2024 Annual Monitoring Report
Wolf Creek Waste Disposal Site
Environmental Compliance Approval
No. A361102

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: 240205-01
March 28, 2025

BluMetric.ca

Table of Contents

1 Introduction ____ 1

1.1 Location ____ 2
1.2 Ownership and Key Personnel ____ 2
1.3 Description and Development of the WDS ____ 3
1.4 Monitoring and Reporting Program and Objectives and Requirements ____ 4

2 Physical Setting ____ 4

2.1 Geology and Hydrogeology ____ 4
2.1.1 Surficial Geology ____ 4
2.1.2 Overburden Hydrogeology ____ 5
2.1.3 Bedrock Geology ____ 5
2.2 Surface Water Features ____ 5

3 Description of Monitoring Program ____ 6

3.1 Site Inspections and Operations Monitoring ____ 6
3.2 Monitoring Locations, Frequency and Monitoring Parameters ____ 6
3.2.1 Groundwater Monitoring ____ 6
3.2.1.1 Groundwater Elevation and Flow Monitoring ____ 8
3.2.1.2 Groundwater Gradients and Flow Direction ____ 8
3.2.2 Surface Water Monitoring ____ 9
3.2.3 Landfill Gas Monitoring ____ 9
3.3 Monitoring Procedures and Methods ____ 10
3.3.1 Groundwater Monitoring ____ 10
3.3.2 Landfill Gas Monitoring ____ 10
3.3.3 Field QA/QC Program ____ 10

4 Monitoring Results ____ 12

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

5 Assessment, Interpretation, and Discussion ____ 16

5.1 Groundwater Assessment ____ 16
5.2 Trigger Mechanisms and Contingency Plan Assessment ____ 18
5.3 Contaminant Attenuation Zone (CAZ) Assessment ____ 18
5.4 Additional Assessment Requirements ____ 19

5.5 Landfill Gas Assessment ____ 19

6 On-Site Operations ____ 19

6.1 Site Operations ____ 19
6.2 Annual Waste Summary ____ 20
6.2.1 Summary of Segregated Materials Removed ____ 21
6.3 Annual Complaints & Emergency Situations Summary ____ 21
6.4 Landfill Closure ____ 21

7 Summary Statements, Conclusions, and Recommendations ____ 22

7.1 Site Operations ____ 22
7.2 Groundwater ____ 23
7.3 Surface Water ____ 23
7.4 Landfill Gas ____ 24
7.5 Landfill Closure ____ 24

8 Limiting Conditions ____ 24

9 References ____ 26

List of Tables

Table 1: Contact Information ____ 3
Table 2: Groundwater Monitoring Well Details ____ 7
Table 3: Groundwater Quality Monitoring Parameters ____ 7
Table 4: Groundwater Elevation Data ____ 8
Table 5: Groundwater Quality Results Exceeding ODWSOG Criteria ____ 12
Table 6: Reasonable Use Calculations ____ 13
Table 7: Groundwater Quality Results Exceeding RUVs ____ 14
Table 8: Groundwater Quality Results Exceeding PWQOs ____ 14
Table 9: Annual Recycling and Waste Tonnages ____ 20
Table 10: 2024 Groundwater Data ____ end of text

List of Figures

Figure 01: Site Location Map
Figure 02: Site Plan
Figure 03: Site Topography and Monitoring Locations
Figure 04: Groundwater Flow Direction – Spring 2024
Figure 05 Groundwater Flow Direction – Fall 2024

Site Photographs

Chemistry Trend Graphs

Graph 1: Alkalinity Trend 2006 to 2024 (Groundwater)
Graph 2: Alkalinity Trend 2019 to 2024 (Groundwater)
Graph 3: Boron Trend 2006 to 2024 (Groundwater - Dissolved)
Graph 4: Chloride Trend 2007 to 2024 (Groundwater)
Graph 5: Chloride Trend 2019 to 2024 (Groundwater)
Graph 6: Dissolved Organic Carbon Trend 2007 to 2024 (Groundwater)
Graph 7: Dissolved Organic Carbon Trend 2019 to 2024 (Groundwater)
Graph 8: Iron Trend 2006 to 2024 (Groundwater – Dissolved)
Graph 9: Iron Trend 2019 to 2024 (Groundwater – Dissolved)
Graph 10: Nitrate Trend 2006 to 2024 (Groundwater)
Graph 11: Sulphate Trend 2006 to 2024 (Groundwater)
Graph 12: TDS Trend 2007 to 2024 (Groundwater)

List of Appendices

(Provided on USB Drive for Hard Copy)

Appendix A: A-1 Environmental Compliance Approval
A-2 Surface Water Comments on the 2020 Annual Monitoring Report
A-3 MECP Letter and 2022 Inspection Report
A-4 Land Use Permit
Appendix B: Monitoring and Screening Checklist (MECP/MOE)
Appendix C: C-1 Monitoring Well Logs
C-2 Private Well Records
Appendix D: Inspection Forms and Laboratory & Chain of Custody Reports
D-1 Operation and Inspection Forms
D-2 Groundwater Laboratory & Chain of Custody Reports
D-3 QA/QC Comparison Calculations
Appendix E: Historical Groundwater Chemistry (2006 to 2024)
Appendix F: Trigger Mechanisms and Contingency Plan
Appendix G: 2022 Contaminant Attenuation Zone (CAZ) Assessment

1 Introduction

BluMetric Environmental Inc. (BluMetric®) was retained by The Municipality of Hastings Highlands (MHHs or Municipality) to conduct the 2024 environmental monitoring and sampling program and prepare the 2024 Annual Monitoring Report (AMR). This report provides a summary and analysis of environmental monitoring activities at the Wolf Creek Waste Disposal Site (WDS), in Barry's Bay, Ontario. The WDS, as shown in Figure 01, is herein referred to as the "Site".

This report is prepared in accordance with Condition 9 of the Environmental Compliance Approval (ECA) A361102 for the Site, issued December 7, 2017, and most recently amended on October 13, 2023, to approve the Closure Plan as further discussed in Sections 1.3 and 6.4. A copy of ECA A361102 is included in **Appendix A (A1).** The report covers all work and activities carried out for the period from January 1 to December 31, 2024. The report includes both the environmental monitoring and sampling program, as well as details relating to site operations, including the Waste Transfer (WT) areas and landfill closure activities at the Site in 2024.

The MECP Surface Water Review for the 2020 AMR dated January 6, 2022, is also provided in **Appendix A (A2)**. Based on the 2020 AMR, the reviewer indicated that surface water impacts are unlikely. In addition, the review indicates that downgradient wells should be compared to the Provincial Water Quality Objectives (PWQOs) and determine if a surface water monitoring program is required.

The MECP conducted an inspection of the Site on August 31, 2022. The Inspection Report and accompanying summary letter are provided in **Appendix A (A3)**. The MECP identified outstanding non-compliance issues, including the absence of the required 30-meter buffer area, Contaminated Attenuation Zone (CAZ), and the necessary approval of the CAZ and Closure Plan through an ECA amendment. The MECP noted that at the time of the inspection, the 2021 AMR was still awaiting review by the ministry's Technical Support Section. The MECP approved the CAZ and Closure Plan on October 13, 2023, via an amendment to the ECA. The required 30-meter buffer area was established in the fall 2024 during closure activities.

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 "closed" as the Site ceased operations on September 16, 2024.

1.1 Location

The WDS is located east of the intersection of Renfrew County Road 69 (Siberia Road) and River Road in Barry's Bay, Ontario (Figure 01). The civic address is 567 River Road, Barry's Bay, Ontario. The Wolf Creek WDS has a total site area of 0.7 hectares (ha) and is located in a former aggregate pit on Part of Lot 22, Concession 14 of the former townships of Bangor, Wicklow, McClure, now part of the Municipality of Hastings Highlands. The facility layout, current topography (2017), road network, and site features are shown on Figure 02.

1.2 Ownership and Key Personnel

The facility is operated by the MHHs, with the Municipal office located in Maynooth, Ontario. The property is owned by the Crown and administered by the Ministry of Natural Resources and Forestry (MNRF). The MNRF leases the property to MHHs for use as a WDS under a Land Use Permit (LUP). The current Land Use Permit (LUP) for the Site (LUP1634-1004191) dated June 28, 2017, is in effect until May 31, 2026. A copy of the LUP is provided in **Appendix A (A4).**

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

Contact information is outlined in Table 1.

Table 1: Contact Information

Role	Name	Address	Phone Number	Email
Site Owner / Contact	CAO, MHHs – David Stewart	P.O. Box 130 33011 Highway No. 62, Maynooth, ON, K0L 2S0	(613) 338-2811 ext. 233	dstewart @hastingshighlands.ca
CEP	Senior Environmental Engineer, BluMetric – S'rana Scholes, P.Eng.	209 Frederick street, Kitchener, ON, N2H 2M7	(877) 487-8436 ext. 218	sscholes @blumetric.ca

1.3 Description and Development of the WDS

The Site covers a total area of approximately 0.7 hectares (ha) and is approved for the operation of a 0.2 ha waste disposal site, which has been functioning as a transfer station since 2017. Landfill closure occurred in September and October 2024, and no waste has been landfilled since 2017. Closure activities are detailed under separate cover. The Site now operates solely as a waste transfer station. In addition to domestic waste, Wolf Creek WDS includes recycling bins for metal, plastic, paper/cardboard products, as well as segregated areas for scrap metal, bulky items, tires, and brush. The brush pile has been removed as of September 2024 as part of closure activities and will remain removed. The Ontario Electronic Stewardship (OES) has approved the Wolf Creek 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 not approved to collect household hazardous waste; however, bins are kept onsite for any inadvertently left HHW.

In accordance with Ontario Regulation (O.Reg.) 347/90, the Site must be located and operated to minimize fire hazards. Due to the location of the Site within a forested area, a minimum 30 m buffer between the waste footprint and the surrounding treeline for a firebreak is required (Forest Fires Prevention Act, R.S.O. 1990, c. F.24). The MECP identified in August 2022 that the Site did not have a sufficient 30 m buffer from the edge of the active landfilling area, or combustible waste (brush) stored onsite. A 30 m buffer was established during closure activities and as of October 2024, the site now has an acceptable 30 m firebreak. The 30 m buffer is shown on Figure 03.

In 2022, a Contaminant Attenuation Zone (CAZ) Assessment was carried out for the Site. The MECP issued approval for the CAZ (shown on Figure 03) in the most recently amended ECA A361102 dated October 13, 2023. The 2022 CAZ Assessment is provided in **Appendix G** and is discussed further in Section 5.3.

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 and WTS. The monitoring and reporting program has been developed with these objectives in mind. In addition, the monitoring and reporting program are designed to adhere to the MECP's Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water-Technical Guidance Document (November 2010) and the ECA for the Site.

2 Physical Setting

2.1 Geology and Hydrogeology

2.1.1 Surficial Geology

The surficial geology of the area is a glaciofluvial plain covered with till veneer. The immediate area of the Site is characterized by generally sandy overburden with a thickness ranging from 5 to 10 metres. Monitoring well logs for the three site monitoring wells drilled in 2003 indicated that the overburden is a sand and gravel unit to depths of over 11 metres below ground surface (mbgs). Monitoring well logs for the five site monitoring wells drilled in July 2019 indicated that the overburden is a sand and gravel unit to depths of 23.8 mbgs. The 2019 overburden wells along the west property boundary ranged in depth from 12.2 to 13.7 mbgs. A well nest was drilled between the west property boundary and the creek to the west of the property. The well nest consists of three overburden wells to depths of 12.8 mbgs, 18.9 mbgs and 23.4 mbgs. The deepest well was drilled just into granitic bedrock to a depth of 24.4 m. The amount and size of the gravel increases with depth particularly below 15 mbgs.

Well records for four private wells located within 500 m of the Site and along the Madawaska River were obtained from the MECP website. The monitoring well logs and well records are provided in **Appendix C** and indicate the overburden ranges from approximately 18 mbgs to 44 mbgs and are generally sand and gravel with some silt and clay layers.

2.1.2 Overburden Hydrogeology

On October 24, 2019, slug-bail testing was carried out on two of the new monitoring wells (MW6.3-19 and MW6.1-19). The results of the field testing were analyzed using the Hvorlev analyses and indicated the overburden sand and gravel at MW6.1-19 has an estimated hydraulic conductivity of 3.86 to 4.61 x 10^{-4} m/s, while the sand and gravel at MW6.3-19 has an estimated hydraulic conductivity of 1.31 to 7.03 m^{-3} m/s.

2.1.3 Bedrock Geology

The Wolf Creek WDS is located within the Grenville geological province, on Precambrian bedrock. Bedrock is described as Felsic igneous rocks such as tonalite, granodiorite, monzonite, granite, syenite, and derived gneisses (Map 2544, MNDM). The well records mentioned in the Section above, identify the bedrock as granite.

Based on the geology, surface water features, and historic data the shallow aquifer flows in a general west direction toward Wolf Creek, while deep bedrock aquifers have not been measured but may flow southward toward the Madawaska River and/or southeast towards Kamaniskeg Lake.

2.2 Surface Water Features

Historical reviews of the topographical maps and site inspections identified that the surface water drainage at the Site flowed into the waste site, which is a former aggregate pit and that the surface water infiltrated into the subsurface and enters into the groundwater system.

It is anticipated that landfill closure activities may adjust the surface water drainage at the Site. The post-closure Site topography is shown on Figure 03 and surface water drainage will be re-evaluated.

In 2017, the MECP confirmed that surface water monitoring is not required unless additional groundwater monitoring demonstrates a potential for leachate impacts to the creek.

3 Description of Monitoring Program

3.1 Site Inspections and Operations Monitoring

Site visits to the Wolf Creek WDS were conducted on April 30, 2024, and October 17, 2024. In general, the Site was in good to excellent condition. The detailed site checklists are provided in **Appendix D (D-1)**. During the spring sampling event, one concern was noted: the bulk waste pile was full and overflowing into the metals pile indicating the berms dividing the segregated scrap piles need to be better established. The fall sampling event coincided with closure activities which occurred from September 16 to October 18, 2024. As a result, the recycling and waste bins were temporarily relocated, and the segregated waste piles were cleared. Following landfill closure, new segregated waste piles will be established, with concrete barriers used to divide the segregated waste piles.

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

In accordance with the ECA, semi-annual (spring and fall) groundwater monitoring and sampling is required. There are currently eight groundwater monitoring wells located at the Site. The semi-annual groundwater sampling protocol was identified in the Development and Operations (D&O) Plan, which was accepted in the December 7, 2017, ECA amendment. The details and descriptions of all existing groundwater monitoring wells are provided in Table 2, while the monitoring well logs are provided in **Appendix C.**

Table 2: Groundwater Monitoring Well Details

Sample Location	Northing[1]	Easting[1]	Screened Interval (mbgs)	Location Description
WC1-03	5032819	285905	4.57 to 7.62	110 m north-northeast of last area of waste deposition
WC2-03	5032777	285842	8.23 to 11.28	100 m northwest of last area of waste deposition
WC3-03	5032701	285860	8.23 to 11.28	30 m west of last area of waste deposition
WC4-19	5032744	285836	9.2 to 12.2	40 m west of last area of waste deposition
WC5-19	5032816	285830	10.8 to 13.8	120 m north-northwest of last area of waste deposition
WC6.1-19	5032773	285818	20.4 to 23.4	90 m northwest of last area of waste deposition
WC6.2-19	5032772	285821	15.9 to 18.9	90 m northwest of last area of waste deposition
WC6.3-19	5032771	285817	9.8 to 12.8	90 m northwest of last area of waste deposition

Note:

[1] UTM Zone 18, NAD 83 as surveyed on December 11, 2019.

Groundwater samples were collected on April 30 and October 17, 2024. The laboratory reports and chain of custody records are included in **Appendix D (D-2)**. Table 3 lists the groundwater quality monitoring parameters.

Table 3: Groundwater Quality Monitoring Parameters

Category	Parameters
Organic Parameters	Dissolved Organic Carbon (DOC)
Inorganic Parameters	Alkalinity, Ammonia, Calcium, Chloride, Magnesium, Nitrate, Potassium, Sodium, Sulphate
Dissolved Metals	Aluminum, Boron, Iron, Lead, Manganese, Strontium, Zinc
Physical/Chemical Parameters	Chemical Oxygen Demand (COD), Conductivity, pH, Total Dissolved Solids (TDS)

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

During the fall 2024 monitoring event, the conditions of groundwater monitoring wells were inspected. Any repairs, such as new locks, labels or well caps, were made as necessary. The areas surrounding the wells were also cleared of overgrown brush.

Watertight casings and seals remain in place at all monitors to ensure that surface water or foreign materials cannot enter groundwater monitoring wells. All groundwater monitoring wells are fitted with a vermin proof cap to meet the requirements of O.Reg. 903 and are locked to provide protection against vandalism and are in line with industry best practices.

3.2.1.1 Groundwater Elevation and Flow Monitoring

During each monitoring event, groundwater elevations were collected from all existing monitoring wells. Groundwater level measurements were collected using a Solinst electronic water level meter prior to purging/sampling activity. Groundwater elevation data are presented in Table 4 and are provided on Figure 04 for the spring data and Figure 05 for the fall data.

Table 4: Groundwater Elevation Data

Groundwater Monitor	Elevation TPVC (masl)	Water Level 30-April-24 (mbTPVC)	Water Level 17-Oct-24 (mbTPVC)	Groundwater Elevation 30-April-24 (masl)	Groundwater Elevation 17-Oct-24 (masl)
WC1-03	289.41	5.27	5.67	284.14	283.74
WC2-03	292.74	8.83	9.11	283.92	283.63
WC3-03	292.93	9.00	9.30	283.93	283.63
WC4-19	292.83	8.93	9.21	283.90	283.62
WC5-19	294.21	10.18	10.47	284.03	283.74
WC6.1-19	293.62	9.72	10.00	283.90	283.63
WC6.2-19	293.55	9.67	9.89	283.88	283.67
WC6.3-19	293.59	9.68	9.95	283.92	283.65

Notes:
Monitoring well elevations are geodetic based on December 11, 2019, survey.
mbTPVC – metres below top of PVC casing

3.2.1.2 Groundwater Gradients and Flow Direction

Based on the spring (April 30, 2024) water levels, the average horizontal hydraulic gradient was calculated at 0.0023 m/m towards the southwest from north of the WDS footprint, and 0.0001 m/m towards the northwest from the buried waste within the footprint. Based on the spring water levels, groundwater is inferred to flow in a southwesterly direction from WC-1-03 and a slight northwesterly direction from WC-3-03, both towards WC-6.3-19. The overall groundwater flow direction is inferred to be towards the west for the spring event based on the assumed convergence of the groundwater flow directions, which is consistent with historic results.

The average horizontal hydraulic gradient was calculated to be 0.0015 m/m towards the southwest using the October 17, 2024, groundwater elevation data. Based on the fall data, groundwater is inferred to flow in a southwesterly direction from WC-1-03 and WC-5-19 north of the footprint, towards WC-6.3-19. Based on historic and spring flow directions, groundwater is inferred to flow in a northwesterly direction from WC-3-03 to WC-4-19 towards WC-2-03. However, the fall water levels in recent years (2019 to 2023) have indicated a relatively flat gradient (<0.001 m/m) between the monitoring wells WC-3-03, WC-4-19, and the wells to the west of the Site property. In 2024, the hydraulic gradient was calculated to be 0.0002 m/m towards the southeast. The landfill closure activities that took place in fall 2024 may have contributed to this shift in the hydraulic gradient, and continued monitoring of water levels in the coming years will be important to assess the long-term effects of these changes on groundwater flow and overall site conditions.

In 2024, a calculated upward vertical gradient of 0.003 m/m from WC6.1-19 to WC6.2-19 was observed in the spring and a downward vertical gradient of 0.007m/m was observed in the fall. Conversely, a downward vertical gradient of 0.007 m/m from WC6.3-19 to WC6.2-19 was observed in the spring and an upward vertical gradient of 0.003 m/m was observed in the fall.

3.2.2 Surface Water Monitoring

Surface water monitoring is not required or conducted at the Wolf Creek WDS.

3.2.3 Landfill Gas Monitoring

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

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

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

3.3 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, and conductivity measurements were recorded at the time of sampling using a calibrated YSI 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. Laboratory reports and chain of custody forms are compiled in **Appendix D (D-2)**. Bureau Veritas is an accredited member of the Canadian Association of Laboratory Accreditation (CALA).

3.3.2 Landfill Gas Monitoring

There are no sampling valves, ports, or vapour monitors on-site. Gas monitoring using a calibrated RKI Eagle gas monitor was collected from the on-site Attendant's building and all groundwater monitoring wells during both sampling events in 2024.

Gas monitoring measurements from the building and privy 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.

3.3.3 Field QA/QC Program

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

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

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

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

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

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

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

4 Monitoring Results

4.1 Groundwater Quality

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

Ontario Drinking Water Standards and Operational Guidelines (ODWSOG)

Field groundwater measurements in 2024 resulted in pH results from 5.35 to 6.21 in the spring and from 5.82 to 6.48 in the fall, which are generally below the ODWSOG criteria. The summary of the 2024 groundwater results exceeding the ODWSOG criteria is summarized in Table 5. The full laboratory results are presented in Table 9 at the end of the text.

Table 5: Groundwater Quality Results Exceeding ODWSOG Criteria

Sample Location	Location Description	Parameter Exceeding ODWSOG
WC1-03	Background well - NE of waste footprint	Alkalinity (spring and fall, below criteria)
WC2-03	Downgradient well – NW of waste footprint	None
WC3-03	Leachate well -within waste footprint	TDS (spring), Alkalinity (fall, below criteria)
WC4-19	Downgradient well - west boundary of footprint	Manganese (fall)
WC5-19	Upgradient well - North of footprint	None
WC6.1-19	Downgradient well nest- Northwest of the waste footprint	None
WC6.2-19	Downgradient well nest- Northwest of the waste footprint	None
WC6.3-19	Downgradient well nest- Northwest of the waste footprint	None

Reasonable Use Values (RUVs)

The following calculations are based on the median background groundwater (WC1-03) values from the 2006 to 2024 results.

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

Where:

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

The following Table 6 summarizes the data used to calculate Cm values (RUVs).

Table 6: Reasonable Use Calculations

Parameter	Units	ODWSOG		Historical Median	x	RUV
		Type	Cr	Cb		Cm
Alkalinity as CaCO3 (upper)	mg/L	OG	500	24.5	0.5	262.3
Boron	mg/L	IMAC	5.0	0.005	0.25	1.3
Chloride	mg/L	AO	250	0.58	0.5	125.3
DOC	mg/L	AO	5.0	4.75	0.5	4.9
Iron	mg/L	AO	0.30	0.015	0.5	0.2
Manganese	mg/L	AO	0.05	0.004	0.5	0.027
Nitrate	mg/L	MAC	10	0.75	0.25	3.1
Sodium	mg/L	AO	200	1.83	0.5	100.9
Sulphate	mg/L		500	6.88	0.5	253.4
TDS	mg/L		500	58.0	0.5	279.0
Zinc	mg/L	MAC	5.0	0.0025	0.5	2.5

Note: The background water quality at WC1-03 and regional groundwater is generally below the lower criterion for alkalinity. Therefore, there is no lower RUV for alkalinity.

Parameters from the 2024 Wolf Creek WDS monitoring program that exceed the RUVs are shown in the following Table 7.

Table 7: Groundwater Quality Results Exceeding RUVs

Groundwater Monitoring Location	Parameter Exceeding RUV (Result)
WC1-03	None
WC2-03	Nitrate (fall), TDS (fall)
WC3-03	Nitrate (spring), Alkalinity (spring), TDS (spring)
WC4-19	Manganese (spring and fall), Nitrate (fall), TDS (fall)
WC5-19	None
WC6.1-19	None
WC6.2-19	Manganese (fall)
WC6.3-19	Nitrate (spring and fall), TDS (spring)

Provincial Water Quality Objectives (PWQO)

At the request of the MECP, groundwater results were compared to the PWQO criteria. The only parameters that are tested at the Site and have surface water criteria under the PWQO are alkalinity, pH, aluminum, boron, iron, lead, and zinc.

Parameters from the 2024 Wolf Creek WDS monitoring program that exceed the PWQOs are shown in the following Table 7.

Table 8: Groundwater Quality Results Exceeding PWQOs

Groundwater Monitoring Location	Parameter Exceeding PWQOs (Result)
WC1-03	Aluminum (spring and fall)
WC2-03	None
WC3-03	Boron (spring)
WC4-19	Boron (fall)
WC5-19	None
WC6.1-19	None
WC6.2-19	None
WC6.3-19	None

Groundwater alkalinity concentrations at the Site are naturally low. The background well mean concentration (2006 to 2024 data) is 24.0 mg/L. PWQO criteria states that alkalinity cannot be decreased by more than 25%. Impacts from the WDS are observed to increase the alkalinity at the Site, therefore the downgradient wells do not exceed the PWQO for this parameter.

Dissolved aluminum groundwater concentrations are naturally high at the Site. The background mean concentration (2006 to 2024) is 0.078 mg/L. Interim aluminum PWQO criteria states that aluminum should not exceed 0.075 mg/L. Concentrations at background well WC1-03 exceeded this criterion in the spring and fall of 2024. In order to compare to the interim aluminum PWQO criteria, a clay-free sample is required which is achieved using a 0.2-micron filter. Groundwater samples are field filtered using a 0.45-micron filter; as a result, an accurate comparison between groundwater and the PWQO criteria cannot be made. Consequently, exceedances are not considered to be evidence of potential impacts to surface water.

Field pH readings are considered more indicative of in-situ pH values than laboratory readings. The well nest located closest to the creek had spring field pH readings of 5.66 to 6.21 and fall pH readings of 6.24 to 6.48. Background field pH was 5.53 and 5.82 for the spring and fall, respectively. Low pH values at the well nest are not considered to be attributed to the WDS impacts.

4.2 Landfill Gas Monitoring

Gas readings collected on April 30, 2024, at the existing monitoring wells and the attendant's building ranged from 0 to 5 ppm.

Gas reading collected on October 17, 2024, at the existing monitoring wells and the attendant's building ranged from 0 to 30 ppm.

4.3 QA/QC Results

One groundwater duplicate sample was collected during each sampling event in 2024. The consistency of the results was evaluated based on the relative percentage difference (RPD) of each field duplicate pair. No field duplicate pairs exceeded the recommended percentage difference during the spring event. One field duplicate pair, conductivity, exceeded the recommended percentage difference during the fall event. The RPD value for conductivity was 12% which is above the 10% criteria for a high level of reproducibility. The QA/QC comparison calculations are provided in **Appendix D (D-3).**

5 Assessment, Interpretation, and Discussion

5.1 Groundwater Assessment

The groundwater chemistry results for the eight monitoring wells sampled during the two monitoring events are summarized in Table 10 (at the end of text). Parameters with concentrations that fell outside the RUVs, ODWSOG, and/or PWQO criteria are highlighted.

Groundwater chemistry in 2024 is similar to the historical groundwater quality results from the 2006 to 2023 monitoring events for the historic wells. **Appendix E** presents the historical groundwater quality results from the Wolf Creek WDS. Chemistry trend graphs for select parameters are provided following the tables, figures, and photographs at the end of this report.

The graphs indicate a slight decreasing trend in alkalinity, boron, and chloride at WC2-03. Significant fluctuations are observed in nitrate and sulfate concentrations at WC2-03, although a general slight decreasing trend is still evident.

An increasing trend in boron concentrations at WC6.3-19 may be observed since 2022, though further monitoring is necessary to confirm this trend. Similarly, chloride concentrations at WC1-03 and WC5-19 may be on the rise since spring 2023, but additional monitoring is required to validate this observation.

DOC concentrations remain within historical ranges following maximum concentrations observed in fall 2021 at WC2-03, WC3-03, WC4-19, WC5-19, WC6.1-19, WC6.2-19, and WC6.3-19, and the elevated DOC concentrations observed in fall 2021 at all locations are considered to be anomalous, likely reflecting temporary variations rather than a consistent trend. Nitrate concentrations at WC01-03 have returned to historical levels following the historic maximum concentration recorded in spring 2023.

A slight decreasing trend in nitrate concentrations may be observed at WC6.3-19 following the historic maximum concentration recorded in fall 2022, although further monitoring is required. Historic maximum concentrations for sulfate and TDS were observed at WC6.3-19 in spring 2024. Additionally, a slight increasing trend in TDS may be noted at WC6.1-19 and WC6.2-19, though further monitoring is needed to confirm this trend.

The field pH for all monitoring locations was found to be below the ODWSOG limit of 6.5. These results are both typical for the Site and the surrounding region. All laboratory pH results for all wells were within the 6.5 to 8.5 criteria.

Monitoring well WC1-03 is the background well for the Site (hydraulically upgradient from the other historic monitoring well location) and has alkalinity and pH concentrations that typically fall below the lower limit of ODWSOG criteria. On occasion, select metals (iron, manganese, aluminum), TDS, nitrate, and DOC concentrations have exceeded the ODWSOG criteria and/or RUV limit.

Monitoring well WC2-03 is hydraulically downgradient from WC1-03 (background well), WC3-03 (leachate well) and the waste disposal footprint area. WC3-03 is adjacent to the most recent active trench area before landfill closure. Both these wells (WC2-03 and WC3-03) have historically been used to monitor groundwater impacts from the waste disposal activities. Key groundwater leachate indicators for the Site have been identified in the Trigger Mechanisms and Contingency Plan (2017) in **Appendix F** and include alkalinity, nitrate, iron, sulphate, and TDS. These wells are considered impacted by leachate. In the fall of 2021, leachate well WC3-03 exhibited significant increases in concentrations of alkalinity, dissolved boron, chloride, DOC, nitrate, sulfate, and TDS By 2023, these parameters returned to historical levels. However, in spring 2024, notable increases in alkalinity, dissolved boron, chloride, nitrate, sulfate, and TDS were observed. Although the 2024 concentrations remained below the 2021 levels for most parameters, sulfate and TDS concentrations slightly exceeded those recorded in 2021.

The RUVs apply to groundwater at the property boundary. Downgradient offsite monitoring wells WC2-03, WC4-19, WC6.1-19, WC-6.2-19, and WC-6.3-19 are all north, west, and downgradient of the WDS. Based on historic background data, the DOC RUV exceedances may be due to natural conditions; however, the exceedances of other RUVs (nitrate, TDS, and manganese in 2024) at these offsite downgradient monitoring wells are likely due to leachate impacts. These wells are considered out of compliance with respect to Guideline B-7. The 2021 CAZ Assessment was conducted to address non-compliance with Guideline B-7-1 **(Appendix G)** and approved in the most recent ECA in 2023. The Site is anticipated to be in compliance with Guideline B-7 based on the CAZ Assessment as discussed in Section 5.3.

5.2 Trigger Mechanisms and Contingency Plan Assessment

A Trigger Mechanisms and Contingency Plan was prepared in December of 2017 and appended to the D & O Plan which was approved by the MECP. A copy is appended to this report as **Appendix F.** The surface water trigger plan is assessed using monitoring well WC2-03. The groundwater trigger plan is assessed using WC2-03 and WC6.3-19. The groundwater chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for surface water and groundwater.

5.3 Contaminant Attenuation Zone (CAZ) Assessment

In 2022, a CAZ Assessment was carried out for the Site. The work was carried using the calculations presented in journal article "*Determination of Groundwater Attenuation Distances for Municipal Landfill Sites in Ontario*", *E. Zaltsburg, 1995*. Based on the results iron was determined to be the only critical parameter, with a calculated required attenuation distance of 87 m. Based on no future placement of waste at the Site, we would recommend that the Municipality move forward with acquiring a minimum 100 m CAZ/buffer to the West and North of the Site Property Boundary, and a 30 m buffer to the east and south of the property boundary. The initial steps in obtaining the CAZ property, either by ownership or easement, is to initiate discussions with both the MECP and the Ministry of Natural Resources and Forestry (MNRF). Approval with the CAZ distances have been obtained from the MECP, while general agreement to transfer the Crown Land ownership/easement should be obtained from the MNRF. We understand that the process of surrendering the aggregate pit licence to the east must be completed before any changes to that property can be undertaken. We also understand this was initiated in previous years and is still awaiting processing by the MNRF.

More details on the CAZ assessment, including calculations, are provide in **Appendix G**. The CAZ is shown on Figure 03.

5.4 Additional Assessment Requirements

Surface water sampling was determined not to be required (WESA, 2015) as surface water flows towards the south and then the topography rises again, therefore surface water from the Site remains in the immediate vicinity of the Site and infiltrates into the subsurface. Vertical hydraulic gradients calculated from the fall of 2019 to the fall of 2020 indicate a low potential for impacts to the creek. The 2024 downgradient groundwater data was compared to PWQO criteria to assess potential surface water impacts and to determine if a surface water monitoring program is required. Based on the 2024 results (refer to Section 4.1), no impacts were identified.

5.5 Landfill Gas Assessment

The RKI Eagle gas monitoring results for 2024 (0 to 30 ppm) indicated methane gas concentrations are well below the concentrations of concern, 10,000 ppm for the subsurface, buildings and structures on-site.

6 On-Site Operations

6.1 Site Operations

The Wolf Creek WDS currently collects waste in covered waste bins (8 cubic yard). The waste is periodically picked up and transferred to one of the other WDS operated by the MHHs.

The Site has segregated collection areas for scrap metal, tires, large bulky items (couches and mattresses), electronic waste and a recycling transfer station (8 cubic yard bin) for household blue box recyclable containers (aluminum cans, metal cans, plastic bottles) and fibre (paper and cardboard). The Municipality implemented a clear bag policy in October 2014 which was updated in May 2018, to facilitate increased waste diversion to extend the operational life of their municipal landfill sites. The clear bag policy applies to both recyclable and household waste, with non-compliant bags to be refused unless residents remove recyclables from the bag.

In the fall of 2024, closure activities were conducted at the Wolf Creek WDS. Further details are provided in Section 6.3.

Figure 03 presents an aerial view of the site following the completion of landfill closure activities. During the closure process, the Waste Transfer Station area was temporarily relocated. Beginning in 2025, the Wolf Creek WDS will operate exclusively as a transfer station.

