

The Corporation of the Municipality of Temagami
Briggs Landfill 2023 Annual Report



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Briggs Landfill 2023 Annual Report**

Prepared for:
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Municipality of Temagami**
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- Appendix A Environmental Compliance Approval
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- Appendix D Groundwater Chemistry

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1 Introduction

The Briggs Landfill (“Site”) is operated by The Corporation of the Township of Temagami (“Temagami”). This report summarizes the Site’s operations and water quality monitoring conducted in 2023, as required by Section 38. (a) to (h) of the Amendment to Provisional Certificate of Approval Waste Disposal Site No. A7206002, now referred to as an Environmental Compliance Approval (“ECA”). A copy of the ECA is provided in Appendix A.

The Site has been in operation since the 1970s. The landfill was established by the Ministry of Natural Resources and Forestry (“MNRF”), but the exact date of establishment is unknown. The Temagami Public Works Department (“Public Works”) has operated the landfill since 1998. An existing, but pending, transfer of Site ownership from the MNRF to Temagami has not yet been finalized. Currently, the landfill serves the residents of Lake Temagami who access the lake via the Lake Temagami Access Road.

This document represents the Site’s twelfth annual report prepared and submitted to the Ministry of Environment, Conservation and Parks (“MECP”) by Story Environmental Inc. (“SEI”). Annual Site Reports have been prepared for each year of operation between 2008 to 2011 and 2016 to 2023 by SEI and SEI’s predecessor Story Environmental Services (“SES”). From 2012 to 2015, no monitoring or reporting were conducted. Prior to 2008, an annual report had not been prepared and the Site had only been monitored in 2001.

