (calculated as CaCO3)		9338394	N/A	2024/04/24	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9347311	2024/04/22	2024/04/23	Arefa Dabhad
Total Ammonia-N	LACH/NH4	9341424	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9340782	N/A	2024/04/18	Chandra Nandlal
pH	AT	9340760	2024/04/18	2024/04/19	Nachiketa Gohil
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Sulphate by Automated Turbidimetry	SKAL	9342307	N/A	2024/04/23	Alina Dobreanu
Total Dissolved Solids	BAL	9344349	2024/04/20	2024/04/20	Madhav Somani
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Total Kjeldahl Nitrogen in Water	SKAL	9342424	2024/04/18	2024/04/19	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9342355	2024/04/18	2024/04/19	Sachi Patel
Total Suspended Solids	BAL	9341557	2024/04/18	2024/04/19	Razieh Tabesh
Un-ionized Ammonia	CALC/NH3	9338763	2024/04/23	2024/04/23	Automated Statchk

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: YXQ267
Sample ID: HR-SW4
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	9348560	N/A	2024/04/23	Azita Fazaeli
Alkalinity	AT	9340759	N/A	2024/04/19	Nachiketa Gohil
Biochemical Oxygen Demand (BOD)	DO	9340789	2024/04/18	2024/04/23	Amrutha Anilkumar
Chloride by Automated Colourimetry	SKAL	9342298	N/A	2024/04/23	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9344824	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9340761	N/A	2024/04/19	Nachiketa Gohil
Hardness (calculated as CaCO3)		9338394	N/A	2024/04/24	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9347311	2024/04/22	2024/04/23	Arefa Dabhad
Total Ammonia-N	LACH/NH4	9341424	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9340782	N/A	2024/04/18	Chandra Nandlal
pH	AT	9340760	2024/04/18	2024/04/19	Nachiketa Gohil
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Sulphate by Automated Turbidimetry	SKAL	9342307	N/A	2024/04/23	Alina Dobreanu
Total Dissolved Solids	BAL	9345497	2024/04/19	2024/04/22	Razieh Tabesh
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Total Kjeldahl Nitrogen in Water	SKAL	9342424	2024/04/18	2024/04/19	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9342355	2024/04/18	2024/04/19	Sachi Patel
Total Suspended Solids	BAL	9341557	2024/04/18	2024/04/19	Razieh Tabesh
Un-ionized Ammonia	CALC/NH3	9338763	2024/04/23	2024/04/23	Automated Statchk

Bureau Veritas ID: YXQ267 Dup
Sample ID: HR-SW4
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9340759	N/A	2024/04/19	Nachiketa Gohil
Conductivity	AT	9340761	N/A	2024/04/19	Nachiketa Gohil
pH	AT	9340760	2024/04/18	2024/04/19	Nachiketa Gohil

Bureau Veritas ID: YXQ268
Sample ID: HR-QAQC-SW1
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	9347131	N/A	2024/04/23	Prempal Bhatti
Alkalinity	AT	9342122	N/A	2024/04/19	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	9340789	2024/04/18	2024/04/23	Amrutha Anilkumar
Chloride by Automated Colourimetry	SKAL	9341260	N/A	2024/04/23	Geetee Noorzaad
Chemical Oxygen Demand	SPEC	9344824	N/A	2024/04/23	Arshdeep Jagayat
Conductivity	AT	9342140	N/A	2024/04/19	Nachiketa Gohil
Hardness (calculated as CaCO3)		9338394	N/A	2024/04/24	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9347311	2024/04/22	2024/04/23	Arefa Dabhad
Total Ammonia-N	LACH/NH4	9341424	N/A	2024/04/21	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9341272	N/A	2024/04/18	Chandra Nandlal

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: YXQ268
Sample ID: HR-QAQC-SW1
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH	AT	9342159	2024/04/18	2024/04/19	Nachiketa Gohil
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Sulphate by Automated Turbidimetry	SKAL	9341265	N/A	2024/04/23	Geetee Noorzaad
Total Dissolved Solids	BAL	9345497	2024/04/19	2024/04/22	Razieh Tabesh
Field Measured pH	PH	ONSITE	N/A	2024/04/17	Rupinder Kaur
Total Kjeldahl Nitrogen in Water	SKAL	9342424	2024/04/18	2024/04/19	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9342355	2024/04/18	2024/04/19	Sachi Patel
Total Suspended Solids	BAL	9341557	2024/04/18	2024/04/19	Razieh Tabesh
Un-ionized Ammonia	CALC/NH3	9338763	2024/04/23	2024/04/23	Automated Statchk

Bureau Veritas ID: YXQ268 Dup
Sample ID: HR-QAQC-SW1
Matrix: Water

Collected: 2024/04/16
Shipped:
Received: 2024/04/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Biochemical Oxygen Demand (BOD)	DO	9340789	2024/04/18	2024/04/23	Amrutha Anilkumar

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GENERAL COMMENTS

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

Package 1	4.3°C

Results relate only to the items tested.

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Bureau Veritas Job #: C4B3920
Report Date: 2024/04/24

QUALITY ASSURANCE REPORT

BluMetric Environmental Inc
Client Project #: 240205-05
Site Location: Hickey Road
Sampler Initials: CM

			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
9340759	Alkalinity (Total as CaCO3)	2024/04/19			102	85 - 115	ND, RDL=1.0	mg/L	6.9	20		
9340760	pH	2024/04/19			102	98 - 103			0.75	N/A		
9340761	Conductivity	2024/04/19			102	85 - 115	ND, RDL=1.0	umho/cm	2.4	10		
9340782	Nitrate (N)	2024/04/18	84..88	80 - 120	97	80 - 120	ND, RDL=0.10	mg/L	1.2	20		
9340782	Nitrite (N)	2024/04/18	100	80 - 120	102	80 - 120	ND, RDL=0.010	mg/L	8.2	20		
9340789	Total BOD	2024/04/23					ND,RDL=2	mg/L	NC	30	100	80 - 120
9341260	Dissolved Chloride (Cl-)	2024/04/23	NC	80 - 120	98	80 - 120	ND, RDL=1.0	mg/L	7.0	20		
9341265	Dissolved Sulphate (SO4)	2024/04/23	NC	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	2.8	20		
9341272	Nitrate (N)	2024/04/18	98	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	NC	20		
9341272	Nitrite (N)	2024/04/18	101	80 - 120	101	80 - 120	ND, RDL=0.010	mg/L				
9341424	Total Ammonia-N	2024/04/21	94	75 - 125	103	80 - 120	ND, RDL=0.050	mg/L	2.0	20		
9341557	Total Suspended Solids	2024/04/19			100	80 - 120	ND, RDL=10	mg/L	NC	20		
9342122	Alkalinity (Total as CaCO3)	2024/04/19			96	85 - 115	ND, RDL=1.0	mg/L	1.7	20		
9342140	Conductivity	2024/04/19			101	85 - 115	ND, RDL=1.0	umho/cm	0.18	10		
9342159	pH	2024/04/19			102	98 - 103			0.55	N/A		
9342298	Dissolved Chloride (Cl-)	2024/04/23	94	80 - 120	97	80 - 120	ND, RDL=1.0	mg/L	NC	20		
9342307	Dissolved Sulphate (SO4)	2024/04/23	95	75 - 125	96	80 - 120	ND, RDL=1.0	mg/L	0.71	20		
9342355	Total Phosphorus	2024/04/19	97	80 - 120	98	80 - 120	ND, RDL=0.020	mg/L	4.0	20	93	80 - 120
9342424	Total Kjeldahl Nitrogen (TKN)	2024/04/19	105	80 - 120	103	80 - 120	ND, RDL=0.10	mg/L	0	20	103	80 - 120
9344349	Total Dissolved Solids	2024/04/20			95	80 - 120	ND, RDL=10	mg/L	12	20		
9344824	Total Chemical Oxygen Demand (COD)	2024/04/23	106	80 - 120	100	80 - 120	ND, RDL=4.0	mg/L	9.6	20		
9345362	Dissolved (0.2u) Aluminum (Al)	2024/04/22	104	80 - 120	100	80 - 120	ND,RDL=5	ug/L	3.6	20		
9345497	Total Dissolved Solids	2024/04/22			95	80 - 120	ND, RDL=10	mg/L	0.83	20		
9347131	Dissolved (0.2u) Aluminum (Al)	2024/04/23	103	80 - 120	103	80 - 120	ND,RDL=5	ug/L	3.0	20		
9347311	Total Barium (Ba)	2024/04/23	97	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L				
9347311	Total Boron (B)	2024/04/23	99	80 - 120	99	80 - 120	ND, RDL=10	ug/L				

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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
9347311	Total Calcium (Ca)	2024/04/23	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L				
9347311	Total Cobalt (Co)	2024/04/23	98	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L				
9347311	Total Copper (Cu)	2024/04/23	99	80 - 120	96	80 - 120	ND, RDL=0.90	ug/L	5.5	20		
9347311	Total Iron (Fe)	2024/04/23	97	80 - 120	95	80 - 120	ND, RDL=100	ug/L				
9347311	Total Lead (Pb)	2024/04/23	99	80 - 120	94	80 - 120	ND, RDL=0.50	ug/L				
9347311	Total Magnesium (Mg)	2024/04/23	106	80 - 120	106	80 - 120	ND, RDL=50	ug/L				
9347311	Total Manganese (Mn)	2024/04/23	95	80 - 120	94	80 - 120	ND, RDL=2.0	ug/L				
9347311	Total Potassium (K)	2024/04/23	106	80 - 120	101	80 - 120	ND, RDL=200	ug/L				
9347311	Total Sodium (Na)	2024/04/23	99	80 - 120	92	80 - 120	ND, RDL=100	ug/L				
9347311	Total Zinc (Zn)	2024/04/23	99	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L				
9348560	Dissolved (0.2u) Aluminum (Al)	2024/04/23	96	80 - 120	93	80 - 120	ND,RDL=5	ug/L	NC	20		

N/A = Not Applicable

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

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

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

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

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

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

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

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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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Custody Tracking Form

T880132

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: HR-SW1
Last Sample: HR-QAQC-SW1
Sample Count: 5

Relinquished By				Received By			
Brad McCallum	Brad McCallum	Date	2024/04/16	ASHITHA SUKUMAR	Ashitha Sukumar	Date	2024/04/17
		Time (24 HR)	16:15			Time (24 HR)	16:00
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 McCallum / Samantha Norman

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐
Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

17-Apr-24 10:00
Christine Gripton
C4B3920
AKO ENV-764

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

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

COR FCD-00383/4

Appendix D

D-4 QAQC Calculations

2024 Groundwater Sampling Quality Assurance and Quality Control (Spring)

Sample Description		MDL	HR2-03	HR-QAQC-GW1 (HR2-03)	Relative Percent Difference
Date Sampled			16-Apr-24	16-Apr-24	
Parameter	Unit				
pH	pH Units	NA	6.94	6.96	NA
Alkalinity (as CaCO3)	mg/L	5	180	180	0%
Electrical Conductivity	uS/cm	2	610	620	2%
Total Dissolved Solids	mg/L	10	400	435	8%
Chloride	mg/L	0.1	69	74	7%
Nitrate as N	mg/L	0.05	<0.1	<0.1	NA
Sulphate	mg/L	0.1	45	45	0%
Ammonia as N	mg/L	0.18	0.62	0.64	NA
Chemical Oxygen Demand	mg/L	5	38	39	NA
Dissolved Organic Carbon	mg/L	0.5	7.1	7	1%
Dissolved Calcium	mg/L	0.05	97	98	1%
Dissolved Magnesium	mg/L	0.05	9.1	9.4	3%
Dissolved Potassium	mg/L	0.5	14	14	0%
Dissolved Sodium	mg/L	0.05	18	18	0%
Dissolved Aluminum	mg/L	0.004	0.031	0.031	0%
Dissolved Barium	mg/L	0.002	0.16	0.16	0%
Dissolved Beryllium	mg/L	0.001	<0.0004	<0.0004	NA
Dissolved Boron	mg/L	0.01	0.074	0.075	1%
Dissolved Cadmium	mg/L	0.0001	<0.00009	<0.00009	NA
Dissolved Chromium	mg/L	0.003	<0.005	<0.005	NA
Dissolved Cobalt	mg/L	0.0005	0.0061	0.0062	2%
Dissolved Copper	mg/L	0.002	<0.0009	<0.0009	NA
Dissolved Iron	mg/L	0.1	24	24	NA
Dissolved Lead	mg/L	0.001	<0.0005	<0.0005	NA
Dissolved Manganese	mg/L	0.002	2.7	2.7	0%
Dissolved Molybdenum	mg/L	0.002	<0.0005	<0.0005	NA
Dissolved Nickel	mg/L	0.001	0.003	0.0029	NA
Dissolved Silicon	mg/L	0.05	9	9	0%
Dissolved Silver	mg/L	0.0001	<0.00009	<0.00009	NA
Dissolved Strontium	mg/L	0.005	0.42	0.43	2%
Dissolved Thallium	mg/L	0.0003	<0.00005	<0.00005	NA
Dissolved Titanium	mg/L	0.002	<0.005	<0.005	NA
Dissolved Vanadium	mg/L	0.002	0.0019	0.002	NA
Dissolved Zinc	mg/L	0.005	<0.005	<0.005	NA

Yellow shading indicates RPD value is above the percentage for a high level of reproducibility:
10% for electrical conductivity
20% for metals and inorganics
30% for BTEX and PHC.

2024 Surface Water Sampling Quality Assurance and Quality Control (Spring)

Sample Description		MDL	HR-SW2	HR-QAQC-SW1 (HR-SW2)	Relative Percent Difference
Date Sampled			16-Apr-24	16-Apr-24	
Parameter	**Unit**				
pH	pH Units	0.01	7.03	7.37	5%
Alkalinity (as CaCO3)	mg/L	5	22	27	NA
Electrical Conductivity	uS/cm	2	54	55	2%
Hardness (as CaCO3) (Calculated)	mg/L	0.5	26	27	4%
Total Dissolved Solids	mg/L	10	60	85	34%
Total Suspended Solids	mg/L	10	<10	<10	NA
Chloride	mg/L	0.10	<1	<1	NA
Nitrate as N	mg/L	0.05	<0.1	<0.1	NA
Nitrite as N	mg/L	0.05	<0.01	<0.01	NA
Sulphate	mg/L	0.10	5.6	5.5	2%
Ammonia as N	mg/L	0.02	<0.05	<0.05	NA
Total Kjeldahl Nitrogen	mg/L	0.10	0.1	0.11	NA
Total Phosphorus	mg/L	0.02	<0.02	<0.02	NA
Chemical Oxygen Demand	mg/L	5	11	13	NA
Total Calcium	mg/L	0.32	8.3	7.9	5%
Total Magnesium	mg/L	0.34	1	1	NA
Total Potassium	mg/L	1.15	0.71	0.7	NA
Total Sodium	mg/L	0.45	0.87	0.81	NA
Aluminum-dissolved	mg/L	0.004	0.048	0.048	0%
Total Barium	mg/L	0.002	0.011	0.011	0%
Total Boron	mg/L	0.010	<0.01	<0.01	NA
Total Cobalt	mg/L	0.0005	<0.0005	<0.0005	NA
Total Copper	mg/L	0.002	0.0013	0.0012	NA
Total Iron	mg/L	0.010	<0.1	<0.1	NA
Total Lead	mg/L	0.001	<0.0005	<0.0005	NA
Total Manganese	mg/L	0.002	<0.002	<0.002	NA
Total Zinc	mg/L	0.020	<0.005	<0.005	NA

Yellow shading indicates RPD value is above the percentage for a high level of reproducibility:
10% for electrical conductivity
20% for metals and inorganics
30% for BTEX and PHC.