6.2 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 9. Tonnages of recycled goods and waste are monitored to ensure that recyclables are not being deposited in the landfill. In 2024, it is estimated that 20.8% of waste, excluding the segregated materials discussed in Section 6.2.1, was diverted from the landfill by recycling.

The 2024 residential / commercial waste calculations are based on bag counts at the waste sites. There were 4646 bags deposited at the Wolf Creek WDS in 2024. An assumed density of 15 kg/bag (MHH's) was used in the tonnage calculations.

Table 9: Annual Recycling and Waste Tonnages

Q1		Q2		Q3		Q4		Year End	
R	W	R	W	R	W	R	W	R	W
2023									
2.1	11.1	4.1	17.7	7.6	27.3	3.6	15.1	17.4	71.1
2024									
2.3	11.0	4.1	18.4	8.4	27.5	3.4	12.9	18.3	69.7

Based on these reported quantities, the mass of recyclables collected in 2024 is 5% more than collected in 2023. The amount of waste received has decreased by 2% since 2023.

6.2.1 Summary of Segregated Materials Removed

Segregated materials are collected at each of the nine WDSs/WTSs in Hastings Highlands. The breakdown of these wastes in 2024 at the Wolf Creek site was:

- Scrap metal and white goods – 4.04 tonnes
- Bulky wastes – 24.29 tonnes
- Leaf and yard waste – 242 truck & trailer loads
- Electrical and Electronic Equipment – 0 tonnes
- 12 tires

Household hazardous wastes are not collected at the Wolf Creek WDS. The Municipality however does ensure batteries left at the WDS are disposed of properly. In 2024, 975 kg of batteries were collected across the nine WDSs/WTSs in Hastings Highlands.

6.3 Annual Complaints & Emergency Situations Summary

There were no documented complaints, rejected waste, or emergency situations report at the Wolf Creek WDS in 2024.

6.4 Landfill Closure

The closure plan for the Site, titled *Wolf Creek Waste Disposal Site Closure Plan*, was approved by the MECP in 2023 (BluMetric, 2023). On October 13, 2023, an amended Environmental Compliance Approval (No. A361102) was issued approving the Closure Plan, Waste Transfer Station (WTS) Design and Operation Plan, and the CAZ assessment.

Closure activities took place from September 16, 2024, to October 18, 2024. All construction activities were completed by the MHH. BluMetric was retained by the MHH to carry out construction quality assurance and quality control monitoring during all construction activities.

The Wolf Creek WDS has been operational since 1980, with waste disposal occurring until 2017. No waste has been deposited at the site since that time. Initially, the site utilized a trench and fill method for waste disposal, with an area fill method applied at the southern end in later years. As a result, no visible mound was present, and the trenches were previously covered to ensure waste was not exposed. The total volume of buried waste at the site was 1,220 m^3. Additional interim fill was required to achieve the contours outlined in the closure plan (BluMetric, 2023).

Approximately 1,013 m^3 of interim cover was placed to form the mound, bringing the total disposal volume to 2,233 m^3. Closure activities were conducted across the entire 0.2 ha waste footprint. Final cover material was compacted in three 200 mm lifts, achieving a compaction effort of 95% of the Standard Proctor Maximum Dry Density (SPMDD). A minimum of 150 mm of topsoil was then placed on the compacted cover soil and seeded. The final cover was designed with slopes ranging from 4H:1V to 20H:1V to promote runoff and minimize the risk of erosion. The closure work was generally completed in accordance with the approved closure plan (BluMetric, 2023). A full description of closure activities will be provided under separate cover.

7 Summary Statements, Conclusions, and Recommendations

The following summary statements, conclusions and recommendations are based on the results of the 2024 monitoring program:

7.1 Site Operations

- Closure activities occurred in fall 2024. Wolf Creek will operate solely as a transfer station in 2025.
- There were no records of public concerns/complaints and emergency situations occurrences in 2024 at Wolf Creek. Should they occur in the future, the complaint and the Municipality's response to each is to be documented.
- Site operations, site conditions and the order and management of debris were observed to be organized.
- It is recommended that periodic inspections be performed and documented by the Municipality to ensure proper burning practices are being followed.

- It is recommended that waste transferred to the Site continues to be accounted for and documented by tracking the number of loads of waste deposited at the Site. Detailed descriptions and quantities of rejected waste should continue to be documented.
- Public Education with respect to waste reduction and recycling should be an on-going effort by the Municipality.

7.2 Groundwater

- Groundwater monitoring should continue on a semi-annual basis for the Wolf Creek WDS (spring and fall) for the same chemical parameters as listed in Table 3, at all existing monitoring wells;
- Due to current or historic exceedances of alkalinity and pH results below the lower limit at the background monitoring well, these parameters are considered naturally occurring.
- The data indicates slight decreasing trends in alkalinity, boron, and chloride at WC2-03, with fluctuations in nitrate and sulfate concentrations, while boron at WC6.3-19 and chloride at WC1-03 and WC5-19 may be rising, requiring further monitoring. DOC concentrations remain stable, and fluctuations in nitrate, sulfate, and TDS levels across various sites also suggest trends that need additional observation to confirm.
- The RUVs apply to groundwater at the property boundary. Based on historic background data, the DOC RUV exceedances may be due to natural conditions, however the other RUV exceedances at these offsite downgradient monitoring wells are likely due to leachate impacts. These wells are considered out of compliance with respect to Guideline B-7.
- The groundwater chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for groundwater.
- The CAZ was approved in the most recent ECA therefore, the Site is anticipated to be in compliance with Guideline B-7 once the land is transferred to the Municipality.
- Additional wells are not recommended at this time.

7.3 Surface Water

- The nearest surface water feature is located approximately 180 m west of the Site;

- Surface water sampling was determined not to be required (WESA, 2015) as surface water flows towards the south and then the topography rises again, therefore surface water from the Site remains in the immediate vicinity of the Site and infiltrates into the subsurface.
- Based on the comparison of the 2024 groundwater results to PWQO criteria, surface water monitoring remains unwarranted.
- The groundwater chemical results in 2024 did not trigger the Tier 1 Contingency Plan response for surface water.

7.4 Landfill Gas

- The RKI Eagle gas monitoring results for 2024 (0 to 30 ppm) indicated methane gas concentrations are well below the concentrations of concern as identified above for the subsurface, buildings and structures on-site.
- Landfill gas should continue to be monitored at the on-site structures during the semi-annual monitoring events.

7.5 Landfill Closure

- The Wolf Creek Waste Disposal Site Closure Plan was approved by the MECP in 2023, with an amended Environmental Compliance Approval issued on October 13, 2023, covering the Closure Plan, Waste Transfer Station Design, and the CAZ assessment.
- Closure activities were conducted between September and October 2024, with quality assurance provided throughout the construction process.
- The closure involved the placement of 1,013 m^3 of interim cover to form a mound, bringing the total disposal volume to 2,233 m^3, with final cover material compacted and seeded in line with the approved closure plan.

8 Limiting Conditions

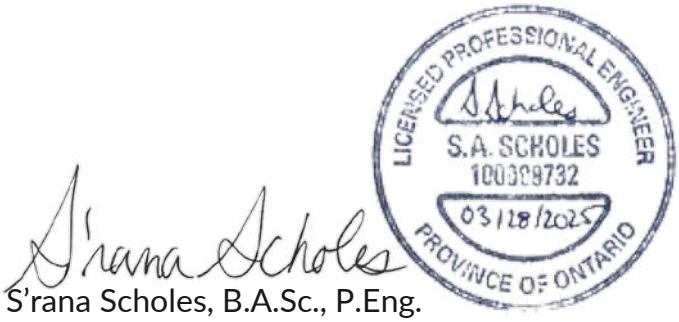
The conclusions presented in this report represent our professional opinion and are based upon the work described in this report and any limiting conditions in the terms of reference, scope of work, or conditions noted herein.

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.



Lauren Hamilton, B.Eng.
Engineering Intern

S'rana Scholes, B.A.Sc., P.Eng.
Senior Environmental Engineer

9 References

BluMetric, 2020. 2019 Annual Monitoring Report Wolf Creek Waste Disposal Site. Submitted to The Corporation of the Municipality of Hastings Highlands, March 2020.

BluMetric, 2021. 2020 Annual Monitoring Report Wolf Creek Waste Disposal Site. Submitted to The Corporation of the Municipality of Hastings Highlands, February 2021.

BluMetric, 2022. 2021 Annual Monitoring Report Wolf Creek Waste Disposal Site. Submitted to The Corporation of the Municipality of Hastings Highlands, February 2022.

BluMetric, 2024. 2023 Annual Monitoring Report Wolf Creek Waste Disposal Site. Submitted to The Corporation of the Municipality of Hastings Highlands, March 2024.

BluMetric, 2023, *Wolf Creek Waste Disposal Site Closure Plan*, Submitted to The Corporation of the Municipality of Hastings Highlands, February 2023.

Canadian Water Resources Journal, E. Zaitsburg, Determination of Groundwater Attenuation Distances for Municipal Landfill Sites in Ontario, Vol. 20, No.1, 1995

CCME (Canadian Council of Ministers of the Environment), 2011. Protocols Manual For Water Quality Sampling in Canada (p.12).

CCME (Canadian Council of Ministers of the Environment), 2011. Protocols Manual For Water Quality Sampling in Canada (p.12).

MNDM (Ministry of Energy, Northern Development and Mines), 1991. Map 2544.

Ministry of the Environment (MOE). Procedure B-7-1: Determination of Contaminant Limits and Attenuation Zones. Ministry of Environment, Government of Ontario, 9pp.

Ministry of the Environment (MOE), Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water-Technical Guidance Document, November 2010.

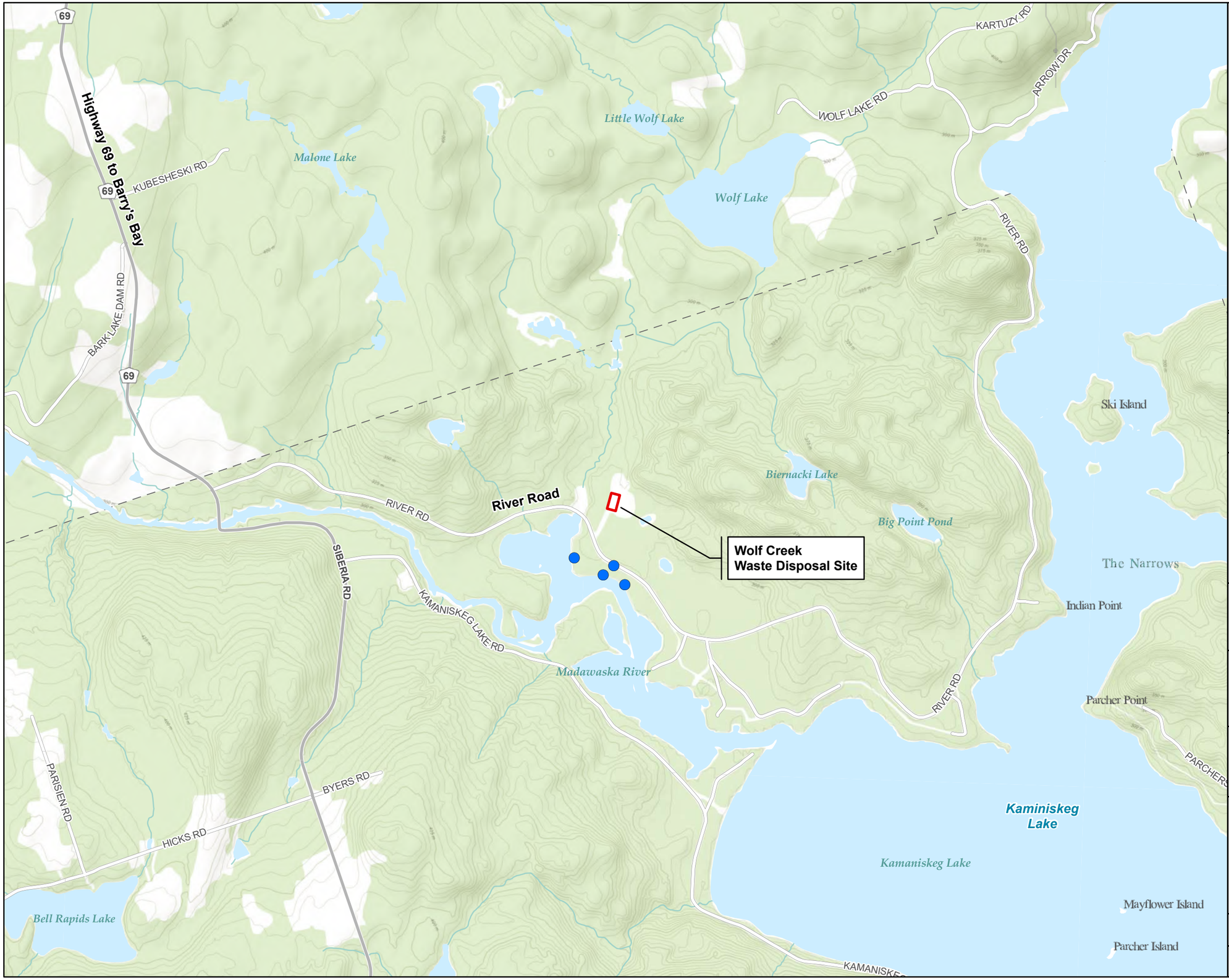
Tables

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	WC1-03	WC1-03	WC2-03	WC2-03	WC3-03	WC-QAQC-GW1 (WC3-03)	WC3-03	WC-QAQC-GW1 (WC3-03)	WC4-19	WC4-19	WC5-19	WC5-19	WC6.1-19	WC6.1-19	WC6.2-19	WC6.2-19	WC6.3-19	WC6.3-19
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Apr-30	2024-Oct-17	2024-Oct-17	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Oct-17
Anions						Detection Limit																		
Chloride	mg/L	125.3	250	-	-	1	<1	<1	<1	<1	6.1	6.4	<1	<1	<1	2.5	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate as N	mg/L	3.1	10	-	-	0.1	<0.1	<0.1	1.32	5.41	9.01	8.9	0.52	0.53	1.8	4.39	2.01	1.31	<0.1	<0.1	<0.1	<0.1	5	3.29
Sulphate	mg/L	253.4	500	-	-	1	3.8	4.2	7.4	43	72	72	2.8	2.6	21	33	15	5.5	9.7	8.7	7.1	8	140	18
Cations																								
Calcium (diss)	mg/L	-	-	-	-	0.2	6.8	7	11	40	130	130	6.4	6.5	26	63	18	11	20	20	14	13	73	25
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.3	1.4	1.8	6.2	20	20	1.2	1.2	4.3	10	4	2	4.1	3.9	3	2.6	14	4.5
Potassium (diss)	mg/L	-	-	-	-	0.2	1.1	1.2	2.7	6	24	24	2.8	2.9	8.7	13	1.5	2	1.9	1.8	1.3	1.3	5.2	4.1
Sodium (diss)	mg/L	100.9	200	-	-	0.1	1.2	1.2	1.9	3.1	15	15	1.3	1.3	4.3	7	2.9	7	1.9	1.9	1.8	1.8	5.3	2.7
General Chemistry																								
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	28	23	38	76	330	320	26	28	76	170	42	45	66	68	60	47	97	64
Ammonia as N	mg/L	-	-	-	-	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	0.12	<0.05	<0.05	0.093	<0.05	<0.05	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	14	5.6	<4	<4	9.9	9.9	<4	<4	8.1	9.7	<4	<4	<4	<4	4.7	<4	11	8.3
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	4.7	4.5	2	3.4	3.7	3.5	0.8	0.9	3	4.9	2.2	1.8	1.5	1.6	2.6	2.8	4.3	2.5
Electrical Conductivity	uS/cm	-	-	-	-	1	52	59	93	300	820	820	63	71	210	440	130	110	140	190	100	100	510	190
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.19	6.9	7.93	7.35	8.14	7.83	7.22	7.24	7.68	7.31	7.09	7.13	7.85	7.62	7.67	7.4	7.61	7.32
Total Dissolved Solids	mg/L	279	500	-	-	10	45	60	80	285	540	520	85	85	165	335	120	115	180	135	95	100	350	165
Metals																								
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.0049	0.091	0.084	<0.0049	<0.0049	<0.0049	<0.0049	0.012	0.024	<0.0049	<0.0049	0.0088	0.016	0.0079	0.015	0.013	0.022	0.0052	0.0056
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	0.024	0.081	0.48	0.51	<0.01	<0.01	0.15	0.28	0.023	0.041	<0.01	<0.01	<0.01	<0.01	0.2	0.11
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (diss)	mg/L	-	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	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	0.0024	0.0023	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.05	0.16	<0.002	<0.002	<0.002	<0.002	0.018	0.032	<0.002	<0.002
Strontium (diss)	mg/L	-	-	-	-	0.001	0.024	0.028	0.071	0.24	0.32	0.33	0.039	0.04	0.1	0.26	0.073	0.067	0.054	0.059	0.043	0.042	0.85	0.26
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	<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-WC	Reasonable Use Values Wolf Creek
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

Figures



LEGEND

- Private Wells
- Site Property Boundary (0.7 ha)
- Elevation Contour (5 m)

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 Metres

CLIENT

Municipality of Hastings Highlands

PROJECT

Wolf Creek 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		
240205-1	February 14, 2025		
DRAWN	CHECKED	FIG NO.	REV
EB	LH	01	0

LEGEND

- Monitoring Wells
- Site Property Boundary (0.7 ha)
- Approximate Location of Aggregate Pit Boundary

Note: Aerial imagery captured prior to closure, 2017

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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

N W E S

0 20 40 Metres

CLIENT

Municipality of Hastings Highlands

PROJECT

Wolf Creek Waste Disposal Site

TITLE

Site Plan

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

PROJECT #	DATE
240205-1	February 14, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	LH	02	0

LEGEND

- Monitoring Wells
- Approximate Location of Aggregate Pit Boundary
- Treeline
- Contaminant Attenuation Zone (4.6 ha)
- Approved Waste Footprint (0.2 ha)
- 30 m Firebreak Buffer
- Site Property Boundary (0.7 ha)

2024 Topographic Contours

- Elevation Contour (2.0 m)
- Elevation Contour (0.5 m)

Note: Aerial imagery captured post-closure, October 2024

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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

N W E S

0 20 40 Metres

CLIENT

Municipality of Hastings Highlands

PROJECT

Wolf Creek Waste Disposal Site

TITLE

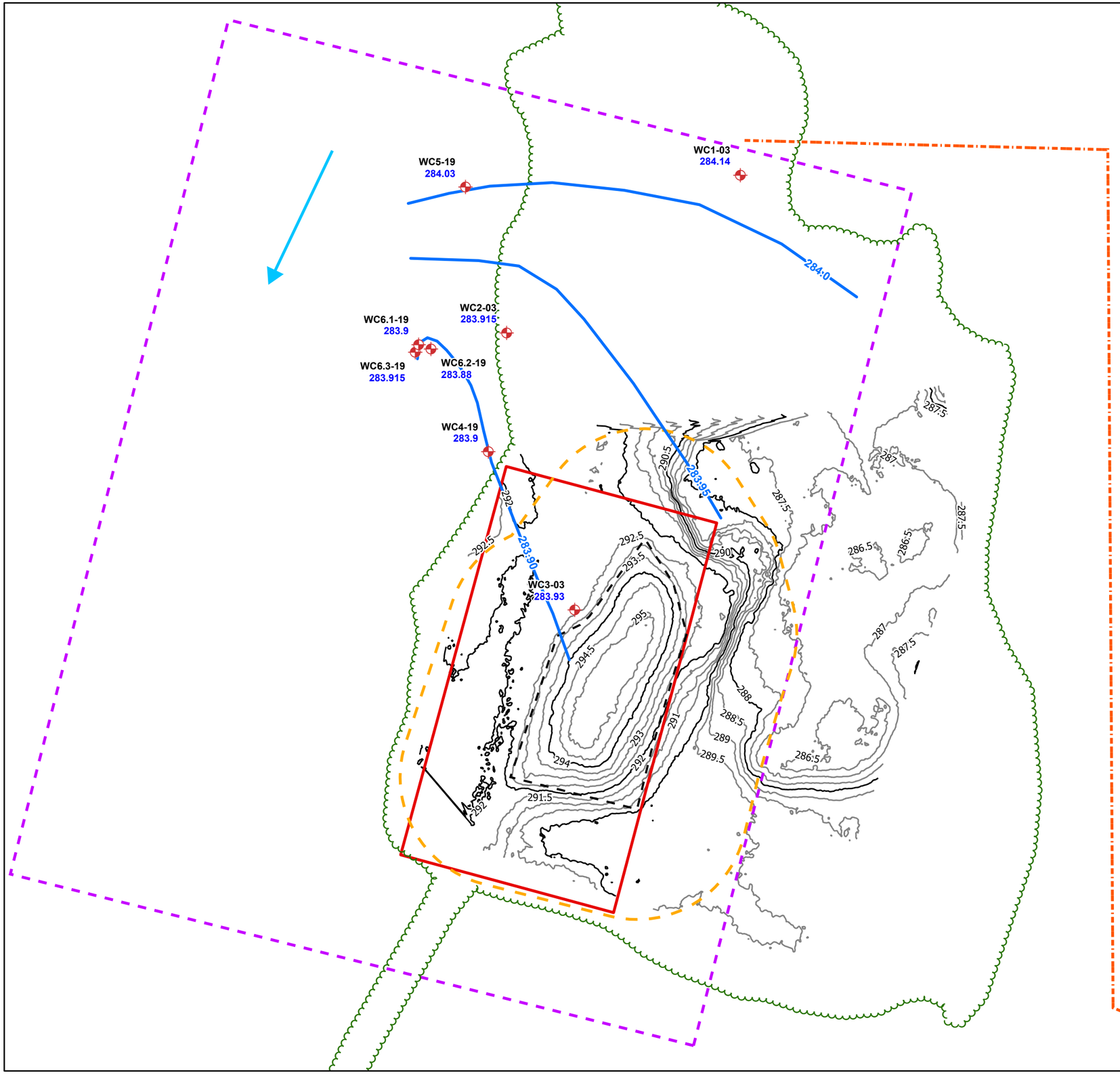
Site Topography and Monitoring Locations

BluMetric Environmental

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

PROJECT #	DATE
240205-1	February 20, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	LH	03	0



LEGEND

- Monitoring Wells
- Approximate Location of Aggregate Pit Boundary
- Approved Waste Footprint (0.2 ha)
- 30 m Firebreak Buffer
- Contaminant Attenuation Zone (4.6 ha)
- Site Property Boundary (0.7 ha)
- Inferred Groundwater Flow Direction
- Treeline
- Elevation Contour (2.0 m)
- Elevation Contour (0.5 m)
- Groundwater Contour
- 284.69 Groundwater Elevation (masl, Spring, 2024)

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.

CLIENT

Municipality of Hastings Highlands

PROJECT

Wolf Creek Waste Disposal Site

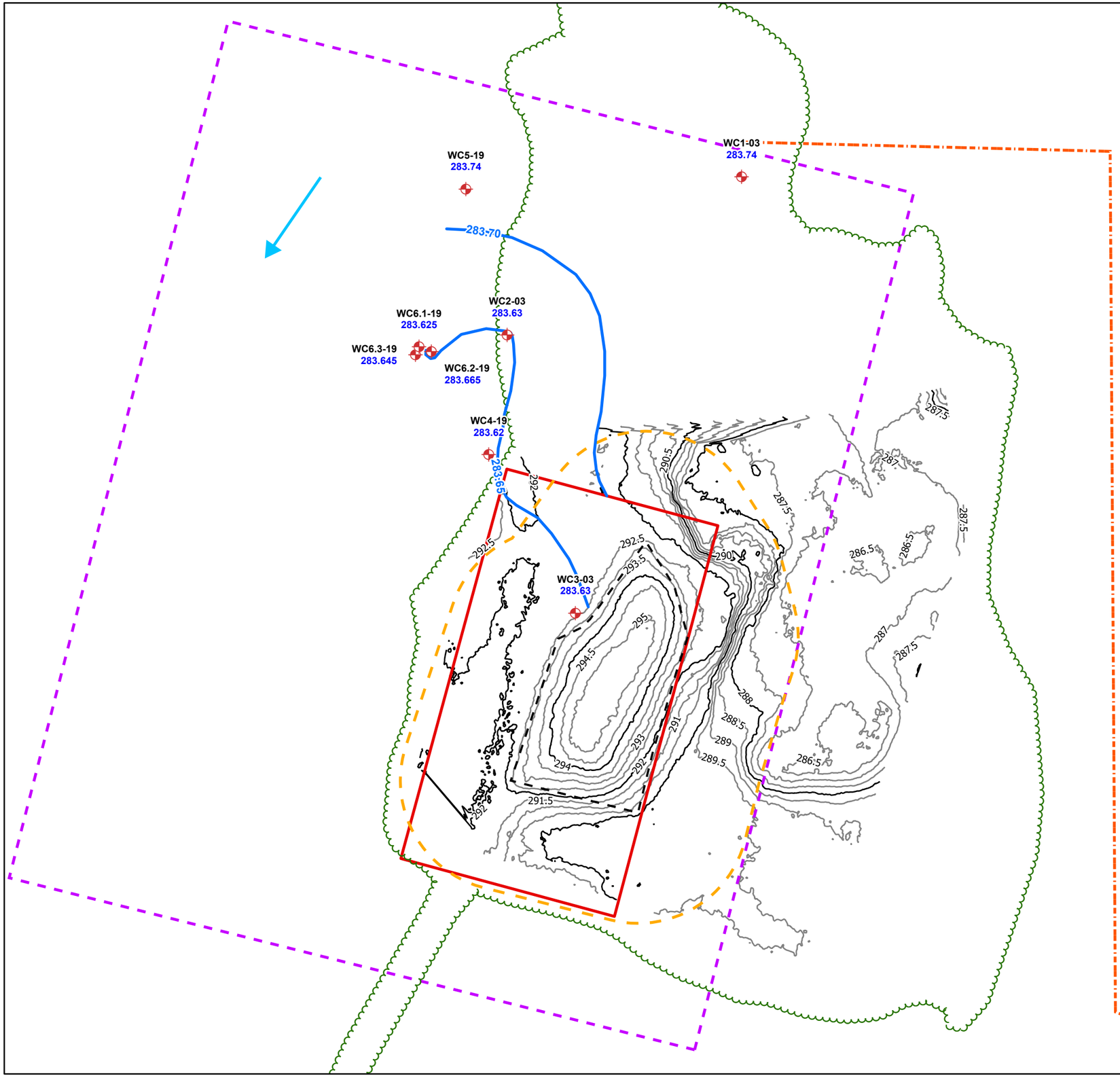
TITLE

Groundwater Flow Direction - Spring 2024

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

PROJECT #	DATE
240205-1	February 20, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	LH	04	0



LEGEND

- Monitoring Wells
- Approximate Location of Aggregate Pit Boundary
- Approved Waste Footprint (0.2 ha)
- 30 m Firebreak Buffer
- Contaminant Attenuation Zone (4.6 ha)
- Site Property Boundary (0.7 ha)
- Inferred Groundwater Flow Direction
- Treeline
- Elevation Contour (2.0 m)
- Elevation Contour (0.5 m)
- Groundwater Contour
- 283.88 Groundwater Elevation (masl) (Fall, 2024)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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

N W E S

0 20 40 Metres

CLIENT

Municipality of Hastings Highlands

PROJECT

Wolf Creek Waste Disposal Site

TITLE

Groundwater Flow Direction - Fall 2024

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

PROJECT #	DATE
240205-01	February 20, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	LH	05	0

Site Photographs

Photo 1: Front Signage – April 30, 2024

Photo 2: Front Signage & Secure Gate – April 30, 2024

Photo 3: Waste & Recycling Collection Bins – April 30, 2024

Photo 4: Attendant shack and battery collection bin – April 30, 2024

Photo 5: Brush and Yard Waste – April 30, 2024

Photo 6: Metal Recyclables – April 30, 2024

Photo 7: Bulk Items – April 30, 2024

Photo 8: Segregated Tires – April 30, 2024

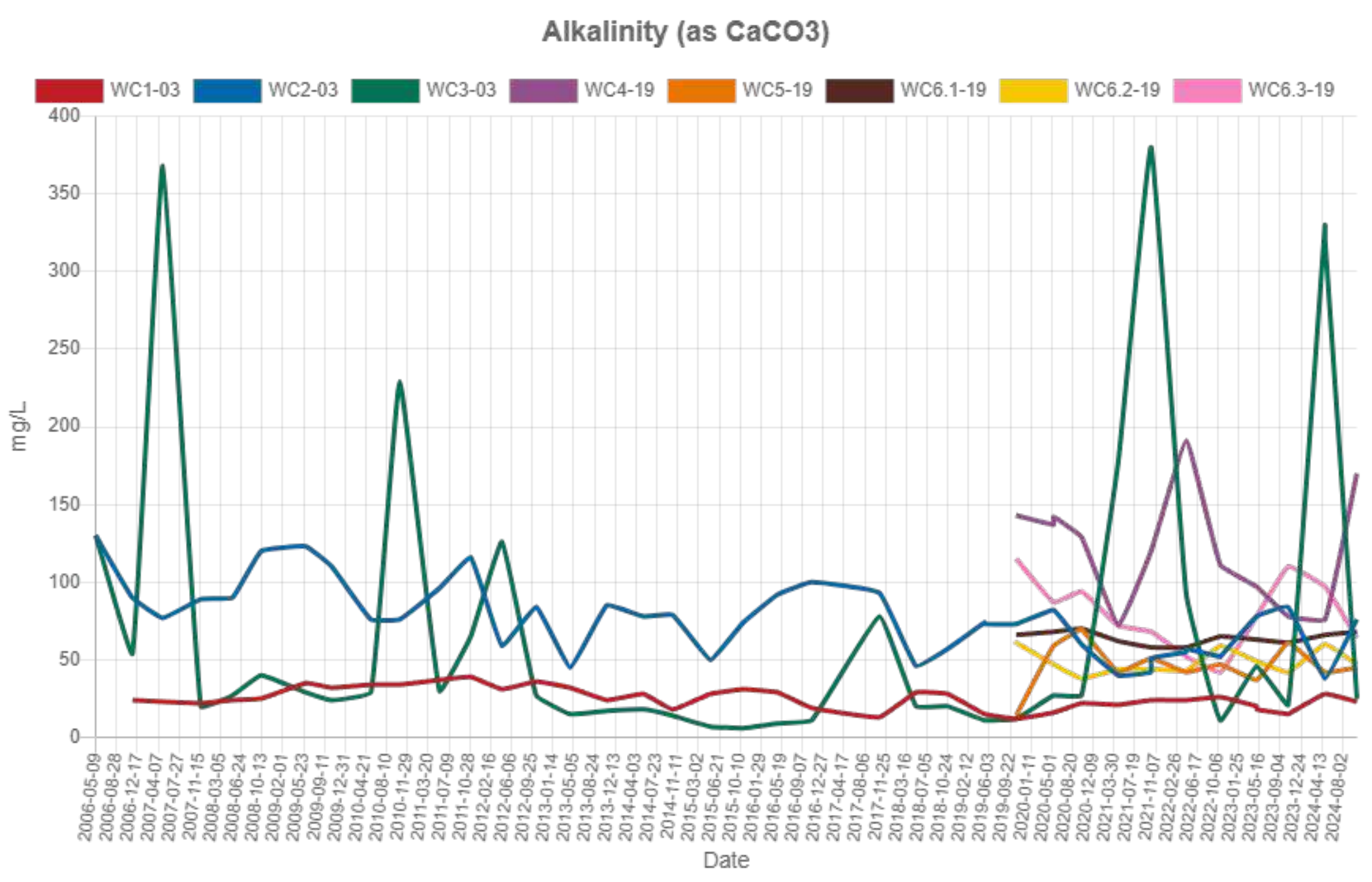
Photo 9: Entrance Signage – October 17, 2024

Photo 10: Front signage and open gate due to closure activities – October 17, 2024

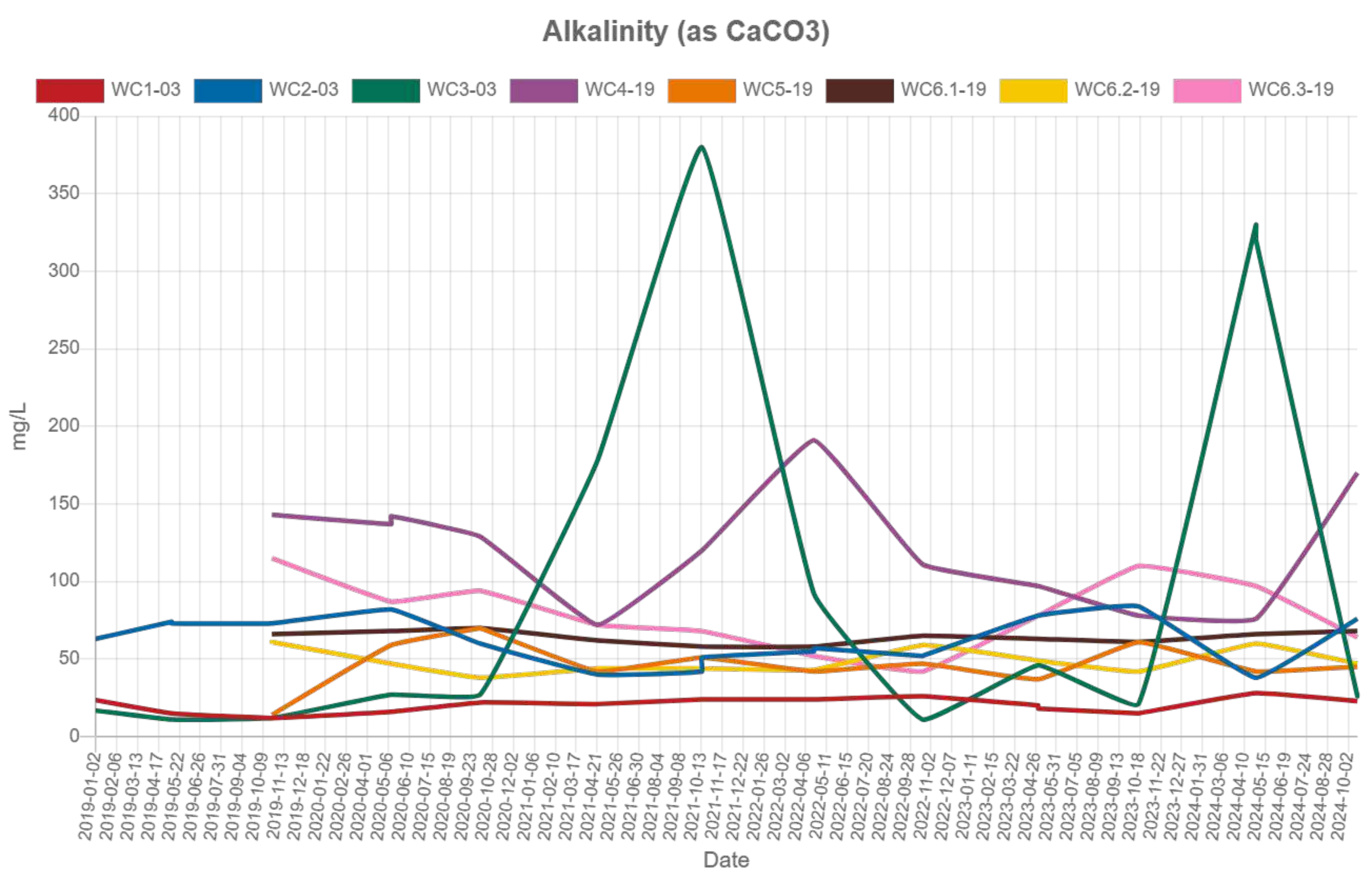
Photo 11: Temporary bin location during closure activities – October 17, 2024