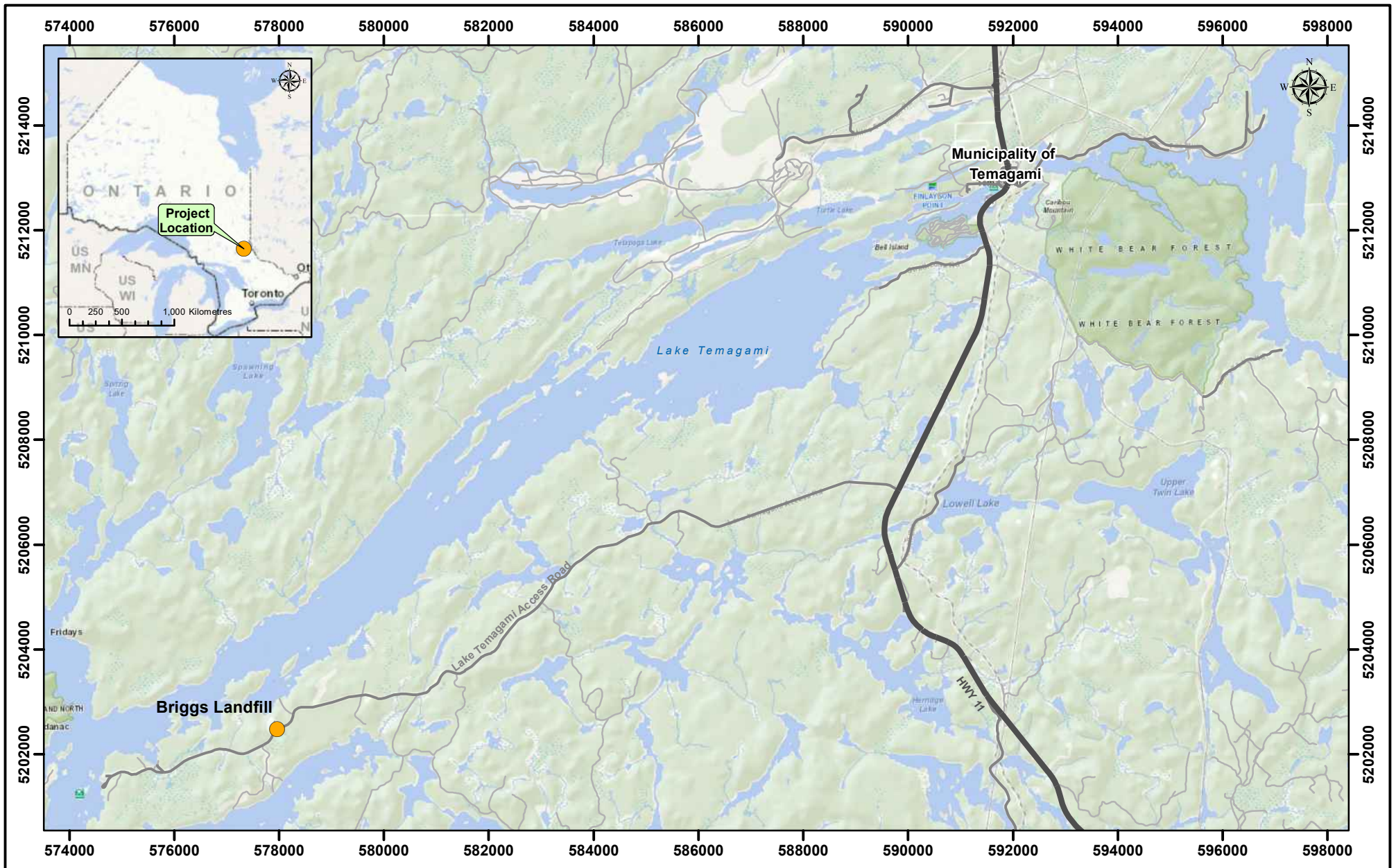
2 Landfill Site

2.1 Site Description and Recent Work

The Site is located approximately 13 kilometres (“km”) west of Highway 11 along the Lake Temagami Access Road in the geographic Township of Briggs, as shown in Figure 2.1.1. The entrance to the Site is located on the north side of Lake Temagami Access Road.

The Site occupies a total area of 9.25 hectares (“ha”). The permitted Fill Area (i.e., the portion of the Site where waste can be disposed) occupies an area of 0.77 ha, as illustrated in Figure 2.1.2 and Figure 2.1.3. The Site has an approved capacity of 40 000 cubic metres (“m³”).

SEI conducted the required groundwater monitoring and a Remote Piloted Aircraft Survey (“RPAS”) for the Site in 2023.