2024 Groundwater Sampling Quality Assurance and Quality Control (Fall)

Sample Description		MDL	HR2-03R	HR-QAQC GW1 (HR2-03R)	Relative Percent Difference
Date Sampled			28-Oct-24	28-Oct-24	
Parameter	**Unit**				
pH	pH Units	NA	7.21	7.22	NA
Alkalinity (as CaCO3)	mg/L	5	310	310	0%
Electrical Conductivity	uS/cm	2	810	820	1%
Total Dissolved Solids	mg/L	10	500	480	4%
Chloride	mg/L	0.10	64	64	0%
Nitrate as N	mg/L	0.05	<0.1	<0.1	NA
Sulphate	mg/L	0.10	3.6	3.4	6%
Ammonia as N	mg/L	0.18	3.6	3.5	3%
Chemical Oxygen Demand	mg/L	5	81	77	5%
Dissolved Organic Carbon	mg/L	0.5	18	19	5%
Dissolved Calcium	mg/L	0.05	82	81	1%
Dissolved Magnesium	mg/L	0.05	9.2	9.3	1%
Dissolved Potassium	mg/L	0.50	18	18	0%
Dissolved Sodium	mg/L	0.05	47	48	2%
Dissolved Aluminum	mg/L	0.004	0.072	0.071	1%
Dissolved Barium	mg/L	0.002	0.19	0.19	0%
Dissolved Beryllium	mg/L	0.001	<0.0004	<0.0004	NA
Dissolved Boron	mg/L	0.010	0.11	0.11	0%
Dissolved Cadmium	mg/L	0.0001	<0.00009	<0.00009	NA
Dissolved Chromium	mg/L	0.003	<0.005	<0.005	NA
Dissolved Cobalt	mg/L	0.0005	0.0052	0.0055	NA
Dissolved Copper	mg/L	0.002	<0.0009	<0.0009	NA
Dissolved Iron	mg/L	0.10	32	32	NA
Dissolved Lead	mg/L	0.001	<0.0005	<0.0005	NA
Dissolved Manganese	mg/L	0.002	3.1	3.2	3%
Dissolved Molybdenum	mg/L	0.002	<0.0005	<0.0005	NA
Dissolved Nickel	mg/L	0.001	0.0027	0.0028	NA
Dissolved Silicon	mg/L	0.05	7.5	7.4	1%
Dissolved Silver	mg/L	0.0001	<0.00009	<0.00009	NA
Dissolved Strontium	mg/L	0.005	0.41	0.42	2%
Dissolved Thallium	mg/L	0.0003	<0.00005	<0.00005	NA
Dissolved Titanium	mg/L	0.002	<0.005	<0.005	NA
Dissolved Vanadium	mg/L	0.002	0.0049	0.005	NA
Dissolved Zinc	mg/L	0.005	<0.005	<0.005	NA

Yellow shading indicates RPD value is above the percentage for a high level of reproducibility:
10% for electrical conductivity
20% for metals and inorganics
30% for BTEX and PHC.