Photo 12: Closure activities occurring on waste footprint – October 17, 2024

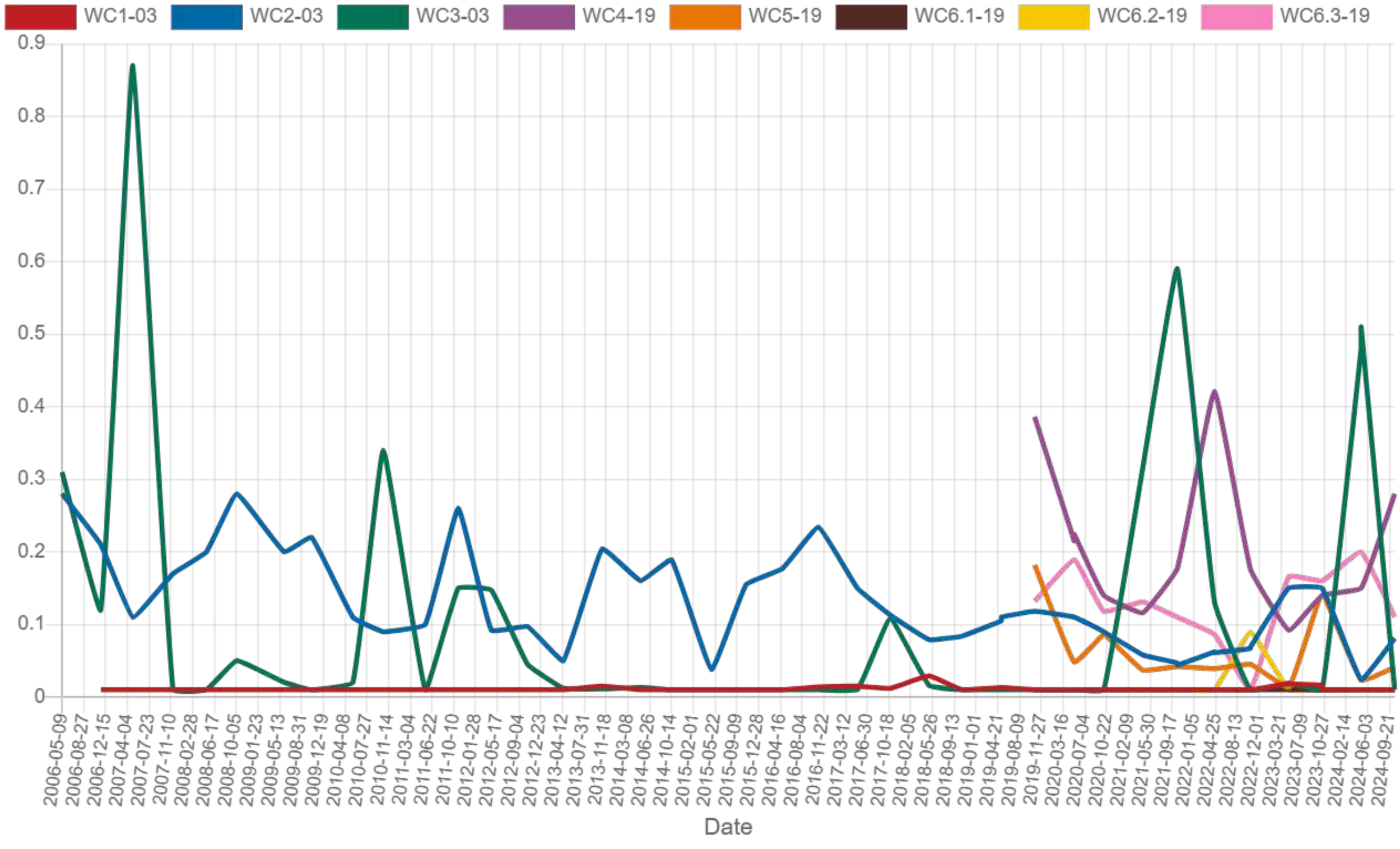
Chemistry Trend Graphs


Alkalinity (as CaCO3)
WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
mg/L
Date

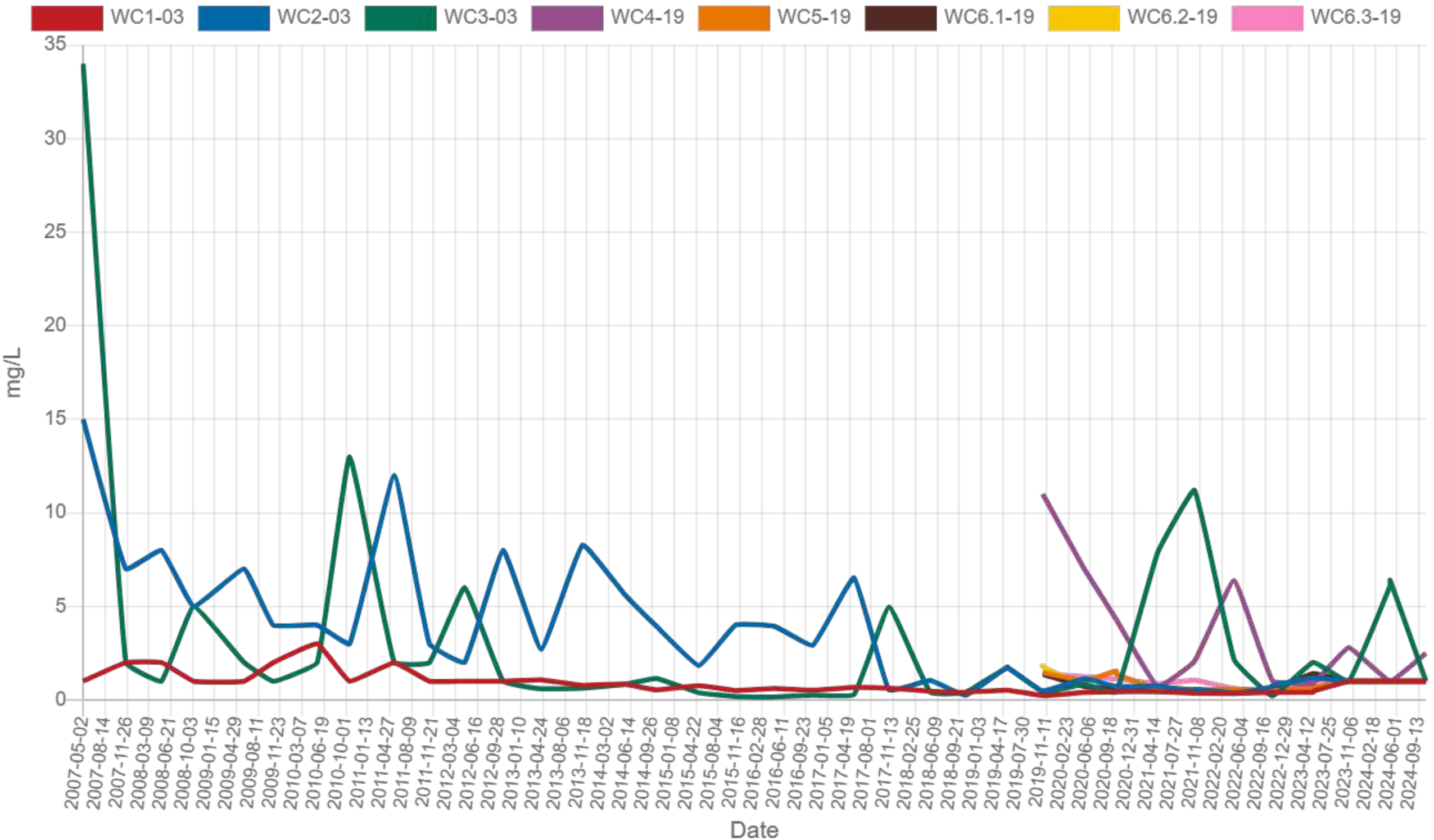
Alkalinity (as CaCO3)



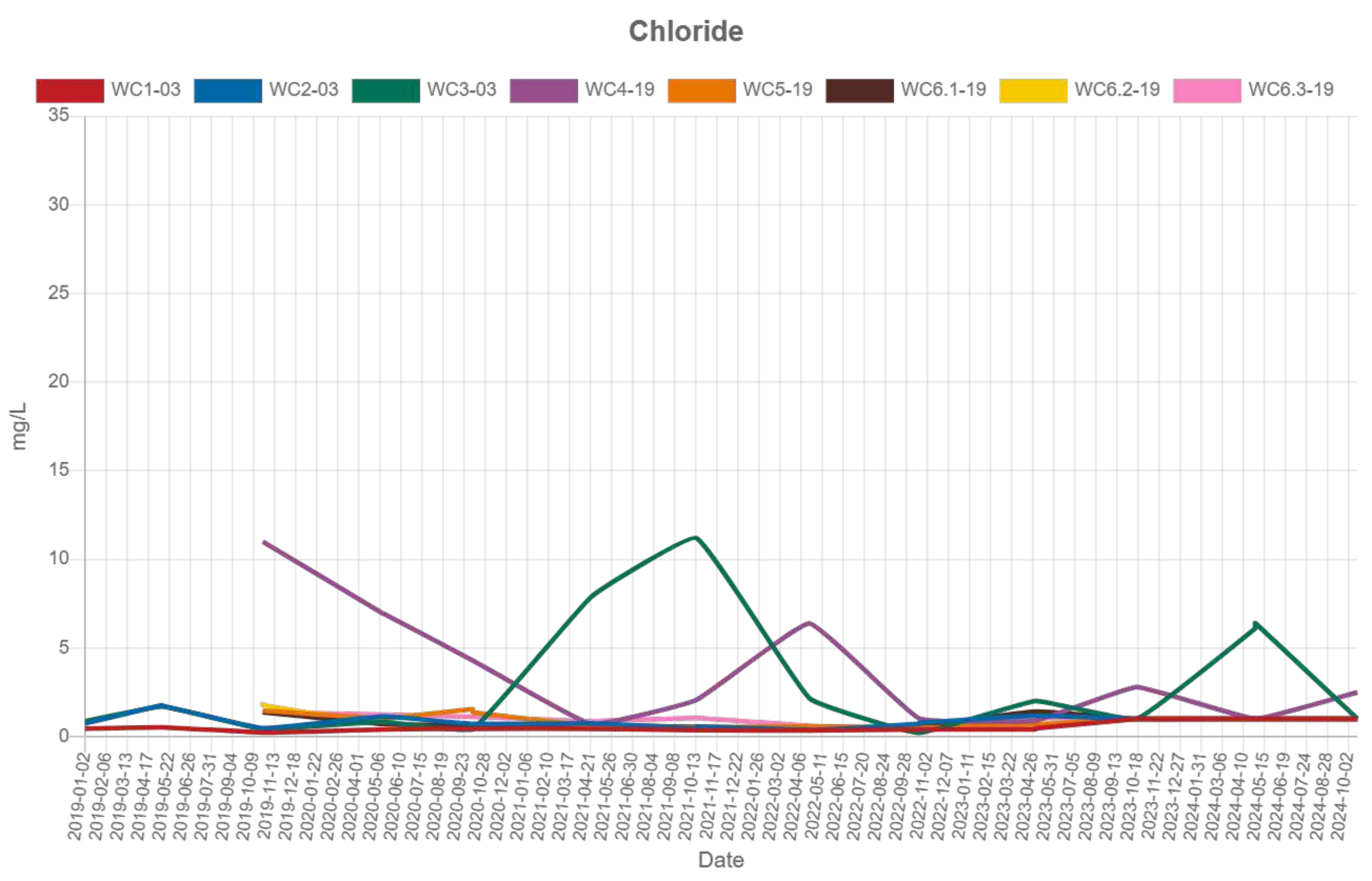
Boron (diss)


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
mg/L
2006-05-09
2006-08-27
2006-12-15
2007-04-04
2007-07-23
2007-11-10
2008-02-28
2008-06-17
2008-10-05
2009-01-23
2009-05-13
2009-08-31
2009-12-19
2010-04-08
2010-07-27
2010-11-14
2011-03-04
2011-06-22
2011-10-10
2012-01-28
2012-05-17
2012-09-04
2012-12-23
2013-04-12
2013-07-31
2013-11-18
2014-03-08
2014-06-26
2014-10-14
2015-02-01
2015-05-22
2015-09-09
2015-12-28
2016-04-16
2016-08-04
2016-11-22
2017-03-12
2017-06-30
2017-10-18
2018-02-05
2018-05-26
2018-09-13
2019-01-01
2019-04-21
2019-08-09
2019-11-27
2020-03-16
2020-07-04
2020-10-22
2021-02-09
2021-05-30
2021-09-17
2022-01-05
2022-04-25
2022-08-13
2022-12-01
2023-03-21
2023-07-09
2023-10-27
2024-02-14
2024-06-03
2024-09-21
Date

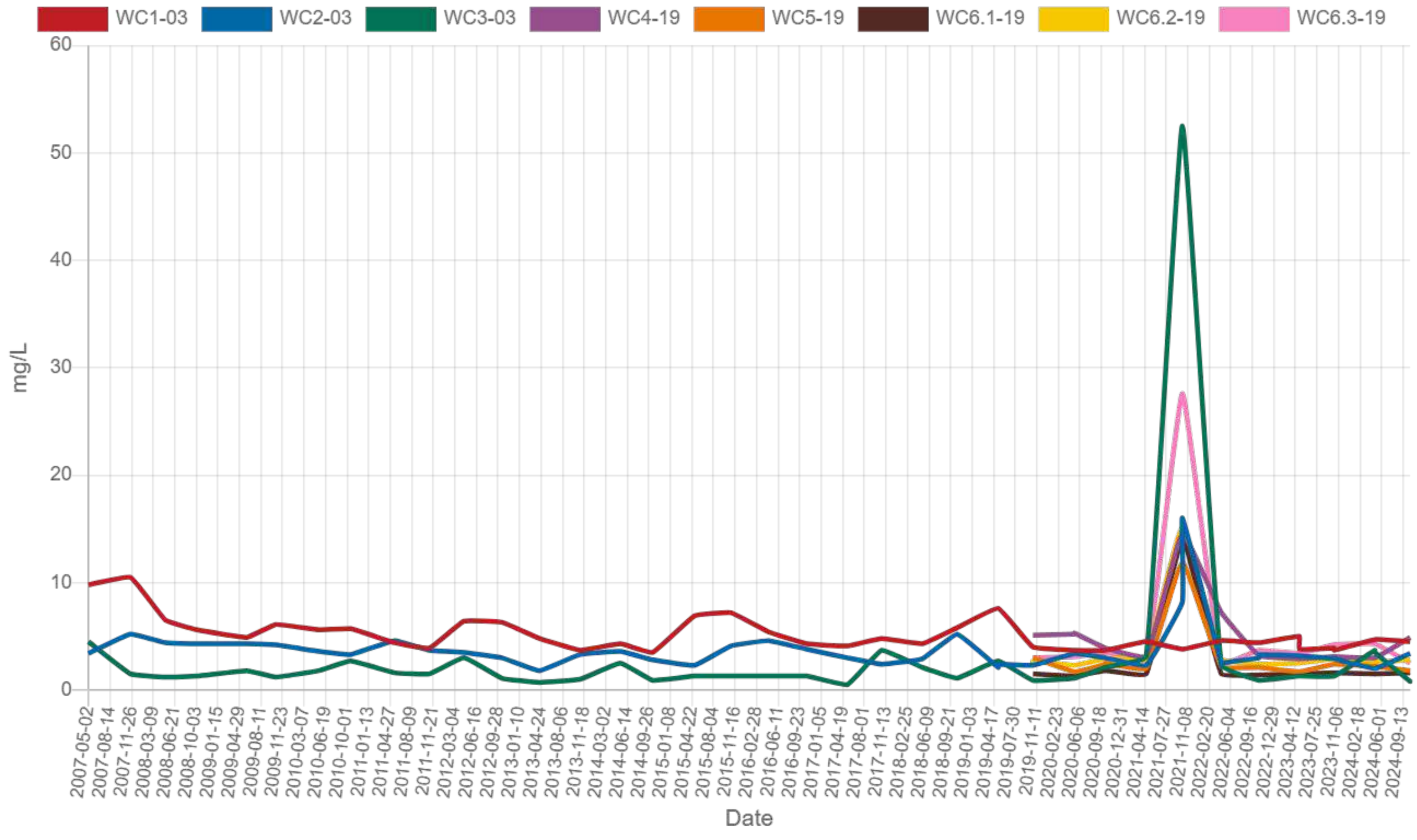
Chloride


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
35
30
25
20
15
10
5
0
mg/L
2007-05-02
2007-08-14
2007-11-26
2008-03-09
2008-06-21
2008-10-03
2009-01-15
2009-04-29
2009-08-11
2009-11-23
2010-03-07
2010-06-19
2010-10-01
2011-01-13
2011-04-27
2011-08-09
2011-11-21
2012-03-04
2012-06-16
2012-09-28
2013-01-10
2013-04-24
2013-08-06
2013-11-18
2014-03-02
2014-06-14
2014-09-26
2015-01-08
2015-04-22
2015-08-04
2015-11-16
2016-02-28
2016-06-11
2016-09-23
2017-01-05
2017-04-19
2017-08-01
2017-11-13
2018-02-25
2018-06-09
2018-09-21
2019-01-03
2019-04-17
2019-07-30
2019-11-11
2020-02-23
2020-06-06
2020-09-18
2020-12-31
2021-04-14
2021-07-27
2021-11-08
2022-02-20
2022-06-04
2022-09-16
2022-12-29
2023-04-12
2023-07-25
2023-11-06
2024-02-18
2024-06-01
2024-09-13
Date

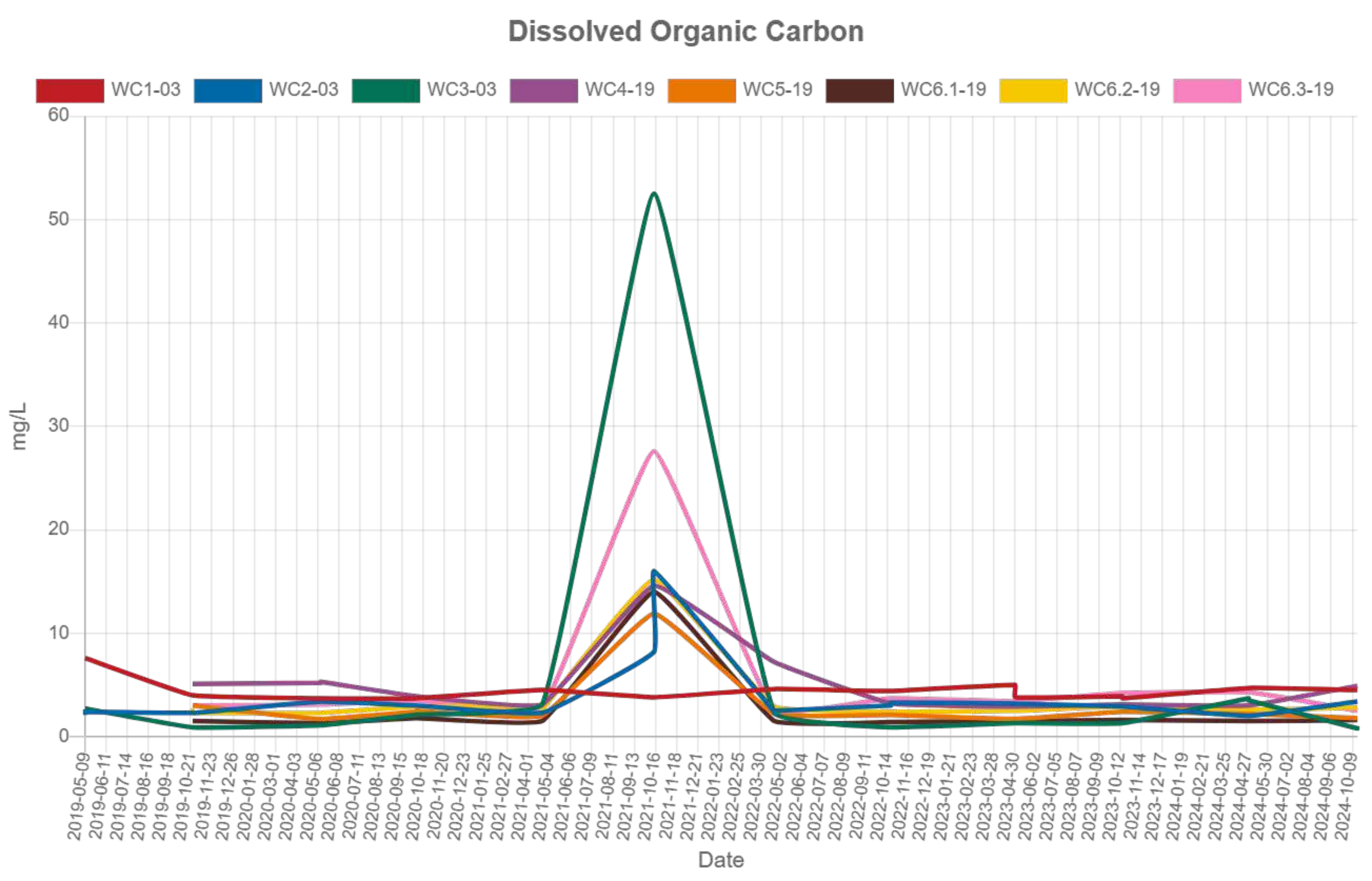
Chloride


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
35
30
25
20
15
10
5
0
mg/L
2019-01-02
2019-02-06
2019-03-13
2019-04-17
2019-05-22
2019-06-26
2019-07-31
2019-09-04
2019-10-09
2019-11-13
2019-12-18
2020-01-22
2020-02-26
2020-04-01
2020-05-06
2020-06-10
2020-07-15
2020-08-19
2020-09-23
2020-10-28
2020-12-02
2021-01-06
2021-02-10
2021-03-17
2021-04-21
2021-05-26
2021-06-30
2021-08-04
2021-09-08
2021-10-13
2021-11-17
2021-12-22
2022-01-26
2022-03-02
2022-04-06
2022-05-11
2022-06-15
2022-07-20
2022-08-24
2022-09-28
2022-11-02
2022-12-07
2023-01-11
2023-02-15
2023-03-22
2023-04-26
2023-05-31
2023-07-05
2023-08-09
2023-09-13
2023-10-18
2023-11-22
2023-12-27
2024-01-31
2024-03-06
2024-04-10
2024-05-15
2024-06-19
2024-07-24
2024-08-28
2024-10-02
Date

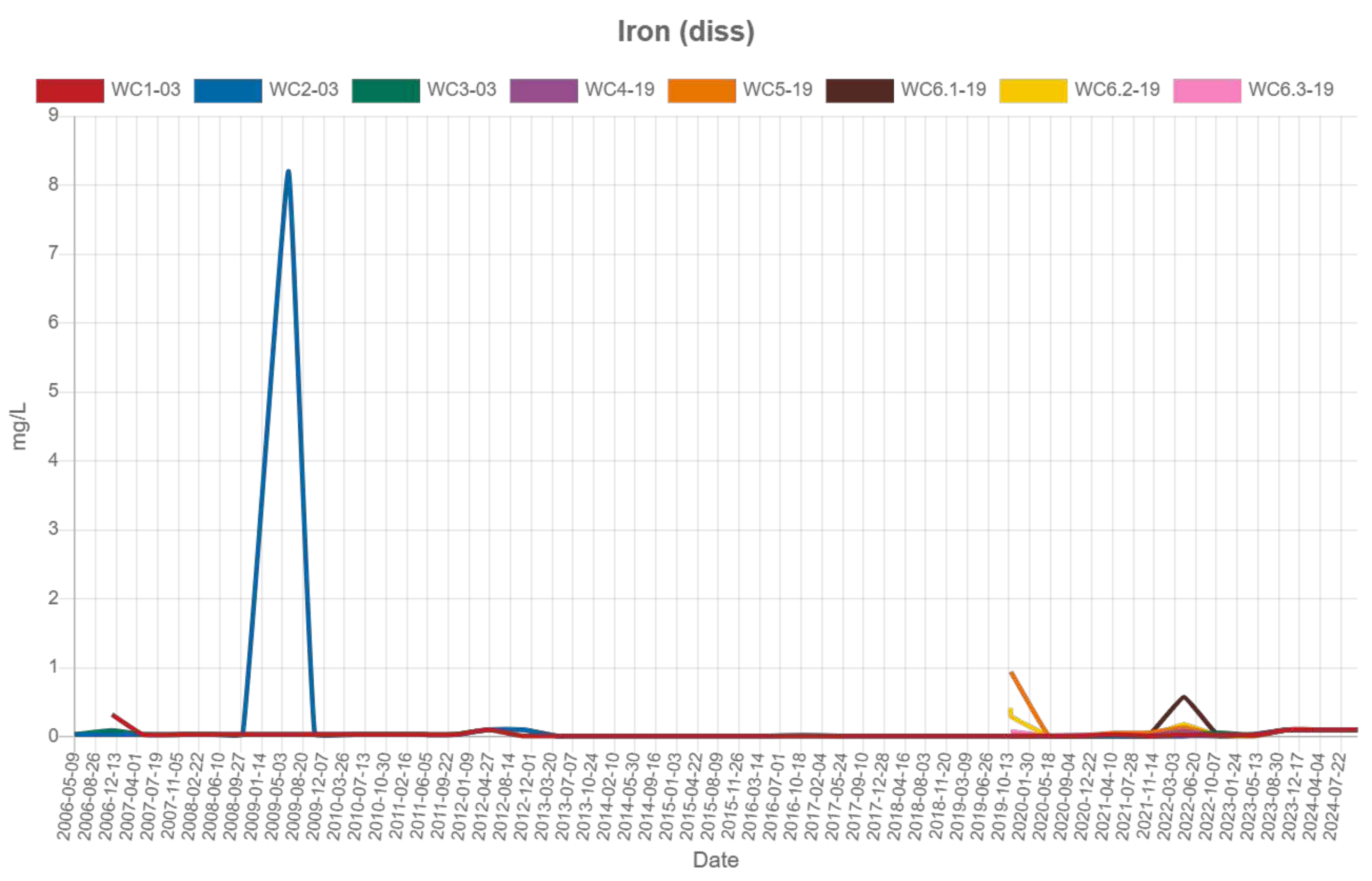
Dissolved Organic Carbon



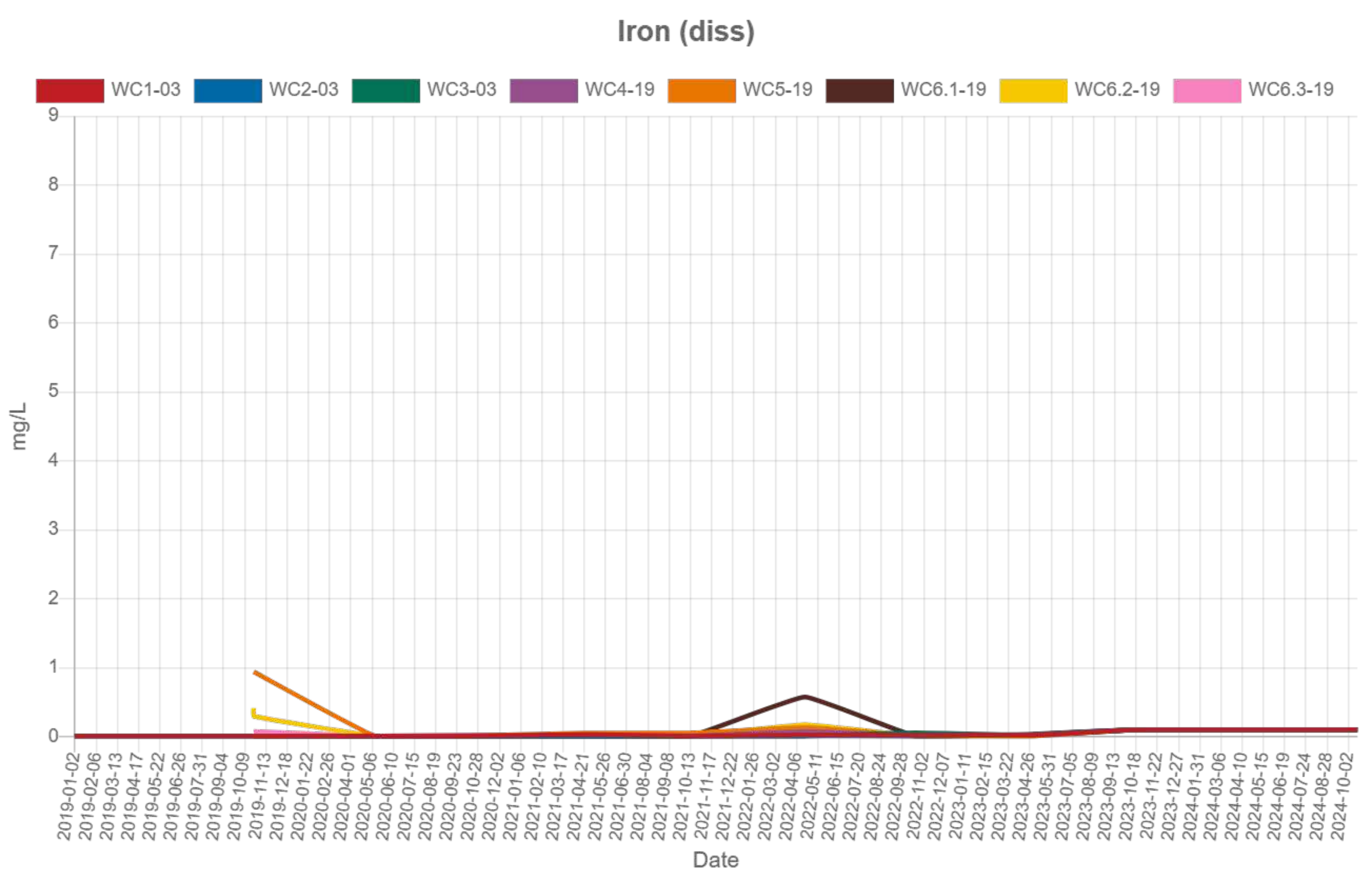
Dissolved Organic Carbon



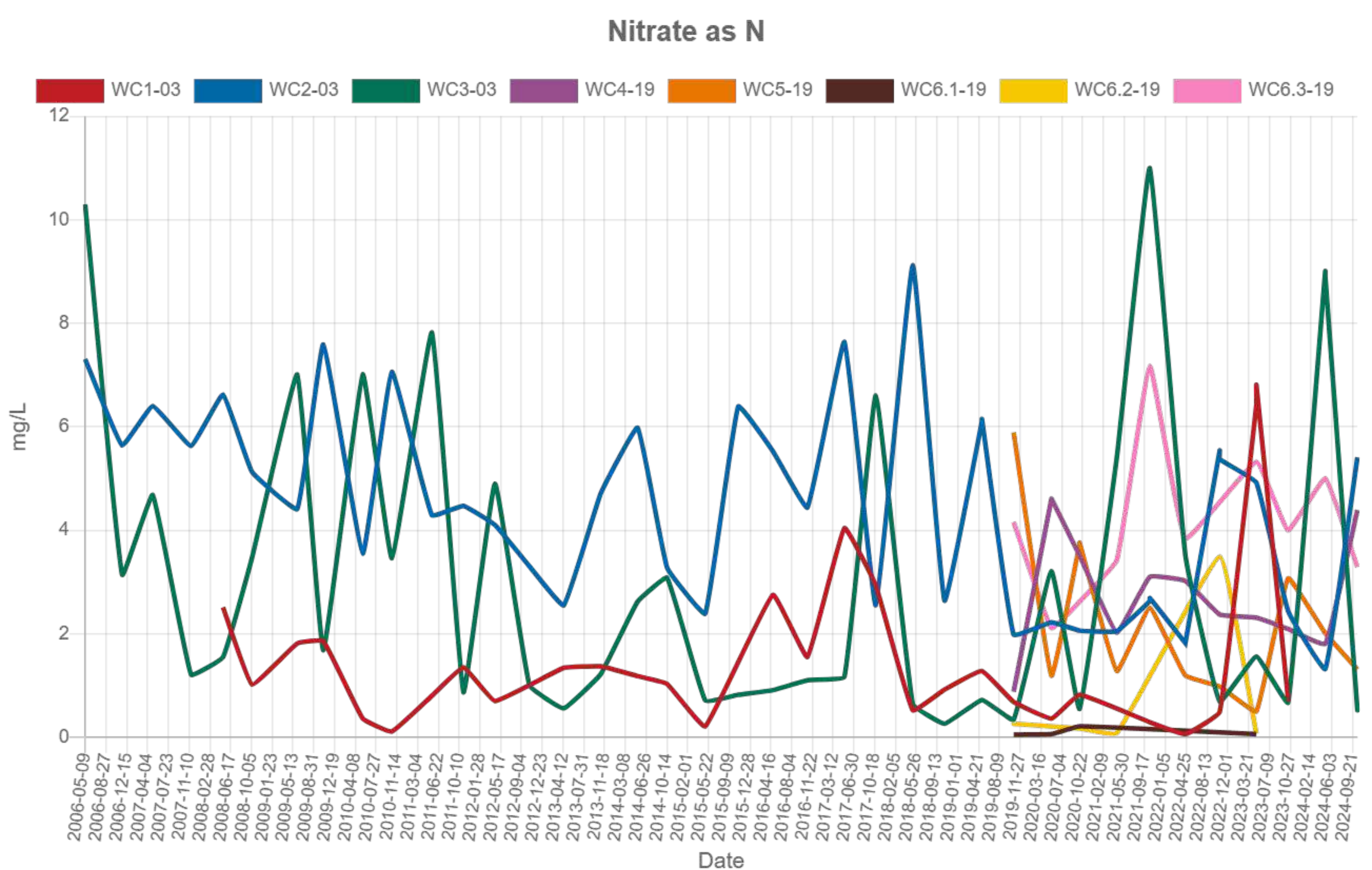
Iron (diss)