Legend	
Road Class	● Briggs Landfill
— Other	
— Highway	
— Local Road	

NAD83 UTM Zone 17T

Kilometres

0 0.5 1 2



Corporation of the Municipality of Temagami

Date: 22-May-2024 | Drwn by: SWK | Rvw'd by: MES

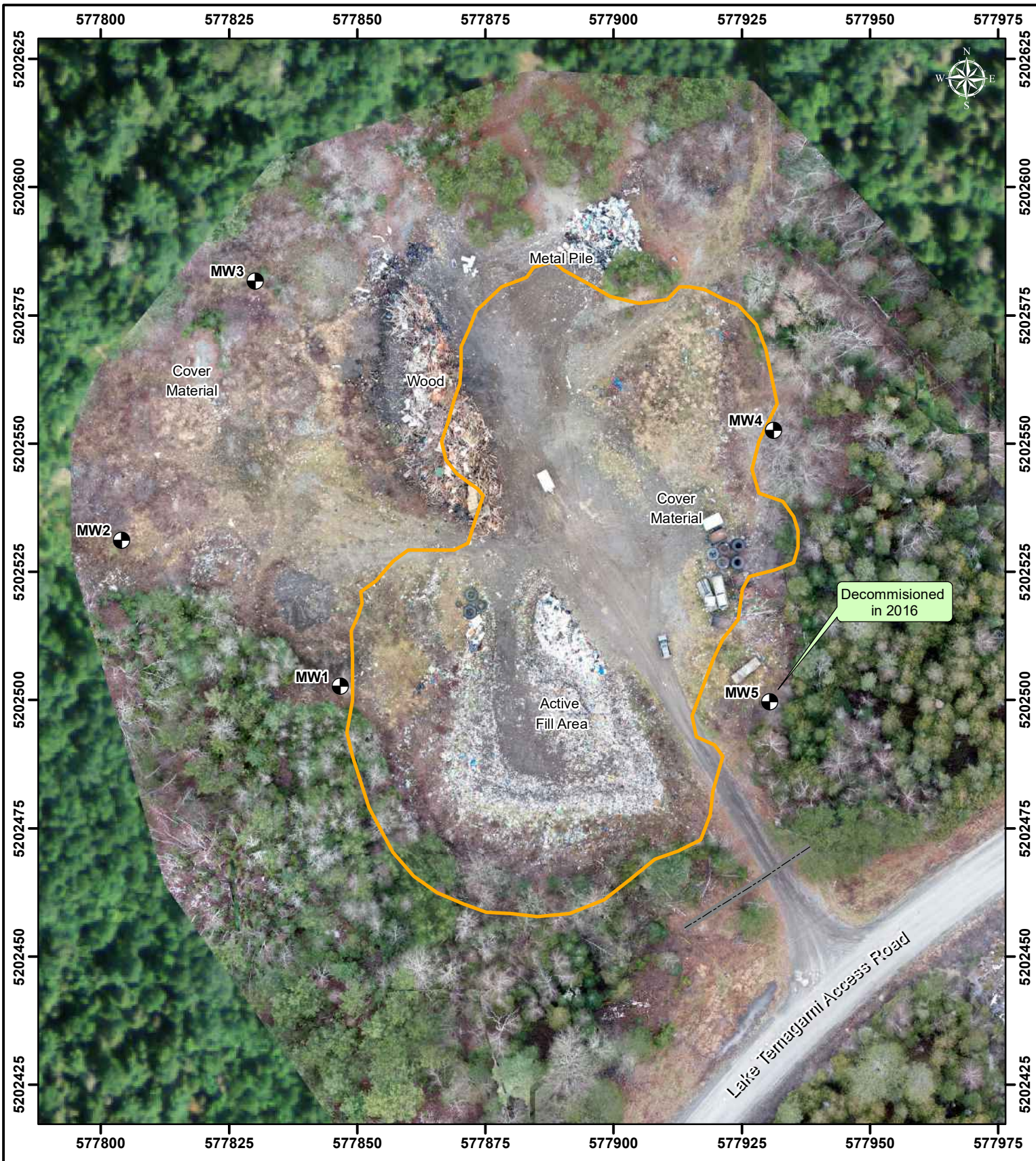
Briggs Landfill Annual Report

Drawing No.: SEI-048-01-33-002

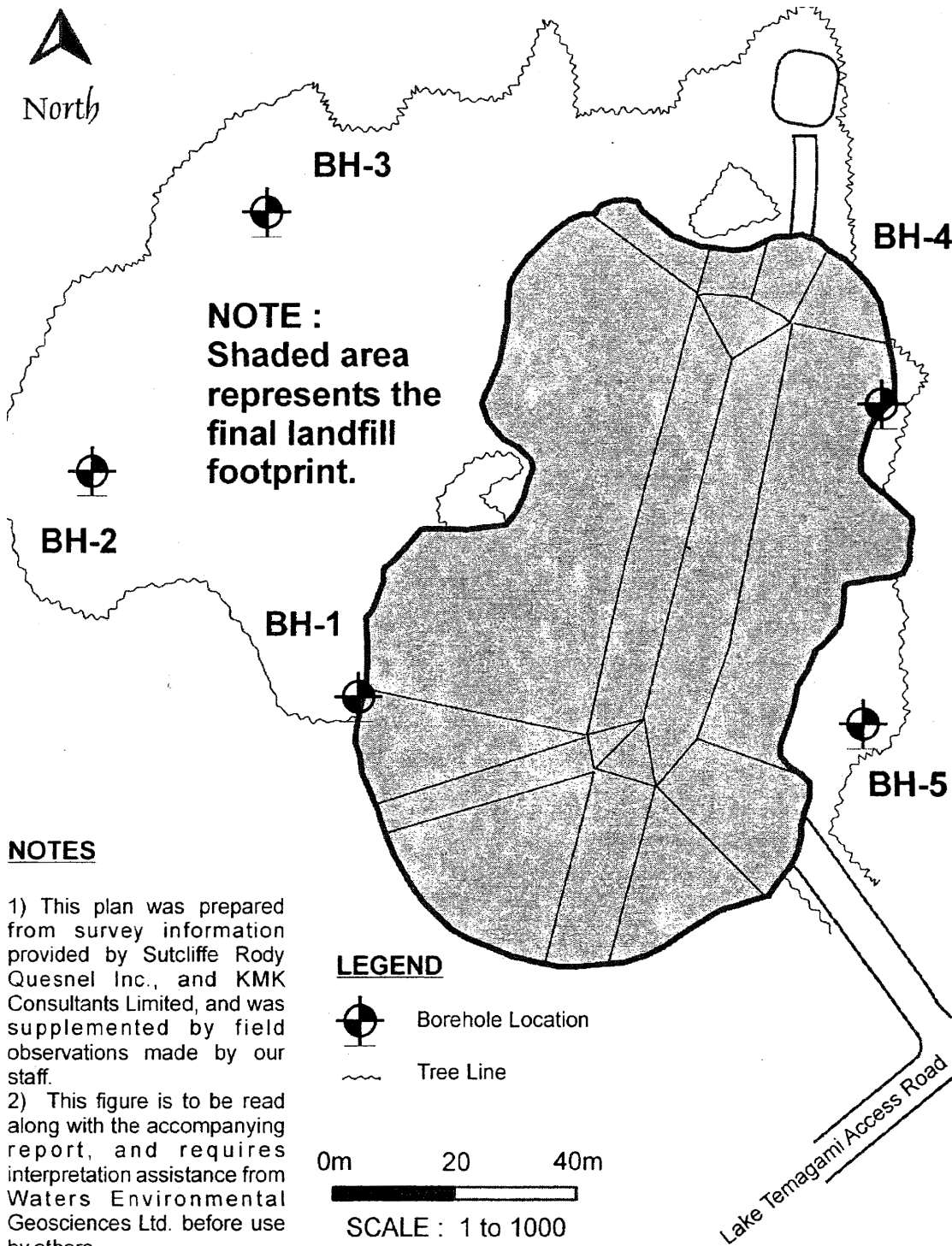
Sources: Ontario Ministry of Natural Resources and Forestry: Ontario Road Segment - With Address, LIO Topographic Basemap 2022.