Appendix E

Historical Groundwater and Surface Water Chemistry

Appendix E

E-1 Historical Groundwater Chemistry

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2003-Sep-30	2006-May-10	2006-Nov-20	2007-May-03	2008-May-08	2008-Oct-09	2009-Jun-04	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2012-Apr-16	2013-Apr-16	2014-May-12	2015-May-05
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	7	-	-	3	1	1	2	1	2	<1	31	2	1.52	1.3	1.06
Fluoride	mg/L	-	1.5	-	-	0.01	0.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	1.83	<0.1	<0.1	<0.1	<0.1	0.23	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.05	0.1
Sulphate	mg/L	-	500	-	-	0.1	49	8	31	12	8	11	10	12	11	12	12	6	15.1	6.8	12.5
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	85	10	18	31	12	19	12	20	27	24	22	13.3	28.7	9.61	28.1
Magnesium (diss)	mg/L	-	-	-	-	0.05	9	1	2	2	<1	2	2	4	3	2	2	995	2.29	0.73	2.74
Potassium (diss)	mg/L	-	-	-	-	0.05	4	2	2	1	<1	1	1	1	<1	<1	<1	752	1.27	0.87	1.12
Sodium (diss)	mg/L	104.5	200	-	-	0.05	18	<2	<2	<2	<2	<2	2	<2	2	<2	<2	1.12	2.93	1.33	1.39
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	215	22	46	75	29	54	31	64	81	71	57	36	65	20	67
Ammonia as N	mg/L	-	-	-	-	0.02	-	-	-	0.06	0.03	<0.02	<0.02	0.02	0.03	<0.02	<0.02	0.02	0.14	0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	-	-	-	<5	16	25	15	34	25	30	18	61	8	<5	9
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	-	-	-	5.7	5.8	9.3	7.7	14.6	8.6	11.9	5.2	6.3	2.2	5.6	3.1
Electrical Conductivity	uS/cm	-	-	-	-	1	481	64	123	171	78	135	90	153	190	166	133	103	168	64	168
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	237	29.1	53.2	85.6	32	55.7	38.2	66.4	79.8	68.2	63.2	4130.6	81.1	27	81.4
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.02	6.71	6.63	6.67	7.38	6.9	6.73	6.87	7.84	6.89	7.34	7.1	7.52	7.18	7.69
Total Dissolved Solids	mg/L	314	500	-	-	10	-	-	-	111	51	88	59	100	123	108	86	133	118	90	120
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.01	0.05	0.06	0.02	0.03	0.03	0.04	0.01	<0.01	0.02	0.01	0.02	0.02	0.02	0.01
Antimony (diss)	mg/L	-	0.006	-	0.02		0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.05	<0.01	0.01	0.04	0.02	0.02	0.03	0.04	0.04	0.03	0.02	0.02	0.04	0.02	0.04
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.1	0.01	0.01	0.02	<0.01	0.01	0.01	0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	0.01
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	0	<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	0.0136	0.05	-	-	0.002	0	<0.001	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0	<0.001	<0.001	<0.003	<0.003	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.01	<0.0002	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0	0	<0.0002	<0.0005	<0.001	<0.001	<0.001
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0	0	0	0	0	0	<0.001	0	<0.001	0	<0.001	0	<0.003	<0.003	<0.003
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	0.03	<0.03	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.002	<0.002	<0.002
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	1.98	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	0	<0.002	0
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.003	<0.003	<0.003
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	7.4	3.9	5.2	4	4.3	5.4	3.6	4.9	4.4	4.9	4.1	3.21	4.56	4.17	3.82
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	0	<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
Strontium (diss)	mg/L	-	-	-	-	0.001	0.39	0.05	0.11	0.12	0.05	0.09	0.08	0.12	0.15	0.15	0.1	0.07	0.16	0.05	0.13
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0	<0.006	<0.006	<0.006
Titanium (diss)	mg/L	-	-	-	-	0.002	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.002	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.002	<0.002
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	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR1-03	HR2-03	HR2-03	HR2-03	HR2-03
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2016-Apr-27	2017-May-12	2017-Oct-24	2018-May-09	2019-May-08	2020-May-08	2021-Apr-22	2021-Oct-21	2022-May-02	2023-May-03	2024-Apr-16	2003-Sep-30	2006-May-10	2006-Nov-20	2007-May-03
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	0.94	2.28	0.68	0.84	0.77	1.06	0.97	31.3	0.58	4.17	<1	6	-	-	4
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	0.06	1.06	<0.05	<0.05	<0.1	0.21	5.24	5.12	4.54
Sulphate	mg/L	-	500	-	-	0.1	7.05	7.91	11.4	2.1	5.08	7.51	7.07	7.16	8.89	9.52	8	45	88	51	44
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	10.5	10.5	24.3	15.4	9.16	8.43	18.6	33.8	27.7	12.2	21	85	72	64	51
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.63	1.51	4.33	2.62	1.31	1.31	2.05	4.22	1.99	0.87	3.1	6	11	6	5
Potassium (diss)	mg/L	-	-	-	-	0.05	1.9	1.13	0.95	1.11	0.93	0.61	0.78	1.36	0.9	0.69	0.92	4	21	18	14
Sodium (diss)	mg/L	104.5	200	-	-	0.05	1.66	1.32	1.21	1.32	1.15	1.18	1.39	2.01	1.09	1.26	1.6	6	10	7	6
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	30	31	79	51	35	26	58	71	73	38	65	215	161	135	108
Ammonia as N	mg/L	-	-	-	-	0.02	0.07	<0.02	<0.02	0.04	<0.02	0.03	<0.02	0.1	<0.02	<0.02	<0.05	-	-	-	0.04
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	21	<5	<5	7	<5	12	<5	19	13	-	-	-	5
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	2.7	1.8	14.1	2.1	2.6	1.7	3.1	1.9	2.6	2.7	2	-	-	-	9.6
Electrical Conductivity	uS/cm	-	-	-	-	1	74	86	155	107	68	79	124	245	165	84	130	481	547	437	350
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	32.9	32.4	78.5	49.2	28.3	26.4	54.9	101.8	77.4	-	-	237	225.1	184.5	147.9
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.5	7.77	7.62	6.83	6.57	6.68	7.06	**6.35**	6.86	7.16	6.96	6.86	6.86	6.71	**6.42**
Total Dissolved Solids	mg/L	314	500	-	-	10	76	72	92	58	72	60	150	178	114	84	45	-	-	-	228
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.03	0.01	0.01	0.01	0.02	0.02	0.023	0.04	0.007	0.018	0.0079	<0.01	0.1	0.02	0.04
Antimony (diss)	mg/L	-	0.006	-	0.02		-	0.02	-	-	-	-	-	-	-	-	-	<0.001	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.02	0.02	0.04	0.03	0.02	0.02	0.023	0.065	0.039	0.017	0.038	0.05	0.24	0.13	0.14
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	**0.03**	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0004	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.248	<0.01	<0.01	<0.01	0.1	0.32	0.23	0.21
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.002	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.005	<0.001	0	0	0
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.01	0.01	0.01	0.01
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.003	<0.003	<0.003	<0.003	0	<0.002	<0.002	<0.002	<0.002	<0.001	0.0013	0	0.01	0	0.01
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.035	<0.01	<0.01	0.034	<0.1	0.03	<0.03	<0.03	<0.03
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0	<0.001	<0.001	<0.001
Manganese (diss)	mg/L	0.03	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	1.98	0.12	0.13	0.08
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.002	0	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.0011	<0.005	<0.005	<0.005	<0.005
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	4.51	4.96	4.29	3.99	4.07	2.78	3.47	4.95	3.61	4.61	4.6	7.4	3.6	5.7	4.1
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.05	0.06	0.12	0.08	0.05	0.04	0.082	0.15	0.139	0.05	0.095	0.39	0.4	0.29	0.18
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00005	<0.001	0	0	0
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006	0.003	0.007	<0.002	<0.005	<0.01	<0.01	<0.01	<0.01
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.001	0	0	0
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	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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2007-Nov-22	2008-May-08	2008-Oct-09	2009-Jun-04	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-03	2012-Apr-16	2012-Oct-15	2013-Apr-16	2013-Oct-30	2014-May-12	2014-Oct-16
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	3	5	3	19	9	11	8	32	5	12	9	9.39	5.52	52.9	8.56
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	0.42	4.58	3.15	5.43	4.97	8.46	4.65	6.79	1.81	3.7	1.4	4.96	1.48	8.22	5.09
Sulphate	mg/L	-	500	-	-	0.1	26	48	47	54	33	48	40	43	21	34	57	40.2	33.1	47.3	36.3
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	51	62	49	60	43	55	50	64	54	40.4	51.3	65.7	70.2	74.9	52.4
Magnesium (diss)	mg/L	-	-	-	-	0.05	4	7	4	6	4	5	4	6	4	3.46	6.03	6.03	5.52	6.56	1.21
Potassium (diss)	mg/L	-	-	-	-	0.05	5	11	17	15	10	8	9	8	3	6.7	4.91	10.5	4.67	11.4	8.18
Sodium (diss)	mg/L	104.5	200	-	-	0.05	3	9	4	8	3	11	7	16	<2	14.8	3.15	8.09	3.45	15.7	9.91
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	138	128	107	111	99	113	104	122	129	120	178	138	147	113	100
Ammonia as N	mg/L	-	-	-	-	0.02	0.07	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.02	0.04	0.02	0.05	0.09	<0.02	0.02	0.08
Chemical Oxygen Demand	mg/L	-	-	-	-	4	10	<5	20	15	17	18	8	28	20	21	98	8	12	10	10
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	10.9	6.8	8.8	6.5	5	5.5	5.6	7.3	3.6	6.2	6.7	3.8	2.2	4.6	3.1
Electrical Conductivity	uS/cm	-	-	-	-	1	322	406	353	442	340	434	355	511	305	405	460	405	369	561	396
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	143.8	183.6	138.8	174.5	123.8	157.9	141.3	184.5	151.3	115.1	152.9	188.9	198	214	135.8
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.88	7.12	6.6	6.57	6.71	7.61	6.48	7.28	6.54	6.9	6.4	7.17	7.21	7.01	6.75
Total Dissolved Solids	mg/L	314	500	-	-	10	209	264	229	287	221	282	231	332	198	345	243	262	266	358	<0.002
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.02	0.04	0.03	0.04	0.03	0.03	0.03	0.04	<0.01	0.03	0.01	0.03	0.02	0.04	0.02
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.06	0.19	0.17	0.22	0.13	0.16	0.12	0.17	0.05	0.12	0.1	0.11	0.07	0.16	0.1
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.07	0.15	0.17	0.2	0.12	0.11	0.11	0.11	0.04	0.2	0.07	0.31	0.07	0.15	0.09
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	<0.002	<0.002	<0.002	<0.002
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.001	0	<0.001	0	0	<0.001	0	0	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0	0.01	0	0.01	0.01	0.01	0	0.01	0	0	0	0	0	0.01	0
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0	0.01	0	0.01	0	0	0	0.01	0	0	0	<0.003	<0.003	0	<0.003
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	0.04	<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
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	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.63	0.04	0.06	0.04	0.05	0.05	0.05	0.05	<0.01	0.03	0.12	0.05	0.03	0.06	0.04
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005	0	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0	<0.004	<0.003	<0.003	<0.003	<0.003
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	7.6	3	5.3	3.7	5.7	3.6	5.4	3.8	7.7	3.53	5.21	4.13	5.99	3.44	5.05
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0	<0.002	<0.002	<0.002	<0.002
Strontium (diss)	mg/L	-	-	-	-	0.001	0.21	0.26	0.16	0.34	0.25	0.27	0.23	0.3	0.27	0.22	0.37	0.29	0.28	0.37	0.26
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0001	<0.0001	0	0	0	0	0	0	<0.0001	0	0	<0.006	<0.006	<0.006	<0.006
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0	0	<0.001	0	0	<0.001	<0.001	0	0	0	<0.0005	<0.002	<0.002	<0.002	234
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	<0.01	<0.01	<0.005	<0.005	0.01	0.05	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03	HR2-03R	HR2-03R	HR2-03R	HR2-03R	HR2-03R	HR-QAQC GW-S21 (HR2-03R)	HR2-03R	HR2-03R	HR2-03R
Parameter	**Units**	**RUV-HR**	**ODWQS-ALL-**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2016-Apr-27**	**2016-Oct-27**	**2017-May-12**	**2017-Oct-24**	**2018-May-09**	**2018-Oct-23**	**2019-May-08**	**2019-Oct-23**	**2020-May-08**	**2020-Oct-08**	**2021-Apr-22**	**2021-Apr-22**	**2021-Oct-21**	**2022-May-02**	**2022-Oct-20**
Anions						**Detection Limit**															
Chloride	mg/L	128.5	250	-	-	0.1	74	4.48	52.3	50.4	61.4	3.18	70.7	6.15	59.1	14.7	54.7	54.2	38.3	86.7	15.6
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	9.75	1.04	6.36	2.62	8.56	0.75	2.16	0.1	<0.25	<0.05	<0.1	<0.1	<0.05	<0.05	<0.05
Sulphate	mg/L	-	500	-	-	0.1	84.2	35.8	56.1	18.4	5.4	22.3	35	23	35.4	23.7	26	26.3	10.9	26.9	24.8
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	94.1	67.2	62.9	55.1	61.5	45.2	76	39.9	73.1	44.6	72	72.7	90.9	93.8	57
Magnesium (diss)	mg/L	-	-	-	-	0.05	8.96	5.31	5.8	3.81	4.76	3.8	6.92	3.44	6.31	3.82	6.85	6.87	7.15	6.94	4.67
Potassium (diss)	mg/L	-	-	-	-	0.05	11.2	6.92	7.67	13.1	19.6	6.44	15.7	5.99	15.9	6.38	14.5	14.3	11.8	12.5	6.85
Sodium (diss)	mg/L	104.5	200	-	-	0.05	39	5.92	30.2	18.2	31.9	5.94	42	6.81	33.3	9.95	45.6	45.3	26.6	33.7	15.3
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	164	164	129	131	138	113	245	130	226	140	243	232	274	229	148
Ammonia as N	mg/L	-	-	-	-	0.02	0.1	0.08	<0.02	<0.02	0.08	<0.02	<0.02	0.06	0.08	0.04	0.21	0.26	0.33	0.18	0.32
Chemical Oxygen Demand	mg/L	-	-	-	-	4	31	23	14	14	<5	<5	15	<5	47	11	48	51	35	43	11
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	7.3	3	4.5	8	5.4	3.5	8.2	2.5	15.4	3.1	25.8	24.9	15.1	14.9	4.5
Electrical Conductivity	uS/cm	-	-	-	-	1	754	416	625	420	563	325	706	292	811	312	688	682	679	762	400
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	271.9	189.7	180.9	153.3	173.2	128.5	218.3	113.8	208.5	127.1	208	209.8	256.4	262.8	161.6
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.47	7.92	7.91	7.76	7.11	7.78	6.73	7.56	6.51	7.65	6.81	6.86	6.54	6.65	7.05
Total Dissolved Solids	mg/L	314	500	-	-	10	436	246	312	254	328	192	410	178	360	170	354	348	390	444	222
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.05	0.16	0.05	0.02	0.05	0.01	0.06	0.36	0.16	0.03	0.092	0.088	0.096	0.081	0.063
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	0.16	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.24	0.09	0.16	0.13	0.26	0.07	0.23	0.07	0.19	0.06	0.167	0.162	0.149	0.186	0.068
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	<0.001	0.26	<0.001	0	<0.0005	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.0005
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.22	0.06	0.14	0.14	0.19	0.05	0.12	0.06	0.11	0.06	0.152	0.156	0.191	0.1	0.071
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.002	<0.001	<0.001	<0.001	0	<0.0001	0	0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.003	<0.003	<0.003	<0.003	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.005	<0.003	<0.002
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.01	0	0.01	0	0.01	0	0.01	0.01	0.04	0.01	0.0281	0.0278	0.0135	0.0173	0.0042
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0.01	<0.003	0.01	0	0	<0.003	0.01	0.01	0	0	<0.002	<0.002	<0.002	<0.002	<0.001
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.01	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	1.47	33.5	5.89	29.5	29	30.1	13.9	8.58
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.11	0.19	0.03	0.03	0.04	0.05	0.16	0.71	2.14	0.49	1.36	1.36	1.07	2.04	0.918
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	0	<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
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.003	0	<0.003	<0.003	<0.003	<0.003	<0.003	0	0.01	0	0.009	0.008	0.003	0.008	0.002
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	2.94	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	3.07	5.69	2.94	4.04	4.43	5.34	3.24	5.88	3.69	6.27	5.29	5.58	7.21	4.55	6.49
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.34	0.28	0.31	0.24	0.34	0.22	0.38	0.19	0.32	0.21	0.372	0.362	0.479	0.535	0.3
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	0.03	0	<0.002	<0.002	0.006	<0.002	0.01	0.005
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0	<0.002	0.002	0.004	0.004	0.002	<0.002
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	0.05	<0.005	0.01	0.01	0.01	0.01	0.02	0.01	0.01	<0.005	0.005	0.008	<0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR2-03R	HR2-03R	HR2-03R	HR-QAQC-GW1 (HR2-03R)	HR2-03R	HR-QAQC-GW1 (HR2-03R)	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Apr-16	2024-Oct-28	2024-Oct-28	2003-Sep-30	2006-May-10	2006-Nov-20	2007-May-03	2007-Nov-22	2008-May-08	2008-Oct-09	2009-Jun-04	2009-Oct-21
Anions						**Detection Limit**															
Chloride	mg/L	128.5	250	-	-	0.1	89.7	35	69	74	64	64	7	-	-	6	2	7	1	4	2
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	0.47	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	1.83	2.97	<0.1	2.96	0.19	1.87	0.17	1	1.35
Sulphate	mg/L	-	500	-	-	0.1	26.8	7.3	45	45	3.6	3.4	49	20	33	35	17	27	21	25	13
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	99.6	57	97	98	82	81	35	47	15	40	18	43	18	39	21
Magnesium (diss)	mg/L	-	-	-	-	0.05	13.1	4.8	9.1	9.4	9.2	9.3	3	2	1	3	2	2	2	2	2
Potassium (diss)	mg/L	-	-	-	-	0.05	37.6	16	14	14	18	18	4	3	2	3	2	4	2	2	2
Sodium (diss)	mg/L	104.5	200	-	-	0.05	69.9	23	18	18	47	48	18	3	<2	4	<2	7	2	4	3
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	403	170	180	180	310	310	69	98	37	71	51	81	36	88	56
Ammonia as N	mg/L	-	-	-	-	0.02	5.3	1.8	0.62	0.64	3.6	3.5	-	-	-	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	168	26	38	39	81	77	-	-	-	<5	<5	5	10	13	12
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	62.5	7.8	7.1	7	18	19	-	-	-	5.6	3.8	3	3.1	3.3	2.9
Electrical Conductivity	uS/cm	-	-	-	-	1	1080	490	610	620	810	820	247	295	111	256	143	257	128	250	159
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	-	-	-	-	-	-	100	125.6	41.6	112.2	53.2	115.6	53.2	105.6	60.7
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.83	7.42	6.94	6.96	7.21	7.22	7.02	7.14	6.67	6.38	6.85	7.19	6.91	7	6.9
Total Dissolved Solids	mg/L	314	500	-	-	10	638	260	400	435	500	480	-	-	-	166	93	167	83	163	103
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.205	0.046	0.031	0.031	0.072	0.071	<0.01	0.03	<0.01	0.02	0.02	0.02	0.01	0.01	<0.01
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	<0.001	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.391	0.13	0.16	0.16	0.19	0.19	0.05	0.1	0.04	0.14	0.05	0.17	0.04	0.09	0.06
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0005	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.162	0.085	0.074	0.075	0.11	0.11	0.01	0.05	0.03	0.03	0.01	0.03	0.06	0.05	0.03
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.0531	0.006	0.0061	0.0062	0.0052	0.0055	0	0	0	0	0	0	0	0	0
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0.001	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	0	0	0	0.01	0	0	0	0	0
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	46.3	17	24	24	32	32	0.01	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	4.11	2.4	2.7	2.7	3.1	3.2	0.01	0.05	<0.01	0.02	<0.01	0.04	<0.01	0.03	<0.01
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	<0.0001	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.009	<0.001	0.003	0.0029	0.0027	0.0028	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	5.09	7.8	9	9	7.5	7.4	4.3	4	4.6	5.3	5.2	4.6	3.7	3.1	4.7
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.448	0.23	0.42	0.43	0.41	0.42	0.12	0.13	0.05	0.12	0.06	0.12	0.06	0.12	0.08
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0003	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium (diss)	mg/L	-	-	-	-	0.002	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0.007	0.0034	0.0019	0.002	0.0049	0.005	<0.001	0	<0.001	0	0	0	<0.001	<0.001	0