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
mg/L
9
8
7
6
5
4
3
2
1
0
2006-05-09
2006-08-26
2006-12-13
2007-04-01
2007-07-19
2007-11-05
2008-02-22
2008-06-10
2008-09-27
2009-01-14
2009-05-03
2009-08-20
2009-12-07
2010-03-26
2010-07-13
2010-10-30
2011-02-16
2011-06-05
2011-09-22
2012-01-09
2012-04-27
2012-08-14
2012-12-01
2013-03-20
2013-07-07
2013-10-24
2014-02-10
2014-05-30
2014-09-16
2015-01-03
2015-04-22
2015-08-09
2015-11-26
2016-03-14
2016-07-01
2016-10-18
2017-02-04
2017-05-24
2017-09-10
2017-12-28
2018-04-16
2018-08-03
2018-11-20
2019-03-09
2019-06-26
2019-10-13
2020-01-30
2020-05-18
2020-09-04
2020-12-22
2021-04-10
2021-07-28
2021-11-14
2022-03-03
2022-06-20
2022-10-07
2023-01-24
2023-05-13
2023-08-30
2023-12-17
2024-04-04
2024-07-22
Date

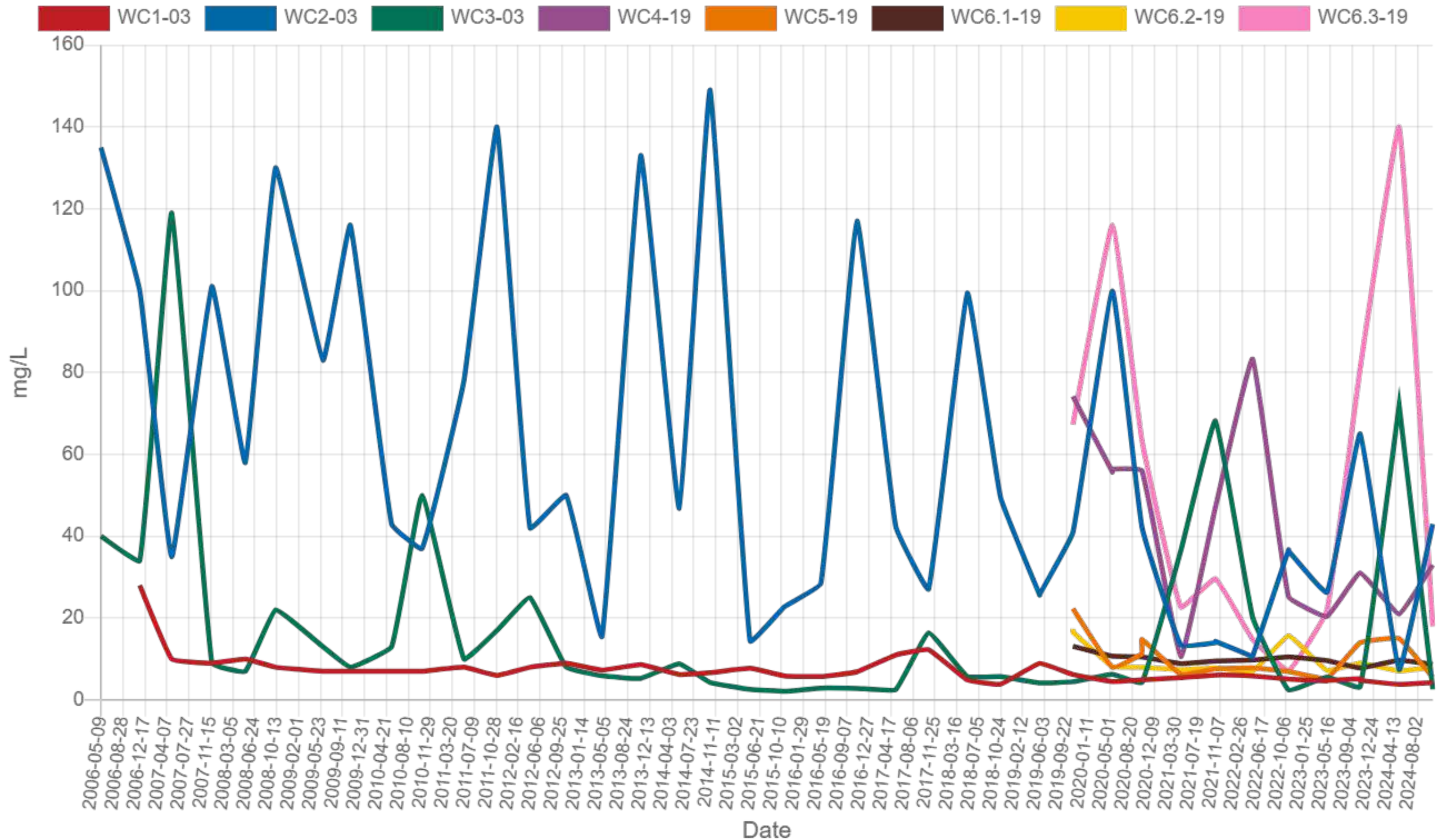
Iron (diss)


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
9
8
7
6
5
4
3
2
1
0
mg/L
2019-01-02
2019-02-06
2019-03-13
2019-04-17
2019-05-22
2019-06-26
2019-07-31
2019-09-04
2019-10-09
2019-11-13
2019-12-18
2020-01-22
2020-02-26
2020-04-01
2020-05-06
2020-06-10
2020-07-15
2020-08-19
2020-09-23
2020-10-28
2020-12-02
2021-01-06
2021-02-10
2021-03-17
2021-04-21
2021-05-26
2021-06-30
2021-08-04
2021-09-08
2021-10-13
2021-11-17
2021-12-22
2022-01-26
2022-03-02
2022-04-06
2022-05-11
2022-06-15
2022-07-20
2022-08-24
2022-09-28
2022-11-02
2022-12-07
2023-01-11
2023-02-15
2023-03-22
2023-04-26
2023-05-31
2023-07-05
2023-08-09
2023-09-13
2023-10-18
2023-11-22
2023-12-27
2024-01-31
2024-03-06
2024-04-10
2024-05-15
2024-06-19
2024-07-24
2024-08-28
2024-10-02
Date

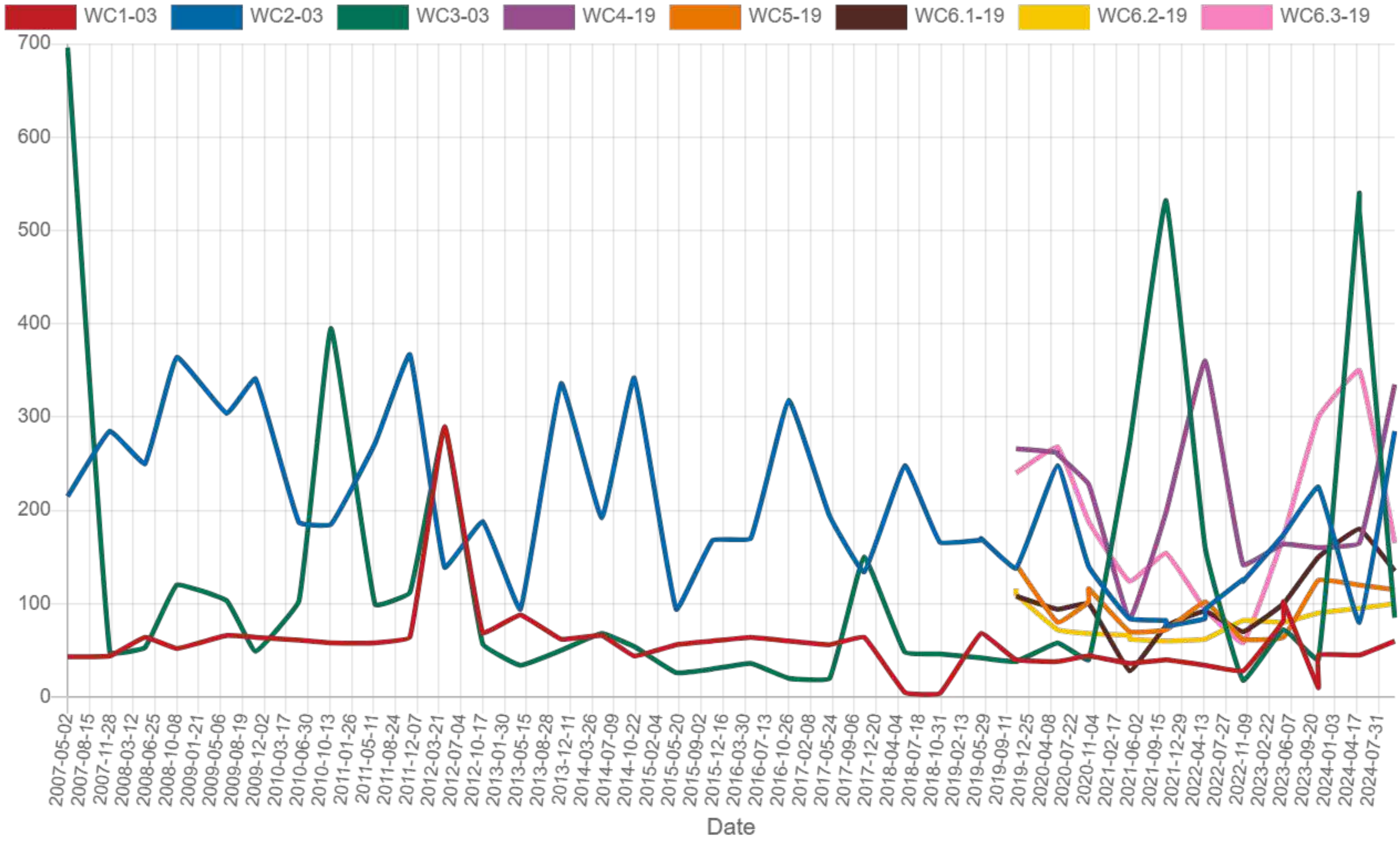
Nitrate as N


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
12
10
8
6
4
2
0
mg/L
2006-05-09
2006-08-27
2006-12-15
2007-04-04
2007-07-23
2007-11-10
2008-02-28
2008-06-17
2008-10-05
2009-01-23
2009-05-13
2009-08-31
2009-12-19
2010-04-08
2010-07-27
2010-11-14
2011-03-04
2011-06-22
2011-10-10
2012-01-28
2012-05-17
2012-09-04
2012-12-23
2013-04-12
2013-07-31
2013-11-18
2014-03-08
2014-06-26
2014-10-14
2015-02-01
2015-05-22
2015-09-09
2015-12-28
2016-04-16
2016-08-04
2016-11-22
2017-03-12
2017-06-30
2017-10-18
2018-02-05
2018-05-26
2018-09-13
2019-01-01
2019-04-21
2019-08-09
2019-11-27
2020-03-16
2020-07-04
2020-10-22
2021-02-09
2021-05-30
2021-09-17
2022-01-05
2022-04-25
2022-08-13
2022-12-01
2023-03-21
2023-07-09
2023-10-27
2024-02-14
2024-06-03
2024-09-21
Date

Sulphate


WC1-03
WC2-03
WC3-03
WC4-19
WC5-19
WC6.1-19
WC6.2-19
WC6.3-19
160
140
120
100
80
60
40
20
0
mg/L
2006-05-09
2006-08-28
2006-12-17
2007-04-07
2007-07-27
2007-11-15
2008-03-05
2008-06-24
2008-10-13
2009-02-01
2009-05-23
2009-09-11
2009-12-31
2010-04-21
2010-08-10
2010-11-29
2011-03-20
2011-07-09
2011-10-28
2012-02-16
2012-06-06
2012-09-25
2013-01-14
2013-05-05
2013-08-24
2013-12-13
2014-04-03
2014-07-23
2014-11-11
2015-03-02
2015-06-21
2015-10-10
2016-01-29
2016-05-19
2016-09-07
2016-12-27
2017-04-17
2017-08-06
2017-11-25
2018-03-16
2018-07-05
2018-10-24
2019-02-12
2019-06-03
2019-09-22
2020-01-11
2020-05-01
2020-08-20
2020-12-09
2021-03-30
2021-07-19
2021-11-07
2022-02-26
2022-06-17
2022-10-06
2023-01-25
2023-05-16
2023-09-04
2023-12-24
2024-04-13
2024-08-02
Date

Total Dissolved Solids



Appendix A

A-1 Environmental Compliance Approval

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A361102
Issue Date: October 13, 2023

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

Site Location: Wolf Creek WDS
Lot Part of 22, Concession 14
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 0.2 hectare waste disposal/transfer site within a total site area of 0.7 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;
- "HHW" means household hazardous waste;
- "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 Highland 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 Wolf Creek Waste Disposal Site, Part of Lot 22, Concession 14, Hastings Highlands Municipality, 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;

- management procedures including the use and operation of equipment for the processes and wastes to be handled;
- emergency response procedures;
- specific written procedures for the control of nuisance conditions;
- specific written procedures for refusal of unacceptable waste loads; and
- 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) Within thirty (30) calendar days from the date of issuance of this Approval, 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) Within thirty (30) calendar days of receiving a Certificate of Requirement authorized by the Director, 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.

Inspections by the Ministry

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

(17) (a) Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site 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 Site 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 Site.

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

(18) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this 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.

(19) 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.

(20) 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 on 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);
- (i) a warning against dumping outside the Site;
- (j) display of "No smoking and no open fire"; and
- (k) indicates that the landfill is closed and the nearest location for disposal of unacceptable wastes; and

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

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

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

Summer (Victoria Day to Thanksgiving)
Wednesday, Sunday and Holiday Mondays: 12 p.m.-5 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.

Site Security

(10) (a) No waste shall be received from the public at the Site unless a site Supervisor or an Attendant is present and supervises the operations during operating hours. The Site shall be closed to the public when a site Supervisor/Attendant is not present to supervise landfilling operations.

(b) Waste/recyclables relocated on-site or removed from the Site by a registered/licensed waste hauler shall be carried out by trained personnel during the hours of 7 a.m. and 5 p.m. Monday to Friday.

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

3. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the 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

Daily Inspections and Log Book

(1) An inspection of 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.

(2) 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.

(3) 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.

7. LANDFILL CLOSURE

(1) The landfill shall be closed in accordance with the closure plan included in Item 5 of Schedule A. No additional waste shall be disposed of at the landfill.

Final Cover

(2) The landfill top surface shall be graded to have a slope of no less than 20(H):1(V) and no more than 4(H):1(V).

(3) The final cover shall consists of a minimum 600 millimetre thick layer of soil of medium permeability and 150 millimetres of top soil, and shall be properly seeded immediately following the topsoil placement for the establishment of vegetative cover.

(4) Within ten (10) days of the completion of the landfill closure, the Owner shall notify the District Manager in writing, that the landfill has been closed in accordance with the approved closure plan.

(5) By December 31, 2025, the Owner shall complete acquisition or obtaining the property right of the proposed contaminate attenuation zone as detailed in Attachment 4 of Item 5 in Schedule A.

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 maintained in such a way as to ensure compliance with the following:

(a) Reasonable Use Guideline B-7 in terms of key leachate indicators for the protection of the groundwater at the Site;

(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; and

(c) Ontario Drinking Water Quality Standards except where background conditions are confirmed to fall above or below the criteria.

Surface Water and Groundwater

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

(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) Trigger mechanisms shall be in accordance with Section 6 of the Closure Plan included in Item 5 of Schedule "A".

(b) Contingency plan 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 shall be in accordance with Section 6 of the Closure Plan included in Item 5 of Schedule "A".

(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.

9. ANNUAL REPORT

(1) A written report on the 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.

(2) 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; the progress of final cover, vegetative cover; facilities existing, added or removed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
(d) quantities of waste and recyclables received during the reporting period;
(e) a summary of the weekly, maximum daily and total annual quantity of waste received at the Site;
(f) a summary of any complaints received and the responses made;
(g) a discussion of any operational problems encountered at the Site and corrective action taken;
(h) any changes to the Design and Operations Report and the Closure Plan that have been approved by the Director since the last Annual Report;
(i) a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903; and
(j) any other information with respect to the Site which the District Manager may require from time to time.

10. WASTE TRANSFER STATION

(1) The Waste Transfer Station shall be operated in accordance with the Wolf Creek Waste Transfer Station Design and Operations Plan included in Item 5 of the Schedule A.

(2) Only waste that is generated within the boundaries of the Municipality of Hastings Highlands may be accepted at the Waste Transfer Station.

(3) Only the following types of waste shall be accepted at the Waste Transfer Station:

i. solid non-hazardous household waste;
ii. blue box recyclables including glass, cardboard, paper, plastic, metals;
iii. scrap metals;
iv. household appliances;
v. household batteries;
vi. tires;
vii. styrofoam;
viii. clean wood and brush;
ix. bulky items; and
x. Waste Electrical and Electronic Equipment

(4) Total amount of waste and recyclables accepted at the Waste Transfer Station shall not exceed 2 metric tonnes per week and 107 metric tonnes per year.

(5) 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.

(6) 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.
(d) a segregated area is not required if Refrigerant Appliances are not accepted at the waste transfer station

(7) 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.

(8) 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.

HHW and WEEE

(9) Sealable and lockable bins may be used to collect inadvertently left WEEE and HHW.

(10) Storage and transfer of above WEEE shall be in accordance with the guideline titled "Collection Site Organizing & Operating Waste Electrical and Electronic Equipment (WEEE) Guidebook" dated November 2012 as amended prepared by Ontario Electronic Stewardship.

(11) Storage and transfer of above HHW shall be in a way to protect health and safety of the public and the environment.

SCHEDULE "A"

1. Detail site plan "Site No. A361102, Township of Bangor, North End of Kamaniskeg Lake, Lot 23, Conc. 14" dated October 22, 1979.

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

3. Environmental Compliance Approval Application dated August 21, 2017 and signed by Pat Pilgrim, Chief Administrative Officer, the Corporation of the Municipality of Hastings Highlands, including the attached supporting documentation.

4. Report titled "Development and Operations Plan, Wolf Creek Waste Disposal Site, Environmental Compliance Approval No. A361102" dated August 2017 and prepared by BluMetric Environmental Inc.

5. Amendment Application, Environmental Compliance Approval No. A361102 Wolf Creek Waste Disposal Site dated February 27, 2023 prepared by Blue Metric Environmental, that includes the following documents:
   i. Environmental Compliance Approval Application signed by David Steward dated February 24, 2023;
   ii. Wolf Creek Waste Disposal Site Closure Plan dated February 27, 2023 prepared by Blue Metric Environmental;
   iii. Wolf Creek Waste Transfer Station Design and Operations Plan dated February 27, 2023 prepared by Blue Metric Environmental.

Schedule "B"

Wolf Creek Annual Semi-Annual (Spring & Fall) Groundwater Analysis

Location	Parameters
WC1-03 WC2-03 WC3-03 WC4-19 WC5-19 WC6.1-19 WC6.2-19 WC6.3-19	Dissolved Organic Carbon (DOC) Alkalinity Ammonia Calcium Chloride Magnesium Nitrate Potassium Sodium Sulphate Aluminum Boron Iron Lead Manganese Strontium Zinc Chemical Oxygen Demand (COD) Conductivity pH Total Dissolved Solids (TDS)

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

GENERAL

- The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9), (10), (17), (18) and (19) is to clarify the legal rights and responsibilities of the *Owner* and *Operator* under this *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) and (15) 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(16) is to ensure that appropriate *Ministry* staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this *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 (20) 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) (a) and (b) 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) and 2(9) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.

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

EMPLOYEE TRAINING

- 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

- 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* , the *EPA* and its regulations.

- The reason for Condition 6(3) is to ensure that detailed records of *Site* inspections are recorded and maintained for inspection and information purposes.

LANDFILL CLOSURE

- The reason for Conditions 7(1) 7(2) 7(3) and 7(4) is to approve the landfill closure plan, and to ensure the landfill is closed in accordance with the Ministry landfill standards. 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.*

- Condition 7(5) is to ensure adequate contaminant attenuation zone is established for the site to comply with the ministry's Reasonable Use Guideline.

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.

REPORTING

- The reasons for Conditions 9(1) and 9(2) 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.

WASTE DIVERSION

- Condition 10(1) is to approve the Waste Transfer Station Design and Operations Plan.

- Conditions 10 (2), 10(3), and 10(4) is to specify the service area of the waste transfer station and the waste types and quantities that can be received.

- Conditions 10 (5) to 10(11) are included to ensure that the Waste Transfer Station is operated ina a manner that does not cause adverse effect to the environment, and to ensure 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). A361102 issued on December 7, 2017

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me and the Ontario Land 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 ("the Notice") 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:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

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 Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.oltt.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 13th day of October, 2023

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

RL/
c: Area Manager, MECP Belleville
c: District Manager, MECP Kingston - District
Carolyn Miller B.A.Sc., P.Eng., BluMetric Environmental Inc.

Appendix A

A-2 Surface Water Comments on the 2020 Annual Monitoring Report

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

January 6, 2022

TO: Jon Morrish
Senior Environmental Officer
Belleville Area Office
Eastern Region

FROM: Sarah Baxter
Surface Water Specialist
Technical Support Section
Eastern Region

RE: Wolf Creek Waste Disposal Site
2020 Annual Monitoring Report
Township Hastings Highlands; County of Hastings
Environmental Compliance Approval #A361102
ECHO #1-25671878

I have reviewed the "2020 Annual Monitoring Report, Wolf Creek Waste Disposal Site, Environmental Compliance Approval No. A361102" dated March 2021 and prepared by BluMetric Environmental Inc. The following comments, relative to surface water impact concerns, are provided for your consideration.

Background

The Wolf Creek Waste Disposal Site (WDS) is an active natural attenuation landfill and recycling transfer station. The site is operated by the Township of Hastings Highlands and has been operating since at least 1980. The WDS is situated on Crown Land leased from the Ministry of Northern Development, Mines, Natural Resources, and Forestry (MNDMNRF).

The WDS is regulated by Environmental Compliance Approval (ECA) #A361102 and has an approved footprint of 0.2 hectares on a 0.7 hectare site. The landfill is approved to receive solid non-hazardous waste, blue box recyclables, scrap metal, tires, brush, waste electrical and electronic equipment (WEEE), bulky items, and white goods.

The annual report indicates that the site has approximately 27 years of site life remaining. However, BluMetric suggests that no waste has been landfilled at the site since 2017; the waste has been collected in bins and transferred to other WDSs within the township. BluMetric also indicates that the township anticipates closing the site and that a closure plan has been developed.

Site Description

The Wolf Creek WDS is located on Lot 22, Concession 14, Geographic Township of Bangor, in the Township of Hastings Highlands. The site is approximately 10 kilometers southwest of the village of Barry's Bay and is accessed via River Road (civic address 567).

The landfill is located in a heavily forested portion of the Upper Madawaska tertiary watershed and is situated within a former aggregate pit. The site is bound by River Road to the south, Wolf Creek to the west, and forest to the north and east.

Wolf Creek flows southward approximately 200 meters west of the site. Soon after passing the site, flows join Mud Bay of the Madawaska River which flows eastward to the south basin of Kaminiskeg Lake. Kaminiskeg Lake is managed as a naturally-reproducing Lake Trout Lake and according to the County of Renfrew Official Plan, the lake is designated as being "at capacity".

According to the annual report, the overburden is composed of sand and gravel up to 23.8 meters in depth. The bedrock is Precambrian granite. Interpreted groundwater flow is typically towards the west or northwest, towards Wolf Creek.

BluMetric characterizes the landfill leachate as having elevated alkalinity, iron, nitrate, sulphate and total dissolved solids (TDS). As inferred from groundwater monitoring wells WC1-03 (background), WC2-03 (downgradient) and WC4-19 (downgradient), the leachate may also be characterized as having elevated boron, chloride, conductivity, magnesium, sodium, and strontium.

Surface Water Monitoring Program

There is currently no surface water monitoring program at the site, as the nearest surface water feature (i.e. Wolf Creek) is nearly 200 meters downgradient of the WDS. In addition, all surface water runoff that comes onsite quickly infiltrates into the sandy overburden.

Instead, potential impacts to Wolf Creek can be assessed by examining water quality in the most westerly, downgradient groundwater monitoring wells. Newly installed wells WC4-19 and WC6-19 appear to be impacted by landfill leachate. At one or more of these wells, the chronic Canadian Water Quality Guideline (CWQG) for nitrate was exceeded. Concentrations of most landfill indicator parameters are elevated above background levels, however the elevations are relatively minor in nature and concentrations of most parameters are still within the ranges characteristic of natural surface waters. In addition, Wolf Creek is a significant distance downgradient of these wells, so impacts to the creek are unlikely at this time.

Conclusions and Recommendations

1. The Wolf Creek WDS is an active natural attenuation landfill site that is operated by the Township of Hastings Highlands. The site is situated on leased Crown Land.

2. The report indicates that waste has not been deposited at the site since 2017 and that the Township is preparing to close the site. BluMetric estimates that there is approximately 27 years of site life remaining, so it is unclear as to why the Township would close the site with so much capacity available.

3. Surface water monitoring is not conducted at the Wolf Creek WDS as the nearest receiver (i.e. Wolf Creek) is approximately 200 meters downgradient of the landfill.

4. The most westward and downgradient groundwater monitoring wells appear to be impacted by landfill leachate, but to a relatively minor degree. Considering the limited leachate impacts in these wells, and the wells' significant distance from Wolf Creek, surface water impacts are unlikely at this time.

5. Water quality in the most downgradient groundwater monitoring wells should be compared to surface water criteria to infer impacts to Wolf Creek and determine the need for the establishment of a surface water monitoring program.

If you have any questions regarding the above comments, I would be pleased to discuss them with you.

SB/sb

ec: Victor Castro
Obai Mohammad

c: File SW HA HH 03 06 (Wolf Creek WDS)

Appendix A

A-3 MECP Letter and 2022 Inspection Report

Ministry of the Environment, Conservation and Parks
Eastern Region
Belleville Area Office
345 College Street East
Belleville ON K8N 5S7
Tel: (613) 848-0853
or 1.800.860.2763

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
Bureau du secteur de Belleville
345, rue College Est
Belleville (Ontario) K8N 5S7
Tél: (613) 848-0853
ou 1 800 860 2763

Ontario

August 31, 2022

Adrian Tomasini
Operations Manager
The Corporation of the Municipality of Hastings Highlands
33011 Highway 62 N
Maynooth, ON K0L 2S0

Dear Mr. Tomasini:

RE: Solid Non-Hazardous Waste Disposal Site Compliance Inspection, Wolf Creek Landfill, 567 River Road (former Bangor Township)
Municipality of Hastings Highlands, County of Hastings

Thank you for your time and cooperation in relation to the above-referenced inspection, which I conducted on and about June 30, 2022. A copy of the associated inspection report is attached.

As outlined in the report, the outstanding non-compliance items associated with the site are the lack of required buffer area and Contaminant Attenuation Zone (CAZ; needed to satisfy the ministry's Guideline B-7), and corresponding approval of them (through an ECA amendment), along with a Closure Plan for the landfilling area.

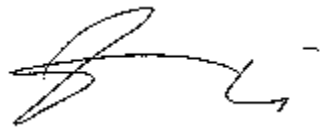
Comments from the ministry's Technical Support Section, on review of the 2021 Annual Monitoring Report (and proposed buffer and CAZ areas), are anticipated shortly and will be forwarded upon their availability.

It is understood that the Municipality will be continuing discussions with NDMNRF, with a view to transfer of the relevant lands, and that an application to amend the ECA will then be submitted (to incorporate the buffer and CAZ lands, and Closure Plan).

Accordingly, a response to this inspection and letter is not requested at this time. However, the Municipality is respectfully reminded that the site remains in non-compliance / non-conformance until the above-noted actions are achieved.

Thanks again, and please don't hesitate to contact me (at 613-848-0853 or jon.morrish@ontario.ca) if you have any questions or concerns.

Sincerely,



Jon Morrish
Senior Environmental Officer
Belleville Area Office

Ontario

Wolf Creek Waste Disposal Site
567 RIVER RD, HASTINGS HIGHLANDS, ON,

Inspection Report

Entity:	CORPORATION OF THE MUNICIPALITY OF HASTINGS HIGHLANDS
Inspection Start Date:	08/31/2022
Inspection End Date:	08/31/2022
Inspected By:	Jon Morrish
Badge #:	847

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

The following item(s) have been identified as non-compliance/non-conformance, based on a "No" response captured for a legislative or best management practice (BMP) question (s), respectively.

Question Group: Operations

Question ID	NOL 12	**Question Type**	Legislative
Question: Does the landfill have a large enough Buffer Area as specified in the ECA or Regulation 232/98?			
Legislative Requirement	EPA | 27 | (1);		
Observation/Corrective Action(s)			
No See comments above.			

Question ID	NOL 33	**Question Type**	Legislative
Question: Is the water quality being monitored/sampled for surface water features on-site and for any off-site surface water features that receive run-off from the site?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 24;		
Observation/Corrective Action(s)			
No There is currently no surface water monitoring program at the site, as the nearest surface water feature (i.e. Wolf Creek) is approximately 200 m downgradient of the site. In addition, all surface water runoff at the site quickly infiltrates into the sandy overburden. In review of the 2020 AMR, the ministry's surface water reviewer (Baxter) noted that: "potential impacts to Wolf Creek can be assessed by examining water quality in the most westerly, downgradient groundwater monitoring wells. Newly installed wells WC4-19 and WC6-19 appear to be impacted by landfill leachate. At one or more of these wells, the chronic Canadian Water Quality Guideline (CWQG) for nitrate was exceeded. Concentrations of most landfill indicator parameters are elevated above background levels, however the elevations are relatively minor in nature and concentrations of most parameters are still within the ranges characteristic of natural surface waters. In addition, Wolf Creek is a significant distance downgradient of these wells, so impacts to the creek are unlikely at this time."			

The same review recommended that "Water quality in the most downgradient groundwater monitoring wells should be compared to surface water criteria to infer impacts to Wolf Creek and determine the need for the establishment of a surface water monitoring program."

INSPECTION DETAILS

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

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

Question ID	NOL 1	**Question Type**	Legislative
Question: Does the Open landfill site have an Environmental Compliance Approval (ECA)?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes This inspection of the Wolf Creek Waste Disposal Site (at 567 River Road, Hastings Highlands)included a site visit on June 30, 2022, attended by Adrian Tomasini, Operations Manager for the Municipality of Hastings Highlands, and Jon Morrish, MECP. The site was closed to the public at the time. No waste has been landfilled at the site since 2017; the site currently operates as a waste transfer site (waste is collected in bins and transferred to another landfill within the municipality). The current version of the (amended) ECA Number A361102, for the Wolf Creek WDS, was issued on December 7, 2017. The ECA was first issued on March 27, 1980. The ECA approves the use and operation of a 0.2 ha waste disposal/transfer site within a total site area of 0.7 ha. Notice No. 1 under the current ECA was issued on March 21, 2018, in order to correct the site location - as Part of Lot 22 (instead of Part of Lot 23)… at Concession 14 in the former Bangor Township.			

Question ID	NOL 2	**Question Type**	Information
Question: Is this landfill on Crown land?			
Legislative Requirement	Not Applicable		
Observation			

Yes This site is located on Crown Land, under the authorization of Land Use Permit LUP1634-1004191. The LUP recognizes an area of 0.7 ha. It was issued on June 1, 2016 and expires on May 31, 2026.

Question ID	NOL 4	Question Type	Information

Question:

Does the landfill have a Contaminant Attenuation Zone (CAZ)?

Legislative Requirement	Not Applicable

Observation

No The site does not currently have a buffer zone or Contaminant Attenuation Zone (CAZ).

The 2021 Annual Monitoring Report (AMR) for the site (by BluMetric) notes that in 2021, a CAZ assessment was carried out for the site. The AMR noted that iron was determined to be the only critical parameter, with a calculated required attenuation distance of 87 m. It stated that "Based on no future placement of waste at the site, we would recommend that the municipality move with acquiring a minimum 100 m CAZ/buffer to the west and north of the site property boundary, and a 30 m buffer to the east and south of the property boundary. The initial steps in obtaining the CAZ property, either by ownership or easement, is to initiate discussions with both the MECP...and NDMNRF. General agreement with the CAZ distances should be obtained from the MECP, while general agreement to transfer the Crown Land ownership/easement should be obtained from the NDMNRF. We understand that the process of surrendering the aggregate pit licence to the east must be completed before any changes to the property can be undertaken. We also understand that this was initiated in previous years and is still awaiting processing by the NDMNRF."