Briggs Landfill Site Location

FIGURE 2.1.1



Legend Monitoring Wells Gate Fill Area	NAD83 UTM Zone 17T Metres 0 5 10 20			
		Corporation of the Municipality of Temagami Briggs Landfill Proj. No.: 048-01-33		Briggs Landfill Annual Report Drawing No.: SEI-048-01-33-002
Sources: Corporation of the Municipality of Temagami: Landfill Features 2022, Aerial imagery collected by Story Environmental Inc. on 16-Nov-2023; Land Information Ontario: FRI 2007-2011 Orthoimagery (used in background).		Date: 21-Feb-2024 Drwn by: JALD Rvw'd by: MES	FIGURE 2.1.2	
Site Plan - Site Monitoring Wells and Other Features				





NOTE :
 Shaded area
 represents the
 final landfill
 footprint.

NOTES

- 1) This plan was prepared from survey information provided by Sutcliffe Rody Quesnel Inc., and KMK Consultants Limited, and was supplemented by field observations made by our staff.
- 2) This figure is to be read along with the accompanying report, and requires interpretation assistance from Waters Environmental Geosciences Ltd. before use by others.

LEGEND



-  Borehole Location
-  Tree Line

0m 20 40m



SCALE : 1 to 1000

Lake Temagami Access Road

STORY environmental 		
Corporation of the Municipality of Temagami		Briggs Landfill Annual Report
Scale: As Shown		
Proj. No.: 048-01-33-2022		Drawing No.: 04805-05
Date: 09-03-2017	Rev by: SEE	Rvw'd by: MES
FIGURE 2.1.3		
Briggs MRF Landfill Footprint		

2.2 Onsite Groundwater Monitoring Wells

During a 2001 Hydrogeological Assessment, conducted by Waters Environmental Geosciences Ltd. (“WEG”), five boreholes were drilled at the Site and groundwater monitoring wells, MW1, MW2, MW3, MW4, and MW5 were installed (WEG, 2001). The locations of the monitoring wells are illustrated in Figures 2.1.2. and 2.1.3. Based on the groundwater data collected in 2001 and the hydraulic conductivity testing, a proposed natural attenuation zone for the Site was established. The monitoring well details are presented in Table 2.2.1 and the borehole logs for the monitoring wells are provided in Appendix B.

The groundwater elevation at MW4 has been very low since regular monitoring began in 2008. This well has either been dry or there has not been sufficient water to collect a sample since its installation in 2001.

During the June 2016 monitoring event, it was noted that MW5 had been inadvertently damaged. After reviewing the historical data for MW5, it was decided that this well should be decommissioned since it had been dry since 2001. Monitoring well MW5 was decommissioned by a licensed well technician in December 2016. Therefore, there are four remaining groundwater monitoring wells on Site, MW1 to MW4 (see Figure 2.1.2), but only three wells have had sufficient volumes of water to sample (i.e., MW1 to MW3).

Table 2.2.1 Site Groundwater Monitoring Well Details

Well	Year of Installation	Easting ⁵	Northing ⁵	Top of Pipe Elevation ⁵	Pipe Stickup ⁵	Grade Elevation ⁵	Well Depth ⁶	Base of Well Elevation ^{5 and 6}	Screen Length ⁶	Borehole Refusal ⁶
				masl	mag	masl	mbg	masl	m	mbg
MW1	2001	577846	5202502	311.476	0.82	310.653	3.51	307.143	2.45	3.5
MW2	2001	577802	5202538	311.230	0.77	310.459	3.83	306.634	2.78	not encountered
MW3	2001	577830	5202581	310.824	0.71	310.110	1.98	308.130	1.55	2.0
MW4	2001	577932	5202552	316.206	0.76	315.450	2.60	312.850	1.45	2.7
MW5 ⁷	2001	577930	5202499	316.88	0.79	316.09	5.94	310.150	3.05	5.9

Notes:

1. masl metres above sea level
2. mag metres above grade
3. mbg metres below grade
4. m metres
5. Obtained/calculated from 2016 survey
6. Obtained/calculated from borehole log
7. All elevations for MW5 obtained/calculated from borehole log. Well decommissioned in 2016.