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	0.01	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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-03	2012-Apr-16	2012-Oct-15	2013-Apr-16	2013-Oct-30	2014-May-12	2014-Oct-16	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-12
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	7	6	34	6	24	8	5.79	4.64	34	8.56	16.8	36.1	137	1.52	21.1
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	4.82	1.88	1.98	0.61	2.6	0.7	1.19	0.38	1.43	0.68	1.43	1.46	0.81	0.16	0.29
Sulphate	mg/L	-	500	-	-	0.1	27	20	10	14	11	12	15.5	10.1	10.5	16.9	15.1	14.7	4.08	10.5	16.5
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	37	33	47	26	30.4	10.3	29.1	14.4	30.1	16.8	23.1	28.7	40.9	6.6	24.8
Magnesium (diss)	mg/L	-	-	-	-	0.05	3	3	2	2	1.88	1.88	3.47	1.37	1.31	1.21	1.6	2.77	1.95	0.53	1.17
Potassium (diss)	mg/L	-	-	-	-	0.05	3	3	3	3	3.06	1.75	2.49	2.09	2.87	2.26	2.73	2.41	3.75	1.34	1.7
Sodium (diss)	mg/L	104.5	200	-	-	0.05	4	3	5	9	8.72	6.89	8.66	8.95	15.6	14.4	17.1	14.7	55.9	11.5	16.6
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	75	79	84	65	60	45	71	42	54	52	61	51	57	36	69
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	0.04	0.02	<0.01	0.19	<0.02	<0.02	0.1	<0.02	<0.02	0.04	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	10	5	10	30	3.7	2.4	<5	5	<5	7	<5	<5	<5	<5	6
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	3.5	3.4	2.4	2.9	17	25	1.6	1.6	2	2.3	3.5	2.8	2.3	2.3	2.2
Electrical Conductivity	uS/cm	-	-	-	-	1	270	231	320	171	278	151	198	122	259	180	219	260	553	102	262
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	104.7	94.8	125.6	73.2	83.7	33.5	87	41.6	80.6	46.9	64.3	83.1	110.2	18.7	66.7
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.74	6.92	7.2	**6.41**	6.5	6.4	7.61	7.08	7.14	6.65	6.96	7.13	7.49	7.28	7.74
Total Dissolved Solids	mg/L	314	500	-	-	10	176	150	208	111	250	89	128	94	158	106	128	162	322	56	128
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	<0.01	0.01	0.01	0.23	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.14	0.07	0.15	0.05	0.18	0.04	0.04	0.03	0.14	0.07	0.14	0.06	0.3	0.02	0.11
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.04	0.04	0.02	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.24
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.001	<0.001	0	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0	0	0	0	0	0	0	<0.001	0	0	0	0	0.01	<0.001	0
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0	0	0	0	0	0	<0.003	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.03	<0.03	<0.03	**0.37**	<0.1	<0.1	<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	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.02	<0.01	0.02	<0.01	0.02	<0.005	0	0	0.02	0.01	0.01	0	0.04	<0.002	0.02
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.005	<0.005	<0.005	<0.005	0	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.06
Silicon (diss)	mg/L	-	-	-	-	0.05	4	4.7	4.1	4.2	3.91	3.2	5.32	4.11	3.52	3.82	4.86	4.26	2.95	3.5	3.06
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium (diss)	mg/L	-	-	-	-	0.001	0.13	0.11	0.14	0.06	0.13	0.06	0.1	0.05	0.1	0.07	0.1	0.11	0.15	0.03	0.07
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Titanium (diss)	mg/L	-	-	-	-	0.002	<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
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.001	<0.001	<0.001	0	0	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	0.05	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR3-03	HR3-03	HR3-03	HR3-03	HR-QAQC GW-S19 (HR3-03)	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR3-03	HR-QAQC-GW1 (HR3-03)
Parameter	**Units**	**RUV-HR**	**ODWQS-ALL-**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2017-Oct-24**	**2018-May-09**	**2018-Oct-23**	**2019-May-08**	**2019-May-08**	**2019-Oct-23**	**2020-May-08**	**2020-Oct-08**	**2021-Apr-22**	**2021-Oct-21**	**2022-May-02**	**2022-Oct-20**	**2023-May-03**	**2023-May-03**
Anions						**Detection Limit**														
Chloride	mg/L	128.5	250	-	-	0.1	2.77	49.2	0.92	43.3	43.3	1.26	32	1.38	18.3	14.5	18.2	5.75	29.3	29.6
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	0.26	0.76	0.09	2.97	2.9	0.4	2.62	0.42	1.97	1.74	2.04	0.59	1.84	1.85
Sulphate	mg/L	-	500	-	-	0.1	17.6	2.5	9.74	2.7	2.64	12.4	22.6	7.56	7.74	10.4	10	8.97	4.6	4.53
Cations																				
Calcium (diss)	mg/L	-	-	-	-	0.05	19.4	42.9	9.86	28.3	28.6	8.73	37	10.7	31	20.5	34.2	20.2	34.2	35.1
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.43	2.74	0.7	1.26	1.24	0.64	2.31	0.8	2.06	1.29	2.01	1.55	1.23	1.2
Potassium (diss)	mg/L	-	-	-	-	0.05	1.65	1.94	1.43	1.65	1.66	1.23	1.44	1.23	1.52	1.64	1.61	<0.5	1.75	1.72
Sodium (diss)	mg/L	104.5	200	-	-	0.05	6.42	13	8.59	16.6	16.8	8	8.98	8.71	9.74	12.1	13.7	10	12.6	12.6
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	53	84	36	72	72	34	73	43	71	58	88	57	69	66
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	0.07	<0.02	0.03	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	2.6	2.5	5.4	1.6	1.6	2.1	2.2	2.1	2	2.2	2.4	2	1.7	1.5
Electrical Conductivity	uS/cm	-	-	-	-	1	138	324	111	273	276	97	359	102	232	194	268	161	255	252
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	54.3	118.4	27.5	75.9	76.5	24.4	101.9	30	85.9	56.5	93.7	56.8	-	-
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.43	7.08	7.32	6.59	6.57	7.11	6.51	6.75	6.79	6.57	6.76	7.14	7.05	7.17
Total Dissolved Solids	mg/L	314	500	-	-	10	94	194	70	172	180	62	176	54	114	112	204	84	154	148
Metals																				
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.01	0.02	0.03	0.01	0.01	0.05	0.02	0.02	0.008	0.027	0.021	<0.004	0.013	0.02
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.06	0.16	0.03	0.11	0.11	0.03	0.11	0.03	0.101	0.096	0.098	0.027	0.067	0.067
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	0.16	<0.001	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.04	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.02	0.049	0.012	0.023	0.013	0.011
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.001	<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
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.003	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.002
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0	0	<0.001	0	0	0	0	<0.0005	0.0029	0.002	0.0037	0.0009	0.0046	0.0042
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.003	<0.003	<0.003	0	0	0	0	0	0.002	0.003	0.002	0.003	0.001	0.001
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.002	<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
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.01	0.02	0	0.02	0.02	0	0.02	<0.002	0.01	0.007	0.015	0.002	0.02	0.018
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<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
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.001	<0.001	<0.001	<0.001
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	3.34	4.01	3.59	2.83	2.54	3.37	2.44	3.78	3.75	4.57	3.37	3.88	3.44	3.47
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.002	<0.002	<0.002	<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	0.07	0.13	0.04	0.09	0.09	0.04	0.11	0.04	0.088	0.076	0.094	0.068	0.093	0.087
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0	<0.002	<0.002	0.013	<0.002	0.003	0.003	<0.002	0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<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
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	0.01	<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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR3-03	HR3-03	HR3-03	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10
Parameter	**Units**	**RUV-HR**	**ODWQS-ALL-**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2023-Oct-17**	**2024-Apr-16**	**2024-Oct-28**	**2010-May-18**	**2010-Oct-19**	**2011-May-19**	**2011-Nov-03**	**2012-Apr-16**	**2012-Oct-15**	**2013-Apr-16**	**2013-Oct-30**	**2014-May-12**	**2014-Oct-16**	**2015-May-05**	**2015-Oct-27**
Anions						**Detection Limit**															
Chloride	mg/L	128.5	250	-	-	0.1	3.9	<1	15	40	56	119	117	34	125	94.2	194	37.2	214	55.1	76.5
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	0.31	0.12	0.87	<0.1	0.27	0.7	<0.1	6.6	<0.1	0.44	<0.5	6.34	0.2	1.27	<0.25
Sulphate	mg/L	-	500	-	-	0.1	7.2	7.1	9.8	39	50	56	91	57	63	76.2	68.8	36.9	82.7	36.3	17.2
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	11	12	22	85	74	93	107	52.5	56.4	84	120	69.8	143	76.6	81.6
Magnesium (diss)	mg/L	-	-	-	-	0.05	0.82	1.1	1.8	7	9	9	14	5.26	10.6	13.5	18.8	7.57	18.7	12.9	13.7
Potassium (diss)	mg/L	-	-	-	-	0.05	1.1	1.1	1.5	14	16	18	25	18.5	25	33.9	54.3	27.5	48.5	56.8	51.5
Sodium (diss)	mg/L	104.5	200	-	-	0.05	9.2	10	13	23	42	58	63	52.5	87.1	85	204	36.5	209	71.7	60.6
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	34	53	58	248	228	231	288	237	301	292	479	221	703	392	349
Ammonia as N	mg/L	-	-	-	-	0.02	<0.05	<0.05	<0.05	3.49	3.2	2.51	2.82	2.02	3.29	0.65	8.3	0.54	11.9	14	8.4
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<4	6.1	6.2	65	33	53	88	53	145	40	99	33	138	57	83
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	2.5	2.2	2.9	20.1	11.9	14	22	15.2	30	13.1	30.8	14	49.1	27.1	23.3
Electrical Conductivity	uS/cm	-	-	-	-	1	100	110	190	692	705	963	1080	752	1050	986	1620	674	2010	1020	968
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	-	-	-	241.1	221.8	269.3	324.8	152.8	184.5	265.3	377.1	205.5	434.1	244.4	260.2
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.33	7.23	7.65	7.65	6.92	7.16	6.69	6.7	6.5	7.49	7.2	7.17	6.83	7.27	7.29
Total Dissolved Solids	mg/L	314	500	-	-	10	90	50	145	450	458	626	702	540	564	572	1000	332	1130	568	496
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.0058	<0.0049	0.0062	0.02	<0.01	0.01	<0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.023	0.031	0.065	0.32	0.17	0.32	0.35	0.26	0.39	0.32	0.6	0.35	0.56	0.4	0.42
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0004	<0.0004	<0.0004	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.024	0.011	0.024	0.28	0.25	0.22	0.23	0.26	0.38	0.38	0.37	0.26	0.52	0.51	0.31
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	0	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.005	<0.005	<0.005	<0.001	0	0.01	0	<0.001	0	<0.003	0	<0.003	<0.003	0	0
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.00071	0.0012	0.0041	0.08	0.03	0.04	0.03	0.02	0.02	0.02	0.03	0.01	0.03	0.02	0.04
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0.0017	0.0018	0.0029	<0.001	0	0.01	0	0.02	0	0.03	0.01	0.01	0.06	0.05	0.01
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.1	<0.1	<0.1	61.4	4.42	7.51	9.83	0.11	3.05	0.77	5.59	0.07	0.11	0.53	8.8
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	<0.002	<0.002	0.0042	3.99	2.91	2.75	3.55	2.03	2.42	3.23	3.54	1.49	3.38	2	2.63
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.001	<0.001	0.0013	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	4.1	4.7	4.3	10	7.8	8.2	8	7.77	6.22	8.14	8.09	7.56	5.26	7.49	8.84
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium (diss)	mg/L	-	-	-	-	0.001	0.032	0.04	0.077	0.47	0.46	0.54	0.65	0.23	0.39	0.55	0.86	0.36	0.77	0.42	0.51
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.00005	<0.00005	<0.00005	<0.0001	0	0	<0.0001	0	<0.0001	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.0005	<0.0005	<0.0005	0	0	0	0.01	0	0	<0.002	<0.002	<0.002	<0.002	<0.002	0
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	0.02	0.05	<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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR4-10	HR-QAQC GW-S22 (HR4-10)	HR4-10
Parameter	**Units**	**RUV-HR**	**ODWQS-ALL-**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2016-Apr-27**	**2016-Oct-27**	**2017-May-12**	**2017-Oct-24**	**2018-May-09**	**2018-Oct-23**	**2019-May-08**	**2019-Oct-23**	**2020-May-08**	**2020-Oct-08**	**2021-Apr-22**	**2021-Oct-21**	**2022-May-02**	**2022-Oct-20**
Anions						**Detection Limit**														
Chloride	mg/L	128.5	250	-	-	0.1	72.8	127	44.8	122	4.46	54	11.3	83.5	14.5	46	40.5	58.1	35	34.5	51.2
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	163	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	<0.25	<0.25	<0.05	<0.25	<0.05	<0.25	<0.05	<0.25	<0.25	<0.25	<0.25	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L	-	500	-	-	0.1	5.82	35.7	5.43	44.2	8.9	50.8	6.45	61.1	5.3	47	7.44	8.99	6.91	6.14	36.5
Cations																				
Calcium (diss)	mg/L	-	-	-	-	0.05	84.3	94	39.8	87.1	22.6	65	34.8	75.6	48.9	73	78.9	54.1	49.6	49.6	81.6
Magnesium (diss)	mg/L	-	-	-	-	0.05	9.27	15.8	4.3	21.1	2.77	14.5	5.39	17.3	8.6	14.5	13.4	9.98	8.25	8.15	14.3
Potassium (diss)	mg/L	-	-	-	-	0.05	27.9	48	22.7	68	18.6	53.2	24.6	67.5	37.1	45.5	46.3	31.5	24.6	24	29.7
Sodium (diss)	mg/L	104.5	200	-	-	0.05	59.6	103	44.9	188	10.3	49.3	17.2	128	20	45.9	47.4	58.8	29	28.9	78.2
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	345	464	239	790	154	328	349	571	364	373	424	395	325	323	357
Ammonia as N	mg/L	-	-	-	-	0.02	4.96	14.2	7.2	33.8	9.26	23.6	11.2	20	20.2	20.6	25.5	25.2	18.9	17.9	19.6
Chemical Oxygen Demand	mg/L	-	-	-	-	4	217	144	145	286	38	104	95	132	48	91	74	164	153	157	60
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	93.2	22.8	44.7	79.6	8.9	38.5	33	43.6	27.8	42.8	37.5	55.7	37.3	43.1	47.8
Electrical Conductivity	uS/cm	-	-	-	-	1	859	1380	689	1660	317	1030	619	1350	911	886	968	990	774	773	1040
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	248.7	299.8	117.1	304.4	67.8	222	109.1	260	157.5	242	252.2	176.2	157.8	157.4	262.6
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.22	7.17	7.33	7.82	7.27	7.62	6.5	7.48	6.51	7.04	6.79	6.74	6.72	6.72	7.02
Total Dissolved Solids	mg/L	314	500	-	-	10	522	774	358	976	142	572	300	802	348	486	486	506	386	378	514
Metals																				
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.05	0.02	0.04	0.18	0.03	0.03	0.04	0.05	0.04	0.07	0.042	0.073	0.052	0.032	0.103
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.51	0.64	0.41	1.41	0.45	0.88	0.68	0.91	0.78	0.77	0.618	0.709	0.553	0.621	0.691
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	<0.001	**0.45**	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.23	0.36	0.27	0.57	0.11	0.42	0.26	0.55	0.28	0.43	0.421	0.45	0.232	0.226	0.336
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.002	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.003	0.01	0	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.006	<0.003	<0.003	0.002
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.1	0.17	0.16	0.15	0.08	0.1	0.09	0.08	0.07	0.05	0.036	0.0968	0.0338	0.0375	0.0464
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0	<0.001	0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	112	124	163	151	50.6	106	115	60.5	66	77.6	60.577	129.2	131	125	62.6
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	5.52	4.61	6.02	6.91	2.24	3.03	3.33	2.63	4.46	2.92	2.3	2.73	2.58	2.72	1.65
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.002	<0.002	0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.01	0.02	0.02	**0.03**	<0.003	0.01	0.02	0.02	0.02	0.01	0.012	**0.038**	0.007	0.008	0.011
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	11.6	11.8	11.9	12.1	10.4	10.6	10.9	8.92	9.44	10.7	9.42	11.5	8.65	8.07	8.71
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.51	0.73	0.32	0.75	0.18	0.45	0.28	0.46	0.35	0.44	0.483	0.294	0.267	0.261	0.434
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	0	0	<0.002	0	<0.002	<0.002	<0.002	0	<0.002	0	<0.002	0.002	0.003	0.003	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0.01	0.01	0.01	0.02	0	0.01	0.01	0.01	0	0.01	0.005	0.008	0.007	0.006	0.007
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR4-10	HR4-10	HR4-10	HR4-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Oct-28	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-03	2012-Apr-16	2012-Oct-15	2013-Apr-16	2013-Oct-30	2014-May-12	2014-Oct-16	2015-May-05
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	35.4	110	22	49	6	4	10	7	8	6	8.85	10.1	7.09	19.4	20.5
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	<0.05	<0.1	<0.1	<0.1	<0.1	0.68	1.06	<0.1	1.2	0.3	2.31	<0.5	2.57	0.23	2.77
Sulphate	mg/L	-	500	-	-	0.1	10.6	34	41	28	39	33	32	20	26	18	26	22.3	32.4	21.1	27.3
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	83.6	120	59	64	59	50	54	54	41.2	50.7	55.8	50.8	54.3	53.3	57.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	12.3	21	9.8	12	5	4	5	4	4.52	3.97	5.47	4.78	4.84	4.39	5.57
Potassium (diss)	mg/L	-	-	-	-	0.05	41.9	58	25	50	10	11	8	11	9.15	9.91	11.1	12.8	9.16	13.2	9.22
Sodium (diss)	mg/L	104.5	200	-	-	0.05	54.8	150	51	60	11	6	7	4	7.04	4.03	5.63	8.07	7.85	14.1	10.2
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	477	660	290	420	175	146	157	158	139	152	134	135	130	162	132
Ammonia as N	mg/L	-	-	-	-	0.02	21.7	36	12	41	2.07	1	1.18	0.39	0.33	0.38	0.19	1.37	0.14	2.88	0.13
Chemical Oxygen Demand	mg/L	-	-	-	-	4	88	200	62	130	58	28	23	35	44	54	1190	18	8	12	<5
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	35.6	64	17	41	20.3	12.1	11.1	7.8	9.4	8.1	2.8	3.5	7.3	3.6	3.9
Electrical Conductivity	uS/cm	-	-	-	-	1	954	1700	690	1100	445	370	408	352	386	348	356	341	374	436	405
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	-	-	-	-	167.9	141.3	155.4	151.3	121.5	142.9	161.9	146.5	155.5	151.2	167.5
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.24	7.15	7.12	7.42	7.43	7	7.04	6.53	6.5	6.3	7.43	7.19	6.99	6.73	6.84
Total Dissolved Solids	mg/L	314	500	-	-	10	474	905	415	510	289	241	265	229	294	198	224	210	194	234	234
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.037	0.047	0.016	0.04	0.01	<0.01	<0.01	<0.01	0	0	0.01	0.01	0.01	0.01	0.01
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.528	0.98	0.25	0.89	0.19	0.18	0.15	0.12	0.16	0.1	0.14	0.17	0.14	0.22	0.12
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0005	<0.0004	<0.0004	<0.0004	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.4	0.44	0.26	0.5	0.14	0.12	0.1	0.11	0.17	0.14	0.13	0.15	0.13	0.18	0.17
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.002	<0.005	<0.005	<0.005	<0.001	<0.001	0	0	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.0246	0.065	0.037	0.037	0.05	0.02	0.02	0.01	0.01	0.01	0	0	0.01	0	0.01
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.001	0.0038	<0.0009	<0.0009	<0.001	0	0	0	0	0	<0.003	<0.003	<0.003	<0.003	<0.003
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	42.2	83	30	58	39.3	8.87	5.65	0.93	0.3	0.2	<0.01	<0.01	<0.01	0.02	<0.01
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	0.0009	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	1.01	2.4	0.92	2.2	1.18	0.52	0.92	0.58	0.43	0.4	0.74	0.46	0.75	0.47	0.48
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	0.00091	0.0007	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.009	0.015	0.012	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	0.01	<0.003	0.01
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	9.14	10	7.6	8.3	9.2	6.7	6.8	6.4	5.59	4.88	5.73	5.38	5.93	5.01	4.82
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002
Strontium (diss)	mg/L	-	-	-	-	0.001	0.359	0.62	0.26	0.36	0.3	0.27	0.25	0.27	0.22	0.23	0.24	0.23	0.25	0.27	0.28
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0003	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	0	<0.0001	<0.006	<0.006	<0.006	<0.006	<0.006