Further details of the CAZ assessment are included in Appendix G of the AMR - which was carried out as part of 'Phase 3' work to address the MECP's concerns regarding non-compliance with Guideline B-7. A summary of that phased work (taken from the 2021 annual report) is as follows:

"Phase 1 (2019 and 2020):
- Five new monitoring wells, including one well nest were installed in 2019...
Phase 2 (summer 2021):
- Sampling events...
Phase 3 (Winter - Summer of 2022):
- The horizontal extent of impact has not yet been determined. Based on 2019, 2020 and 2021 data, and the CAZ assessment (2022) the current impacts may extend 87 m to the north and west of the footprint, or approximately 50 m from the property boundary.
- Based on the 2022 CAZ assessment we recommend that the 30 m buffer to the east and south, and the 100 m CAZ to the west, and the 100 m CAZ/buffer to the north is adequate to prevent RUV exceedances, or surface water impacts to the west.

- Initiate discussion with the MECP regarding general approval of the proposed size for the CAZ/buffer areas.
- Discuss easement rights or the intent to purchase the required CAZ/buffer lands from NDMNRF.
- Once the proposed CAZ/buffer areas are put into place, the site is anticipated to be in compliance with Guideline B-7. Additional wells are not recommended at this time.

Once the request is made to NDMNRF it is expected that they will carry out their Environmental Assessment (EA) process which is required for them to grant easement rights. Once this process is complete, the Municipality should submit an ECA amendment to include CAZ lands to the site. However, should the Municipality submit a Closure Plan ECA amendment application prior to this CAZ work then they should consider submitting the application to accept both the Closure Plan and the CAZ lands at the same time."

The 2021 AMR was still awaiting review by the ministry's Technical Support Section, at the time of this report preparation.

Question ID	NOL 12	**Question Type**	Legislative
Question: Does the landfill have a large enough Buffer Area as specified in the ECA or Regulation 232/98?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
No See comments above.			

Question ID	NOL 13	**Question Type**	Information
Question: Are access roads and on-site roads provided so that vehicles hauling waste to and on the site may travel readily on any day under all normal weather conditions?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

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

Question ID	NOL 15	Question Type	Legislative
Question: Does the site only receive waste from within its approved service area?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 16	Question Type	Information
Question: Is the site required to have a ground water monitoring program by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

Question ID	NOL 17	Question Type	Legislative
Question: Is the site implementing the groundwater monitoring program as required by the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes Groundwater monitoring is being done as per the requirements of the ECA. Currently, eight (8) monitoring wells are in place at the site; five of them were installed in 2019.			

Question ID	NOL 18	**Question Type**	Legislative
Question: Are monitoring well samples taken and tested to determine the quality of the ground water?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 25;		
Observation			
Yes Dissolved Organic Carbon (DOC) results exceeded the Ontario Drinking Water Standards and Operational Guidelines criteria at seven of the eight monitoring wells. However, the Municipality's consultant provided an explanation in relation to a laboratory process 'upset'. The site is out of compliance with the Guideline B-7 'Reasonable Use Values', along the northwest property boundary. A Trigger Mechanism and Contingency Plan (prepared in August 2017 and included in the Design Operations Plan - which was approved through the 2017 ECA amendment) is in place. No triggers of 'Tier 1' of the Contingency Plan were reached in 2021.			

Question ID	NOL 19	**Question Type**	Information
Question: Is the ministry concerned with the results of the samples that have been tested?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 21	**Question Type**	Information
Question: Is the site required to manage leachate by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 23	Question Type	Legislative
Question: Are samples taken to monitor leachate quality?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 26;		
Observation			
Yes			

Question ID	NOL 24	Question Type	Information
Question: Is the ministry concerned with the leachate quality?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

Question ID	NOL 25	Question Type	Information
Question: Is there ongoing abatement to address any concerns the ministry has with the leachate monitoring?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

Question ID	NOL 26	Question Type	Information
Question: Is the site required to manage landfill gas by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No Condition 8 of the ECA requires that adequate ventilation of methane be provided at any buildings, and that routine monitoring be conducted. The 2021 Annual Monitoring			

Report indicated that methane was monitored at the site during the semi-annual monitoring events.

Question ID	NOL 28	**Question Type**	Legislative
Question: Is landfill gas managed and monitored at this site?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes As indicated in the 2021 Annual Monitoring Report (BluMetric), methane gas monitoring results revealed concentrations (0 to 35 ppm) well below the concentration of concern (10,000 ppm).			

Question ID	NOL 29	**Question Type**	Information
Question: Is the ministry concerned with landfill gas at this site?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 30	**Question Type**	Information
Question: Is there ongoing abatement to address any concerns the ministry has with landfill gas at this site?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 31	**Question Type**	Information
Question: Is the site required to have a surface water monitoring program by the ECA?			
Legislative Requirement	Not Applicable		

Observation
No The site does not currently have a surface water monitoring program. In review of the 2020 AMR for the site (by BluMetric), the ministry's reviewer noted that surface water impacts are unlikely, and that downgradient wells should be compared to the Provincial Water Quality Objectives (PWQOs)…and that surface water monitoring is not required unless additional groundwater monitoring demonstrates a potential for leachate impacts to the creek. The AMR noted that comparison to the PWQOs was done (for those parameters that have PWQOs - alkalinity, aluminum, boron, iron, lead, pH and zinc), and none were found to exceed their respective criteria at the downgradient wells. Surface water drainage at the site flows into the waste site (i.e. stays on the site), which is a former aggregate pit (and very sandy).

Question ID	NOL 33	Question Type	Legislative
Question: Is the water quality being monitored/sampled for surface water features on-site and for any off-site surface water features that receive run-off from the site?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 24;		
Observation			
No There is currently no surface water monitoring program at the site, as the nearest surface water feature (i.e. Wolf Creek) is approximately 200 m downgradient of the site. In addition, all surface water runoff at the site quickly infiltrates into the sandy overburden. In review of the 2020 AMR, the ministry's surface water reviewer (Baxter) noted that: "potential impacts to Wolf Creek can be assessed by examining water quality in the most westerly, downgradient groundwater monitoring wells. Newly installed wells WC4-19 and WC6-19 appear to be impacted by landfill leachate. At one or more of these wells, the chronic Canadian Water Quality Guideline (CWQG) for nitrate was exceeded. Concentrations of most landfill indicator parameters are elevated above background levels, however the elevations are relatively minor in nature and concentrations of most parameters are still within the ranges characteristic of natural surface waters. In addition, Wolf Creek is a significant distance downgradient of these wells, so impacts to the creek are unlikely at this time." The same review recommended that "Water quality in the most downgradient groundwater monitoring wells should be compared to surface water criteria to infer impacts to Wolf Creek and determine the need for the establishment of a surface water monitoring program."			

Question ID	NOL 35	**Question Type**	Information
Question: Is there ongoing abatement to address any concerns the ministry has with the surface water monitoring?			
Legislative Requirement	Not Applicable		
Observation			
No			

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

Question ID	NOL 37	**Question Type**	Legislative
Question: Is the landfill able to accurately determine the amount of waste received?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 38	**Question Type**	Legislative
Question: Are all disposal operations at the site adequately and continually supervised?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 39	Question Type	Information
Question: Does the landfill operator have a site inspection program as required by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

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

Question ID	NOL 45	Question Type	Legislative
Question: Is the waste disposal area adequately screened from public view?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

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

Question ID	NOL 47	Question Type	Legislative
Question: Has the annual operations report been submitted to MECP or available on site as required by the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 48	Question Type	Legislative
Question: Is scavenging being prevented?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 23;		
Observation			
Yes			

Question ID	NOL 49	Question Type	Information
Question: Has a closure plan been submitted to the MECP?			
Legislative Requirement	Not Applicable		
Observation			
No As indicated in the 2020 AMR, the Municipality is planning to formally close the site, and a closure plan has been developed.			

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

Question ID	NOL 52	Question Type	Information
Question: Does the landfill have a waste refusal procedure in place to manage waste that arrives at the site that the site is not approved the accept?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

Question ID	NOL 53	Question Type	Legislative
Question: is the waste refusal procedure being followed?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 54	Question Type	Legislative
Question: Does the landfill have a procedure in place to address and document spills and fires?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 55	Question Type	Legislative
Question: Does the landfill have emergency contingency plan as required by the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 56	Question Type	Information

Question: Is there an ECA condition requiring financial assurance?	
Legislative Requirement	Not Applicable
Observation	
No	

Question ID	NOL 59	**Question Type**	Legislative
Question: Does the landfill have a procedure in place to address complaints?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 61	**Question Type**	Information
Question: Has the landfill operator developed a Design and Operations Manual?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The 'Development and Operations Plan', dated August 2017, was prepared by BluMetric Environmental.			

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

Question ID	NOL 63	**Question Type**	Legislative
Question:			

Does the landfill operator have training procedures for site personnel?	
Legislative Requirement	EPA | 27 | (1);
Observation	
Yes	

Question ID	NOL 64	**Question Type**	Legislative
Question: Is the landfill operator following the established training procedures?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

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

Appendix A

A-4 Land Use Permit

Ontario

Land Use Permit

Public Lands Act

File: (MAY)

RECEIVED
JUL 7 - 2017

Permit No.
LUP1634-1004191

Use shaded areas for corrections.

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

As Trustee for

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

City, Town or Village	Prov./State	Country	Postal Code
Maynooth	ON	Canada	K0L 2S0

Location of Land

Lot	Concession/Block No.	Geographic Township	Municipality
Pt. 22	14	BANGOR	HASTINGS HIGHLANDS M

U.T.M. Grid	Geographic Location	Area in ha.
Zone 18 E. 285870 N. 5032695	Kamaniskeg Lake, Wolf Creek Waste Disposal Site.	0.70

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

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

Fee(s) and Period of Land Use

Amount Due	Annual Fee (subject to adjustment)	Permit Effective Date	Permit Termination Date
$937.90	$680.00 + $88.40 (HST)	Jun 1, 2016	May 31, 2026

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

Terms and Conditions applicable to this permit

MINISTRY OF NATURAL RESOURCES
RECEIVED
JUN 26 2017
BANCROFT, ONTARIO

Purpose

Waste Disposal Site

Sub-Purpose
Dump

Applicant's certification

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

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

Corporation Use Only

I have authority to bind the herein-named Corporation

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

Ministry Approval

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

Signature of MNRF Official	Date Signed	Cash Register Validation or Receipt No.	Amount Paid
	06/28/2017	13770	$937.90

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

1620(95-03)

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

Terms and Conditions

It is agreed by the parties hereto that:

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

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

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

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

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

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

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

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

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

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

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

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

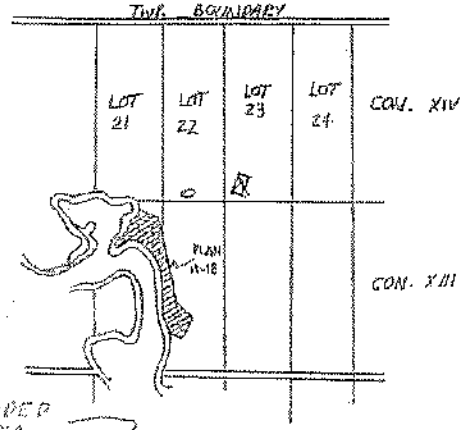
13. The permittee acknowledges and confirms that:
   (i) upon termination of this permit, the decision to issue a new permit is at the sole discretion of the MNRF Official, and the permittee has no right to, nor reasonable expectation for, the issuance of a new permit based on prior use of the land;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

LAND USE PERMIT
COVERING WASTE DISPOSAL SITE

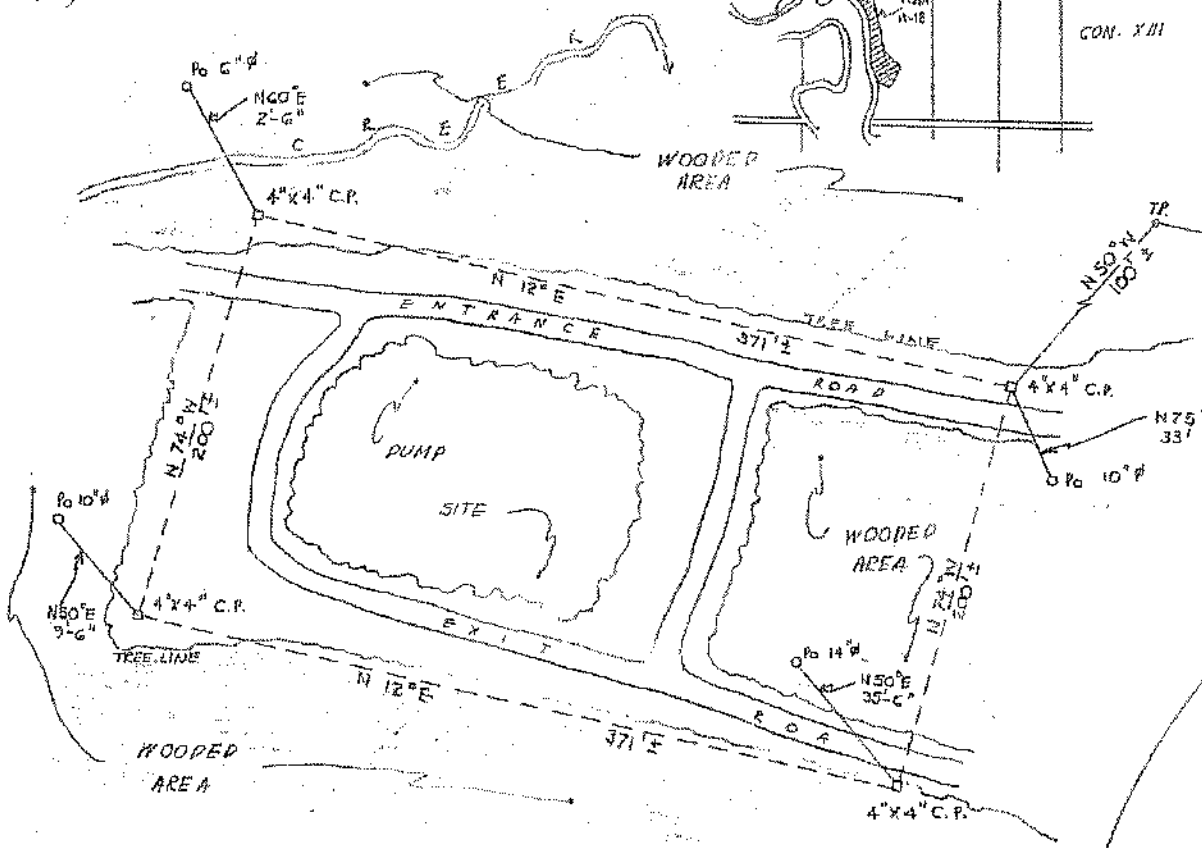
SITUATE ON PART OF
LOT 23 22 CONCESSION XIV
BANGOR TWP., HASTINGS CO.
SCALE: 1"=60'

Sept 1/70

KEY PLAN
SCALE: 1"=40 Ch.
Twp. BOUNDARY



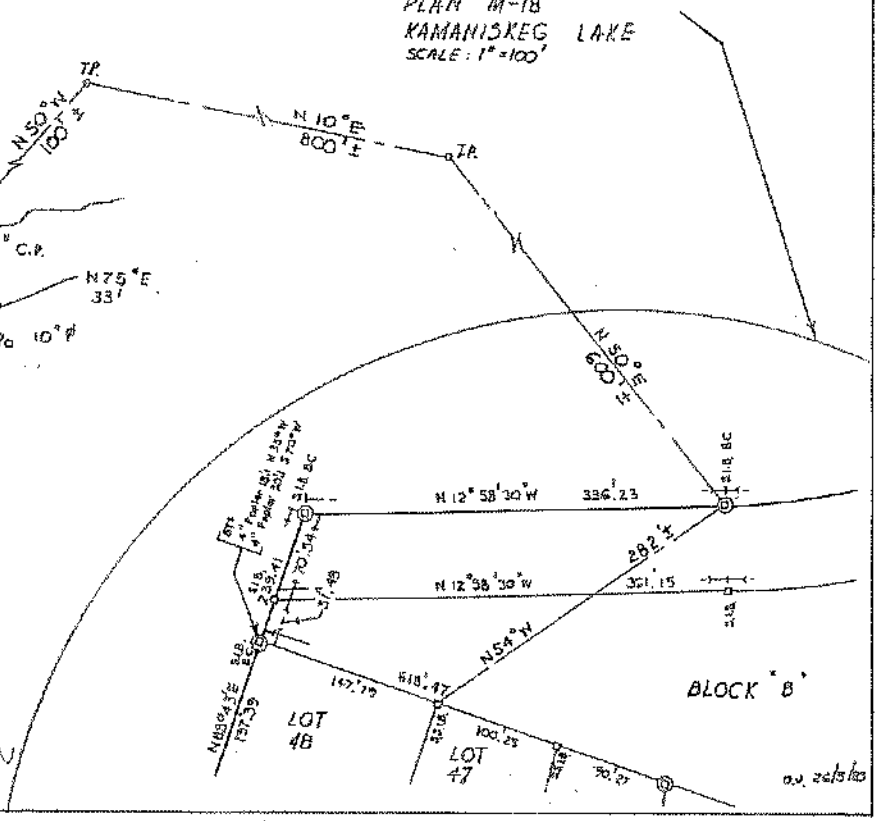
---- L.U.P. BOUNDARY



NOTE: ALL BEARINGS WITH RELATION TO NORTHERN QUADRANTS.

ASTRONOMIC BEARINGS

DETAIL SECTION
PART SUBDIVISION
PLAN M-18
KAMANISKEG LAKE
SCALE: 1"=100'



Appendix B

Monitoring and Screening Checklist (MECP/MOE)

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

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

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

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

Monitoring Report and Site Information	
Waste Disposal Site Name	Wolf Creek
Location (e.g. street address, lot, concession)	567 River Road, Part of Lot 22, Concession 14
GPS Location (taken within the property boundary at front gate/ front entry)	
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 Number:	A361102
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	◉ **Annual** ○ **Other**		
The site is: **(Operation Status)**	○ **Open** ○ **Inactive** ◉ **Closed**		
Does your Site have a Total Approved Capacity?	◉ **Yes** ○ **No**		
If yes, please specify Total Approved Capacity	Waste site closed in 2024	*Units*	
Does your Site have a Maximum Approved Fill Rate?	○ **Yes** ◉ **No**		
If yes, please specify Maximum Approved Fill Rate	0	*Units*	
Total Waste Received within Monitoring Period (Year)	0	*Units*	Tonnes
Total Waste Received within Monitoring Period (Year) *Methodology*	Estimation based on bag counts and estimated mass per bag.		
Estimated Remaining Capacity	0	*Units*	Cubic Metres
Estimated Remaining Capacity *Methodology*			
Estimated Remaining Capacity *Date Last Determined*	Waste Disposal Site closed in 2024.		
Non-Hazardous Approved Waste Types	☒ Domestic ☐ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☒ Tires	☒ Contaminated Soil ☒ Wood Waste ☒ Blue Box Material ☐ Processed Organics ☒ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other:
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*			
Year Site Opened *(enter the Calendar Year only)*	1980	**Current ECA Issue Date**	10/13/2023
Is your Site required to submit Financial Assurance?		○ **Yes** ◉ **No**	
Describe how your Landfill is designed.		◉ Natural Attenuation only ○ Fully engineered Facility ○ Partially engineered Facility	
Does your Site have an approved Contaminant Attenuation Zone?		◉ **Yes** ○ **No**	

If closed, specify C of A, control or authorizing document closure date:	October 13, 2023

Has the nature of the operations at the site changed during this monitoring period?	◉ **Yes** ○ **No**
If yes, provide details:	The WDS was closed in fall 2024. Landfill closure activities occurred between September 16 and October 18, 2024. Following closure, the site will operate as a Waste Transfer Station in accordance with the Wolf Creek Waste Transfer Design and Operations Plan which was approved in the October 13, 2023 ECA (No. A361102).
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)	○ Yes ◉ No

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

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

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

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

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

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

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 CAZ is adequate for current site conditions.	
6) The site meets compliance and assessment criteria.	( ) **Yes** (●) **No**	There are RUV exceedances west of the current property boundary.	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	(●) **Yes** ( ) **No**		
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/ treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	(●) **Yes** ( ) **No**	**Note which practice(s):**	☐ **(a)** ☐ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (●) **No** ( ) **Not Applicable**		

Groundwater CEP Declaration:

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

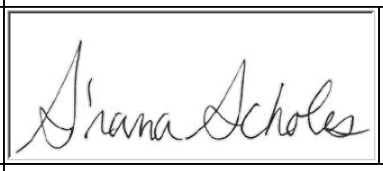
I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended),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

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

Recommendations:

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

◉ **No changes to the monitoring program are recommended**	
○ **The following change(s) to the monitoring program is/are recommended:**	
○ **No Changes to site design and operation are recommended**	
◉ **The following change(s) to the site design and operation is/ are recommended:**	As the WDS underwent closure activities in the fall 2024, we would recommend that the Municipality move forward with acquiring a CAZ. The initial steps in obtaining the CAZ property, either by ownership or easement, is to initiate discussions with both the MECP and the Ministry of Natural Resources and Forestry (MNRF). General agreement with the CAZ distances should be obtained from the MECP, while general agreement to transfer the Crown Land ownership/ easement should be obtained from the MNRF. We understand that the process of surrendering the aggregate pit licence to the east must be completed before any changes to that property can be undertaken. We also understand this was initiated in previous years and is still awaiting processing by the MNRF.

Name:	S'rana Scholes, P.Eng.		
Seal:			
Signature:		**Date:**	28-Mar-2025
CEP Contact Information:			
Company:	BluMetric Environmental Inc.		
Address:	209 Frederick street, Kitchener, ON, N2H 2M7		
Telephone No.:	(877) 487-8436 ext. 218	Fax No. :	
E-mail Address:	sscholes@blumetric.ca		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

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

Name (s)	Un-named Marsh and Creek
Distance(s)	100 m east, 180 m west, but are at higher elevations than base of the WDS.

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	Surface water sampling is not required.
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	( ) Yes ( ) No (●) **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

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

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

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

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	Not applicable

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

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

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Not Applicable		
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**	

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**	
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	
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	◯ **Yes** ◉ **No** ◯ **Not Applicable**	

Surface Water CEP Declaration:

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

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

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

Recommendations:

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

◉ **No Changes to the monitoring program are recommended**	
○ **The following change(s) to the monitoring program is/are recommended:**	
○ **No changes to the site design and operation are recommended**	
◉ **The following change(s) to the site design and operation is/are recommended:**	The WDS was closed in 2024 with landfill closure activities occurring Sept 16 to Oct 18, 2024. The site now operates as a WTS following closure activities.

CEP Signature	
Relevant Discipline	Senior Environmental P.Eng. with 19 years experience assessing landfill SW at landfills. Hydrology at Uof W.
Date:	28-Mar-2025
CEP Contact Information:	
Company:	BluMetric Environmental Inc.
Address:	Unit 3B, 209 Frederick Street, Kitchener, ON, N2H 2M7
Telephone No.:	877-487-8436 x218
Fax No. :	
E-mail Address:	sscholes@blumetric.ca

Save As		**Print Form**

Appendix C

C-1 Monitoring Well Logs

Project No: KB1946-1

Project: Wolf Creek WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5032818, East 285898

Log of Borehole: WC1-03

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	97.31		Ground Surface						Steel locking protective cover and casing Stick-up: 0.885m
0 – 1			SAND and COBBLES, trace Garbage (plastic).						
1	95.78								51mm (2") I.D. Sch. 40 PVC pipe
1 – 2			Brown SAND, dry.	SS1	SS	8	15"		Native backfill
2 – 3									
3 – 4				SS2	SS	13	16"		
4	92.73								3/8" Bentonite holeplug
4 – 5			Brown SAND, saturated.	SS3	SS	11	16"		#3 Silica sand pack
5 – 6									
6	91.21								
6 – 7			Brown Sand, saturated.	SS4	SS	2			10' Slot 10 PVC screen (2")
7	89.69								
			End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: July 22/03

Datum: Top of PVC Elevation - 98.192 m

Checked by:

Sheet: 1 of 1

Project No: KB1946-1

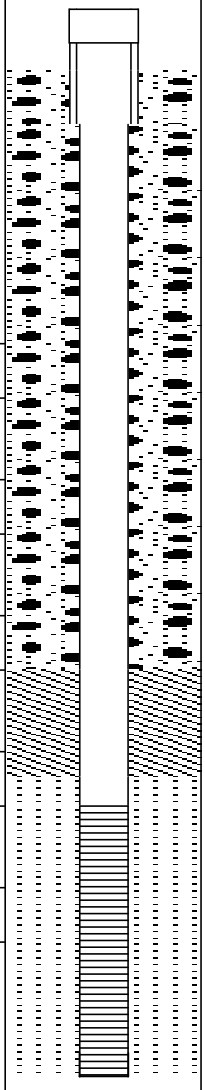
Project: Wolf Creek WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5032777, East 285840

Log of Borehole: WC2-03

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	100.98		Ground Surface						Steel locking protective cover and casing Stick-up: 0.59m
0 – 6 / 0 – 2	99.00		Brown SAND, GRAVEL, and COBBLE, dry.						51mm (2") I.D. Sch. 40 PVC pipe
6 – 9 / 2 – 3	97.93		Brown SAND, dry.						Native backfill
9 – 14 / 3 – 4	96.41		Brown SAND, trace small gravel, dry.	SS1	SS	15	15"		
14 – 19 / 4 – 6	94.88		Brown SAND, dry.	SS2	SS	15	16"		
19 – 24 / 6 – 7	93.36		Brown SAND, moist.	SS3	SS	15	18"		3/8" Bentonite holeplug
24 – 29 / 7 – 9	91.83		Brown, SAND and GRAVEL, moist to wet.	SS4	SS	18	12"		#3 Silica sand pack
29 – 36 / 9 – 11	89.70		Brown SAND and GRAVEL, saturated.	SS5	SS	8	10"		10' Slot 10 PVC screen (2")
36 / 11			End of Borehole						

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: July 23/03

Datum: Elevation TPVC - 101.569 m

Checked by:

Project No: KB1946-1

Project: Wolf Creek WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5032703, East 285859

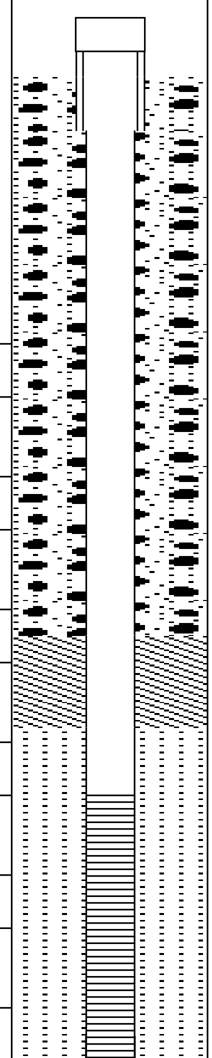
Log of Borehole: WC3-03

Field Personnel: B. M.

SUBSURFACE PROFILE		SAMPLE			
Elevation	Description	Number	Type	SPT N-Value	Recovery
101.00	Ground Surface				
99.01	SAND, GRAVEL, and COBBLE, dry.				
97.95	Brown SAND, dry.				
96.42	Brown SAND, dry.	SS1	SS	6	15"
94.90	Brown SAND, trace small gravel, dry.	SS2	SS	13	12"
93.38	Brown SAND, dry.	SS3	SS	17	16"
91.85	Brown SAND, wet.	SS4	SS	20	14"
90.33	Brown SAND, trace small gravel, saturated.	SS5	SS	3	9"
89.72	Brown SAND, trace small gravel, saturated.	SS6	SS	7	
	End of Borehole				

WELL INSTALLATION

Well Construction



Comments:

Steel locking protective cover and casing

Stick-up: 0.78m

51mm (2") I.D. Sch. 40 PVC pipe

Native backfill

3/8" Bentonite holeplug

#3 Silica sand pack

10' Slot 10 PVC screen (2")

Drill Method: 8" Hollow Stem Auger

Hole Size: 8" (205mm)

Drill Date: July 23/03

Datum: Elevation TPVC - 101.775 m

Checked by:

Sheet: 1 of 1

Appendix C

C-2 Private Well Records

Well ID: WC4-19

Project No.: 190495-00
Client: Municipality of Hastings Highlands
Report: 2019 Monitoring Well Installations
Site Address: Wolfe Creek W.D.S.
567 River Road, Maynooth, Ontario

Elevation Ground: *292.08 m*
TOP: *292.83 m*

UTM NAD83 (Zone 18T): 5032744 N
285836 E

SUBSURFACE PROFILE			SAMPLE						WELL COMPLETION	
Depth (m)	Symbol	Description	Depth (m) / Elev. (m.a.s.l.)	Sample ID	Type	Blow Counts	Recovery (%)	Lab Analysis	Headspace Vapour Level (ppm) 10 100 1000 10000	Construction	Notes
		Ground Surface	0.00								4 in. sq. steel monument with lock PVC Stickup = 0.75m
0		**Sand and Gravel** Light brown, dry, trace cobbles.	292.08								
1			1.52								backfilled with drill cuttings
		Sand Light brown, dry, medium to coarse grained.	290.56								
2											
3											
4											bentonite gravel seal
		- trace gravel.									
5											
6											
7											
		- moist to wet.									
8											
		- (8.53m) wet									
9											
10											
11											3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
12			12.25								
		End of well at 12.25 m	279.83								
13		Well Completion Details: Screened interval from 9.20 m to 12.25 m below surface Elevation at top of pipe (TOP) = 292.83 m									
14											

Drill Date: 2019 July 17
Drilled By: Canadian Environmental Drilling
Drilling Method: Hollow Stem Auger
Logged By: B.M.
Hole Diameter: 0.2 m (OD)
Checked By: I.O'C.

Notes: AUGER SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-00 WOLFE CREEK.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Well ID: WC5-19

Project No.: 190495-00
Client: Municipality of Hastings Highlands
Report: 2019 Monitoring Well Installations
Site Address: Wolfe Creek W.D.S.
567 River Road, Maynooth, Ontario

Elevation Ground: *293.36 m*
TOP: *294.21 m*

UTM NAD83 (Zone 18T): 5032816 N
285830 E

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)	Notes
	Ground Surface	0.00	4 in. sq. steel monument with lock PVC Stickup = 0.85m
0	**Sand and Gravel** Brown, dry, trace cobbles.	293.36	
1		1.52	
2	**Sand** Brown, dry, trace gravel.	291.84	
3			
4			
5	- light brown,		bentonite gravel seal
6			
7			
8	- light brown, moist to wet.		
9			
10	- wet to saturated.		
11	- saturated.		
12			3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
13		13.75	
14	End of well at 13.75 m	279.61	
15	Well Completion Details: Screened interval from 10.70 m to 13.75 m below surface Elevation at top of pipe (TOP) = 294.21 m		

Headspace Vapour Level (ppm): 10 100 1000 10000

Drill Date: 2019 July 17
Drilled By: Canadian Environmental Drilling
Drilling Method: Hollow Stem Auger
Hole Diameter: 0.2 m (OD)
Logged By: B.M.
Checked By: I.O'C.

Notes: AUGER SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-00 WOLFE CREEK.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Well ID: WC6.1-19

Project No.: 190495-00
Client: Municipality of Hastings Highlands
Report: 2019 Monitoring Well Installations
Site Address: Wolfe Creek W.D.S.
567 River Road, Maynooth, Ontario

Elevation Ground: *292.80 m*
TOP: *293.62 m*
MOECC Well Tag: A236144
UTM NAD83 (Zone 18T): 5032773 N
285817 E

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)	Sample ID	Type	Blow Counts	Recovery (%)	Lab Analysis	Headspace Vapour Level (ppm)	Construction	Notes
	Ground Surface	0.00 / 292.80								4 in. sq. steel monument with lock PVC Stickup = 0.79m
0–3	**Sand and Gravel** Brown, dry, trace cobbles.	3.05 / 289.75								
3–15	**Sand** Brown, dry, trace gravel. - wet, medium grained, trace gravel. - brownish grey, wet. - saturated, trace gravel.	15.24 / 277.56								bentonite gravel seal native soil collaspe
15–24	**Sand** Sand, some gravel. - cobbles.	23.77 / 269.03								bentonite gravel seal 3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
24	**Granite**	24.38 / 268.42								
24–27	End of well at 24.38 m Well Completion Details: Screened interval from 22.77 m to 24.29 m below surface Elevation at top of pipe (TOP) = 293.62 m									

Drill Date: 2019 July 18
Drilled By: Canadian Environmental Drilling
Drilling Method: Mud Rotary
Logged By: B.M.
Hole Diameter: 0.2 m (OD)
Checked By: I.O'C.

Notes: AUGER SAMPLE GRAB SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-00 WOLFE CREEK.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Well ID: WC6.2-19

Project No.: 190495-00
Client: Municipality of Hastings Highlands
Report: 2019 Monitoring Well Installations
Site Address: Wolfe Creek W.D.S.
567 River Road, Maynooth, Ontario

Elevation Ground: *292.76 m*
TOP: *293.55 m*

UTM NAD83 (Zone 18T): 5032772 N
285821 E

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)	Sample ID	Type	Blow Counts	Recovery (%)	Lab Analysis	Headspace Vapour Level (ppm)	Construction	Notes
	Ground Surface	0.00 / 292.76								4 in. sq. steel monument with lock PVC Stickup = 0.79m
0–3	**Sand and Gravel** Brown, dry, trace cobbles.	3.05 / 289.71								
3–15	**Sand** Brown, dry, trace gravel. - wet, medium grained, trace gravel. - brownish grey, wet. - saturated, trace gravel.	15.24 / 277.52								bentonite gravel seal backfill with drill cuttings bentonite gravel seal
15–19	**Sand and Gravel** Sand and Gravel	18.90 / 273.86								3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
19	End of well at 18.95 m Well Completion Details: Screened interval from 15.90 m to 18.95 m below surface Elevation at top of pipe (TOP) = 293.55 m									

Drill Date: 2019 July 19
Drilled By: Canadian Environmental Drilling
Drilling Method: Mud Rotary
Hole Diameter: 0.2 m (OD)
Logged By: B.M.
Checked By: I.O'C.