Source:

R:\SEI\048 Temagami\01_Briggs\Work\2023\048_Briggs_Site.MW.Install_21Feb24_SED.xlsx]well details-from 2016 Survey

2.3 Local Environment

2.3.1 Site Geology

The bedrock in the region consists of felsic to intermediate metavolcanic flows, tuff, and breccia containing minor aphanitic to porphyritic felsic dykes (ODM, 1967 and ODNA, 1971).

The overburden in the area is generally glaciofluvial in origin and consists of sandy glacial outwash plains and valley terrain deposits. Bedrock knobs are also found in the region. The local topography is low in relief, typical of plain deposits, with mixed wet and dry drainage (OGS, 1979). The original ground surface at the Site has been reworked considerably over the years both as a landfill and, prior to that time, as a material borrow pit.

The depth to bedrock for the Site can be inferred from the borehole logs. Four out of the five boreholes encountered refusal during drilling. MW2 was the only well that did not encounter refusal. MW1 encountered refusal at 3.5 metres below grade (“mbg”), MW3 at 2.0 mbg, MW4 at 2.7 mbg, and MW5 at 5.9 mbg. It should be noted that refusal does not necessarily indicate the presence of bedrock, as refusal could have occurred on a boulder and/or dense granular material. However, due to the presence of bedrock outcrops in the vicinity of the landfill, SEI suspects that the refusal occurrences during Site drilling were due to the presence of bedrock.

2.3.2 Site Hydrology

The Site is situated within the drainage basin of Amphibolite Bay of Lake Temagami. The Active Fill Area is approximately 300 metres (“m”) from the shoreline of Amphibolite Bay which flows into the northeast arm of the Lake Temagami.

Along the eastern edge of the Site, a small creek flows north to northeast. The creek originates from the south side of the Lake Temagami Access Road and discharges into Amphibolite Bay a bay on the south side of the Northeast Arm of Lake Temagami. This creek is not identified on any base maps and, therefore, is not mapped on the figures in this report.

Surface water samples were not collected as part of the monitoring program in 2023. SEI considers collecting samples from a small stream/swamp system to the east and northeast of the Site during each sampling event. However, in 2023, similar to 2022, there was insufficient flow in the stream for sample collection. As a result of these low flows, the swamp downstream of the Access Road was characterized by a series of small, isolated pools with limited flow connection between them. Consequently, meaningful water chemistry data would not be obtained from these small pools of water for the purpose of assessing landfill impact. In addition, WEG (2001) identified that the surface water pond adjacent to the Access Road, but on the other side of the road from the landfill, is likely located across a groundwater divide from the Fill Area.

2.3.3 Site Hydrogeology

The 2001 Hydrogeological Assessment was conducted by WEG to assist with the transfer of the Site ownership from the MNRF to Temagami (WEG, 2001) and to provide background environmental information. A baseline survey was not conducted at the Site prior to its use as a landfill.

Measured groundwater elevations for the years 2001, 2008 to 2011, and 2016 to 2023, expressed in mbg, are provided in Table 2.3.1. MW4 has never contained sufficient volume of water for sampling. Monitoring well MW5 was sampled in 2001, but had insufficient water for sampling in subsequent years, was inadvertently damaged, and was decommissioned in 2016 by a licensed well technician.

Water table contours for April and November 2023 are provided in Figures 2.3.1 and 2.3.2, respectively. These water table contours were prepared using a kriging algorithm in Golden Software's Surfer®.

Historical and 2023 data show that groundwater elevations tend to be higher in the spring/summer than in the fall (Table 2.3.1.) Groundwater elevations in MW4 have varied little over time, perhaps due to the proximity of the bottom of the monitoring well to the suspected bedrock (i.e., small quantities of groundwater might consistently be present at the base of the well). However, in 2001, 2019, and 2021, MW4 was dry and groundwater elevations could not be measured at this location.

Groundwater elevations from 2023 indicate that the shallow groundwater flow-direction at the Site was westerly in April and November (Figure 2.3.1 and Figure 2.3.2).

In 2023, the average horizontal hydraulic gradient was 0.028 metres per metre ("m/m"). WEG (2001) recommended using a mean hydraulic conductivity of 3.8×10^{-4} cm/s for the Site. Using this data and an estimated effective porosity of 0.3, in 2023, the average linear flow velocity across the Site was approximately 11 metres per year ("m/yr").