Titanium (diss)	mg/L	-	-	-	-	0.002	0.002	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0.006	0.0097	0.0034	0.005	<0.001	<0.001	0	0	0	0	<0.002	<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	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	0.09	<0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10	HR5-10-QAQC GW-S20 (HR5-10)	HR5-10	HR-QAQC GW-F20 (HR5-10)	HR5-10
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-12	2017-Oct-24	2018-May-09	2018-Oct-23	2019-May-08	2019-Oct-23	2020-May-08	2020-May-08	2020-Oct-08	2020-Oct-08	2021-Apr-22
Anions						Detection Limit														
Chloride	mg/L	128.5	250	-	-	0.1	15	16	27.8	31.5	34.9	39.8	22.8	56.6	36.5	39.6	40.3	24.8	24.5	30.4
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	0.05	1.61	<0.25	4.56	1.13	5.81	0.35	3.22	<0.25	0.32	0.37	<0.05	<0.05	0.22
Sulphate	mg/L	-	500	-	-	0.1	24.7	30.8	145	137	79.8	4.8	52.2	329	101	80.1	78.8	44.9	44.8	96.7
Cations																				
Calcium (diss)	mg/L	-	-	-	-	0.05	57.3	58.8	92.2	97.2	78.9	80.3	87.9	159	120	52.1	51.5	63.6	52.4	86.3
Magnesium (diss)	mg/L	-	-	-	-	0.05	5.43	5.65	7.04	7.94	6.58	7.2	6.62	12.6	9.37	4.84	4.82	5.44	4.3	8.2
Potassium (diss)	mg/L	-	-	-	-	0.05	10.1	8.02	12.9	11.4	12.9	7.92	11.5	13.4	13.6	8.18	8.2	11.6	9.45	11
Sodium (diss)	mg/L	104.5	200	-	-	0.05	10.5	8.16	29.1	13.6	20.4	14.8	22.4	48.4	29.6	16	15.7	22.7	19.1	25.3
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	156	154	163	149	180	137	211	227	317	165	161	234	232	163
Ammonia as N	mg/L	-	-	-	-	0.02	0.35	0.09	1.36	0.04	3.04	0.2	1.05	0.02	1.77	1.13	1.12	3.2	3.54	0.89
Chemical Oxygen Demand	mg/L	-	-	-	-	4	16	10	20	21	32	<5	31	<5	39	36	31	55	53	<5
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	3.6	7.5	9.3	8.7	12.2	4.8	12.4	10.2	12.8	8.6	8.7	15.3	13.6	8
Electrical Conductivity	uS/cm	-	-	-	-	1	401	389	707	737	555	553	663	1160	818	621	617	552	551	611
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	165.4	170.1	259.2	275.4	224.1	230.2	246.7	448.9	338.2	150	148.4	181.2	148.6	249.3
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.31	7.19	7.05	7.49	7.32	7.05	7.6	6.61	7.14	**6.42**	**6.46**	6.77	6.68	6.57
Total Dissolved Solids	mg/L	314	500	-	-	10	218	236	406	400	390	340	390	782	486	288	286	346	316	336
Metals																				
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.01	0.01	<0.004	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	<0.004
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	0.24	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.11	0.15	0.24	0.24	0.19	0.13	0.19	0.16	0.23	0.14	0.14	0.24	0.23	0.128
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	0.13	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.14	0.11	0.28	0.23	0.62	0.18	0.38	1.08	0.34	0.08	0.08	0.29	0.28	0.529
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.002	<0.002	<0.001	<0.001	<0.001	<0.0001	<0.0001	0	0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.003	<0.003	<0.003	<0.003	<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	0.0005	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.02	0.02	0.05	0.05	0.0195
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.003	<0.003	0	0	0.01	<0.003	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.005
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.27	**10.4**	**6.61**	**6.69**	**25.8**	**25.6**	**6.46**
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.56	0.77	0.97	1.23	0.89	0.87	1.37	1.62	2.87	1.18	1.13	2.03	2.05	2.19
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<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
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.01	0	0.01	0.01	0.01	<0.003	0.01	0.01	0.01	0.01	0	0.01	0.01	0.008
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	**7.19**	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	4.81	6.21	5.51	<0.002	6.37	6.6	4.06	5.75	5.45	4.69	4.26	5.61	5.42	6.5
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.36	0.25	0.6	0.45	0.41	0.38	0.48	0.63	0.77	0.32	0.31	0.4	0.4	0.414
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.002	0	<0.002	<0.002	<0.002	<0.002	0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<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
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR5-10	HR-QAQC-GW-F21 (HR5-10)	HR5-10	HR5-10	QC-GW1-F22 (	HR5-10	HR5-10	HR5-10	HR5-10	HR6-19	HR6-19	HR6-19	HR6-19	HR6-19	HR6-19
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2021-Oct-21	2021-Oct-21	2022-May-02	2022-Oct-20	2022-Oct-20	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Oct-28	2020-May-08	2020-Oct-08	2021-Apr-22	2021-Oct-21	2022-May-02	2022-Oct-20
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	37.5	37.6	42.9	48	52.4	38.3	38	76	51	3.12	1.99	3.27	2.01	2	1.26
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	<0.05	<0.05	0.08	<0.05	<0.05	0.19	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05
Sulphate	mg/L	-	500	-	-	0.1	155	156	42.1	22.5	23.5	43.9	52	15	53	68.4	10.9	42.2	13.8	26.3	12.2
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	125	122	81.9	105	89.3	72.1	150	87	110	111	84.7	116	120	88.9	92.2
Magnesium (diss)	mg/L	-	-	-	-	0.05	10.9	10.5	8.66	7.71	7.88	6.72	14	7.6	13	4.28	2.61	4.32	3.64	3.06	2.74
Potassium (diss)	mg/L	-	-	-	-	0.05	13.9	13.3	18.6	13.6	19.5	9.51	15	11	21	4.59	3.15	4.35	4.56	3.52	2.04
Sodium (diss)	mg/L	104.5	200	-	-	0.05	33.7	32.9	32.7	30.7	23	25.8	49	35	42	4.27	2.64	5.35	5.66	4.1	3.64
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	297	296	277	273	263	178	430	230	330	271	261	272	333	232	180
Ammonia as N	mg/L	-	-	-	-	0.02	1.79	1.85	4.92	1.82	1.8	1.43	6.9	11	11	2.67	1.36	1.92	3.4	1.54	1.23
Chemical Oxygen Demand	mg/L	-	-	-	-	4	64	68	65	56	73	37	100	62	120	26	23	<5	20	22	30
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	17.4	18.4	25	21.4	20.8	10.2	33	15	31	4.4	4	5	6.4	4.1	5.2
Electrical Conductivity	uS/cm	-	-	-	-	1	959	962	742	798	777	541	1000	700	910	777	452	606	650	503	396
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	357	347.9	240.2	293.9	255.4	-	-	-	-	294.8	222.2	307.4	314.6	234.6	241.5
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.7	6.75	6.73	6.79	6.86	7.06	7.07	7.1	7.34	6.62	7.14	7.08	6.91	6.82	7.08
Total Dissolved Solids	mg/L	314	500	-	-	10	590	596	402	426	404	318	620	390	525	334	280	322	356	218	218
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.018	0.018	0.062	0.091	0.05	0.004	0.04	0.031	0.025	0.01	0.01	<0.004	0.207	0.03	0.046
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.197	0.2	0.37	0.379	0.384	0.137	0.44	0.26	0.43	0.06	0.05	0.059	0.084	0.056	0.04
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0004	<0.0004	<0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	1.12	1.15	0.273	0.311	0.285	0.302	0.3	0.14	0.73	0.09	0.06	0.119	0.155	0.064	0.064
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.0001	<0.0001	<0.0001	0.0001	0.0004	<0.0001	<0.00009	<0.00009	<0.00009	0	<0.0001	<0.0001	<0.0001	<0.0001	0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	0.003	<0.003	<0.003	<0.002	<0.002	<0.002	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	0.003	<0.003	<0.002
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.0585	0.0593	0.0467	0.0465	0.0459	0.0196	0.07	0.033	0.048	<0.0005	0	<0.0005	0.0008	<0.0005	0.002
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0.003	0.004	<0.002	<0.001	0.002	0.001	0.0034	0.0024	0.0021	<0.002	0	<0.002	0.003	<0.002	<0.001
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	29.2	29.7	61.7	62.6	66.7	11.2	49	23	47	30	19.3	26.9	20.6	21.6	24.1
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	0.001	<0.001	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	2.58	2.6	3.53	2.34	2.29	1.11	3.1	1.5	4.4	0.5	1.62	0.402	0.336	0.298	0.48
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00084	0.00072	0.00065	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.008	0.008	0.009	0.005	0.006	0.004	0.0081	0.0052	0.0093	<0.003	0	<0.003	<0.003	0.001	0.003
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	6.86	6.9	5.37	7.06	6.32	6.11	6.4	5.5	5.6	3.07	6.77	3.53	5.13	3.29	6.41
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.566	0.573	0.411	0.503	0.458	0.348	1	0.67	0.49	0.42	0.3	0.39	0.458	0.371	0.348
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.000054	0.00011	0.000076	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.002	0.003	0.003	0.003	<0.002	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	0.007	<0.002	0.003
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	<0.002	0.003	0.002	0.002	<0.002	0.0036	0.002	0.002	<0.002	<0.002	<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	0.0052	<0.005	<0.005	<0.005	0.01	0.005	0.009	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR6-19	HR6-19	HR6-19	HR6-19	HR7-19	QC GW-F19 (H	HR7-19	HR7-19	HR7-19	HR7-19	HR7-19	HR7-19	HR7-19	HR7-19	HR7-19
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Oct-28	2019-Oct-23	2019-Oct-23	2020-May-08	2020-Oct-08	2021-Apr-22	2021-Oct-21	2022-May-02	2022-Oct-20	2023-May-03	2023-Oct-17	2024-Apr-16
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	4.16	<1	2.2	<1	34.7	34.7	57.1	28.4	26.3	15.3	55.5	26	38.1	22	48
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	<0.05	<0.1	<0.1	<0.1	0.46	0.46	0.85	<0.25	0.8	0.43	0.07	<0.05	<0.05	0.36	<0.1
Sulphate	mg/L	-	500	-	-	0.1	59.7	8.7	75	4.8	12	12	67.7	23	71.1	57.6	25	33.2	30.9	14	25
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	107	80	130	34	44.7	44.4	114	56.9	116	35.9	83.4	137	102	60	72
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.82	2.9	4.8	1.4	5.9	5.79	15.8	7.92	13.1	3.93	7.52	8.97	8.69	6.1	8.6
Potassium (diss)	mg/L	-	-	-	-	0.05	5.82	3.4	4	1.2	20.6	20.3	28.5	24.9	27.7	1.97	18	20.3	22.2	21	24
Sodium (diss)	mg/L	104.5	200	-	-	0.05	6.83	3.3	6.4	1.4	24.9	24.7	72.1	56.6	36.9	10.5	30.6	40.6	37.2	39	49
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	279	200	280	130	225	226	401	431	367	246	278	329	403	260	310
Ammonia as N	mg/L	-	-	-	-	0.02	4.28	2.7	3.6	0.92	11	10.9	12.4	19.9	16.4	6.94	7.92	7.4	13.7	13	17
Chemical Oxygen Demand	mg/L	-	-	-	-	4	56	20	27	35	66	69	114	95	43	35	55	14	74	45	73
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	6.2	4.5	4.9	4.1	12.6	12	39.1	38.5	25.8	14	23.3	26.6	32.4	13	23
Electrical Conductivity	uS/cm	-	-	-	-	1	624	400	640	250	555	557	1320	862	926	633	759	861	921	620	760
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	-	-	-	-	135.9	134.7	349.7	174.7	343.6	105.8	239.2	379	-	-	-
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.34	7.22	7.1	7.26	7.02	7.09	6.5	7.33	6.96	6.84	6.78	6.95	7.22	7.07	7.06
Total Dissolved Solids	mg/L	314	500	-	-	10	350	220	360	180	286	274	584	432	512	360	402	454	502	320	405
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.015	0.018	0.014	0.023	0.04	0.04	0.18	0.05	0.01	0.034	0.037	0.012	0.021	0.02	0.022
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.043	0.037	0.066	0.018	0.32	0.33	0.6	0.44	0.494	0.286	0.273	0.326	0.398	0.3	0.38
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0005	<0.0004	<0.0004	<0.0004	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0004	<0.0004
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.103	0.069	0.099	0.023	0.23	0.23	0.73	0.59	0.98	0.579	0.206	0.728	0.502	0.29	0.28
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.002	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.005	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.0005	0.0019	<0.0005	0.00053	0.07	0.07	0.08	0.08	0.0445	0.031	0.0586	0.0575	0.0572	0.042	0.055
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.001	0.0013	<0.0009	0.002	0.01	0.01	0.01	0	0.01	0.008	0.004	0.008	0.005	0.0041	0.0042
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	20.5	21	26	7.7	27.9	28	66	54	24.1	14.6	36.4	53.5	47.6	38	50
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.343	0.33	0.41	0.18	2.76	2.77	6.21	4.41	4.41	2.59	3.56	3.6	3.17	1.8	2.3
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	0.00062	0.0011
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.001	0.0023	0.001	0.0012	0.01	0.01	0.01	0.01	0.012	0.006	0.012	0.002	0.009	0.008	0.012
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	3.6	5.8	3.6	5	9.39	9.49	7.29	10.9	8.27	8.12	7.77	7.94	9.38	11	9.9
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009
Strontium (diss)	mg/L	-	-	-	-	0.001	0.327	0.26	0.45	0.12	0.28	0.27	0.59	0.49	0.556	0.318	0.378	0.405	0.363	0.26	0.32
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0003	<0.00005	<0.00005	<0.00005	<0.0003	0	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.000087	0.000074
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.005	<0.005	<0.005	0	<0.002	0.01	<0.002	0.007	<0.002	0.007	0.004	<0.002	<0.005	<0.005
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	0.00084	<0.0005	0.00087	<0.002	<0.002	0	0.01	0.002	<0.002	0.003	0.003	0.003	0.0019	0.0031
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	0.011	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	0.035	<0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR7-19	HR8-19
Parameter	**Units**	**RUV-HR**	**ODWQS-ALL-**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2024-Oct-28**	**2019-Oct-23**
Anions						**Detection Limit**		
Chloride	mg/L	128.5	250	-	-	0.1	24	2.44
Fluoride	mg/L	-	1.5	-	-	0.01	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	1.25	0.21
Sulphate	mg/L	-	500	-	-	0.1	37	6.84
Cations								
Calcium (diss)	mg/L	-	-	-	-	0.05	90	8.05
Magnesium (diss)	mg/L	-	-	-	-	0.05	9.1	0.99
Potassium (diss)	mg/L	-	-	-	-	0.05	19	1.04
Sodium (diss)	mg/L	104.5	200	-	-	0.05	35	2.61
General Chemistry								
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	350	27
Ammonia as N	mg/L	-	-	-	-	0.02	12	0.06
Chemical Oxygen Demand	mg/L	-	-	-	-	4	74	24
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	17	1.1
Electrical Conductivity	uS/cm	-	-	-	-	1	820	75
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	-	24.2
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.73	6.69
Total Dissolved Solids	mg/L	314	500	-	-	10	460	84
Metals								
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.022	0.02
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.37	0.01
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0004	<0.0005
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.66	0.02
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.00009	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.005	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.03	<0.0005
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0.0062	0
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	26	0.03
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005	<0.0005	<0.001
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	1.7	0.05
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	0.00054	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	0.0082	<0.003
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	7.4	4.29
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.00009	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.35	0.07
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	0.00011	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.005	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0.0018	<0.002
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR8-19	HR8-19	HR8-19	HR8-19	HR8-19	HR8-19	HR8-19	HR8-19	HR8-19	HR8-19	HR9-21	GRQAQC-GW-SU21 (HR9-21)	HR9-21	HR9-21	HR9-21
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2020-May-08	2020-Oct-08	2021-Apr-22	2021-Oct-21	2022-May-02	2022-Oct-20	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Oct-28	2021-Aug-19	2021-Aug-19	2021-Oct-21	2022-May-02	2022-Oct-20
Anions						Detection Limit															
Chloride	mg/L	128.5	250	-	-	0.1	14.5	3.78	4.53	3.56	27.4	6.05	4.64	5.9	4.6	3	4.33	4.35	1.21	0.82	1.67
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	0.1	0.25	0.42	0.65	0.07	0.48	0.63	0.22	1.25	0.18	0.48	0.47	0.1	0.1	0.59
Sulphate	mg/L	-	500	-	-	0.1	13.9	8.53	13.3	10.2	6.46	10.6	13.8	5.5	9.7	8.2	5.06	5.04	5.72	4.83	6.41
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	41.5	12.6	25.2	77.7	54.2	44.1	21	11	15	36	8.6	8.39	3.53	2.89	7.1
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.54	1.37	2.7	6.03	7.6	3.81	2.15	1.1	1.7	3.5	1.24	1.22	0.54	0.48	0.94
Potassium (diss)	mg/L	-	-	-	-	0.05	2.07	1.25	1.5	14.7	12.5	1.97	1.43	1	1.2	1.8	1.48	1.47	0.96	0.66	1.85
Sodium (diss)	mg/L	104.5	200	-	-	0.05	8.98	2.9	3.25	17.9	42.9	7.98	4.88	2.9	5.2	14	4.12	4.1	1.62	1.4	4.34
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	117	36	63	122	276	79	59	29	35	99	33	32	13	10	18
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	0.07	5.85	0.03	<0.02	0.075	<0.05	<0.05	<0.02	<0.02	0.09	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	18	14	<5	<5	34	13	<5	8.6	9.3	20	<5	<5	<5	5	9
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	5.1	1.5	2.4	4.6	18	4.3	2	1.3	2	4.1	5.9	5.9	1.9	2	1.8
Electrical Conductivity	uS/cm	-	-	-	-	1	359	91	171	260	627	210	161	80	110	240	89	89	40	34	64
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	122.3	37.1	74	218.8	166.6	125.8	-	-	-	-	26.6	26	11	9.2	21.6
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.44	6.66	6.83	6.78	7	7.08	7.06	7.17	6.77	7.45	6.59	6.52	6.43	6.37	6.61
Total Dissolved Solids	mg/L	314	500	-	-	10	138	54	108	164	334	120	94	80	55	180	72	66	36	<10	52
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.02	0.02	<0.004	0.018	0.022	0.013	0.012	0.0069	0.0087	0.0076	0.028	0.029	0.034	0.127	0.038
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.07	0.01	0.031	0.053	0.399	0.032	0.025	0.013	0.022	0.033	0.02	0.02	0.011	0.012	0.015
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0004	<0.0004	<0.0004	<0.001	<0.001	<0.001	<0.001	<0.0005
Boron (diss)	mg/L	1.265	5	-	0.2	0.01	0.09	0.02	0.028	0.062	0.147	0.039	0.022	0.01	0.012	0.078	0.016	0.019	<0.01	<0.01	0.013
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	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.003	<0.002
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0	<0.0005	<0.0005	<0.0005	0.0051	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	0.001	<0.0005	<0.0005	<0.0005
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	0	<0.002	<0.002	0.005	0.035	0.006	0.001	<0.0009	<0.0009	0.005	<0.002	<0.002	0.003	<0.002	0.002
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	0.01	0.02	0.03	<0.01	0.09	0.025	0.012	<0.1	<0.1	<0.1	0.023	<0.01	<0.01	0.046	<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	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.1	0.01	0.004	0.01	5.53	0.193	0.008	0.003	0.0022	0.0089	0.06	0.063	0.006	0.008	0.015
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.003	<0.003	<0.003	<0.003	0.022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.001	<0.001
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	5.56	4.77	4.97	6.77	6.74	4.94	5.66	4.6	4.5	4.8	6.49	5.07	5.13	3.24	5.14
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009	0.0001	0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.3	0.09	0.178	0.276	0.669	0.208	0.122	0.07	0.1	0.26	0.109	0.104	0.042	0.032	0.072
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00005	<0.00005	<0.00005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.005	<0.005	<0.005	0.008	<0.002	<0.002	0.003	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.0005	<0.0005	<0.002	<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	0.02	<0.005	<0.005	<0.005	<0.005	0.016	<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-HR	Reasonable Use Values Hickey Road
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