Notes: AUGER SAMPLE GRAB SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-00 WOLFE CREEK.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Well ID: WC6.3-19

Project No.: 190495-00
Client: Municipality of Hastings Highlands
Report: 2019 Monitoring Well Installations
Site Address: Wolfe Creek W.D.S.
567 River Road, Maynooth, Ontario

Elevation Ground: *292.78 m*
TOP: *293.59 m*

UTM NAD83 (Zone 18T): 5032771 N
285817 E

Depth (m)	Description	Depth (m) / Elev. (m.a.s.l.)	Sample ID	Type	Blow Counts	Recovery (%)	Lab Analysis	Headspace Vapour Level (ppm)	Construction	Notes
	Ground Surface	0.00								4 in. sq. steel monument with lock PVC Stickup = 0.81m
0	**Sand and Gravel** Brown, dry, trace cobbles.	292.78								
1										backfill with drill cuttings
2										
3		3.05								
	Sand Brown, dry, trace gravel.	289.73								
4										
5										bentonite gravel seal
6										
7										
8										
9	- wet, medium grained, trace gravel. - brownish grey, wet.									
10										
11										3.05m x 50mm slot 10 PVC screen within No. 2 silica sand pack
12	- saturated, trace gravel.									
13										
14										native soil collaspe
15		15.24								
	End of well at 15.24 m	277.54								
16	Well Completion Details: Screened interval from 9.81 m to 12.86 m below surface Elevation at top of pipe (TOP) = 293.59 m									
17										

Drill Date: 2019 July 17
Drilled By: Canadian Environmental Drilling
Drilling Method: Hollow Stem Auger
Logged By: B.M.
Hole Diameter: 0.2 m (OD)
Checked By: I.O'C.

Notes: AUGER SAMPLE

Sheet 1 of 1

BH MW OB LOGV1.0 190495-00 WOLFE CREEK.GPJ WESA TEMPLATE V1.2.GDT 20-3-5

Appendix D

Inspection Forms and Laboratory & Chain of Custody Reports

Appendix D

D-1 Operation and Inspection Forms

SMALL LANDFILL
OPERATION AND INSPECTION FORM

BluMetric Environmental

Site Name: Wolf Creek WDS, MHHs	Date: Apr 30. 2024	Weather: Overcast, Misty Rain, 8°C
Project #: 240205-01	BluMetric Staff: BM/MD	

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 _	N/A Transfer Site
❑ 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 _	
❑ Bulky Items neat and appropriate size	Yes _	No ✓	Area full and spilling into metals area
❑ Brush pile neat and appropriate size	Yes ✓	No _	
❑ Construction debris neat and appropriate size	Yes _	No _	NA ✓

MONITORING WELL CONDITION

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

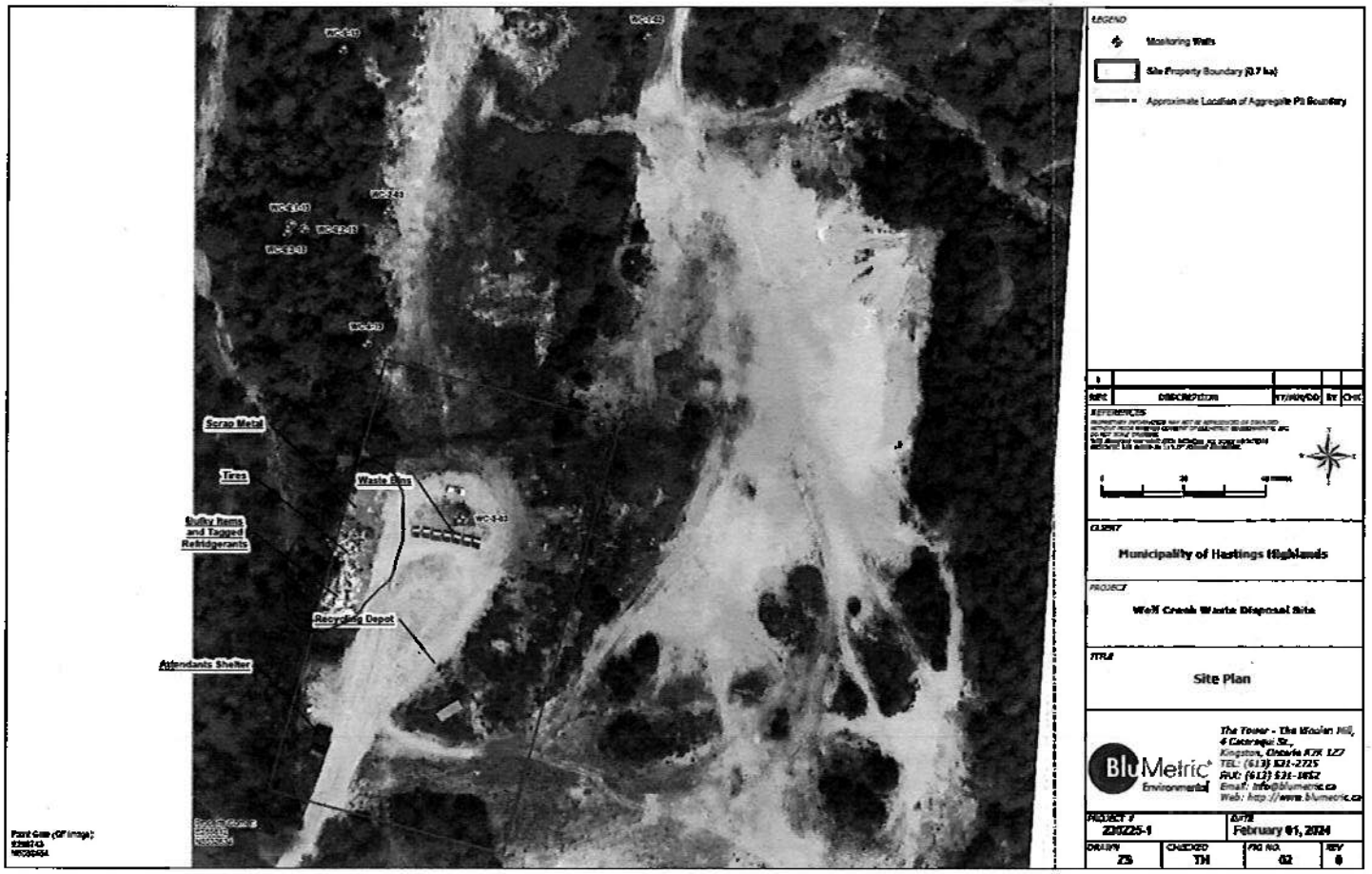
LANDFILL GAS MONITORING

❑ Conducted at structures	Yes ✓	No _	Attendant Building : Open
❑ 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:

Segregated Areas need to be cleaned up (Bulk removed) and seperation berms built up for better seperation

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: Wolf Creek WDS, MHHs	Date: Oct 17, 2024	Weather:
Project #: 240205-01	BluMetric Staff: BM/NW	Sunny 12°C

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

OVERALL INSPECTION AND OPERATION REVIEW

❑ Signage in good condition	Yes ✓	No _	Gate open - township hauling soil for closure activity currently happening
❑ 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 _	NA - Closed Site
❑ Designated waste areas are properly signed and easily accessed by public	Yes _	No _	

RECYCLING OPERATION (if applicable)

❑ Proper signage and bins present	Yes _	No _	Site is currently undergoing closure (Final cap and grading)
❑ Clearly signed	Yes _	No _	
❑ Overall neat in appearance	Yes _	No _	

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

❑ Metals neat and appropriate size	Yes _	No _	Recycle bins + waste bins not in final location
❑ Tires neat and appropriate size	Yes _	No _	
❑ Bulky Items neat and appropriate size	Yes _	No _	
❑ Brush pile neat and appropriate size	Yes _	No _	
❑ Construction debris neat and appropriate size	Yes _	No _	

MONITORING WELL CONDITION

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

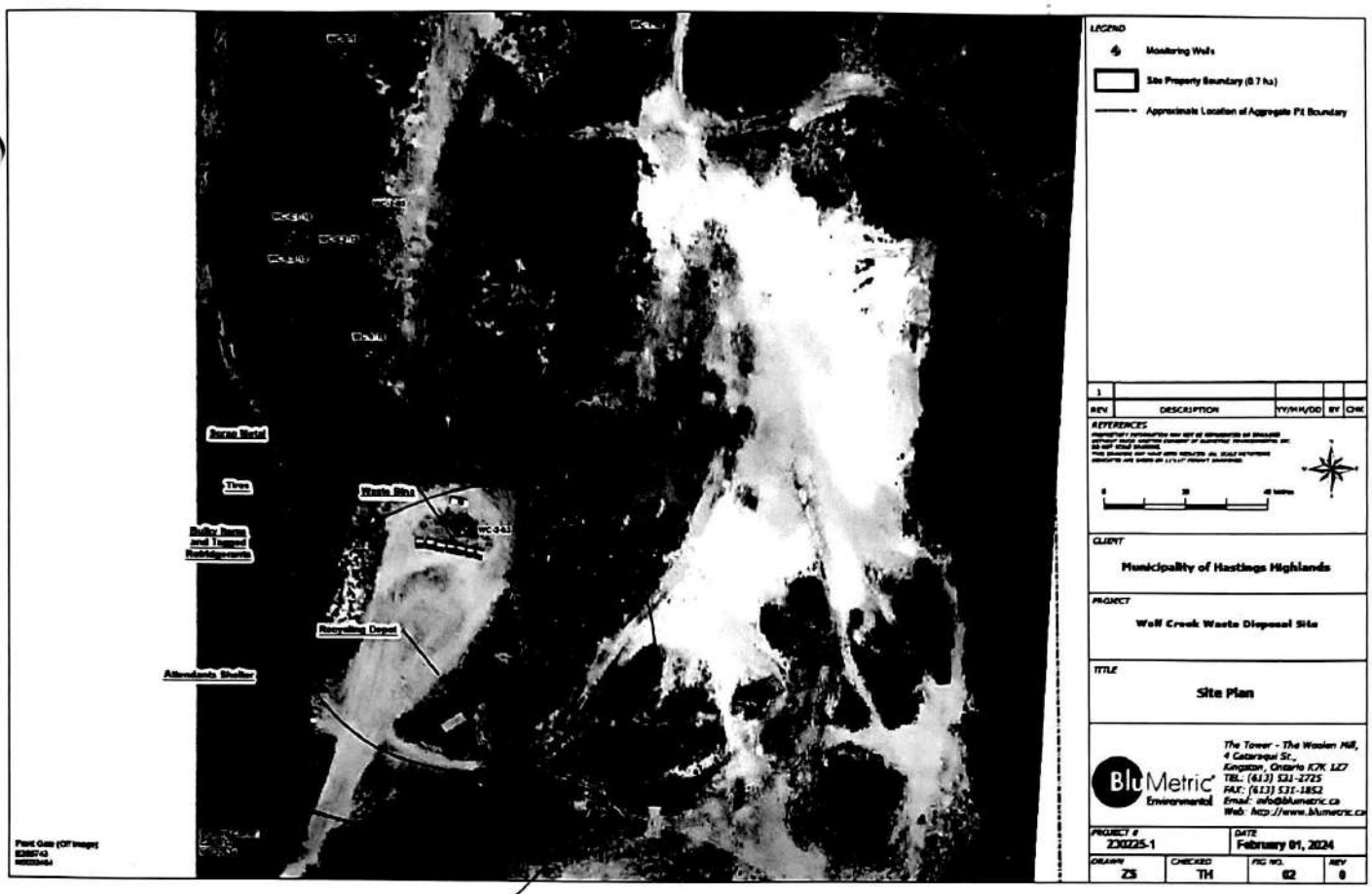
LANDFILL GAS MONITORING

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

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

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

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



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

Entire area being reworked for final closure

New Segregation cells to be built

Garbage and recycle bins not in final location

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 & Chain of Custody Reports

Your Project #: 240205-01
Site Location: Wolf Creek
Your C.O.C. #: 880140

Attention: MHH Distribution

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

Report Date: 2024/05/10
Report #: R8143159
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D1207
Received: 2024/05/02, 09:22

Sample Matrix: Water
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	9	N/A	2024/05/08	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	9	N/A	2024/05/07	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	9	N/A	2024/05/08	CAM SOP-00416	SM 24 5220 D m
Conductivity	9	N/A	2024/05/08	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	9	N/A	2024/05/06	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	3	N/A	2024/05/03	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	6	N/A	2024/05/06	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	9	N/A	2024/05/08	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	5	N/A	2024/05/03	CAM SOP-00440	SM 24 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	4	N/A	2024/05/06	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	9	2024/05/03	2024/05/08	CAM SOP-00413	SM 24th - 4500H+ B
Sulphate by Automated Turbidimetry	9	N/A	2024/05/07	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	9	2024/05/07	2024/05/08	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 #: 240205-01
Site Location: Wolf Creek
Your C.O.C. #: 880140

Attention: MHH Distribution

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

Report Date: 2024/05/10
Report #: R8143159
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D1207

Received: 2024/05/02, 09:22

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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

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

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

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

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

Encryption Key

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

==========

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZBG510			ZBG510			ZBG511		
Sampling Date		2024/04/30 11:45			2024/04/30 11:45			2024/04/30 00:30		
COC Number		880140			880140			880140		
	UNITS	WC1-03	RDL	QC Batch	WC1-03 Lab-Dup	RDL	QC Batch	WC2-03	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9372073				ND	0.050	9372073
Total Chemical Oxygen Demand (COD)	mg/L	14	4.0	9375921				ND	4.0	9375921
Conductivity	umho/cm	52	1.0	9371843				93	1.0	9371905
Total Dissolved Solids	mg/L	45	10	9374000				80	10	9374000
Dissolved Organic Carbon	mg/L	4.7	0.4	9375697				2.0	0.4	9375697
pH	pH	7.19		9371830				7.93		9371904
Dissolved Sulphate (SO4)	mg/L	3.8	1.0	9373398	3.8	1.0	9373398	7.4	1.0	9373398
Alkalinity (Total as CaCO3)	mg/L	28	1.0	9371827				38	1.0	9371880
Dissolved Chloride (Cl-)	mg/L	ND	1.0	9373396	ND	1.0	9373396	ND	1.0	9373396
Nitrate (N)	mg/L	ND	0.10	9371852	ND	0.10	9371852	1.32	0.10	9372893

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		ZBG511			ZBG512		ZBG513		
Sampling Date		2024/04/30 00:30			2024/04/30 11:30		2024/04/30 12:40		
COC Number		880140			880140		880140		
	UNITS	WC2-03 Lab-Dup	RDL	QC Batch	WC3-03	QC Batch	WC4-19	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	0.050	9372073	ND	9372073	0.19	0.050	9372073
Total Chemical Oxygen Demand (COD)	mg/L				9.9	9375921	8.1	4.0	9375921
Conductivity	umho/cm				820	9371843	210	1.0	9371905
Total Dissolved Solids	mg/L				540	9374000	165	10	9374000
Dissolved Organic Carbon	mg/L				3.7	9375697	3.0	0.4	9375697
pH	pH				8.14	9371830	7.68		9371904
Dissolved Sulphate (SO4)	mg/L				72	9373406	21	1.0	9373398
Alkalinity (Total as CaCO3)	mg/L				330	9371827	76	1.0	9371880
Dissolved Chloride (Cl-)	mg/L				6.1	9373402	ND	1.0	9373396
Nitrate (N)	mg/L				9.01	9371847	1.80	0.10	9372893

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

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZBG514		ZBG515		ZBG516	ZBG517		
Sampling Date		2024/04/30 11:55		2024/04/30 12:17		2024/04/30 12:25	2024/04/30 12:10		
COC Number		880140		880140		880140	880140		
	UNITS	WC5-19	QC Batch	WC6.1-19	QC Batch	WC6.2-19	WC6.3-19	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	9372073	0.093	9372073	ND	ND	0.050	9372073
Total Chemical Oxygen Demand (COD)	mg/L	ND	9375921	ND	9375921	4.7	11	4.0	9375921
Conductivity	umho/cm	130	9371843	140	9371905	100	510	1.0	9371905
Total Dissolved Solids	mg/L	120	9374000	180	9374000	95	350	10	9374000
Dissolved Organic Carbon	mg/L	2.2	9375697	1.5	9375697	2.6	4.3	0.4	9375697
pH	pH	7.09	9371830	7.85	9371904	7.67	7.61		9371904
Dissolved Sulphate (SO4)	mg/L	15	9373398	9.7	9373398	7.1	140	1.0	9373398
Alkalinity (Total as CaCO3)	mg/L	42	9371827	66	9371880	60	97	1.0	9371880
Dissolved Chloride (Cl-)	mg/L	ND	9373396	ND	9373396	ND	ND	1.0	9373396
Nitrate (N)	mg/L	2.01	9371847	ND	9371852	ND	5.00	0.10	9372893

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		ZBG518		
Sampling Date		2024/04/30 23:30		
COC Number		880140		
	UNITS	WC-QAQC-GW1	RDL	QC Batch
Inorganics				
Total Ammonia-N	mg/L	ND	0.050	9372073
Total Chemical Oxygen Demand (COD)	mg/L	9.9	4.0	9375921
Conductivity	umho/cm	820	1.0	9371843
Total Dissolved Solids	mg/L	520	10	9374000
Dissolved Organic Carbon	mg/L	3.5	0.4	9375697
pH	pH	7.83		9371830
Dissolved Sulphate (SO4)	mg/L	72	1.0	9373398
Alkalinity (Total as CaCO3)	mg/L	320	1.0	9371827
Dissolved Chloride (Cl-)	mg/L	6.4	1.0	9373396
Nitrate (N)	mg/L	8.90	0.10	9371852

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

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZBG510	ZBG510	ZBG511	ZBG512	ZBG513	ZBG514	ZBG515		
Sampling Date		2024/04/30 11:45	2024/04/30 11:45	2024/04/30 00:30	2024/04/30 11:30	2024/04/30 12:40	2024/04/30 11:55	2024/04/30 12:17		
COC Number		880140	880140	880140	880140	880140	880140	880140		
	UNITS	WC1-03	WC1-03 Lab-Dup	WC2-03	WC3-03	WC4-19	WC5-19	WC6.1-19	RDL	QC Batch
Metals										
Dissolved Aluminum (Al)	ug/L	91	90	ND	ND	ND	8.8	7.9	4.9	9371458
Dissolved Boron (B)	ug/L	ND	ND	24	480	150	23	ND	10	9371458
Dissolved Calcium (Ca)	ug/L	6800	6400	11000	130000	26000	18000	20000	200	9371458
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	ND	ND	ND	100	9371458
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.50	9371458
Dissolved Magnesium (Mg)	ug/L	1300	1300	1800	20000	4300	4000	4100	50	9371458
Dissolved Manganese (Mn)	ug/L	2.4	2.4	ND	ND	50	ND	ND	2.0	9371458
Dissolved Potassium (K)	ug/L	1100	1100	2700	24000	8700	1500	1900	200	9371458
Dissolved Sodium (Na)	ug/L	1200	1200	1900	15000	4300	2900	1900	100	9371458
Dissolved Strontium (Sr)	ug/L	24	24	71	320	100	73	54	1.0	9371458
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9371458

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

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

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZBG516	ZBG517	ZBG518		
Sampling Date		2024/04/30 12:25	2024/04/30 12:10	2024/04/30 23:30		
COC Number		880140	880140	880140		
	UNITS	WC6.2-19	WC6.3-19	WC-QAQC-GW1	RDL	QC Batch
Metals						
Dissolved Aluminum (Al)	ug/L	13	5.2	ND	4.9	9371454
Dissolved Boron (B)	ug/L	ND	200	510	10	9371454
Dissolved Calcium (Ca)	ug/L	14000	73000	130000	200	9371454
Dissolved Iron (Fe)	ug/L	ND	ND	ND	100	9371454
Dissolved Lead (Pb)	ug/L	ND	ND	ND	0.50	9371454
Dissolved Magnesium (Mg)	ug/L	3000	14000	20000	50	9371454
Dissolved Manganese (Mn)	ug/L	18	ND	ND	2.0	9371454
Dissolved Potassium (K)	ug/L	1300	5200	24000	200	9371454
Dissolved Sodium (Na)	ug/L	1800	5300	15000	100	9371454
Dissolved Strontium (Sr)	ug/L	43	850	330	1.0	9371454
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	5.0	9371454

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

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: ZBG510
Sample ID: WC1-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371827	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371843	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9371852	N/A	2024/05/03	Jinal Chavda
pH	AT	9371830	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG510 Dup
Sample ID: WC1-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Nitrate & Nitrite as Nitrogen in Water	LACH	9371852	N/A	2024/05/03	Jinal Chavda
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan

Bureau Veritas ID: ZBG511
Sample ID: WC2-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371880	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371905	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9372893	N/A	2024/05/06	Samuel Law
pH	AT	9371904	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: ZBG511 Dup
Sample ID: WC2-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan

Bureau Veritas ID: ZBG512
Sample ID: WC3-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371827	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373402	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371843	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9371847	N/A	2024/05/03	Jinal Chavda
pH	AT	9371830	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373406	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG513
Sample ID: WC4-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371880	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371905	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9372893	N/A	2024/05/06	Samuel Law
pH	AT	9371904	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG514
Sample ID: WC5-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371827	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: ZBG514
Sample ID: WC5-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9371843	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9371847	N/A	2024/05/03	Jinal Chavda
pH	AT	9371830	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG515
Sample ID: WC6.1-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371880	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371905	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371458	N/A	2024/05/06	Indira HarryPaul
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9371852	N/A	2024/05/03	Jinal Chavda
pH	AT	9371904	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG516
Sample ID: WC6.2-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371880	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371905	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371454	N/A	2024/05/03	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9372893	N/A	2024/05/06	Samuel Law
pH	AT	9371904	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

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

Bureau Veritas Job #: C4D1207
Report Date: 2024/05/10

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: ZBG517
Sample ID: WC6.3-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371880	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371905	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371454	N/A	2024/05/03	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9372893	N/A	2024/05/06	Samuel Law
pH	AT	9371904	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG518
Sample ID: WC-QAQC-GW1
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9371827	N/A	2024/05/08	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373396	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9371843	N/A	2024/05/08	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375697	N/A	2024/05/06	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9371454	N/A	2024/05/03	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9372073	N/A	2024/05/08	Latha Narayanan
Nitrate & Nitrite as Nitrogen in Water	LACH	9371852	N/A	2024/05/03	Jinal Chavda
pH	AT	9371830	2024/05/03	2024/05/08	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9373398	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

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

GENERAL COMMENTS

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

Package 1	8.3°C

Results relate only to the items tested.

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

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9371454	Dissolved Aluminum (Al)	2024/05/03	107	80 - 120	100	80 - 120	ND, RDL=4.9	ug/L		
9371454	Dissolved Boron (B)	2024/05/03	95	80 - 120	97	80 - 120	ND, RDL=10	ug/L	1.8	20
9371454	Dissolved Calcium (Ca)	2024/05/03	NC	80 - 120	100	80 - 120	ND, RDL=200	ug/L		
9371454	Dissolved Iron (Fe)	2024/05/03	104	80 - 120	102	80 - 120	ND, RDL=100	ug/L		
9371454	Dissolved Lead (Pb)	2024/05/03	98	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L	NC	20
9371454	Dissolved Magnesium (Mg)	2024/05/03	NC	80 - 120	101	80 - 120	ND, RDL=50	ug/L		
9371454	Dissolved Manganese (Mn)	2024/05/03	101	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L		
9371454	Dissolved Potassium (K)	2024/05/03	103	80 - 120	102	80 - 120	ND, RDL=200	ug/L		
9371454	Dissolved Sodium (Na)	2024/05/03	NC	80 - 120	102	80 - 120	ND, RDL=100	ug/L	2.0	20
9371454	Dissolved Strontium (Sr)	2024/05/03	NC	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L		
9371454	Dissolved Zinc (Zn)	2024/05/03	103	80 - 120	100	80 - 120	ND, RDL=5.0	ug/L	2.4	20
9371458	Dissolved Aluminum (Al)	2024/05/06	103	80 - 120	98	80 - 120	ND, RDL=4.9	ug/L	0.99	20
9371458	Dissolved Boron (B)	2024/05/06	96	80 - 120	93	80 - 120	ND, RDL=10	ug/L	NC	20
9371458	Dissolved Calcium (Ca)	2024/05/06	104	80 - 120	103	80 - 120	ND, RDL=200	ug/L	5.4	20
9371458	Dissolved Iron (Fe)	2024/05/06	108	80 - 120	102	80 - 120	ND, RDL=100	ug/L	NC	20
9371458	Dissolved Lead (Pb)	2024/05/06	105	80 - 120	97	80 - 120	ND, RDL=0.50	ug/L	NC	20
9371458	Dissolved Magnesium (Mg)	2024/05/06	102	80 - 120	96	80 - 120	ND, RDL=50	ug/L	0.88	20
9371458	Dissolved Manganese (Mn)	2024/05/06	100	80 - 120	93	80 - 120	ND, RDL=2.0	ug/L	0.95	20
9371458	Dissolved Potassium (K)	2024/05/06	107	80 - 120	102	80 - 120	ND, RDL=200	ug/L	0.74	20
9371458	Dissolved Sodium (Na)	2024/05/06	110	80 - 120	100	80 - 120	ND, RDL=100	ug/L	4.3	20
9371458	Dissolved Strontium (Sr)	2024/05/06	98	80 - 120	93	80 - 120	ND, RDL=1.0	ug/L	1.9	20
9371458	Dissolved Zinc (Zn)	2024/05/06	103	80 - 120	96	80 - 120	ND, RDL=5.0	ug/L	NC	20
9371827	Alkalinity (Total as CaCO3)	2024/05/08			102	85 - 115	ND, RDL=1.0	mg/L	4.0	20
9371830	pH	2024/05/08			102	98 - 103			0.26	N/A
9371843	Conductivity	2024/05/08			101	85 - 115	ND, RDL=1.0	umho/cm	1.2	10
9371847	Nitrate (N)	2024/05/03	90	80 - 120	91	80 - 120	ND, RDL=0.10	mg/L	NC	20
9371852	Nitrate (N)	2024/05/03	87	80 - 120	91	80 - 120	ND, RDL=0.10	mg/L	NC	20
9371880	Alkalinity (Total as CaCO3)	2024/05/08			101	85 - 115	ND, RDL=1.0	mg/L	1.3	20
9371904	pH	2024/05/08			102	98 - 103			0.96	N/A
9371905	Conductivity	2024/05/08			100	85 - 115	ND, RDL=1.0	umho/cm	0.15	10
9372073	Total Ammonia-N	2024/05/08	101	75 - 125	99	80 - 120	ND, RDL=0.050	mg/L	NC	20

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

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
9372893	Nitrate (N)	2024/05/06	85	80 - 120	89	80 - 120	ND, RDL=0.10	mg/L	NC	20
9373396	Dissolved Chloride (Cl-)	2024/05/07	104	80 - 120	101	80 - 120	ND, RDL=1.0	mg/L	NC	20
9373398	Dissolved Sulphate (SO4)	2024/05/07	103	75 - 125	98	80 - 120	ND, RDL=1.0	mg/L	0.090	20
9373402	Dissolved Chloride (Cl-)	2024/05/07	NC	80 - 120	99	80 - 120	ND, RDL=1.0	mg/L	1.8	20
9373406	Dissolved Sulphate (SO4)	2024/05/07	NC	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	0.63	20
9374000	Total Dissolved Solids	2024/05/08			100	80 - 120	ND, RDL=10	mg/L	0	20
9375697	Dissolved Organic Carbon	2024/05/06	NC	80 - 120	99	80 - 120	ND, RDL=0.4	mg/L	0.047	20
9375921	Total Chemical Oxygen Demand (COD)	2024/05/08	113	80 - 120	101	80 - 120	ND, RDL=4.0	mg/L	0	20

N/A = Not Applicable

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

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

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

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

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

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

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

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.

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

IMMEDIATE BOD

Custody Tracking Form

T880140

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: WC1-03
Last Sample: WC-QAQC-GW1
Sample Count: 9

Relinquished By				Received By			
Brad McCallum	Brad McCallum	Date	2024/05/01			Date	
		Time (24 HR)	08:00			Time (24 HR)	
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 / Matthew DeGeer

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

02-May-24 09:22
Christine Gripton
C4D1207
RUK ENV-1220

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	9	7	9
Drinking Water Metals Preservation Check Done (Circle)				YES	NO

COR FCD-00383/4

Page 1 of 1

Your Project #: 240205-01
Site Location: Wolf Creek
Your C.O.C. #: 971277

Attention: MHH Distribution

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

Report Date: 2024/10/28
Report #: R8379816
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4W8624
Received: 2024/10/18, 10:28

Sample Matrix: Water
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	3	N/A	2024/10/24	CAM SOP-00448	SM 24 2320 B m
Alkalinity	6	N/A	2024/10/26	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	9	N/A	2024/10/24	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	9	N/A	2024/10/24	CAM SOP-00416	SM 24 5220 D m
Conductivity	3	N/A	2024/10/24	CAM SOP-00414	SM 24 2510 m
Conductivity	6	N/A	2024/10/26	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	9	N/A	2024/10/24	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	9	N/A	2024/10/22	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	9	N/A	2024/10/24	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	9	N/A	2024/10/23	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	3	2024/10/22	2024/10/24	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	6	2024/10/22	2024/10/26	CAM SOP-00413	SM 24th - 4500H+ B
Sulphate by Automated Turbidimetry	9	N/A	2024/10/24	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	9	2024/10/22	2024/10/23	CAM SOP-00428	SM 24 2540C m

Remarks:

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

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

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

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

Your Project #: 240205-01
Site Location: Wolf Creek
Your C.O.C. #: 971277

Attention: MHH Distribution

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

Report Date: 2024/10/28
Report #: R8379816
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4W8624
Received: 2024/10/18, 10:28

dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

Encryption Key

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

==========

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 #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AGHP16			AGHP16			AGHP17		
Sampling Date		2024/10/17 12:23			2024/10/17 12:23			2024/10/17 12:03		
COC Number		971277			971277			971277		
	UNITS	WC1-03	RDL	QC Batch	WC1-03 Lab-Dup	RDL	QC Batch	WC2-03	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9720668				ND	0.050	9720668
Total Chemical Oxygen Demand (COD)	mg/L	5.6	4.0	9718938				ND	4.0	9718938
Conductivity	umho/cm	59	1.0	9716449	59	1.0	9716449	300	1.0	9716449
Total Dissolved Solids	mg/L	60	10	9716161				285	10	9716117
Dissolved Organic Carbon	mg/L	4.5	0.4	9716512				3.4	0.4	9716512
pH	pH	6.90		9716450	6.93		9716450	7.35		9716450
Dissolved Sulphate (SO4)	mg/L	4.2	1.0	9716522				43	1.0	9716531
Alkalinity (Total as CaCO3)	mg/L	23	1.0	9716440	24	1.0	9716440	76	1.0	9716440
Dissolved Chloride (Cl-)	mg/L	ND	1.0	9716521				ND	1.0	9716525
Nitrate (N)	mg/L	ND	0.10	9716509				5.41	0.10	9716501

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

Bureau Veritas ID		AGHP18		AGHP19			AGHP19		
Sampling Date		2024/10/17 11:01		2024/10/17 12:31			2024/10/17 12:31		
COC Number		971277		971277			971277		
	UNITS	WC3-03	QC Batch	WC4-19	RDL	QC Batch	WC4-19 Lab-Dup	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	9720668	0.12	0.050	9720668			
Total Chemical Oxygen Demand (COD)	mg/L	ND	9718938	9.7	4.0	9718938			
Conductivity	umho/cm	63	9716449	440	1.0	9716449			
Total Dissolved Solids	mg/L	85	9716161	335	10	9716161	330	10	9716161
Dissolved Organic Carbon	mg/L	0.8	9716512	4.9	0.4	9716512			
pH	pH	7.22	9716450	7.31		9716450			
Dissolved Sulphate (SO4)	mg/L	2.8	9716522	33	1.0	9716522			
Alkalinity (Total as CaCO3)	mg/L	26	9716440	170	1.0	9716440			
Dissolved Chloride (Cl-)	mg/L	ND	9716521	2.5	1.0	9716521			
Nitrate (N)	mg/L	0.52	9716501	4.39	0.10	9716509			

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

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AGHP20	AGHP21		AGHP22	AGHP23		
Sampling Date		2024/10/17 12:12	2024/10/17 11:44		2024/10/17 11:55	2024/10/17 11:51		
COC Number		971277	971277		971277	971277		
	UNITS	WC5-19	WC6.1-19	QC Batch	WC6.2-19	WC6.3-19	RDL	QC Batch
Inorganics								
Total Ammonia-N	mg/L	ND	ND	9720668	ND	ND	0.050	9720668
Total Chemical Oxygen Demand (COD)	mg/L	ND	ND	9718938	ND	8.3	4.0	9718938
Conductivity	umho/cm	110	190	9716497	100	190	1.0	9716449
Total Dissolved Solids	mg/L	115	135	9716161	100	165	10	9716161
Dissolved Organic Carbon	mg/L	1.8	1.6	9716512	2.8	2.5	0.4	9716512
pH	pH	7.13	7.62	9716494	7.40	7.32		9716450
Dissolved Sulphate (SO4)	mg/L	5.5	8.7	9716522	8.0	18	1.0	9716522
Alkalinity (Total as CaCO3)	mg/L	45	68	9716492	47	64	1.0	9716440
Dissolved Chloride (Cl-)	mg/L	ND	ND	9716521	ND	ND	1.0	9716521
Nitrate (N)	mg/L	1.31	ND	9716509	ND	3.29	0.10	9716509

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		AGHP24		
Sampling Date		2024/10/17 11:01		
COC Number		971277		
	UNITS	WC-QAQC-GW1	RDL	QC Batch
Inorganics				
Total Ammonia-N	mg/L	ND	0.050	9720668
Total Chemical Oxygen Demand (COD)	mg/L	ND	4.0	9718938
Conductivity	umho/cm	71	1.0	9716497
Total Dissolved Solids	mg/L	85	10	9716161
Dissolved Organic Carbon	mg/L	0.9	0.4	9716512
pH	pH	7.24		9716494
Dissolved Sulphate (SO4)	mg/L	2.6	1.0	9716522
Alkalinity (Total as CaCO3)	mg/L	28	1.0	9716492
Dissolved Chloride (Cl-)	mg/L	ND	1.0	9716521
Nitrate (N)	mg/L	0.53	0.10	9716509

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

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AGHP16	AGHP17	AGHP18	AGHP19	AGHP20	AGHP21	AGHP22		
Sampling Date		2024/10/17 12:23	2024/10/17 12:03	2024/10/17 11:01	2024/10/17 12:31	2024/10/17 12:12	2024/10/17 11:44	2024/10/17 11:55		
COC Number		971277	971277	971277	971277	971277	971277	971277		
	UNITS	WC1-03	WC2-03	WC3-03	WC4-19	WC5-19	WC6.1-19	WC6.2-19	RDL	QC Batch
Metals										
Dissolved Aluminum (Al)	ug/L	84	ND	12	ND	16	15	22	4.9	9715747
Dissolved Boron (B)	ug/L	ND	81	ND	280	41	ND	ND	10	9715747
Dissolved Calcium (Ca)	ug/L	7000	40000	6400	63000	11000	20000	13000	200	9715747
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	ND	ND	ND	100	9715747
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.50	9715747
Dissolved Magnesium (Mg)	ug/L	1400	6200	1200	10000	2000	3900	2600	50	9715747
Dissolved Manganese (Mn)	ug/L	2.3	ND	ND	160	ND	ND	32	2.0	9715747
Dissolved Potassium (K)	ug/L	1200	6000	2800	13000	2000	1800	1300	200	9715747
Dissolved Sodium (Na)	ug/L	1200	3100	1300	7000	7000	1900	1800	100	9715747
Dissolved Strontium (Sr)	ug/L	28	240	39	260	67	59	42	1.0	9715747
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9715747

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		AGHP23	AGHP24		
Sampling Date		2024/10/17 11:51	2024/10/17 11:01		
COC Number		971277	971277		
	UNITS	WC6.3-19	WC-QAQC-GW1	RDL	QC Batch
Metals					
Dissolved Aluminum (Al)	ug/L	5.6	24	4.9	9715747
Dissolved Boron (B)	ug/L	110	ND	10	9715747
Dissolved Calcium (Ca)	ug/L	25000	6500	200	9715747
Dissolved Iron (Fe)	ug/L	ND	ND	100	9715747
Dissolved Lead (Pb)	ug/L	ND	ND	0.50	9715747
Dissolved Magnesium (Mg)	ug/L	4500	1200	50	9715747
Dissolved Manganese (Mn)	ug/L	ND	ND	2.0	9715747
Dissolved Potassium (K)	ug/L	4100	2900	200	9715747
Dissolved Sodium (Na)	ug/L	2700	1300	100	9715747
Dissolved Strontium (Sr)	ug/L	260	40	1.0	9715747
Dissolved Zinc (Zn)	ug/L	ND	ND	5.0	9715747

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

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHP16
Sample ID: WC1-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHP16 Dup
Sample ID: WC1-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil

Bureau Veritas ID: AGHP17
Sample ID: WC2-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716525	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716501	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716531	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716117	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHP18
Sample ID: WC3-03
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHP18
Sample ID: WC3-03
Matrix: Water

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

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

Bureau Veritas ID: AGHP19
Sample ID: WC4-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHP19 Dup
Sample ID: WC4-19
Matrix: Water

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

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

Bureau Veritas ID: AGHP20
Sample ID: WC5-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716492	N/A	2024/10/24	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716497	N/A	2024/10/24	Nachiketa Gohil

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHP20
Sample ID: WC5-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716494	2024/10/22	2024/10/24	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHP21
Sample ID: WC6.1-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716492	N/A	2024/10/24	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716497	N/A	2024/10/24	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716494	2024/10/22	2024/10/24	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHP22
Sample ID: WC6.2-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHP23
Sample ID: WC6.3-19
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHP24
Sample ID: WC-QAQC-GW1
Matrix: Water

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

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716492	N/A	2024/10/24	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716497	N/A	2024/10/24	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716509	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716494	2024/10/22	2024/10/24	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

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

GENERAL COMMENTS

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

Package 1	6.7°C

Results relate only to the items tested.