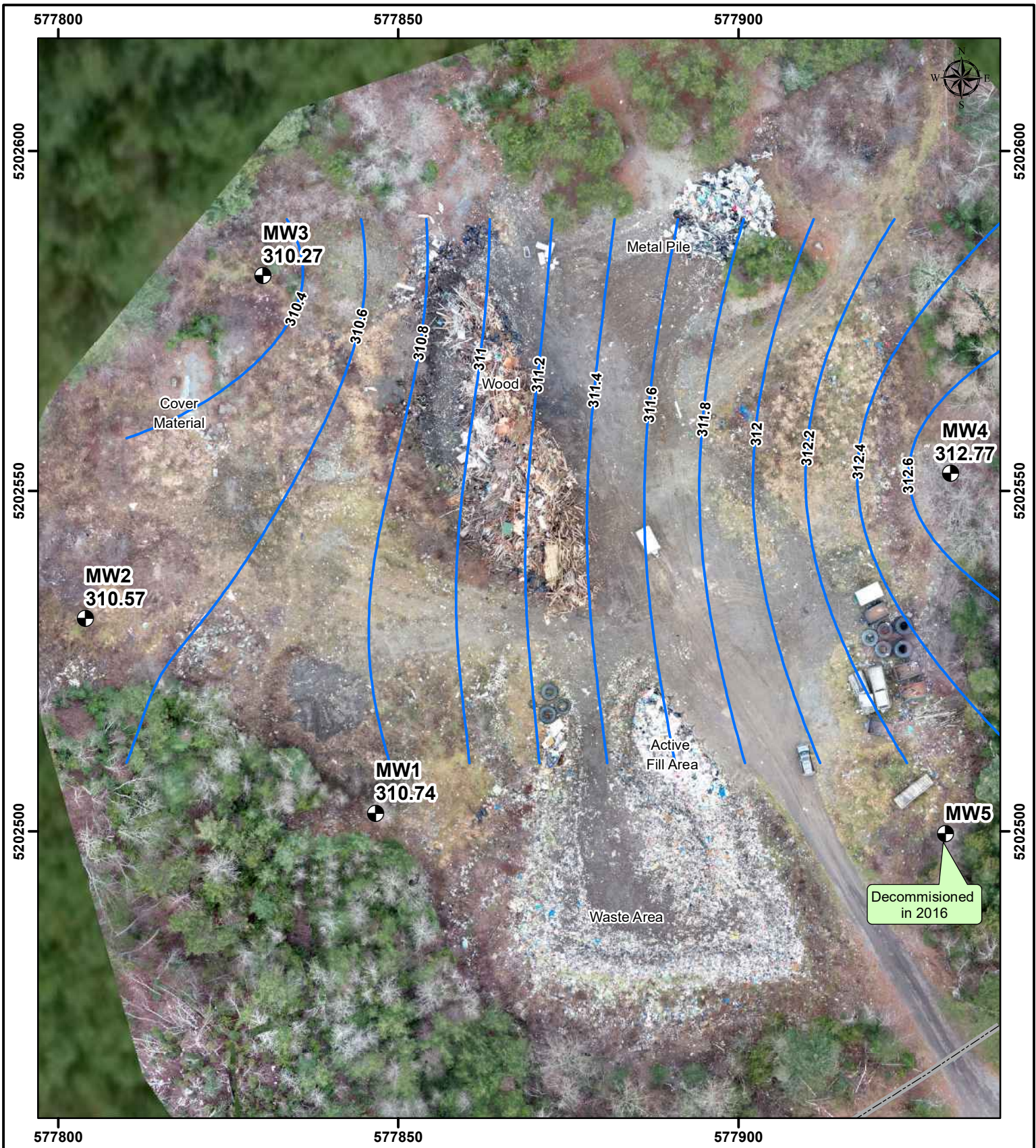
Table 2.3.1 Groundwater Monitoring Well Elevations (mbg)

Date	07 Jun 2001	16 Oct 2008	14 Jul 2009	20 Oct 2009	15 Jun 2010	14 Oct 2010	22 Jun 2011	27 Oct 2011	09 Jun 2016	26 Oct 2016	12 Jul 2017	05 Oct 2017	24 Jul 2018	12 Oct 2018	19 Jun 2019	10 Oct 2019	17 Jun 2020	24 Sep 2020	10 Jun 2021	27 Sep 2021	15 Jun 2022	08 Nov 2022	26 Apr 2023	14 Nov 2023
Monitoring Well																								
MW1	0.39	1.02	0.77	1.01	1.00	1.15	0.58	1.00	0.50	1.17	0.62	1.21	0.78	0.27	0.21	1.34	0.60	1.05	0.66	1.27	0.49	1.32	-0.09	0.71
MW2	0.36	0.91	0.65	0.89	0.86	1.03	0.47	0.87	0.35	1.01	0.51	1.01	0.40	0.24	0.04	1.12	0.43	0.86	0.49	1.02	0.38	1.16	-0.11	0.66
MW3	0.44	0.8	0.58	0.76	0.74	0.88	0.39	0.73	0.30	0.85	0.40	0.86	0.41	0.12	0.04	0.97	0.36	0.71	0.42	0.89	0.33	0.99	-0.16	0.52
MW4	dry	2.5	2.49	2.49	2.50	2.49	2.54	2.51	2.50	2.53	2.62	2.50	2.50	2.53	dry	dry	2.50	2.51	2.50	dry	2.70	2.69	2.69	2.69
MW5	5.09	dry	5.64	dry	dry	dry	5.69	dry	dry	dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-