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	HR9-21	HR9-21	HR9-21	HR9-21	HR10-21	HR10-21	HR10-21	HR10-21	HR10-21	HR10-21	HR10-21	HR10-21
Parameter	Units	RUV-HR	ODWQS-ALL-	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Oct-28	2021-Aug-19	2021-Oct-21	2022-May-02	2022-Oct-20	2023-May-03	2023-Oct-17	2024-Apr-16	2024-Oct-28
Anions						Detection Limit												
Chloride	mg/L	128.5	250	-	-	0.1	0.79	<1	<1	1.1	2.52	2.46	4.87	3.23	3.95	<1	2.4	1.1
Fluoride	mg/L	-	1.5	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate as N	mg/L	3.32	10	-	-	0.05	0.45	1.28	0.55	0.58	0.28	0.2	0.45	0.38	1.85	0.4	1.51	0.46
Sulphate	mg/L	-	500	-	-	0.1	5.14	4.7	5.6	4.9	3.48	3.8	3.21	3.92	3.59	5.2	4.3	4.1
Cations																		
Calcium (diss)	mg/L	-	-	-	-	0.05	3.47	5.2	3.4	2.9	8.97	3.5	4.4	5.12	6.56	4.2	7.5	4.1
Magnesium (diss)	mg/L	-	-	-	-	0.05	0.5	0.74	0.51	0.45	1.46	0.71	0.9	0.89	1.34	0.81	1.5	0.78
Potassium (diss)	mg/L	-	-	-	-	0.05	0.77	1.4	1.2	1.1	1.24	0.97	1.04	0.67	1.18	1	1.2	0.89
Sodium (diss)	mg/L	104.5	200	-	-	0.05	1.67	1.8	1.6	1.8	2.84	2.13	2.59	2.88	3.16	2.2	3	2.1
General Chemistry																		
Alkalinity (as CaCO3)	mg/L	279.5	30 - 500	See Factsheet	-	1	8	8.5	7.5	6.7	33	14	8	15	18	13	26	15
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.05	0.13	<0.05	<0.02	0.14	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	7.9	7.9	19	<5	<5	<5	<5	<5	<4	5.7	13
Dissolved Organic Carbon	mg/L	3.7	5	-	-	0.4	1.3	1.8	2.1	1.7	4	2.3	1	1.3	1.4	1.4	1.9	1.6
Electrical Conductivity	uS/cm	-	-	-	-	1	36	50	34	37	83	42	53	51	69	46	67	23
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-	0.5	-	-	-	-	28.4	11.7	14.7	16.4	-	-	-	-
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.63	6.73	6.45	6.89	7.02	6.41	6.27	6.76	6.84	6.97	6.77	7.32
Total Dissolved Solids	mg/L	314	500	-	-	10	34	45	<10	75	66	62	22	54	48	60	45	110
Metals																		
Aluminum (diss, 0.45 µm)	mg/L	0.55	0.1	-	Calculated	0.004	0.01	0.015	0.01	0.019	0.043	0.047	0.016	0.061	0.016	0.0066	0.032	0.051
Antimony (diss)	mg/L	-	0.006	-	0.02		-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	-	0.01	-	0.005	0.003	-	-	-	-	-	-	-	-	-	-	-	-
Barium (diss)	mg/L	0.301	1	-	-	0.002	0.012	0.016	0.012	0.01	0.005	0.004	0.004	0.004	0.005	0.0035	0.0065	0.0048
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0004	<0.0005	<0.0004	<0.0004	<0.0004	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0004	<0.0004	<0.0004
Boron (diss)	mg/L	1.265	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
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009
Chromium (diss)	mg/L	0.0136	0.05	-	-	0.002	<0.002	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003	<0.002	<0.002	<0.005	<0.005	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper (diss)	mg/L	0.5	1	-	Calculated	0.0009	<0.001	<0.0009	<0.0009	0.0051	0.002	<0.002	<0.002	0.002	<0.001	<0.0009	0.0016	0.0019
Iron (diss)	mg/L	0.155	0.3	0.3	-	0.01	<0.01	<0.1	<0.1	<0.1	0.02	<0.01	0.018	0.016	<0.01	<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	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.03	0.05	-	-	0.002	0.005	0.059	0.015	0.0078	0.02	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	-	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.0005	<0.0005
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (diss)	mg/L	-	0.05	0.1	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.05	4.43	5.1	4.4	4.6	4.85	3.87	3.46	5.61	4.53	4.1	4.5	4.1
Silver (diss)	mg/L	-	-	0.0001	-	0.00009	<0.0001	<0.00009	<0.00009	<0.00009	**0.0002**	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.00009	<0.00009
Strontium (diss)	mg/L	-	-	-	-	0.001	0.029	0.062	0.045	0.042	0.079	0.032	0.057	0.054	0.059	0.04	0.069	0.038
Thallium (diss)	mg/L	-	-	-	0.0003	0.00005	<0.0003	<0.00005	<0.00005	<0.00005	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.00005	<0.00005	<0.00005
Titanium (diss)	mg/L	-	-	-	-	0.002	<0.002	<0.005	<0.005	<0.005	<0.002	0.003	<0.002	0.005	<0.002	<0.005	<0.005	<0.005
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0005	<0.0005	<0.0005
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	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-HR	Reasonable Use Values Hickey Road
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