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

QUALITY ASSURANCE REPORT

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
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
9715747	Dissolved Aluminum (Al)	2024/10/22	96	80 - 120	96	80 - 120	ND, RDL=4.9	ug/L		
9715747	Dissolved Boron (B)	2024/10/22	90	80 - 120	91	80 - 120	ND, RDL=10	ug/L	3.5	20
9715747	Dissolved Calcium (Ca)	2024/10/22	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L		
9715747	Dissolved Iron (Fe)	2024/10/22	98	80 - 120	100	80 - 120	ND, RDL=100	ug/L		
9715747	Dissolved Lead (Pb)	2024/10/22	99	80 - 120	100	80 - 120	ND, RDL=0.50	ug/L	NC	20
9715747	Dissolved Magnesium (Mg)	2024/10/22	94	80 - 120	98	80 - 120	ND, RDL=50	ug/L		
9715747	Dissolved Manganese (Mn)	2024/10/22	97	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L		
9715747	Dissolved Potassium (K)	2024/10/22	100	80 - 120	100	80 - 120	ND, RDL=200	ug/L		
9715747	Dissolved Sodium (Na)	2024/10/22	NC	80 - 120	99	80 - 120	ND, RDL=100	ug/L	3.0	20
9715747	Dissolved Strontium (Sr)	2024/10/22	97	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L		
9715747	Dissolved Zinc (Zn)	2024/10/22	99	80 - 120	100	80 - 120	ND, RDL=5.0	ug/L	NC	20
9716117	Total Dissolved Solids	2024/10/23			100	80 - 120	ND, RDL=10	mg/L	1.8	20
9716161	Total Dissolved Solids	2024/10/23			103	80 - 120	ND, RDL=10	mg/L	1.5	20
9716440	Alkalinity (Total as CaCO3)	2024/10/26			94	85 - 115	ND, RDL=1.0	mg/L	3.2	20
9716449	Conductivity	2024/10/26			100	85 - 115	ND, RDL=1.0	umho/cm	0.51	10
9716450	pH	2024/10/26			102	98 - 103			0.50	N/A
9716492	Alkalinity (Total as CaCO3)	2024/10/24			101	85 - 115	ND, RDL=1.0	mg/L	3.1	20
9716494	pH	2024/10/24			101	98 - 103			1.6	N/A
9716497	Conductivity	2024/10/24			100	85 - 115	ND, RDL=1.0	umho/cm	2.6	10
9716501	Nitrate (N)	2024/10/23	98	80 - 120	103	80 - 120	ND, RDL=0.10	mg/L	0.47	20
9716509	Nitrate (N)	2024/10/23	101	80 - 120	105	80 - 120	ND, RDL=0.10	mg/L	0.52	20
9716512	Dissolved Organic Carbon	2024/10/24	NC	80 - 120	97	80 - 120	ND, RDL=0.4	mg/L	2.5	20
9716521	Dissolved Chloride (Cl-)	2024/10/24	NC	80 - 120	101	80 - 120	ND, RDL=1.0	mg/L	1.2	20
9716522	Dissolved Sulphate (SO4)	2024/10/24	92	75 - 125	95	80 - 120	ND, RDL=1.0	mg/L	5.6	20
9716525	Dissolved Chloride (Cl-)	2024/10/24	NC	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	1.2	20
9716531	Dissolved Sulphate (SO4)	2024/10/24	NC	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	3.5	20
9718938	Total Chemical Oxygen Demand (COD)	2024/10/24	104	80 - 120	101	80 - 120	ND, RDL=4.0	mg/L	NC	20

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

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9720668	Total Ammonia-N	2024/10/24	104	75 - 125	97	80 - 120	ND, RDL=0.050	mg/L	NC	20

N/A = Not Applicable

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

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

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

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

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

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

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

Bureau Veritas Job #: C4W8624
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-01
Site Location: Wolf Creek
Sampler Initials: CM

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.

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

Custody Tracking Form

T971277

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: WC1-03
Last Sample: WC-QAQC-GW1
Sample Count: 9

Relinquished By				Received By			
Print: Nathan Wilson	Sign: NW	Date	2024/10/17	Print: DYRW	Sign:	Date	2024/10/18
		Time (24 HR)	16:20			Time (24 HR)	10:28
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: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

18-Oct-24 10:28
Elora Di Bratto
C4W8624

A3P env-1305

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

Drinking Water Metals Preservation Check Done (Circle) YES NO

COR FCD-00383/4

Page 1 of 1

Appendix D

D-3 QA/QC Comparison Calculations

2024 Groundwater Sampling Quality Assurance and Quality Control
(Spring)

Sample Description		RDL	WC3-03	WC-QAQC GW1 (WC3-03)	Relative Percent Difference
Date Sampled			30-Apr-24	30-Apr-24	
Parameter	Unit				
pH	pH Units	0.01	8.14	7.83	4%
Alkalinity (as CaCO3)	mg/L	5	330	320	3%
Electrical Conductivity	uS/cm	2	820	820	0%
Total Dissolved Solids	mg/L	10	540	520	4%
Chloride	mg/L	0.10	6.1	6.4	5%
Nitrate as N	mg/L	0.05	9.01	8.9	1%
Sulphate	mg/L	0.10	72	72	0%
Ammonia as N	mg/L	0.02	<0.05	<0.05	NA
Chemical Oxygen Demand	mg/L	4	9.9	9.9	NA
Dissolved Organic Carbon	mg/L	0.5	3.7	3.5	6%
Dissolved Calcium	mg/L	0.05	130	130	0%
Dissolved Magnesium	mg/L	0.05	20	20	0%
Dissolved Potassium	mg/L	0.50	24	24	0%
Dissolved Sodium	mg/L	0.05	15	15	0%
Dissolved Aluminum	mg/L	0.004	<0.0049	<0.0049	NA
Dissolved Boron	mg/L	0.010	0.48	0.51	6%
Dissolved Lead	mg/L	0.001	<0.0005	<0.0005	NA
Dissolved Iron	mg/L	0.010	<0.1	<0.1	NA
Dissolved Manganese	mg/L	0.002	<0.002	<0.002	NA
Dissolved Strontium	mg/L	0.005	0.32	0.33	3%
Dissolved Zinc	mg/L	0.005	<0.005	<0.005	NA

Grey shading indicates the maximum RPD calculated when no value exceeds high level of reproducibility.

Yellow shading indicates RPD value is above the percentage for a high level of reproducibility:

NA - RPD not applicable when average result is <5x RDL

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		RDL	WC3-03	WC-QAQC GW1 (WC3-03)	Relative Percent Difference
Date Sampled			17-Oct-24	17-Oct-24	
Parameter	Unit				
pH	pH Units	0.01	7.22	7.24	0%
Alkalinity (as CaCO3)	mg/L	5	26.00	28.00	7%
Electrical Conductivity	uS/cm	2	63	71	12%
Total Dissolved Solids	mg/L	10	85	85	0%
Chloride	mg/L	0.10	<1	<1	NA
Nitrate as N	mg/L	0.05	0.52	0.53	2%
Sulphate	mg/L	0.10	2.8	2.6	7%
Ammonia as N	mg/L	0.02	<0.05	<0.05	NA
Chemical Oxygen Demand	mg/L	5	<4	<4	NA
Dissolved Organic Carbon	mg/L	0.5	0.8	0.9	NA
Dissolved Calcium	mg/L	0.05	6.4	6.5	2%
Dissolved Magnesium	mg/L	0.05	1.20	1.20	0%
Dissolved Potassium	mg/L	0.50	2.80	2.90	4%
Dissolved Sodium	mg/L	0.05	1.300	1.300	0%
Dissolved Aluminum	mg/L	0.004	0.012	0.024	NA
Dissolved Boron	mg/L	0.010	<0.01	<0.01	NA
Dissolved Lead	mg/L	0.001	<0.0005	<0.0005	NA
Dissolved Iron	mg/L	0.010	<0.1	<0.1	NA
Dissolved Manganese	mg/L	0.002	<0.002	<0.002	NA
Dissolved Strontium	mg/L	0.005	0.039	0.04	3%
Dissolved Zinc	mg/L	0.005	<0.005	<0.005	NA

Grey shading indicates the maximum RPD calculated when no value exceeds high level of reproducibility.

Yellow shading indicates RPD value is above the percentage for a high level of reproducibility:

NA - RPD not applicable when average result is <5x RDL

10% for electrical conductivity

20% for metals and inorganics

30% for BTEX and PHC.

Appendix E

Historical Groundwater Chemistry (2006 to 2024)

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08	2008-Oct-08	2009-Jun-05	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-02	2012-Apr-17	2012-Oct-17	2013-Apr-16	2013-Oct-29
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	-	<1	2	2	1	1	2	3	1	2	1	1	1	1.07	0.78
Nitrate as N	mg/L	3.1	10	-	-	0.05	<0.1	<0.1	<0.1	2.51	1.02	1.81	1.86	0.36	0.11	0.8	1.35	0.7	<0.0001	1.34	1.37
Sulphate	mg/L	253.4	500	-	-	0.1	28	10	9	10	8	7	7	7	7	8	6	8	9	7.3	8.61
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	6	7	7	10	8	11	10	11	10	10	11	13.2	7.35	14	9.98
Magnesium (diss)	mg/L	-	-	-	-	0.05	1	2	1	2	2	3	2	2	2	2	2	2.26	2.58	3.02	2.16
Potassium (diss)	mg/L	-	-	-	-	0.05	1	1	1	2	1	2	2	2	1	1	2	1.51	1.78	2.01	1.69
Sodium (diss)	mg/L	100.9	200	-	-	0.05	5	2	<2	3	<2	3	2	<2	<2	<2	<2	1.96	2.01	2.25	2.01
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	24	23	22	24	25	35	32	34	34	37	39	31	36	32	24
Ammonia as N	mg/L	-	-	-	-	0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.03	0.04	0.02	0.15	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	-	14	13	14	10	13	15	18	13	10	8	18	18	12	11
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	-	9.8	10.5	6.5	5.6	4.9	6.1	5.6	5.7	4.4	3.9	6.4	6.3	4.8	3.7
Electrical Conductivity	uS/cm	-	-	-	-	1	72	66	67	98	80	101	98	94	89	90	98	102	118	102	81
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		19.1	25.7	21.6	33.2	28.2	39.8	33.2	35.7	33.2	33.2	35.7	42.3	29	47.4	33.8
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.53	**6.38**	6.59	6.68	6.99	**6.42**	**6.33**	6.79	6.53	6.83	**6.2**	**6.2**	**6.3**	**5.53**	**5.85**
Total Dissolved Solids	mg/L	279	500	-	-	10	-	43	44	64	52	66	64	61	58	58	64	290	69	88	62
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.14	0.1	0.09	0.06	0.07	0.06	0.07	0.07	0.08	0.07	0.07	0.07	0.107	0.108	0.08
Barium (diss)	mg/L	-	1	-	-	0.001	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.023	0.029	0.026	0.022
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.015
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002
Chromium (diss)	mg/L	-	0.05	-	-	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.003	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.0016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.001	<0.001
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	0.002	0.004	0.003	0.003	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.0014	0.0017	<0.003	<0.003
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	**0.32**	<0.03	<0.03	<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	-	0.01	-	Calculated	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.002	<0.002
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.007	<0.005	0.014	0.008
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	<0.005	<0.005	<0.0005	<0.0005	<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	<0.005	<0.005	<0.001	<0.001	<0.003	<0.003
Silicon (diss)	mg/L	-	-	-	-	0.01	6.5	5.9	5.2	5.4	6.1	6.1	6.6	5.4	5.9	5.9	6	4.8	6.99	5.87	5.51
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	<0.002
Strontium (diss)	mg/L	-	-	-	-	0.001	0.032	0.03	0.03	0.04	0.048	0.058	0.051	0.046	0.046	0.043	0.052	0.044	0.049	0.05	0.041
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.006	<0.006
Titanium (diss)	mg/L	-	-	-	-	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	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	0.0008	0.0012	<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	0.094

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-WC	Reasonable Use Values Wolf Creek
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	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03	WC1-03
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2014-May-12	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-09	2019-Oct-24	2020-May-11	2020-Oct-07	2021-Apr-22
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	0.85	0.54	0.76	0.5	0.62	0.52	0.67	0.63	0.47	0.41	0.53	0.23	0.41	0.44	0.44
Nitrate as N	mg/L	3.1	10	-	-	0.05	1.18	1.03	0.21	<0.05	2.75	1.55	4.04	2.93	0.52	0.92	1.28	0.68	0.36	0.82	<0.05
Sulphate	mg/L	253.4	500	-	-	0.1	6.22	6.66	7.74	5.88	5.7	6.88	11	12.3	4.9	3.84	8.94	6.23	4.5	4.88	5.42
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	9.95	8.67	9.7	9.09	9.58	7.08	8.96	9.35	7.19	7.96	6.22	5.17	5.63	7.17	6.31
Magnesium (diss)	mg/L	-	-	-	-	0.05	2.09	1.8	1.93	1.88	2.03	1.52	2.16	2.08	1.69	1.65	1.5	1.15	1.25	1.48	1.38
Potassium (diss)	mg/L	-	-	-	-	0.05	1.53	1.46	1.54	1.55	1.52	1.37	1.32	1.52	1.23	1.41	1.15	1.05	0.98	1.25	1.16
Sodium (diss)	mg/L	100.9	200	-	-	0.05	2.38	2.08	1.96	2.04	2.08	2	2.01	1.84	1.6	1.83	1.36	1.12	1.17	1.37	1.28
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	28	18	28	31	29	19	-	13	29	28	15	12	16	22	21
Ammonia as N	mg/L	-	-	-	-	0.02	0.03	0.14	<0.02	<0.02	0.03	0.21	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	9	5	15	6	6	10	5	6	<5	8	<5	6	12	<5
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	4.3	3.5	6.9	7.2	5.4	4.3	4.1	4.8	4.3	5.8	7.6	4	3.7	3.7	4.5
Electrical Conductivity	uS/cm	-	-	-	-	1	87	82	79	77	88	69	100	82	65	76	62	74	67	57	55
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		33.5	29.1	32.2	30.4	32.3	23.9	31.3	31.9	24.9	26.7	21.7	17.6	19.2	24	21.4
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.71	6.65	6.72	6.96	7.04	7.1	7.22	6.8	6.64	6.48	6.28	6.88	6.41	6.53	6.47
Total Dissolved Solids	mg/L	279	500	-	-	10	66	44	56	60	64	60	56	64	4.9	3.84	68	40	38	44	36
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	-	0.0000028	0.0000028	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.071	0.07	0.103	0.114	0.088	0.064	0.039	0.065	0.073	0.076	0.055	0.081	0.078	0.085	0.117
Barium (diss)	mg/L	-	1	-	-	0.001	0.025	0.025	0.022	0.021	0.024	0.018	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	0.015	0.012	0.029	<0.01	0.013	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.031
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	0.004	0.003	0.005	0.009	0.006	0.003	<0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<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	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	6.1	5.84	5.48	5.14	5.22	4.85	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.046	0.045	0.038	0.034	0.041	0.032	0.047	0.049	0.034	0.038	0.037	0.032	0.03	0.032	0.03
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	<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	-	-	-	-	-	-	-	-	-
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	0.006	<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-WC	Reasonable Use Values Wolf Creek
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	WC1-03	WC1-03	WC1-03	WC1-03	WC-QAQC-GW1 (WC1-03)	WC1-03	WC-QAQC-GW1 (WC1-03)	WC1-03	WC1-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2023-May-01	2023-Oct-16	2023-Oct-16	2024-Apr-30	2024-Oct-17	2006-May-09	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08	2008-Oct-08
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	0.36	0.35	0.4	0.41	0.47	<1	<1	<1	<1	-	-	15	7	8	5
Nitrate as N	mg/L	3.1	10	-	-	0.05	0.29	0.06	0.49	6.42	6.81	0.73	0.75	<0.1	<0.1	7.31	5.64	6.4	5.63	6.62	5.13
Sulphate	mg/L	253.4	500	-	-	0.1	6.08	5.85	5.11	4.64	4.74	5.2	4.8	3.8	4.2	135	100	35	101	58	130
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	6.78	7.26	7.85	12.9	13.9	6.1	6.1	6.8	7	81	62	41	54	47	61
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.42	1.52	1.6	2.33	2.73	1.3	1.4	1.3	1.4	19	13	8	12	10	15
Potassium (diss)	mg/L	-	-	-	-	0.05	1.19	1.19	1.34	1.29	1.28	1	1.1	1.1	1.2	12	8	4	9	12	12
Sodium (diss)	mg/L	100.9	200	-	-	0.05	1.16	1.2	1.15	1.821	1.839	1	1.1	1.2	1.2	9	8	5	6	6	7
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	24	24	26	20	18	15	15	28	23	130	90	77	89	90	120
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	-	-	0.06	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	30	15	12	<5	13	14	14	5.6	-	-	<5	<5	5	10
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	3.8	4.6	4.4	5	3.8	3.9	3.7	4.7	4.5	-	-	3.4	5.2	4.4	4.3
Electrical Conductivity	uS/cm	-	-	-	-	1	58	64	68	108	111	53	53	52	59	626	457	330	438	384	560
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		22.8	24.4	26.2	-	-	-	-	-	-	280.5	208.3	135.3	184.3	158.5	214.1
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.74	6.53	6.97	6.71	6.75	7.24	6.96	7.19	6.9	6.93	6.81	6.79	6.71	7.05	7.48
Total Dissolved Solids	mg/L	279	500	-	-	10	40	34	28	82	102	<10	45	45	60	-	-	215	285	250	364
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.076	0.081	0.07	0.063	0.075	0.07	0.073	0.091	0.084	0.02	0.01	0.02	<0.01	<0.01	<0.01
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	-	-	-	-	0.06	0.03	0.02	0.04	0.05	0.07
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	<0.01	0.019	0.018	0.016	<0.01	<0.01	<0.01	0.28	0.21	0.11	0.17	0.2	0.28
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	-	-	-	-	-	-	-	-	-	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	-	0.05	-	-	0.001	-	-	-	-	-	-	-	-	-	0.001	0.001	0.002	<0.001	<0.001	<0.001
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	-	-	-	-	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	-	-	-	-	0.005	0.002	0.004	0.003	0.003	0.003
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	0.023	0.018	0.021	0.019	<0.1	<0.1	<0.1	<0.1	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.002	0.002	<0.002	0.006	0.004	<0.002	<0.002	0.0024	0.0023	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel (diss)	mg/L	-	-	0.025	-	0.001	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	4.9	6.4	6.3	5.5	5.8	4.9
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.027	0.031	0.032	0.055	0.056	0.025	0.026	0.024	0.028	0.874	0.557	0.242	0.549	0.427	0.149
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	-	-	-	-	-	-	-	-	-	0.002	<0.001	<0.001	0.003	0.002	<0.001
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	0.014	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	0.02	0.01	<0.01	<0.01