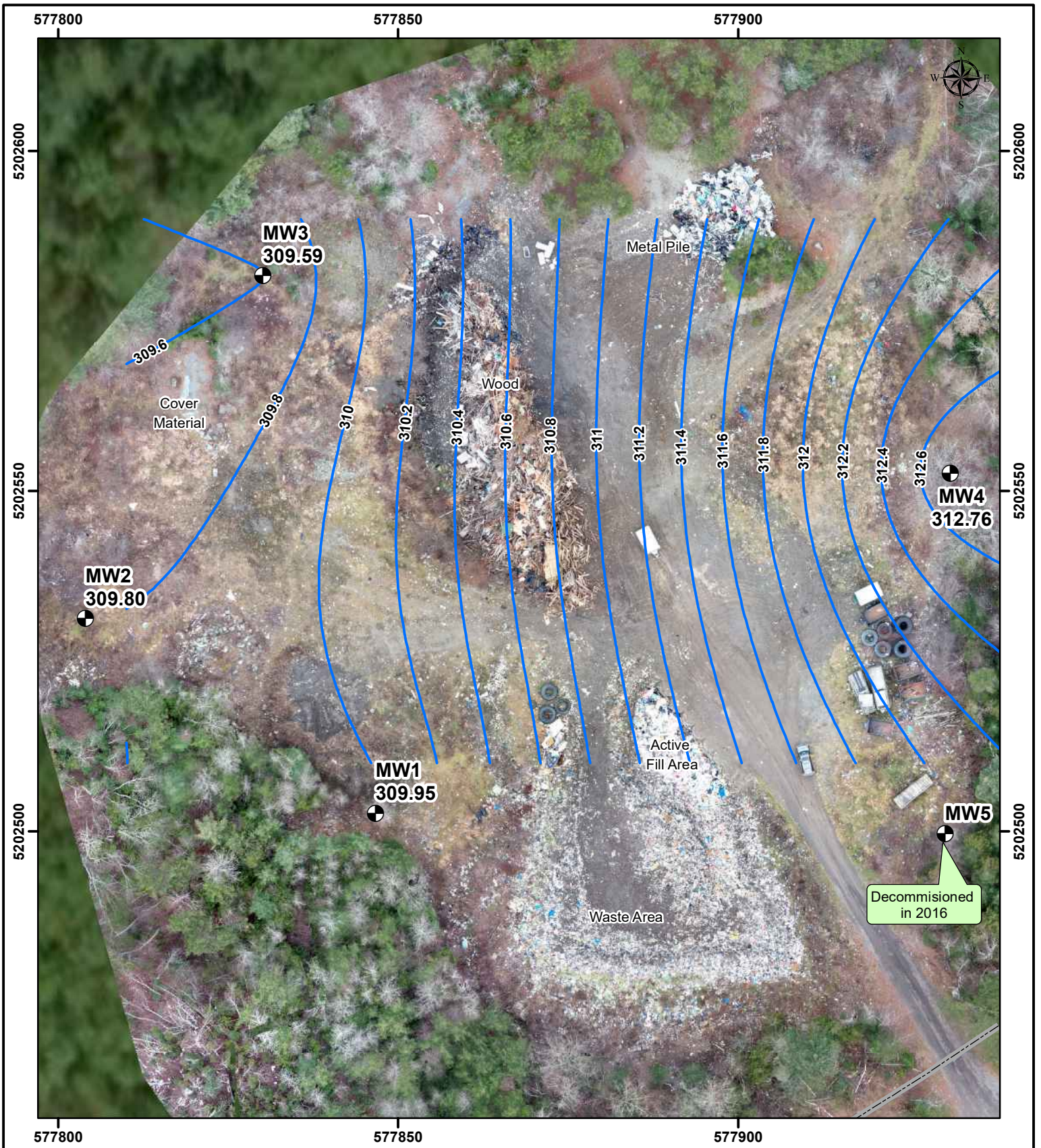
R:\SEI\048 Temagami\01_Briggs\Work\2024\048_Briggs_GW_Levels_22Feb24_JTA.xlsx\Briggs_GW_Levels_Crosstab

Notes:

1. Elevation units are in metres below grade.
2. Monitoring Well MW5 was decommissioned in December 2016, therefore is no longer monitored.