Appendix E

E-2 Historical Surface Water Chemistry

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Surface Water						Sample ID	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2007-May-03	2008-May-08	2008-Oct-09	2009-Jun-04	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2012-Apr-16	2013-Apr-16	2013-Oct-30	2014-May-12	2014-Oct-16	2015-May-05
Anions						**Detection Limit**														
Chloride	mg/L	-	-	180	128	0.1	<1	1	1	2	1	1	<1	<1	<1	0.53	0.64	0.58	0.49	0.72
Nitrate as N	mg/L	-	-	-	-	0.05	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	0.25	0.2	0.16	0.78	0.16	<0.05	0.28
Nitrite as N	mg/L	-	-	-	-	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L	-	-	100	-	0.1	9	9	10	9	8	9	8	7	9	5.95	12.2	7.59	9.13	-
Cations																				
Calcium (tot)	mg/L	-	-	-	-	0.16	4	12	24	16	17	17	18	14	14.7	8.55	25.7	14.9	24.3	16.7
Magnesium (tot)	mg/L	-	-	-	-	0.05	1	1	2	2	2	1	2	1	1630	1.04	2.07	1.45	1.91	1.52
Potassium (tot)	mg/L	-	-	-	-	0.2	<1	<1	<1	<1	<1	<1	<1	<1	795	0.73	1.12	0.84	1.04	0.9
Sodium (tot)	mg/L	-	-	-	-	0.1	<2	<2	<2	2	<2	<2	<2	<2	903	0.74	1.22	0.9	1.16	0.97
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	7	28	61	43	56	50	53	43	42	17.7	51	37	63	36
Ammonia as N	mg/L	-	-	-	-	0.02	0.03	<0.00021	<0.02	<0.02	<0.02	0.00007	<0.02	0.1	<0.01	<0.02	0.00002	<0.02	0.18	<0.02
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	<1	<1	2	<1	<1	<1	<1	<1	<2	<5	12	<5	<5	<5
Chemical Oxygen Demand	mg/L	-	-	-	-	4	-	5	5	8	6	8	8	13	<10	<5	311	<5	9	<5
Electrical Conductivity	uS/cm	-	-	-	-	1	39	79	145	105	125	124	123	99	118	55	141	93	152	98
Hardness (as CaCO3)	mg/L	-	-	-	-	0.5	14.1	34.1	68.2	48.2	50.7	46.6	53.2	39.1	6749	25.6	72.7	43.2	68.5	48
Lab Filtration Aluminum (diss)		-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	pH units	6.5 - 8.5	-	6 - 9	-		6	7.36	7.62	7.41	7.56	7.78	7.66	7.41	7.4	7.08	7.65	7.54	7.21	7.7
Phenols	mg/L	0.001	-	0.04	0.004	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Dissolved Solids	mg/L	-	-	-	-	10	25	51	94	68	81	81	80	64	414	36	98	58	98	62
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.24	0.29	0.21	<0.1	<0.1	0.11	0.15	0.35	<0.1	0.39	9.04	0.4	1	0.22
Total Phosphorus	mg/L	0.03	-	-	-	0.02	0.04	<0.01	0.07	0.06	<0.01	<0.01	0.01	<0.01	<0.01	0.02	0.49	<0.02	0.05	<0.01
Total Suspended Solids	mg/L	-	-	-	-	10	36	17	570	85	5	<2	3	<2	9	<10	164	<10	<10	<10
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.000002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																				
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum (diss, 0.45 µm)	mg/L	-	Calculated	-	-	0.004	0.11	0.02	0.24	0.17	0.04	0.02	0.02	0.02	0.015	0.049	0.019	0.019	0.011	0.018
Aluminum (tot)	mg/L	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.014	0.009	0.044	0.012	0.022	0.012
Beryllium (tot)	mg/L	Calculated	-	-	-	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (tot)	mg/L	-	0.2	3.55	1.5	0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	0.017	0.015	<0.01	<0.01	<0.01	<0.01
Cadmium (tot)	mg/L	-	Calculated	0.00021	0.000017	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0007	<0.0001	<0.0001	<0.0001
Chromium (tot)	mg/L	-	-	0.064	-	0.003	<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
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	0.001	0.001	0.003	0.003	0.001	0.001	0.001	0.001	0.0011	<0.002	0.017	<0.002	0.004	<0.002
Iron (tot)	mg/L	0.3	-	1	-	0.01	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	<0.01	0.11	<0.01	0.068	<0.01
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.001	0.002	<0.001	<0.001	<0.001
Manganese (tot)	mg/L	-	-	-	-	0.002	<0.01	<0.01	0.04	0.01	<0.01	<0.01	<0.01	<0.01	<0.005	0.006	0.206	<0.002	0.047	<0.002
Molybdenum (tot)	mg/L	-	0.04	-	-	0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0012	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (tot)	mg/L	0.025	-	-	-	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.003	0.003	<0.003	0.007	<0.003
Silicon (tot)	mg/L	-	-	-	-	0.1	3.8	3.4	5.5	3.8	4.5	3.9	4.2	3.4	3.22	2.95	4.57	3.13	4.36	3.03
Silver (tot)	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 (tot)	mg/L	-	-	-	-	0.001	0.035	0.06	0.093	0.103	0.105	0.101	0.114	0.091	0.089	0.047	0.169	0.077	0.129	0.072
Thallium (tot)	mg/L	-	0.0003	-	-	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Titanium (tot)	mg/L	-	-	-	-	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (tot)	mg/L	-	0.006	-	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.002	0.002	<0.002	<0.002	<0.002
Zinc (tot)	mg/L	-	0.02	0.089	0.03	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	0.39	<0.005	0.007	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Surface Water						Sample ID	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-SW1	HR-QAQC SW-F20 (HR-SW1)	HR-SW1	HR-SW1	HR-SW1	HR-QAQC SW-S22 (HR-SW1)	HR-SW1
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2016-Apr-27	2017-May-12	2017-Oct-24	2018-May-09	2018-Oct-23	2019-May-08	2020-May-08	2020-Oct-08	2020-Oct-08	2021-Apr-22	2021-Oct-21	2022-May-02	2022-May-02	2023-May-03
Anions						Detection Limit														
Chloride	mg/L	-	-	180	128	0.1	0.56	0.45	0.46	0.49	0.61	0.56	0.63	0.67	0.66	0.57	3.83	0.45	0.43	0.39
Nitrate as N	mg/L	-	-	-	-	0.05	0.18	0.11	<0.05	0.25	0.68	0.93	0.4	0.39	0.43	0.46	0.07	0.34	0.33	0.18
Nitrite as N	mg/L	-	-	-	-	0.01	<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	<0.05
Sulphate	mg/L	-	-	100	-	0.1	6.83	6.52	9.27	5.74	8.38	5.26	7.24	6.87	6.84	7.14	5.85	5.93	5.82	4.67
Cations																				
Calcium (tot)	mg/L	-	-	-	-	0.16	12	12.2	22.4	12.6	21	11.1	13.03	20.81	19.24	15.4	23	14.5	15.4	9.5
Magnesium (tot)	mg/L	-	-	-	-	0.05	1.2	1.18	1.92	1.14	1.62	1.17	1.35	1.73	1.59	1.49	2.08	1.46	1.56	0.86
Potassium (tot)	mg/L	-	-	-	-	0.2	0.7	0.65	1.13	0.75	1.02	0.78	0.73	1.06	1	1	1.61	<1.15	1.2	0.52
Sodium (tot)	mg/L	-	-	-	-	0.1	0.79	0.78	1.08	0.75	1.02	0.8	0.84	1.18	1.08	1.29	1.38	0.96	0.67	0.77
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	34	38	61	36	65	36	41	52	51	35	58	33	31	29
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	0.0000396	0.0000745	<0.02	<0.02	<0.02	<0.02	<0.02	0.11	<0.02	<0.02	<0.02
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	<5	<5	7	<5	<5	<5	<5	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	-	-	-	-	4	-	6	394	<5	251	<5	<5	15	10	<5	7	7	<5	<5
Electrical Conductivity	uS/cm	-	-	-	-	1	79	95	124	88	142	81	101	112	111	93	115	87	86	67
Hardness (as CaCO3)	mg/L	-	-	-	-	0.5	34.9	35.3	63.8	36.2	59.1	32.5	38.1	59.1	54.6	44.6	66	42.2	44.9	27.3
Lab Filtration Aluminum (diss)		-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	
pH	pH units	6.5 - 8.5	-	6 - 9	-		7.71	7.21	7.34	7.19	7.64	6.64	7.44	6.84	6.87	7.62	7.37	6.96	6.85	7.21
Phenols	mg/L	0.001	-	0.04	0.004	0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	-	-	-	-	10	56	44	74	40	78	70	52	74	68	38	80	60	54	52
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.27	0.13	0.32	0.31	0.47	<0.1	0.29	0.26	0.24	<0.1	0.15	0.13	0.14	0.21
Total Phosphorus	mg/L	0.03	-	-	-	0.02	0.01	<0.01	0.94	<0.02	0.73	0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.06	0.04	<0.02
Total Suspended Solids	mg/L	-	-	-	-	10	<10	<10	468	<10	26	<10	<10	15	46	<10	<10	27	49	<10
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.000002	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000002
Metals																				
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	0.029	0.015	0.095
Aluminum (diss, 0.45 µm)	mg/L	-	Calculated	-	-	0.004	0.02	0.022	0.017	0.02	0.01	-	0.022	0.051	0.017	0.018	0.021	-	-	-
Aluminum (tot)	mg/L	-	-	-	-	0.004	-	-	-	-	-	-	0.046	0.035	0.092	0.028	0.057	-	-	0.07
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.011	0.014	0.052	0.013	0.056	0.014	0.01	0.017	0.019	0.011	0.016	0.019	0.021	0.013
Beryllium (tot)	mg/L	Calculated	-	-	-	0.0005	<0.001	-	-	0.056	0.013	-	-	-	-	-	-	-	-	-
Boron (tot)	mg/L	-	0.2	3.55	1.5	0.01	<0.01	<0.01	0.094	<0.01	<0.01	<0.01	<0.01	0.018	0.012	<0.01	0.014	<0.01	<0.01	<0.01
Cadmium (tot)	mg/L	-	Calculated	0.00021	0.000017	0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (tot)	mg/L	-	-	0.064	-	0.003	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	<0.0005	<0.0005	0.001	<0.0005	0.0011	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	<0.002	<0.002	**0.022**	0.001	**0.022**	<0.002	0.002	0.003	0.003	<0.002	<0.002	0.006	0.005	0.001
Iron (tot)	mg/L	0.3	-	1	-	0.01	<0.01	<0.01	0.54	<0.01	0.63	<0.01	0.015	<0.01	0.016	<0.01	0.018	0.362	0.385	0.023
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	<0.001	<0.001	**0.004**	<0.001	**0.007**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001
Manganese (tot)	mg/L	-	-	-	-	0.002	<0.002	<0.002	0.265	<0.002	0.288	0.006	<0.002	<0.002	0.008	<0.002	0.002	0.053	0.043	<0.002
Molybdenum (tot)	mg/L	-	0.04	-	-	0.0005	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (tot)	mg/L	0.025	-	-	-	0.003	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (tot)	mg/L	-	-	-	-	0.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (tot)	mg/L	0.0001	-	-	-	0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (tot)	mg/L	-	-	-	-	0.001	0.066	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (tot)	mg/L	-	0.0003	-	-	0.0001	<0.0003	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (tot)	mg/L	-	-	-	-	0.002	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (tot)	mg/L	-	0.006	-	-	0.001	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (tot)	mg/L	-	0.02	0.089	0.03	0.005	<0.005	<0.005	0.008	<0.005	0.044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Surface Water						Sample ID	HR-SW1	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2	HR-SW2
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2024-Apr-16	2007-May-03	2008-May-08	2009-Jun-04	2010-May-18	2010-Oct-19	2011-May-19	2012-Apr-16	2013-Apr-16	2014-May-12	2015-May-05	2016-Apr-27	2017-May-12	2018-May-09
Anions						**Detection Limit**														
Chloride	mg/L	-	-	180	128	0.1	<1	<1	1	2	1	2	2	<1	0.56	0.59	0.77	0.55	0.48	0.44
Nitrate as N	mg/L	-	-	-	-	0.05	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.05	<0.05	<0.05	<0.05	0.06
Nitrite as N	mg/L	-	-	-	-	0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L	-	-	100	-	0.1	6.3	9	9	7	7	7	6	9	5.21	6.69	-	5.73	6.11	4.49
Cations																				
Calcium (tot)	mg/L	-	-	-	-	0.16	13	10	10	10	12	8	8	12.6	5.52	9.04	8.92	6.44	7.8	7.13
Magnesium (tot)	mg/L	-	-	-	-	0.05	1.2	1	1	1	2	1	1	1330	0.8	1.14	1.14	0.86	1.04	0.8
Potassium (tot)	mg/L	-	-	-	-	0.2	0.78	<1	<1	<1	<1	<1	<1	818	0.77	0.78	0.76	0.59	0.51	0.64
Sodium (tot)	mg/L	-	-	-	-	0.1	0.8	<2	<2	2	<2	<2	<2	1020	0.76	0.99	1.01	0.82	0.87	0.7
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	35	27	23	31	32	23	27	23	10.2	19	18	18	25	31
Ammonia as N	mg/L	-	-	-	-	0.02	<0.05	0.12	<0.00057	0.02	<0.02	0.00001	<0.02	0.03	0.11	0.0001	0.0001252	<0.02	<0.02	0.05
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	<2	<1	<1	1	<1	3	<1	<2	<5	<5	<5	<5	<5	<5
Chemical Oxygen Demand	mg/L	-	-	-	-	4	7.9	-	10	15	20	18	23	30	<5	6	14	-	7	<5
Electrical Conductivity	uS/cm	-	-	-	-	1	80	71	65	73	86	60	63	82	38	62	60	48	67	52
Hardness (as CaCO3)	mg/L	-	-	-	-	0.5	39	29.1	29.1	29.1	38.2	24.1	24.1	5508.4	17.1	27.3	27	19.6	23.8	21.1
Lab Filtration Aluminum (diss)		-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	pH units	6.5 - 8.5	-	6 - 9	-		7.35	6.42	7.31	7.11	7.43	7.09	7.11	6.8	6.72	7.24	7.35	7.35	7.48	6.89
Phenols	mg/L	0.001	-	0.04	0.004	0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-
Total Dissolved Solids	mg/L	-	-	-	-	10	30	46	42	48	56	39	41	166	30	<20	40	42	30	22
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	<0.1	0.23	0.29	0.16	0.16	6.66	0.43	0.3	0.16	5.2	0.57	0.71	0.17	0.37
Total Phosphorus	mg/L	0.03	-	-	-	0.02	<0.02	0.02	<0.01	0.06	<0.01	0.01	<0.01	0.04	<0.02	<0.02	0.07	<0.01	0.01	<0.02
Total Suspended Solids	mg/L	-	-	-	-	10	<10	71	<2	20	4	617	3	13	<10	21	35	<10	<10	<10
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.000002	<0.00061	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																				
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.004	0.024	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum (diss, 0.45 µm)	mg/L	-	Calculated	-	-	0.004	-	0.34	0.05	0.27	0.09	0.46	0.04	0.207	0.069	0.044	0.05	0.05	0.049	0.042
Aluminum (tot)	mg/L	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.011	0.02	0.01	0.02	0.03	0.02	0.01	0.017	0.008	0.013	0.014	0.01	0.015	0.013
Beryllium (tot)	mg/L	Calculated	-	-	-	0.0005	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	-	-
Boron (tot)	mg/L	-	0.2	3.55	1.5	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium (tot)	mg/L	-	Calculated	0.00021	0.000017	0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-
Chromium (tot)	mg/L	-	-	0.064	-	0.003	-	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	-	-
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	<0.0005	0.0002	<0.0002	0.0005	0.0004	0.0004	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	0.0012	0.002	0.001	0.001	0.001	0.003	0.001	0.0016	<0.002	<0.002	<0.002	<0.002	<0.002	0.002
Iron (tot)	mg/L	0.3	-	1	-	0.01	<0.1	0.19	0.07	0.33	0.18	0.32	0.12	0.121	<0.01	<0.01	0.12	0.02	<0.01	0.14
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (tot)	mg/L	-	-	-	-	0.002	<0.002	0.02	<0.01	0.07	0.1	0.05	0.01	0.032	0.013	<0.002	0.022	0.002	0.004	0.018
Molybdenum (tot)	mg/L	-	0.04	-	-	0.0005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.002	<0.002	<0.002	<0.002	-	-
Nickel (tot)	mg/L	0.025	-	-	-	0.003	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.003	0.007	<0.003	<0.003	-	-
Silicon (tot)	mg/L	-	-	-	-	0.1	-	2.1	3.1	3.1	3	3.9	1.9	3.03	2.81	2.37	2.24	2.61	-	-
Silver (tot)	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	-	-
Strontium (tot)	mg/L	-	-	-	-	0.001	-	0.053	0.054	0.076	0.082	0.059	0.049	0.06	0.032	0.054	0.052	0.043	-	-
Thallium (tot)	mg/L	-	0.0003	-	-	0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0003	<0.0003	<0.0003	-	-
Titanium (tot)	mg/L	-	-	-	-	0.002	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.002	<0.002	0.003	<0.002	-	-
Vanadium (tot)	mg/L	-	0.006	-	-	0.001	-	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.0008	<0.002	<0.002	<0.002	<0.002	-	-
Zinc (tot)	mg/L	-	0.02	0.089	0.03	0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	0.005	0.006	<0.005	<0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Surface Water						Sample ID	HR-SW2	HR-QAQC-SW-S19 (HR-SW2)	HR-SW2	HR-SW2-QAQC SW-S20 (HR-SW2)	HR-SW2	HR-SW2	HR-QAQC SW-F21 (HR-SW2)	HR-SW2	HR-SW2	HR-SW2	HR-QAQC-SW1 (HR-SW2)	HR-SW3	HR-SW3
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2019-May-08	2019-May-08	2020-May-08	2020-May-08	2021-Apr-22	2021-Oct-21	2021-Oct-21	2022-May-02	2023-May-03	2024-Apr-16	2024-Apr-16	2014-May-12	2015-May-05
Anions						Detection Limit													
Chloride	mg/L	-	-	180	128	0.1	0.62	0.59	0.63	0.61	0.52	0.68	0.72	0.42	0.38	<1	<1	0.59	0.76
Nitrate as N	mg/L	-	-	-	-	0.05	0.3	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.1	<0.1	<0.05	<0.05
Nitrite as N	mg/L	-	-	-	-	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05
Sulphate	mg/L	-	-	100	-	0.1	5.02	4.98	6.1	6.11	6.02	3.29	2.82	4.76	4.18	5.6	5.5	6.67	-
Cations																			
Calcium (tot)	mg/L	-	-	-	-	0.16	7.5	7.55	8.21	8.13	9.27	13.7	11.6	7.71	5.45	8.3	7.9	8.69	8.63
Magnesium (tot)	mg/L	-	-	-	-	0.05	0.99	0.98	1.03	1.05	1.17	1.97	1.69	0.93	0.76	1	1	1.1	1.08
Potassium (tot)	mg/L	-	-	-	-	0.2	0.71	0.73	0.84	0.66	0.98	2.19	1.7	<1.15	1.1	0.71	0.7	0.69	0.72
Sodium (tot)	mg/L	-	-	-	-	0.1	0.82	0.83	0.84	0.89	1.13	1.49	1.25	0.81	0.89	0.87	0.81	1.01	1.02
General Chemistry																			
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	27	25	23	17	24	35	32	21	17	22	27	18	18
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.00017146
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	<5	<5	<5	<5	<2	5	5	<2	<2	<2	<2	<5	<5
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	<5	101	23	<5	<5	11	13	12	21
Electrical Conductivity	uS/cm	-	-	-	-	1	59	58	69	69	62	72	72	56	49	54	55	59	58
Hardness (as CaCO3)	mg/L	-	-	-	-	0.5	22.8	22.9	24.7	24.6	28	42.3	35.9	23.1	16.7	26	27	26.2	26
Lab Filtration Aluminum (diss)		-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-
pH	pH units	6.5 - 8.5	-	6 - 9	-		6.53	6.54	6.79	6.67	7.25	6.99	6.89	6.73	7.03	7.03	7.37	7.07	6.85
Phenols	mg/L	0.001	-	0.04	0.004	0.001	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
Total Dissolved Solids	mg/L	-	-	-	-	10	62	48	40	44	<20	60	58	36	50	60	85	40	46
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	<0.1	<0.1	0.35	0.41	0.19	0.64	0.28	0.15	<0.1	0.1	0.11	0.58	0.69
Total Phosphorus	mg/L	0.03	-	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.49	0.52	<0.02	<0.02	<0.02	<0.02	0.03	0.11
Total Suspended Solids	mg/L	-	-	-	-	10	<10	<10	134	154	<10	650	96	<10	<10	<10	<10	13	25
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.000002	-	-	-	-	-	-	-	-	<0.000002	<0.00061	<0.00061	-	-
Metals																			
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.004	-	-	-	-	-	-	-	0.043	0.052	0.048	0.048	-	-
Aluminum (diss, 0.45 µm)	mg/L	-	Calculated	-	-	0.004	-	-	0.048	0.047	0.037	0.054	0.057	-	-	-	-	0.053	0.07
Aluminum (tot)	mg/L	-	-	-	-	0.004	-	-	0.472	0.477	0.066	1.01	0.919	-	0.041	-	-	-	-
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.013	0.013	0.013	0.013	0.012	0.024	0.023	0.011	0.012	0.011	0.011	0.014	0.015
Beryllium (tot)	mg/L	Calculated	-	-	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
Boron (tot)	mg/L	-	0.2	3.55	1.5	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
Cadmium (tot)	mg/L	-	Calculated	0.00021	0.000017	0.0001	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Chromium (tot)	mg/L	-	-	0.064	-	0.003	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	0.0015	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	<0.002	<0.002	0.003	0.003	<0.002	0.003	0.003	0.005	0.002	0.0013	0.0012	<0.002	<0.002
Iron (tot)	mg/L	0.3	-	1	-	0.01	<0.01	<0.01	0.419	0.39	0.051	**1.59**	**1.28**	0.04	0.186	<0.1	<0.1	0.05	0.09
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.0005	<0.0005	<0.001	<0.001
Manganese (tot)	mg/L	-	-	-	-	0.002	<0.002	<0.002	0.023	0.029	0.003	0.199	0.159	0.003	0.003	<0.002	<0.002	0.039	0.07
Molybdenum (tot)	mg/L	-	0.04	-	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002
Nickel (tot)	mg/L	0.025	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003
Silicon (tot)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	2.39	1.72
Silver (tot)	mg/L	0.0001	-	-	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Strontium (tot)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	0.052	0.048
Thallium (tot)	mg/L	-	0.0003	-	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	<0.0003	<0.0003
Titanium (tot)	mg/L	-	-	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002
Vanadium (tot)	mg/L	-	0.006	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002
Zinc (tot)	mg/L	-	0.02	0.089	0.03	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.02	<0.02	<0.02	<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 PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Surface Water						Sample ID	HR-SW3	HR-SW3	HR-SW3	HR-SW3	HR-SW3	HR-QAQC SW-S21 (HR-SW3)	HR-SW3	HR-SW3	HR-SW3	HR-QAQC-SW1 (HR-SW3)	HR-SW3	HR-SW4	HR-SW4	HR-SW4
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2016-Apr-27	2017-May-12	2018-May-09	2019-May-08	2021-Apr-22	2021-Apr-22	2021-Oct-21	2022-May-02	2023-May-03	2023-May-03	2024-Apr-16	2020-May-08	2020-Oct-08	2021-Apr-22
Anions						**Detection Limit**														
Chloride	mg/L	-	-	180	128	0.1	0.58	0.48	0.55	0.65	0.58	0.62	1.27	0.44	0.44	0.45	1.3	0.66	0.6	0.64
Nitrate as N	mg/L	-	-	-	-	0.05	<0.05	<0.05	<0.05	0.21	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	0.13	0.28	0.15
Nitrite as N	mg/L	-	-	-	-	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05
Sulphate	mg/L	-	-	100	-	0.1	6.36	6	4.64	5.55	5.44	5.37	0.71	4.64	4.76	4.75	6.9	6.56	5.3	5.53
Cations																				
Calcium (tot)	mg/L	-	-	-	-	0.16	6.96	7.8	6.98	7.01	8.82	9.07	13.1	8.01	6.17	6.38	6.2	3.47	6.88	3.79
Magnesium (tot)	mg/L	-	-	-	-	0.05	0.91	1.04	0.82	0.92	1.13	1.1	1.63	1.07	0.63	0.79	0.81	1.35	2.92	1.28
Potassium (tot)	mg/L	-	-	-	-	0.2	0.56	0.58	0.64	0.67	0.82	0.84	1.73	<1.15	0.53	<0.5	0.59	1.11	1.82	1.27
Sodium (tot)	mg/L	-	-	-	-	0.1	0.85	0.86	0.79	0.9	1.17	1.15	1.48	1	0.57	1.21	0.85	0.97	1.41	1.11
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	18	26	30	23	18	20	37	20	13	11	27	12	16	8
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	0.00002	<0.02	<0.02	<0.02	0.11	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	<5	<5	<5	<5	<2	2	4	<2	<2	<2	<2	<5	<2	<2
Chemical Oxygen Demand	mg/L	-	-	-	-	4	-	9	<5	<5	<5	<5	31	<5	<5	30	21	9	35	<5
Electrical Conductivity	uS/cm	-	-	-	-	1	51	70	53	56	55	55	83	56	45	45	45	44	46	36
Hardness (as CaCO3)	mg/L	-	-	-	-	0.5	21.1	23.8	20.8	21.3	26.7	27.2	39.4	24.4	18	19.2	21	14.2	29.2	14.7
Lab Filtration Aluminum (diss)		-	-	-	-		-	-	-	-	-	-	-	-			-	-	-	-
pH	pH units	6.5 - 8.5	-	6 - 9	-		7.38	7.67	6.82	6.47	7.12	7.05	6.83	6.66	6.75	6.69	7.18	6.83	6.48	6.76
Phenols	mg/L	0.001	-	0.04	0.004	0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	-	-	-	-	10	38	40	<20	50	<20	32	76	40	52	56	20	30	32	36
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	1.85	0.18	0.39	<0.1	0.29	0.31	0.62	0.18	0.32	0.36	0.2	0.31	0.28	0.12
Total Phosphorus	mg/L	0.03	-	-	-	0.02	<0.01	0.01	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.02	<0.02	<0.02	0.03	0.12	0.05
Total Suspended Solids	mg/L	-	-	-	-	10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	<10	17	280	<10
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.000002	-	-	-	-	-	-	-	-	<0.000002	<0.000002	<0.00061	-	-	-
Metals																				
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.004	-	-	-	-	-	-	-	0.051	0.071	0.079	0.087	-	-	-
Aluminum (diss, 0.45 µm)	mg/L	-	Calculated	-	-	0.004	0.054	0.047	0.045	-	0.078	0.073	0.097	-	-	-	-	0.068	0.071	0.062
Aluminum (tot)	mg/L	-	-	-	-	0.004	-	-	-	-	0.11	0.148	0.128	-	0.125	0.167	-	0.487	3.67	0.177
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.011	0.016	0.014	0.013	0.012	0.013	0.025	0.012	0.013	0.018	0.01	0.014	0.065	0.011
Beryllium (tot)	mg/L	Calculated	-	-	-	0.0005	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (tot)	mg/L	-	0.2	3.55	1.5	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	0.018	<0.01
Cadmium (tot)	mg/L	-	Calculated	0.00021	0.000017	0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (tot)	mg/L	-	-	0.064	-	0.003	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0039	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	<0.002	<0.002	0.001	<0.002	<0.002	0.002	<0.002	<0.002	0.001	0.001	0.0016	0.004	**0.017**	<0.002
Iron (tot)	mg/L	0.3	-	1	-	0.01	<0.01	<0.01	0.09	<0.01	0.141	0.214	0.98	0.052	0.079	0.136	<0.1	0.45	**3.85**	0.134
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	**0.003**	<0.001
Manganese (tot)	mg/L	-	-	-	-	0.002	<0.002	0.004	0.073	0.006	0.021	0.032	0.312	0.006	0.017	0.05	0.0062	0.031	0.242	0.007
Molybdenum (tot)	mg/L	-	0.04	-	-	0.0005	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (tot)	mg/L	0.025	-	-	-	0.003	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (tot)	mg/L	-	-	-	-	0.1	2.75	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (tot)	mg/L	0.0001	-	-	-	0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (tot)	mg/L	-	-	-	-	0.001	0.043	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (tot)	mg/L	-	0.0003	-	-	0.0001	<0.0003	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (tot)	mg/L	-	-	-	-	0.002	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (tot)	mg/L	-	0.006	-	-	0.001	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (tot)	mg/L	-	0.02	0.089	0.03	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	0.026	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Surface Water						Sample ID	HR-SW4	HR-SW4	HR-SW4	HR-SW4
Parameter	Units	PWQO-GENERAL	PWQO-INTERIM	MECP-GD-TA	MECP-GD-TB	Sample Date	2021-Nov-15	2022-May-02	2023-May-03	2024-Apr-16
Anions						**Detection Limit**				
Chloride	mg/L	-	-	180	128	0.1	0.48	0.41	0.36	1.2
Nitrate as N	mg/L	-	-	-	-	0.05	0.08	0.06	<0.05	<0.1
Nitrite as N	mg/L	-	-	-	-	0.01	<0.05	<0.05	<0.05	<0.01
Sulphate	mg/L	-	-	100	-	0.1	4.7	4.69	3.85	5.6
Cations										
Calcium (tot)	mg/L	-	-	-	-	0.16	8.2	2.93	2.14	2.8
Magnesium (tot)	mg/L	-	-	-	-	0.05	2.36	1.13	0.62	0.91
Potassium (tot)	mg/L	-	-	-	-	0.2	2.05	<1.15	0.81	0.87
Sodium (tot)	mg/L	-	-	-	-	0.1	1.57	0.9	0.57	0.81
General Chemistry										
Alkalinity (as CaCO3)	mg/L	See Factsheet	-	-	-	1	25	7	<5	8.2
Ammonia as N	mg/L	-	-	-	-	0.02	0.1	<0.02	<0.02	<0.05
Biochemical Oxygen Demand	mg/L	-	-	-	-	2	4	<2	<2	<2
Chemical Oxygen Demand	mg/L	-	-	-	-	4	277	<5	<5	12
Electrical Conductivity	uS/cm	-	-	-	-	1	53	34	25	29
Hardness (as CaCO3)	mg/L	-	-	-	-	0.5	30.2	12	7.9	12
Lab Filtration Aluminum (diss)		-	-	-	-		-	-		-
pH	pH units	6.5 - 8.5	-	6 - 9	-		6.57	6.37	6.5	6.59
Phenols	mg/L	0.001	-	0.04	0.004	0.001	-	-	-	-
Total Dissolved Solids	mg/L	-	-	-	-	10	38	50	40	40
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	8.04	0.17	0.18	<0.1
Total Phosphorus	mg/L	0.03	-	-	-	0.02	0.66	0.08	<0.02	<0.02
Total Suspended Solids	mg/L	-	-	-	-	10	190	13	<10	<10
Unionized Ammonia (Calc)	mg/L	-	-	-	-	0.000002	-	-	<0.000002	<0.00061
Metals										
Aluminum (diss, 0.2 µm)	mg/L	-	Calculated	-	-	0.004	-	0.049	0.062	0.082
Aluminum (diss, 0.45 µm)	mg/L	-	Calculated	-	-	0.004	0.048	-	-	-
Aluminum (tot)	mg/L	-	-	-	-	0.004	1.49	-	0.09	-
Barium (tot)	mg/L	-	-	2.3	-	0.002	0.037	0.011	0.011	0.0097
Beryllium (tot)	mg/L	Calculated	-	-	-	0.0005	-	-	-	-
Boron (tot)	mg/L	-	0.2	3.55	1.5	0.01	<0.01	<0.01	<0.01	<0.01
Cadmium (tot)	mg/L	-	Calculated	0.00021	0.000017	0.0001	-	-	-	-
Chromium (tot)	mg/L	-	-	0.064	-	0.003	-	-	-	-
Cobalt (tot)	mg/L	-	0.0009	-	-	0.0005	0.0018	<0.0005	<0.0005	<0.0005
Copper (tot)	mg/L	-	Calculated	0.0069	-	0.0009	**0.009**	<0.002	0.001	0.0016
Iron (tot)	mg/L	0.3	-	1	-	0.01	**1.65**	0.068	0.038	<0.1
Lead (tot)	mg/L	-	Calculated	0.002	-	0.0005	0.002	<0.001	<0.001	<0.0005
Manganese (tot)	mg/L	-	-	-	-	0.002	0.444	0.005	<0.002	0.0064
Molybdenum (tot)	mg/L	-	0.04	-	-	0.0005	-	-	-	-
Nickel (tot)	mg/L	0.025	-	-	-	0.003	-	-	-	-
Silicon (tot)	mg/L	-	-	-	-	0.1	-	-	-	-
Silver (tot)	mg/L	0.0001	-	-	-	0.0001	-	-	-	-
Strontium (tot)	mg/L	-	-	-	-	0.001	-	-	-	-
Thallium (tot)	mg/L	-	0.0003	-	-	0.0001	-	-	-	-
Titanium (tot)	mg/L	-	-	-	-	0.002	-	-	-	-
Vanadium (tot)	mg/L	-	0.006	-	-	0.001	-	-	-	-
Zinc (tot)	mg/L	-	0.02	0.089	0.03	0.005	0.021	<0.02	<0.02	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Concentration exceeds MECP-GD-TA	MECP Guidance Document Table A
Concentration exceeds MECP-GD-TB	MECP Guidance Document Table B