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-WC	Reasonable Use Values Wolf Creek
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	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2009-Jun-05	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-02	2012-Apr-17	2012-Oct-17	2013-Apr-16	2013-Oct-29	2014-May-12	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	7	4	4	3	12	3	2	8	2.71	8.28	5.71	3.94	1.83	4.01	3.94
Nitrate as N	mg/L	3.1	10	-	-	0.05	4.41	7.59	3.55	7.06	4.29	4.47	4.1	3.3	2.55	4.71	5.98	3.28	2.39	6.39	5.53
Sulphate	mg/L	253.4	500	-	-	0.1	83	116	43	37	78	140	42	50	15.5	133	46.8	149	14.4	22.8	28.4
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	59	67	33	38	46	72	24.7	35	20.1	69.9	38	73.5	20.6	31.5	35.3
Magnesium (diss)	mg/L	-	-	-	-	0.05	12	15	7	6	9	16	5.6	9.17	4.13	14.2	7.56	14	3.98	6.19	7.06
Potassium (diss)	mg/L	-	-	-	-	0.05	13	12	9	6	8	9	4.98	5.76	4.21	9.06	7.91	9.24	4.35	6.17	5.2
Sodium (diss)	mg/L	100.9	200	-	-	0.05	7	7	4	4	5	7	4.3	5.49	4.29	5.63	6.54	6.5	3.63	4.99	4.54
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	123	110	76	76	96	116	59	84	45	85	78	79	50	74	92
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	0.01	0.02	0.33	<0.02	0.03	0.13	<0.02	<0.02	0.03
Chemical Oxygen Demand	mg/L	-	-	-	-	4	13	13	8	<5	15	10	21	15	<5	11	<5	8	<5	12	<5
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	4.3	4.2	3.6	3.3	4.6	3.7	3.5	3	1.8	3.3	3.6	2.8	2.3	4.1	4.6
Electrical Conductivity	uS/cm	-	-	-	-	1	467	524	287	285	418	565	271	342	154	496	325	558	171	261	270
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		196.7	229.1	111.2	119.6	151.9	245.7	84.7	125.2	67.2	233	126	241.2	67.8	104.1	117.2
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.8	6.78	7.1	6.77	7.21	6.59	7.1	6.7	5.7	6.05	7.29	7.64	7.07	7.35	7.39
Total Dissolved Solids	mg/L	279	500	-	-	10	304	341	187	185	272	367	139	188	94	336	192	342	94	168	170
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	2.4	<0.01	<0.01	<0.01	<0.01	<0.01	0.003	0.004	0.007	0.01	0.004	0.005	0.004	0.004	0.007
Barium (diss)	mg/L	-	1	-	-	0.001	<0.1	0.05	0.03	0.02	0.05	0.05	0.019	0.026	0.01	0.045	0.032	0.049	0.012	0.024	0.022
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	<0.01	<0.001	<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
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.2	0.22	0.11	0.09	0.1	0.26	0.092	0.097	0.05	0.204	0.16	0.189	0.038	0.155	0.177
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	<0.001	<0.0001	<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
Chromium (diss)	mg/L	-	0.05	-	-	0.001	<0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	0.004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	0.02	0.002	0.002	0.002	0.002	0.002	0.001	0.0013	<0.003	0.006	<0.003	<0.003	<0.003	<0.003	<0.003
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	8.2	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Silicon (diss)	mg/L	-	-	-	-	0.01	8	5.2	4.5	5.2	5.8	5	4.14	6.03	6.23	5.46	6.41	5.72	6.81	5.49	5.37
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	<0.001	<0.0001	<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
Strontium (diss)	mg/L	-	-	-	-	0.001	0.46	0.536	0.25	0.269	0.369	0.538	0.142	0.221	0.11	0.421	0.242	0.451	0.119	0.176	0.225
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	<0.001	<0.0001	<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
Titanium (diss)	mg/L	-	-	-	-	0.005	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	0.02	0.002	<0.001	<0.001	<0.001	0.002	0.0009	0.0009	<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	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.005	<0.005	0.113	<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-WC	Reasonable Use Values Wolf Creek
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	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03	WC2-03 QAQC (WC2-03)	WC2-03	WC2-03	WC2-03	WC2-03	WC-QAQCGW-F21 (WC2-03)	WC2-03	WC2-03
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-09	2019-May-09	2019-Oct-24	2020-May-11	2020-Oct-07	2021-Apr-22	2021-Oct-14	2021-Oct-14	2022-Apr-20	2022-Oct-19
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	2.92	6.53	0.53	1.05	0.25	1.77	1.75	0.48	1.13	0.72	0.75	0.46	0.57	0.34	0.71
Nitrate as N	mg/L	3.1	10	-	-	0.05	4.44	7.64	2.55	9.12	2.64	6.1	6.15	1.98	2.22	2.06	2.05	2.63	2.69	1.82	5.54
Sulphate	mg/L	253.4	500	-	-	0.1	117	42.4	27.1	99.4	49.5	25.6	25.8	40.9	99.9	42.3	13.4	14	14.3	10.6	36.7
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	65.1	40.2	32.8	44.9	30.3	28	27.8	32.8	55.7	29.9	15.3	16.1	16.1	18	29.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	12.2	7.9	5.42	8.71	5.25	4.69	4.63	5.22	8.71	4.77	2.77	2.83	2.8	2.93	4.79
Potassium (diss)	mg/L	-	-	-	-	0.05	7.61	7.73	8.67	4.85	5.36	6.86	6.8	5.73	8.25	4.9	3.22	3.84	3.81	4.32	5.11
Sodium (diss)	mg/L	100.9	200	-	-	0.05	5.7	4.87	3.94	4.55	3.59	3.98	3.93	2.87	3.62	2.74	2.85	2.06	2.04	2.44	2.51
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	100	-	93	46	57	74	73	73	82	60	40	42	51	55	52
Ammonia as N	mg/L	-	-	-	-	0.02	0.17	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	<5	<5	<5	<5	7	<5	<5	<5	<5	<5	11
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	3.8	3	2.4	2.9	5.2	2.1	2.4	2.3	3.4	3	2.3	8.2	16	2.5	3
Electrical Conductivity	uS/cm	-	-	-	-	1	486	371	233	348	256	235	237	252	496	205	132	136	136	154	232
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		212.8	132.9	104.2	148	97.3	89.2	88.5	103.4	175	94.3	49.6	51.9	51.7	57	94.4
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		8	7.88	7.86	6.84	6.83	6.7	6.72	7.48	6.59	6.73	6.69	6.96	7.06	6.93	7.12
Total Dissolved Solids	mg/L	279	500	-	-	10	318	194	134	248	166	168	170	138	248	140	84	82	76	84	126
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	0.0000044	0.0000044	0.0000046	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	<0.004	0.005	0.004	0.008	0.007	0.005	0.004	0.064	0.01	0.008	0.004	0.008	0.018	0.008	0.023
Barium (diss)	mg/L	-	1	-	-	0.001	0.042	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.234	0.15	0.113	0.079	0.084	0.105	0.11	0.118	0.11	0.09	0.058	0.047	0.044	0.062	0.067
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	<0.01
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<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	<0.001	<0.0005
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.002	<0.002	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.001	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	5.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.468	0.275	0.209	0.284	0.18	0.156	0.159	0.196	0.402	0.217	0.091	0.106	0.104	0.114	0.187
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	<0.006	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.0005	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<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-WC	Reasonable Use Values Wolf Creek
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	WC-QAQC GW-F22 (WC2-03)	WC2-03	WC2-03	WC2-03	WC2-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17	2006-May-09	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08	2008-Oct-08	2009-Jun-05	2009-Oct-21	2010-May-18	2010-Oct-19
Anions						**Detection Limit**															
Chloride	mg/L	125.3	250	-	-	0.1	0.78	1.17	<1	<1	<1	-	-	34	2	<1	5	2	1	2	13
Nitrate as N	mg/L	3.1	10	-	-	0.05	5.37	4.92	2.44	1.32	5.41	10.3	3.14	4.68	1.21	1.55	3.46	7.01	1.68	7.01	3.46
Sulphate	mg/L	253.4	500	-	-	0.1	36.4	26.3	65	7.4	43	40	34	119	9	7	22	13	8	13	50
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	31.9	35	48	11	40	31	14	107	5	6	16	13	5	13	62
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.6	5.67	7.1	1.8	6.2	13	5	33	2	2	5	4	2	4	14
Potassium (diss)	mg/L	-	-	-	-	0.05	5.18	8.27	6.4	2.7	6	51	17	66	5	7	6	8	3	8	29
Sodium (diss)	mg/L	100.9	200	-	-	0.05	2.79	5.62	2.9	1.9	3.1	25	7	31	<2	<2	4	4	2	4	15
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	52	78	84	38	76	130	54	368	20	27	40	29	24	29	229
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.05	<0.05	<0.05	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	6.7	<4	<4	-	-	<5	<5	<5	8	5	<5	5	<5
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	3.3	3.2	2.9	2	3.4	-	-	4.5	1.5	1.2	1.3	1.8	1.2	1.8	2.7
Electrical Conductivity	uS/cm	-	-	-	-	1	233	256	330	93	300	542	187	1070	74	82	184	159	76	159	607
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		98.6	-	-	-	-	130.9	55.5	403.1	20.7	23.2	60.5	48.9	20.7	48.9	212.5
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.25	7.04	7.1	7.93	7.35	7.45	7.01	7.77	6.95	7.12	7.35	6.63	6.76	6.63	7.75
Total Dissolved Solids	mg/L	279	500	-	-	10	124	174	225	80	285	-	-	696	48	53	120	103	49	103	395
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.01	0.015	<0.0049	<0.0049	<0.0049	0.02	0.06	0.02	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	0.05	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.069	0.15	0.15	0.024	0.081	0.31	0.12	0.87	<0.01	0.01	0.05	0.02	0.01	0.02	0.34
Cadmium (diss)	mg/L	-	0.005	-	Calculated	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	-	0.05	-	-	0.001	-	-	-	-	-	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	0.003	0.001	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	0.029	<0.1	<0.1	<0.1	<0.03	0.09	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.0005	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	<0.001
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
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	<0.005
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	<0.005
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	5.5	7.6	4.1	6	7.4	7.8	6.6	7	6.6	5.1
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	0.178	0.23	0.26	0.071	0.24	0.131	0.057	0.251	0.016	0.025	0.069	0.043	0.033	0.043	0.173
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	<0.01	<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	-	-	-	-	-	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<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-WC	Reasonable Use Values Wolf Creek
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	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03
Parameter	**Units**	**RUV-WC**	**ODWQS**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2011-May-19**	**2011-Nov-02**	**2012-Apr-17**	**2012-Oct-17**	**2013-Apr-16**	**2013-Oct-29**	**2014-May-12**	**2014-Oct-15**	**2015-May-05**	**2015-Oct-27**	**2016-Apr-27**	**2016-Oct-27**	**2017-May-11**	**2017-Oct-24**	**2018-May-08**
Anions						**Detection Limit**															
Chloride	mg/L	125.3	250	-	-	0.1	2	2	6	1	0.6	0.63	0.82	1.15	0.38	0.18	0.16	0.26	0.29	4.98	0.4
Nitrate as N	mg/L	3.1	10	-	-	0.05	7.82	0.87	4.9	1	0.56	1.22	2.62	3.08	0.71	0.82	0.91	1.1	1.17	6.6	0.64
Sulphate	mg/L	253.4	500	-	-	0.1	10	17	25	8	5.91	5.26	8.86	4.29	2.58	2.11	2.89	2.82	2.53	16.4	5.75
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	10	20	24.3	6.56	6.27	5.88	7.56	6.85	2.75	2.28	2.65	3.14	2.51	27.5	5.6
Magnesium (diss)	mg/L	-	-	-	-	0.05	3	7	7.6	3.93	1.63	2.09	2.86	2.35	0.71	0.69	0.83	1.13	0.62	8.28	1.39
Potassium (diss)	mg/L	-	-	-	-	0.05	5	4	16.1	2.08	1.29	2	1.6	1.77	0.8	0.7	1.15	2.2	1.77	1.9	0.87
Sodium (diss)	mg/L	100.9	200	-	-	0.05	2	6	8.74	3.03	1.95	1.55	2.44	1.75	0.9	0.97	1.17	1.05	0.99	0.01	1.27
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	30	65	126	27	15	17	18	14	7	6	9	11	-	78	20
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	0.06	0.02	0.02	0.15	<0.02	0.03	0.13	<0.02	<0.02	0.02	0.19	<0.02	0.06	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	13	5	38	23	<5	5	<5	<5	<5	7	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	1.6	1.5	3	1.1	0.7	1	2.5	0.9	1.3	1.3	1.3	1.3	0.5	3.7	2.1
Electrical Conductivity	uS/cm	-	-	-	-	1	152	172	385	86	52	59	88	83	29	27	32	41	36	229	53
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		37.3	78.8	92	32.6	22.4	23.3	30.7	26.8	9.8	8.5	10	12.5	8.8	102.8	19.7
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.95	6.44	7.4	6.4	5.88	6.74	6.89	6.78	6.84	6.63	6.86	7	6.97	7.71	6.6
Total Dissolved Solids	mg/L	279	500	-	-	10	99	112	288	57	34	50	68	54	26	30	36	20	20	150	48
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	<0.01	<0.01	0.002	0.005	0.008	0.016	<0.004	0.007	0.007	0.004	0.01	0.035	<0.004	0.007	0.005
Barium (diss)	mg/L	-	1	-	-	0.001	<0.01	<0.01	0.021	0.003	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	0.003	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	0.15	0.147	0.045	0.012	0.011	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.108	0.016
Cadmium (diss)	mg/L	-	0.005	-	Calculated	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	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	<0.001	0.001	0.0007	<0.0005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.03	<0.03	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.019	<0.01	<0.01	<0.01
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<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	<0.002	<0.001
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<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	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	<0.005	<0.005	<0.0005	<0.0005	<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	<0.001	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	6.9	4.7	5.95	7.14	6.15	5.9	7.61	6.72	5.58	5.24	5.77	5.44	-	-	-
Silver (diss)	mg/L	-	-	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	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.053	0.115	0.083	0.035	0.009	0.02	0.03	0.031	0.006	0.007	0.012	0.02	0.007	0.175	0.023
Thallium (diss)	mg/L	-	-	-	0.0003	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	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	<0.01	<0.01	<0.005	<0.005	<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	0.0009	0.0005	<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	<0.005	<0.005	<0.005	0.168	<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-WC	Reasonable Use Values Wolf Creek
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	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC3-03	WC-QAQC-GW1 (WC3-03)	WC3-03	WC-QAQC-GW1 (WC3-03)
Parameter	**Units**	**RUV-WC**	**ODWQS**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2018-Oct-23**	**2019-May-09**	**2019-Oct-24**	**2020-May-11**	**2020-Oct-07**	**2021-Apr-22**	**2021-Oct-14**	**2022-Apr-20**	**2022-Oct-19**	**2023-May-01**	**2023-Oct-16**	**2024-Apr-30**	**2024-Apr-30**	**2024-Oct-17**	**2024-Oct-17**
Anions						**Detection Limit**															
Chloride	mg/L	125.3	250	-	-	0.1	0.4	1.7	0.43	0.83	0.42	7.88	11.2	2.16	0.21	2.01	<1	6.1	6.4	<1	<1
Nitrate as N	mg/L	3.1	10	-	-	0.05	0.26	0.72	0.34	3.21	0.55	5.4	11	3.52	0.69	1.56	0.67	9.01	8.9	0.52	0.53
Sulphate	mg/L	253.4	500	-	-	0.1	5.72	4.16	4.46	6.25	4.25	36.5	68.2	20.2	2.44	5.61	3.2	72	72	2.8	2.6
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	5.54	3.8	3.62	8.06	7.2	61.1	130	30.5	3.58	11	6	130	130	6.4	6.5
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.78	1.09	1.55	3.44	2.71	12.9	23.2	5.45	0.91	4.56	1.6	20	20	1.2	1.2
Potassium (diss)	mg/L	-	-	-	-	0.05	1.1	1.1	0.82	1.43	1.46	16	30.6	9.97	2.4	2.2	1.3	24	24	2.8	2.9
Sodium (diss)	mg/L	100.9	200	-	-	0.05	1.26	1.45	1.21	2.41	1.56	13	20.6	5.7	1.02	4.18	1.5	15	15	1.3	1.3
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	20	11	12	27	27	178	380	92	11	46	21	330	320	26	28
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	0.04	0.05	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	7	<5	<5	<5	6	<5	7.4	9.9	9.9	<4	<4
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	1.1	2.7	0.9	1.1	2.1	3.1	52.5	2.3	0.9	1.3	1.3	3.7	3.5	0.8	0.9
Electrical Conductivity	uS/cm	-	-	-	-	1	60	42	44	116	58	493	928	259	40	115	56	820	820	63	71
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		21.2	14	15.4	34.3	29.1	205.7	420.1	98.6	12.7	-	-	-	-	-	-
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.72	6.24	7.01	6.17	6.71	7	7.49	7	6.84	7.12	7.08	8.14	7.83	7.22	7.24
Total Dissolved Solids	mg/L	279	500	-	-	10	46	42	38	58	40	272	532	160	18	72	40	540	520	85	85
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	0.000003	0.0000153	-	-	-	-	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.006	0.008	0.011	0.009	0.016	0.004	0.007	0.02	0.059	0.037	<0.0049	<0.0049	<0.0049	0.012	0.024
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.315	0.59	0.131	<0.01	0.019	<0.01	0.48	0.51	<0.01	<0.01
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.053	0.022	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	0.0018	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.041	0.017	0.027	0.065	0.052	0.255	0.455	0.071	0.021	0.051	0.04	0.32	0.33	0.039	0.04
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	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	<0.005	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-WC	Reasonable Use Values Wolf Creek
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	WC4-19	WC4-19	WC4-19-QAQC GW-S20 (WC4-19)	WC4-19	WC4-19	WC4-19	WC4-19	WC4-19	WC4-19	WC4-19	WC4-19	WC5-19	WC5-19	WC5-19
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2019-Oct-24	2020-May-11	2020-May-11	2020-Oct-07	2021-Apr-22	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17	2019-Oct-24	2020-May-11	2020-Oct-07
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	11	6.94	6.95	4.3	0.7	2.07	6.38	1.03	0.9	2.8	<1	2.5	1.47	1.02	1.55
Nitrate as N	mg/L	3.1	10	-	-	0.05	0.88	4.6	4.61	3.51	2.02	3.1	3.02	2.37	2.31	2.09	1.8	4.39	5.89	1.19	3.73
Sulphate	mg/L	253.4	500	-	-	0.1	74.2	55.7	56.4	56.1	10.6	47.1	83.3	25.2	20.4	31	21	33	22.3	7.94	11.3
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	59.3	57.3	57.3	50	20.9	43.8	71.1	38.2	37.6	32	26	63	24.2	10.3	18.7
Magnesium (diss)	mg/L	-	-	-	-	0.05	9.32	9.15	9.27	8.04	3.53	7.38	12.3	6.24	5.47	5.3	4.3	10	4.71	2.29	3.56
Potassium (diss)	mg/L	-	-	-	-	0.05	10.5	6.76	6.81	6.37	4.78	6.73	11.5	9.72	11.3	11	8.7	13	3.63	1.79	3.12
Sodium (diss)	mg/L	100.9	200	-	-	0.05	13.5	11.8	11.7	9.33	7.2	12.4	17.6	8.28	4.51	4	4.3	7	14.8	9.31	10.5
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	143	137	142	129	72	120	191	111	97	78	76	170	14	59	70
Ammonia as N	mg/L	-	-	-	-	0.02	0.14	<0.02	0.04	0.03	0.03	0.11	0.19	0.37	0.24	0.15	0.19	0.12	0.07	0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	11	13	15	<5	<5	15	13	8	10	8.1	9.7	<5	8	17
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	5.1	5.2	5.3	3.9	3.1	14.6	7.2	3.2	2.9	3.1	3	4.9	3	1.7	2.4
Electrical Conductivity	uS/cm	-	-	-	-	1	479	552	557	356	186	343	558	299	262	250	210	440	44	164	175
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		186.5	180.8	181.3	158	66.7	139.8	228.2	121.1	-	-	-	-	79.8	35.1	61.4
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.62	6.68	6.84	6.96	7.13	7.36	7.1	7.47	7.23	7.17	7.68	7.31	6.88	6.69	6.76
Total Dissolved Solids	mg/L	279	500	-	-	10	266	262	260	228	84	198	360	142	164	160	165	335	142	80	102
Unionized Ammonia (Calc)	mg/L	-	-	-	-		0.0000395	-	-	-	-	-	-	-	-	-	-	-	0.0000161	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.021	0.014	0.013	0.006	0.017	0.005	0.059	0.024	0.015	<0.0049	<0.0049	<0.0049	0.463	0.024	0.014
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.386	0.215	0.224	0.14	0.116	0.177	0.421	0.176	0.092	0.14	0.15	0.28	0.182	0.048	0.087
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	0.016	<0.01	<0.01	0.075	0.017	0.029	<0.1	<0.1	<0.1	0.94	<0.01	<0.01
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.001	<0.001	<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
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	0.953	0.092	0.093	0.038	0.043	0.082	0.628	0.201	0.2	0.29	0.05	0.16	0.062	0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.235	0.189	0.19	0.161	0.068	0.124	0.257	0.127	0.126	0.13	0.1	0.26	0.236	0.079	0.133
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	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	0.006	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-WC	Reasonable Use Values Wolf Creek
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	WC-QAQC GW-F20 (WC5-19)	WC5-19	WC5-19	WC5-19	WC5-19	WC5-19	WC5-19	WC5-19	WC5-19	WC6.1-19	WC6.1-19	WC6.1-19	WC6.1-19	WC6.1-19	WC6.1-19
Parameter	**Units**	**RUV-WC**	**ODWQS**	**PWQO-GENERAL**	**PWQO-INTERIM**	**Sample Date**	**2020-Oct-07**	**2021-Apr-22**	**2021-Oct-14**	**2022-Apr-20**	**2022-Oct-19**	**2023-May-01**	**2023-Oct-16**	**2024-Apr-30**	**2024-Oct-17**	**2019-Oct-24**	**2020-May-11**	**2020-Oct-07**	**2021-Apr-22**	**2021-Oct-14**	**2022-Apr-20**
Anions						**Detection Limit**															
Chloride	mg/L	125.3	250	-	-	0.1	1.37	0.6	0.53	0.59	0.5	0.69	<1	<1	<1	1.37	0.71	0.63	0.66	0.54	0.46
Nitrate as N	mg/L	3.1	10	-	-	0.05	3.76	1.28	2.5	1.19	0.98	0.5	3.07	2.01	1.31	0.05	0.06	0.21	<0.05	<0.05	<0.05
Sulphate	mg/L	253.4	500	-	-	0.1	14.8	6.22	7.59	7.84	6.94	5.25	14	15	5.5	13.1	10.7	10.5	8.87	9.5	9.75
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	18.3	8.98	13.3	11.2	12	7.51	17	18	11	18.2	19.4	19.3	18.6	17.7	19
Magnesium (diss)	mg/L	-	-	-	-	0.05	3.47	2	2.92	2.25	2.28	1.36	3.2	4	2	3.51	4.11	3.72	3.96	3.65	3.88
Potassium (diss)	mg/L	-	-	-	-	0.05	3.1	1.44	1.9	1.98	2.39	0.8	2.7	1.5	2	2.33	1.97	1.92	1.9	1.69	1.86
Sodium (diss)	mg/L	100.9	200	-	-	0.05	10.6	8.59	6.72	5.38	7.28	8.23	15	2.9	7	7.18	1.87	2.25	1.98	1.82	1.9
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	70	42	51	42	47	37	61	42	45	66	68	70	62	58	58
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	<0.02	0.13	<0.02	<0.05	<0.05	<0.05	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	12	<5	<5	<5	11	<5	<4	<4	<4	<5	<5	5	<5	<5	<5
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	2.5	2	11.9	2.2	2.1	1.7	2.4	2.2	1.8	1.5	1.3	1.8	1.5	14	1.5
Electrical Conductivity	uS/cm	-	-	-	-	1	176	107	133	111	117	86	180	130	110	186	190	141	144	135	142
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		60	30.7	45.2	37.2	39.4	-	-	-	-	59.9	65.4	63.5	62.8	59.2	63.4
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.85	6.82	7.01	6.78	7.11	7.15	7.11	7.09	7.13	7.75	6.96	6.89	7.17	7.36	7.12
Total Dissolved Solids	mg/L	279	500	-	-	10	116	70	72	102	62	64	125	120	115	108	94	100	28	76	92
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	-	-	-	-	0.0000252	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.018	0.016	0.092	0.077	0.032	0.013	0.0083	0.0088	0.016	0.036	0.021	0.01	0.011	0.02	0.354
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.088	0.037	0.042	0.039	0.045	0.013	0.14	0.023	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	0.05	0.053	0.131	0.021	0.01	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.573
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<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	<0.001	<0.001
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.002	0.003	0.002	0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.042	0.014	<0.002	0.002	<0.002	0.009
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.127	0.051	0.078	0.065	0.073	0.043	0.13	0.073	0.067	0.075	0.069	0.062	0.06	0.052	0.062
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	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	<0.005	<0.005	0.007

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-WC	Reasonable Use Values Wolf Creek
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	WC6.1-19	WC6.1-19	WC6.1-19	WC6.1-19	WC6.1-19	WC6.2-19	WC6.2-19-QAQC (WC6.2-19)	WC6.2-19	WC6.2-19	WC6.2-19	WC-QAQC GW-S21 (WC6.2-19)	WC6.2-19	WC6.2-19	WC6.2-19	WC6.2-19
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17	2019-Oct-24	2019-Oct-24	2020-May-11	2020-Oct-07	2021-Apr-22	2021-Apr-22	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01
Anions						Detection Limit															
Chloride	mg/L	125.3	250	-	-	0.1	0.59	1.41	<1	<1	<1	1.78	1.93	0.72	0.56	0.56	0.69	0.53	0.41	0.57	0.53
Nitrate as N	mg/L	3.1	10	-	-	0.05	<0.05	0.06	<0.1	<0.1	<0.1	0.26	0.28	<0.05	0.17	<0.05	0.08	<0.05	<0.05	3.49	0.07
Sulphate	mg/L	253.4	500	-	-	0.1	10.5	9.61	7.8	9.7	8.7	16.6	17.4	8.18	7.97	7.38	7.36	7.83	6.99	15.7	7.21
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	21.8	20.6	20	20	20	11.5	11	12.6	10.8	12.9	12.9	11.8	12.7	23.3	18
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.03	4.29	3.8	4.1	3.9	2.1	1.99	2.72	2.22	2.86	2.9	2.69	2.76	4.2	3.01
Potassium (diss)	mg/L	-	-	-	-	0.05	2.07	2.07	1.8	1.9	1.8	1.33	1.24	1.39	1.55	1.33	1.36	1.36	1.33	3.67	0.91
Sodium (diss)	mg/L	100.9	200	-	-	0.05	2.04	1.6	2	1.9	1.9	17.4	18.5	1.74	2.13	1.88	1.89	1.75	1.79	3.07	1.53
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	65	63	61	66	68	61	60	47	38	44	44	44	43	59	49
Ammonia as N	mg/L	-	-	-	-	0.02	0.04	<0.02	<0.05	0.093	<0.05	0.08	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	7	<5	10	<4	<4	<5	<5	<5	9	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	1.4	1.5	1.6	1.5	1.6	2.7	2.3	2.3	2.9	2.9	2.6	15.2	2.9	2.4	2.5
Electrical Conductivity	uS/cm	-	-	-	-	1	152	150	140	140	190	191	192	131	87	104	104	100	104	182	112
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		71	-	-	-	-	37.4	35.7	42.7	36.1	44	44.2	40.5	43.1	75.5	-
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		7.46	7.51	7.45	7.85	7.62	7.47	7.37	6.85	6.67	6.83	6.82	6.9	6.92	7.3	7.26
Total Dissolved Solids	mg/L	279	500	-	-	10	70	100	150	180	135	110	116	72	68	66	62	60	62	82	80
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	-	-	0.0000297	0.0000149	-	-	-	-	-	-	-	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.038	0.027	0.022	0.0079	0.015	0.251	0.266	0.015	0.01	0.009	<0.004	0.032	0.141	0.014	0.067
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.089	<0.01
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.01	0.036	<0.1	<0.1	<0.1	0.295	0.415	<0.01	<0.01	<0.01	0.026	<0.01	0.174	0.011	0.014
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	0.0007
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.094	0.084	0.074	0.083	0.03	0.029	0.037	0.03	<0.002	0.007
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.057	0.063	0.057	0.054	0.059	0.086	0.084	0.057	0.047	0.058	0.043	0.04	0.042	0.214	0.052
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	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	0.014	<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-WC	Reasonable Use Values Wolf Creek
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	WC6.2-19	WC6.2-19	WC6.2-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19	WC6.3-19
Parameter	Units	RUV-WC	ODWQS	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2023-Oct-16	2024-Apr-30	2024-Oct-17	2019-Oct-24	2020-May-11	2020-Oct-07	2021-Apr-22	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17
Anions						Detection Limit														
Chloride	mg/L	125.3	250	-	-	0.1	<1	<1	<1	1.39	1.24	1.12	0.87	1.05	0.6	0.48	1.04	<1	<1	<1
Nitrate as N	mg/L	3.1	10	-	-	0.05	<0.1	<0.1	<0.1	4.16	2.11	2.62	3.42	7.17	3.84	<0.05	5.32	4	5	3.29
Sulphate	mg/L	253.4	500	-	-	0.1	9	7.1	8	67.3	116	63.5	22.7	29.6	14.8	7.16	21.9	81	140	18
Cations																				
Calcium (diss)	mg/L	-	-	-	-	0.05	13	14	13	50.4	54.6	42.5	28.6	31.4	20.1	13	33.1	64	73	25
Magnesium (diss)	mg/L	-	-	-	-	0.05	2.7	3	2.6	9.76	11	8.03	5.72	6.33	3.98	2.74	4.66	11	14	4.5
Potassium (diss)	mg/L	-	-	-	-	0.05	1.4	1.3	1.3	7.67	5.19	5.02	3.07	3.96	2.99	1.55	5.53	7.8	5.2	4.1
Sodium (diss)	mg/L	100.9	200	-	-	0.05	1.9	1.8	1.8	5.25	4.72	3.89	4	3.68	3.34	1.96	6.75	4.7	5.3	2.7
General Chemistry																				
Alkalinity (as CaCO3)	mg/L	262.3	30 - 500	See Factsheet	-	1	42	60	47	115	87	94	72	68	52	42	78	110	97	64
Ammonia as N	mg/L	-	-	-	-	0.02	0.22	<0.05	<0.05	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	0.1	<0.02	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<4	4.7	<4	12	9	17	<5	<5	8	<5	<5	16	11	8.3
Dissolved Organic Carbon	mg/L	4.9	5	-	-	0.4	2.9	2.6	2.8	3	3.1	3.5	2.8	27.6	2.5	3.7	3.4	4.2	4.3	2.5
Electrical Conductivity	uS/cm	-	-	-	-	1	97	100	100	400	526	305	225	250	171	101	253	430	510	190
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	-	-	166	181.6	139.2	95	104.5	66.6	43.7	-	-	-	-
pH	pH units	-	6.5 - 8.5	6.5 - 8.5	-		6.94	7.67	7.4	7.39	6.61	6.96	6.83	7.1	6.91	7.2	7.37	6.97	7.61	7.32
Total Dissolved Solids	mg/L	279	500	-	-	10	90	95	100	240	268	188	124	154	94	58	172	300	350	165
Unionized Ammonia (Calc)	mg/L	-	-	-	-		-	-	-	0.0000117	-	-	-	-	-	-	-	-	-	-
Metals																				
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.004	0.023	0.013	0.022	0.069	0.015	0.011	0.009	0.016	0.022	0.03	0.011	0.0064	0.0052	0.0056
Barium (diss)	mg/L	-	1	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (diss)	mg/L	-	-	Calculated	-	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<0.01	<0.01	0.132	0.189	0.118	0.131	0.11	0.086	<0.01	0.166	0.16	0.2	0.11
Cadmium (diss)	mg/L	-	0.005	-	Calculated	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (diss)	mg/L	-	0.05	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	-	1	-	Calculated	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron (diss)	mg/L	0.2	0.3	0.3	-	0.01	<0.1	<0.1	<0.1	0.072	<0.01	0.015	0.012	<0.01	0.015	0.013	0.025	<0.1	<0.1	<0.1
Lead (diss)	mg/L	-	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Manganese (diss)	mg/L	0.027	0.05	-	-	0.002	0.02	0.018	0.032	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	0.04	<0.002	<0.002	<0.002	<0.002
Molybdenum (diss)	mg/L	-	-	-	0.04	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.039	0.043	0.042	0.575	0.688	0.452	0.283	0.362	0.227	0.046	0.367	0.66	0.85	0.26
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	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	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-WC	Reasonable Use Values Wolf Creek
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

Appendix F

Trigger Mechanisms and Contingency Plan

WOLF CREEK WASTE DISPOSAL SITE
TRIGGER MECHANISMS
SURFACE WATER AND GROUNDWATER
Accepted December 7, 2017

OBJECTIVE AND BACKGROUND

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

OBJECTIVE 1: SURFACE WATER IMPACTS

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

West Property Boundary-Surface Water

Assessment Points- WC2-03
Trigger Mechanisms-Alkalinity, Nitrate, Sulphate, TDS, Iron and Un-ionized Ammonia
Frequency-Sampling twice per year (Spring and Fall)
Contingency Plan is activated if:

- Three or more of the following chemical parameters; Alkalinity, Nitrite. Sulphate, TDS exceeds the 75th percentile of the historical data for three of the chemical parameters; or
- Iron or un-ionized ammonia exceeds the Provincial Water Quality Objectives (PWQO). for either of the assessment points.

The 75th percentile for the sampling locations and chemical parameters based on the sampling results from May 2006 to May 2017 are provided in the following tables:

Table 1: WC2-03 Trigger Values for Select Parameters

Parameter	75th Percentile Concentration mg/L	PWQO mg/L
WC2-03		
Alkalinity	99	
Nitrate	6.4	
Sulphate	117	
TDS	318	
Iron		0.3
Unionized Ammonia		0.02

OBJECTIVE 2: GROUNDWATER IMPACTS

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

<u>West Property Boundary-Groundwater</u>
Assessment Point- WC2-03 and future western boundary well(s)
Trigger Mechanisms- Alkalinity, Iron, Nitrate, Sulphate, TDS
Frequency-Sampling twice per year (Spring and Fall)
Contingency Plan is activated if the following occurs: —

- Three or more of the RUVs are exceeded

Table 2: Trigger Values for Select Parameters

Parameter	RUV mg/L
Alkalinity	265
Iron	0.3
Nitrate	3.4
Sulphate	254
TDS	318

WOLF CREEK WASTE DISPOSAL SITE
CONTINGENCY PLAN FOR SURFACE AND GROUNDWATER

Tier 1: If the triggers are exceeded, a repeat sampling will be conducted within one (1) month to confirm or refute the result.

Tier 2: If the exceedance is confirmed through Tier 1 then the following will be carried out:

- Additional sampling will be conducted at an increased monitoring frequency to twice monthly, for four months (if exceedances continue). Revert back to semi-annual sampling if there are two consecutive sampling results that do not show exceedances;
- For surface water, if the exceedance is confirmed through four months of Tier 1 additional sampling then a Toxicity test (Single Concentration – Acute Lethality) sample will be collected to determine the impacts to surface water. If the toxicity test passes then no additional mitigation measures will be required. If toxicity tests fail then proceed to Tier 3.
- For groundwater, if the exceedance is confirmed through four months of Tier 1 additional sampling then proceed to Tier 3.

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 surface water and/or groundwater before it reaches a receptor. The specifics of the plan will be dependent on the nature of the impact.

Appendix G

2021 Contaminant Attenuation Zone (CAZ) Assessment

08-February 2022
Project Number: 210217-01

Adrian Tomasini, Operations Manager, Municipality of Hastings Highland
P.O. Box 130
Maynooth, ON K0L 2S0

RE: 2021 - 2022 Contaminant Attenuation Zone Assessment – Wolf Creek WDS

BluMetric Environmental Inc. (BluMetric™), was retained by the Corporation of the Municipality of Hastings Highlands (MHHs or Municipality) to conduct the CAZ Assessment work in 2021. This Assessment is being reported on as "Appendix G" of the 2021 Annual Monitoring Report (AMR) for the Site, and therefore the Site information (e.g. location, description, figures etc.) are not repeated within this letter report. The geology and hydrogeology for the Site is describe in Section 2 of the AMR, the groundwater elevations and flow direction are described in Section 3 of the AMR.

This report provides a summary of the Contaminant Attenuation Zone (CAZ) Assessment that was carried out on the Site's historic water quality data (2007 to 2021) and the Assessment was completed early in 2022 and therefore includes both the spring and fall results for 2021. This work was carried out as part of the Phase 3 work to address Ministry of Environment, Conservation and Parks (MECP) concerns regarding non-compliance with Guideline B-7.

In 2003 there were three monitoring wells installed at the Site and in 2019 five more wells were installed as identified in the following Table. A description of how each well location relates to the CAZ Assessment work is provided in Table A. These monitoring well locations are shown on Figures 02 to 03 in the AMR, while spring and fall groundwater elevations and flow directions are provided on Figures 04 and 05, respectively.

Table A: Monitoring Well Locations and Relationship to CAZ Assessment

Well Identification	Relationship to CAZ Assessment
WC1-03	Upgradient from waste footprint, used as background well. Historic data from 2007 to 2021 used to determine Mean Background values for the Assessment.
WC2-03	Downgradient well from waste footprint, historically having the highest concentrations of leachate indicators. Historic data for this well used to determine the geometric mean of leachate concentration for Assessment.
WC3-03	Leachate well in north portion of waste footprint, historically having lower concentrations of leachate indicators than WC2-03. Historic data for this well used to determine the geometric mean of leachate concentration for Assessment.
WC4-19	Downgradient well, not used in the assessment.
WC5-19	Upgradient well from waste footprint, not used in Assessment.
WC6.1-19 (well nest, deepest)	Downgradient well, not used in the assessment.
WC6.2-19 (well nest, mid-level)	Downgradient well, not used in the assessment.
WC6.3-19 (well nest, shallowest)	Downgradient well, exhibiting the highest elevated concentrations of leachate indicator parameters of the three in the well nest and directly downgradient of WC2-03. Data from 2019 to 2021 used as the downgradient concentration of water quality impacted by the WDS.

CAZ Assessment

Mean and geometric mean concentrations for the background and leachate wells, respectively, are based on 16 years of data (2007 to 2021), while the geometric mean concentration of the downgradient well is based on three years of data (five datasets). The 2019 data for downgradient well WC6.3-19 only includes fall data as the well was installed until after the spring 2019 sampling event. There was a significant increase is some leachate indicator parameters in the fall of 2021. These increases appear to be an anomaly.

Attenuation distances were calculated based on the methods presented by Zaltsburg (1995) and the following:

- The geometric mean chemical parameter concentrations from 2007 to 2021 at the leachate indicator well. Data from downgradient well WC2-03 and the leachate monitoring WC3-03 were used as it historically had the highest concentrations of leachate parameter concentrations.
- The RUG criteria was revised to include all 2021 water quality data for the Site; and
- The 2019 to 2021 downgradient impacted well geometric mean chemical parameter concentrations (WC6.3-19).

Based on historic data and BluMetric's experience at other sites, the RUG criteria for on-site alkalinity, aluminum, boron, chloride, DOC, iron, nitrate, manganese, sodium, sulphate, and TDS were calculated. Manganese was not carried through in CAZ calculations as upgradient and downgradient concentrations were both lower than the leachate concentration for this parameter. Table B below provides a summary of the results obtained from the CAZ calculations.

The only parameter identified as a Critical Parameter was iron. Meaning, the concentration of this parameters at the leachate indicator well is more than one times greater than the concentration of the RUG criteria. No other “Critical Parameters” were identified. The attenuation distance was then calculated for this parameter.

Table B: Calculation for Attenuation Distance

Parameter	Leachate Well Conc. Geometric Mean (mg/L)	Downgradient Well Conc. Geometric Mean (mg/L)	Conc. Ratio	2007 to 2021 RUV Conc. (mg/L)	Specific Attenuation As	Required Attenuation Distance from footprint
Iron	0.241	0.020	12.06	0.17	0.0101	87.08

Note: Conc. - denotes Concentration

Currently there is no CAZ at the Site. There is no 30 m buffer between the waste footprint and the Site property boundary to the east, and the buffer to the north and west is less than 30 m. Considering the overburden at the Site has a high permeability, and the elevated concentrations observed in water quality off-site, we would recommend that the following CAZ areas (ownership or easements) be obtained for the Site:

- 30 m buffer ownership/easement to the east and south of the existing Site Property Boundary (inferred area of upgradient groundwater), and
- 100 m CAZ ownership/easement to the north and west of the existing Site Property Boundary.

Calculations indicate an 87 m CAZ distance is required from the footprint, or approximately 50 m is required to the west of the property boundary for iron attenuation; however, we recommend the 100 m distance to the north and west to include the existing background wells. The CAZ area to the north will primarily provide access for sampling and maintaining the existing background well WC1-03 and cross-gradient well WC5-19. The CAZ area to the west will serve as the primary downgradient attenuation zone. The proposed CAZ area has been illustrated on Figure 03 Site Topography and Monitoring Locations, included as part of the 2021 AMR.

Additional monitoring wells are not recommended at this time. Future monitoring will confirm if elevated concentrations in the fall of 2021 are an anomaly, or if the downward trends which have been observed in recent years is changing.

Site Property Information

The MHHs does not own the 0.7 ha WDS property, it is situated on Crown land. The MHHs is granted use of the property under a Land Use Permit (LUP). The Ministry of Northern Development, Mines, and Natural Resources (NDMNRF) currently administers Crown land use. All land surrounding the Site is Crown land. The MHHs is in the process of surrendering the Aggregate Permit License for the property immediately to the east of the Site. This land transaction will need to be completed prior to new land transactions being initiated. We understand that documentation has been provided to NDMNRF and it is awaiting processing.

Once the MECP generally reviews and confirms their general agreement with this CAZ Assessment, and the process of the Aggregate Permit License is completed, discussions should begin with NDMNRF regarding purchasing or obtaining an easement of the CAZ/buffer areas.

Additional Actions

The Municipality may be required to submit additional land ownership information or easement information to the MECP. The extent of this information will depend on what type agreement is reached with NDMNRF for the Site and CAZ/buffer areas.

Summary Statement

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 analyses, 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.

Please feel free to call or e-mail the undersigned if you have any questions.

Respectfully submitted,
BluMetric Environmental Inc.

Iris O'Connor, P.Eng.
Project Engineer/Senior Environmental Engineer
ioconnor@blumetric.ca
Office: 613-531-2725 ext. 245
Cell: 613-328-0243

Carolyn Miller, B.A.Sc., EIT.
Engineering Intern
cmiller@blumetric.ca
Cell: 613-898-7360

References

BluMetric, 2021. Wolf Creek WDS 2020 Annual Report. Submitted to The Corporation of the Municipality of Hastings Highlands, March 2020.

Ministry of the Environment (MOE). Procedure B-7-1: Determination of Contaminant Limits and Attenuation Zones. Ministry of Environment, Government of Ontario. 9pp.

E. Zaltsburg, 1995. Determination of Groundwater Attenuation Distances for Municipal Landfill Sites in Ontario, Canadian Water Resources Journal, Vol. 20, No.1, 1995.

1682 Woodward Dr.
Ottawa, ON K2C 3R8
Canada

T 877.487.8436
Ottawa@blumetric.ca

The Tower, 4 Cataraqui St.
Kingston, ON K7K 1Z7
Canada

T 877.487.8436
Kingston@blumetric.ca

3B-209 Frederick St.
Kitchener, ON N2H 2M7
Canada

T 877.487.8436
Kitchener@blumetric.ca

825 Milner Ave.
Toronto, ON M1B 3C3
Canada

T 877.487.8436
Toronto@blumetric.ca

6-410 Falconbridge Rd.
Sudbury, ON P3A 4S4
Canada

T 877.487.8436
Sudbury@blumetric.ca

260-15 Taschereau St.
Gatineau, QC J8Y 2V6
Canada

T 877.487.8436
Gatineau@blumetric.ca

200-1500 Du College St.
Saint-Laurent, QC H4L 5G6
Canada

T 877.487.8436
Montreal@blumetric.ca

27 Parker St.
Dartmouth, NS B2Y 4T5
Canada

T 877.487.8436
Dartmouth@blumetric.ca

4916 49th St.
Yellowknife, NT X1A 1P3
Canada

T 877.487.8436
Yellowknife@blumetric.ca

200-4445 SW 35th Terrace
Gainesville, FL 32608
USA

T 877.487.8436
Gainesville@blumetric.ca