Appendix E

E-3 2024 Surface Water Monitoring Locations Comparisons

E-3: Spring 2024 Surface Water Results Comparison

Sample Description			HR-SW1	HR-SW2	Comparison	HR-SW3	Comparison	HR-SW4	Comparison
Date Sampled			16-Apr-24	16-Apr-24	SW1 to SW2	16-Apr-24	SW1 to SW3	16-Apr-24	SW4 to SW1
Parameter	Unit	RDL			% change		% change		% change
Biochemical Oxygen Demand, Total	mg/L	2	2	2	0%	2	0%	2	0%
pH	pH Units	NA	7.35	7.03	4%	7.18	2%	6.59	-12%
Alkalinity (as CaCO3)	mg/L	5	35	22	37%	27	23%	8.2	-327%
Electrical Conductivity	uS/cm	2	80	54	33%	45	44%	29	-176%
Hardness (as CaCO3) (Calculated)	mg/L	0.5	39	26	33%	21	46%	12	-225%
Total Dissolved Solids	mg/L	20	30	60	-100%	20	33%	40	25%
Total Suspended Solids	mg/L	10	10	10	0%	10	0%	10	0%
Chloride	mg/L	0.10	1	1	0%	1.3	-30%	1.2	17%
Nitrate as N	mg/L	0.05	0.29	0.1	66%	0.1	66%	0.1	-190%
Nitrite as N	mg/L	0.05	0.01	0.01	0%	0.01	0%	0.01	0%
Sulphate	mg/L	0.10	6.3	5.6	11%	6.9	-10%	5.6	-13%
Ammonia as N	mg/L	0.02	0.05	0.05	0%	0.05	0%	0.05	0%
Total Kjeldahl Nitrogen	mg/L	0.10	0.1	0.1	0%	0.2	-100%	0.1	0%
Total Phosphorus	mg/L	0.02	0.02	0.02	0%	0.02	0%	0.02	0%
Chemical Oxygen Demand	mg/L	5	7.9	11	-39%	21	-166%	12	34%
Total Calcium	mg/L	0.16	13	8.3	36%	6.2	52%	2.8	-364%
Total Magnesium	mg/L	0.17	1.2	1	17%	0.81	33%	0.91	-32%
Total Potassium	mg/L	0.58	0.78	0.71	9%	0.59	24%	0.87	10%
Total Sodium	mg/L	0.22	0.8	0.87	-9%	0.85	-6%	0.81	1%
Aluminum-dissolved	mg/L	0.004	0.024	0.048	-100%	0.087	-263%	0.082	71%
Total Barium	mg/L	0.002	0.011	0.011	0%	0.010	9%	0.010	-13%
Total Boron	mg/L	0.010	0.01	0.01	0%	0.01	0%	0.01	0%
Total Cobalt	mg/L	0.0005	0.0005	0.0005	0%	0.0005	0%	0.0005	0%
Total Copper	mg/L	0.002	0.0012	0.001	-8%	0.002	-33%	0.002	25%
Total Iron	mg/L	0.010	0.1	0.100	0%	0.100	0%	0.100	0%
Total Lead	mg/L	0.001	0.0005	0.0005	0%	0.0005	0%	0.0005	0%
Total Manganese	mg/L	0.002	0.002	0.002	0%	0.006	-210%	0.006	69%
Total Zinc	mg/L	0.005	0.005	0.005	0%	0.005	0%	0.005	0%

- value indicates an increase in downstream concentration
red font indicates < removed

Appendix F

Trigger Mechanisms and Contingency Plan

Appendix F

F-1 Surface Water Trigger Mechanisms and Contingency Plan

HICKEY ROAD WASTE DISPOSAL SITE
TRIGGER MECHANISMS
20-NOV-2020
FINAL

OBJECTIVE AND BACKGROUND

The objective of the trigger mechanisms and contingency plan for the Hickey Road Waste Disposal Site (WDS) is to identify the off-site migration of leachate impacted surface water and groundwater, and ensure timely action to prevent and mitigate any adverse impacts to the environment.

OBJECTIVE 1: SURFACE WATER IMPACTS

To identify migration of impacted surface water or leachate impacted groundwater discharging to adjacent surface water bodies; to identify surface water run-off impacts to surface water bodies; and ensure timely action to prevent and mitigate any adverse impacts to the environment.

South Property Boundary-Surface Water

Assessment Points- SW2, SW3
Trigger Mechanisms- Alkalinity, Chloride, Iron, Manganese, TKN and Un-ionized Ammonia
Frequency-Sampling twice per year (Spring and Fall)
Contingency Plan is activated if three or more of the following triggers occur at the assessment point during one sampling event: Alkalinity, Chloride, Iron, Manganese, TKN, and un-ionized ammonia exceeds the values in Table 1. The 75th percentile for SW1 (background) sampling location based on the sampling results from May 2007 to May 2019 (20 results).

Table 1: SW2 and SW3 Trigger Values for Select Parameters

Parameter	SW1 75th Percentile Concentration mg/L	Surface Water Criteria (PWQO/CWQG) mg/L
Alkalinity	54.5	
Chloride	1.0	
Iron		0.3
Manganese	0.0175	
Sodium		128
TKN	0.36	
Unionized Ammonia		0.02

Notes: Should Tier 1 sampling be triggered based on surface water sampling results the contingency sampling will be carried out at the location having results that triggered the Tier 1 sampling.

Surface water samples are quite frequently dry, should dry conditions be encountered during Tier 1 or Tier 2 sampling events, then follow-up sampling will be carried out during the next semi-annual sampling event should water be present.

CONTINGENCY PLAN – SURFACE WATER

Tier 1: If three or more triggers are exceeded at the SW2 or SW3 surface water assessment point during one sampling event; the following Tier 1 sampling will be undertaken:

- Within two weeks of receipt of laboratory results, a Toxicity test (Single Concentration – Acute Lethality) sample will be collected from SW2 or SW3 (as per notes above) to determine the impacts to surface water. Tier 2 Contingency Plan is activated if result of the Toxicity test is greater than 50%.

Tier 2: Within one week of receipt of laboratory results indicting a failed toxicity test the following will be undertaken:

- A second Toxicity test will be collected at the sample location having failed Toxicity test results. Upon receipt of a confirmed second Toxicity test result the following will be undertaken:
- Identification of other potential causes of elevated concentrations through additional studies to be completed within two months of the second failed test. Following the two months, if no other potential causes for the elevated concentrations have been identified then proceed to Tier 3.

Tier 3: If the increased sampling and/or additional studies indicate 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 surface water/groundwater before it reaches a receptor. The specifics of the plan will be dependent on the nature of the impact.

References:

1. Environment Canada, "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", Environmental Technology Centre, Ottawa, Ontario, Report EPS 1/RM/13 Second Edition – December 2000, including May 2007 and February 2016 Amendments.
2. Environment Canada, "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia mangna", Environmental Technology Centre, Ottawa, Ontario, Report EPS 1/RM/14 Second Edition – December 2000, including February 2016 Amendment.

Appendix F

F-2 Draft Groundwater Trigger Mechanisms and Contingency Plan

HICKEY ROAD WASTE DISPOSAL SITE
TRIGGER MECHANISMS
DRAFT FOR DISCUSSION – REV. 05-MARCH-2021

OBJECTIVE AND BACKGROUND

The objective of the trigger mechanisms and contingency plan for the Hickey Road Waste Disposal Site (WDS) is to identify the off-site migration of leachate impacted and groundwater, and ensure timely action to prevent and mitigate any adverse impacts to the environment.

OBJECTIVE 2: GROUNDWATER IMPACTS

To identify migration of leachate impacted groundwater and to ensure timely action to prevent any adverse impacts to the environment.

West and South CAZ Boundary-Groundwater

Assessment Points- Future West and South CAZ Boundaries
Trigger Mechanisms- Barium, Chloride, Iron and TDS
Frequency-Sampling twice per year (Spring and Fall)

Contingency Plan is activated if three or more of the following triggers occur for two consecutive sampling events: Barium, Chloride, Iron, and TDS exceed the RUV criteria for the assessment point.

Table 4: Trigger Values for Select Parameters

Parameter	RUV mg/L
Barium	0.303
Chloride	129
Iron	0.25
TDS	314

CONTINGENCY PLAN – GROUNDWATER

Tier 1: If three or more triggers are exceeded at one assessment point for two consecutive sampling events, a repeat sampling will be conducted within one (1) month of receipt of the laboratory results to confirm or refute the results at that location.

Tier 2: If three or more triggers are exceeded at one assessment point and are confirmed through Tier 1 additional sampling then the following measures will be implemented depending on the nature of the trigger activation:

a. Increase monitoring frequency to twice monthly, for four months (if exceedances continue). Revert back to typical annual monitoring sampling frequency if there are two consecutive sampling results that do not show exceedances; and/or
b. 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.