Legend Monitoring Wells April 2023 Groundwater Contours (0.2m Interval) Gate	NAD83 UTM Zone 17T Metres 0 3.75 7.5 15 	 Corporation of the Municipality of Temagami Briggs Landfill Proj. No.: 048-01-33		 Briggs Landfill Annual Report
		Date: 24-Apr-2024 Drwn by: JALD Rvw'd by: MES		Drawing No.: SEI-048-01-33-003.2
Sources: Corporation of the Municipality of Temagami: Landfill Features 2022, RPAS Aerial Imagery acquired by SEI on 16-Nov-2023, Groundwater Contours 2023 created in Surfer. World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Locations are approximate.				FIGURE 2.3.1 April 2023 Groundwater Elevation Contours



Legend Monitoring Wells November 2023 Groundwater Contours (0.2m Interval) Gate	NAD83 UTM Zone 17T Metres 0 3.75 7.5 15 	 Corporation of the Municipality of Temagami Briggs Landfill Proj. No.: 048-01-33		 Briggs Landfill Annual Report
		Date: 24-Apr-2024 Drwn by: JALD Rvw'd by: MES		Drawing No.: SEI-048-01-33-004.2
Sources: Corporation of the Municipality of Temagami: Landfill Features 2022, RPAS Aerial Imagery acquired by SEI on 16-Nov-2023, Groundwater Contours 2023 created in Surfer. World Imagery:Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Locations are approximate.		FIGURE 2.3.2 November 2023 Groundwater Elevation Contours		

3 Site Operations

3.1 Day-to-Day Operations

Temagami's Waste Management Program includes diversion of waste from landfill disposal. Storage areas for scrap metal, white goods, and used tires are provided at Site and these materials are transferred offsite, as required. In 2015, Temagami implemented a recycling program. A garbage dumpster, at the landing at the end of Lake Temagami Access Road, is available for afterhours waste disposal.

The hours of Site operation are:

- Monday: 1:00 pm to 4:30 pm
- Tuesday: closed
- Wednesday: 1:00 pm to 4:30 pm
- Thursday: 8:30 am to 12:00 pm
- Friday: closed
- Saturday: closed
- Sundays and Holidays: closed

SEI conducted a gap analysis of best management practices and legislative requirements for the Temagami landfills in 2007. Inconsistent record keeping was one of the identified gaps. Since October of 2007, Temagami has maintained daily records at each of their landfills through completion of a daily log sheet. The data recorded includes:

- the date of waste receipt;
- the hours of operation;
- the landfill attendant;
- the type of vehicle that delivered the waste;
- an estimated volume of the total waste received in cubic metres and its category (clean wood/brush, commercial waste, construction waste, domestic, metal, refrigerators, and tires);
- any complaints received and the responding actions to address them; and
- any other comments relevant to describe the daily landfill operations.

The MECP issued a Provincial Officer's Order, No. 6174-A3KJ9R, to Temagami on 30 April 2016. This Order stated that Temagami is to ensure:

- that, when the Site is open, all incoming waste to the Site is inspected and that an attendant is always on duty; and
- to implement measures to prevent access to the Site by public vehicles and pedestrians during those periods when an attendant is not on duty.

Previously, the Site employed a single bar gate to prevent citizens from entering the Site afterhours. This proved ineffective as citizens would walk on to the Site on foot. To better secure the Site, Temagami installed a new chain link fence gate topped with barbed wire in 2016.

The main operating challenge encountered in 2023 was a significant volume of windblown and scattered debris which is a function of: the size of the working face, bears moving waste outside of the Active Fill Area, and the pre-existing polygon shape of the Fill Area. Suggested mitigation actions which address this issue are provided in the Recommendations Regarding Operations section of this report.

3.2 Waste Volume and Landfill Capacity

The landfill is a trench and fill operation with use of one Active Fill Area at a time. Public Works has tracked the amount of waste accepted at the Site since October 2007. There was not any recording of the volume of waste deposited in the landfill prior to this time. Data available to estimate deposited waste volumes prior to 2008 consist of Site topographic surveys completed by Sutcliffe Rody Quesnel Inc. ("SRQ") in 2001 and 2008. SEI had SRQ conduct cut and fill volume calculations using the survey data to determine the volume of waste deposited between 2001 and 2008. In 2009, SEI conducted test pitting to determine a topographic baseline of the landfill and to calculate a reliable residual capacity for the landfill.

Landfill volumes from 2009 to 2018 were based on historical waste deposition surveys, landfill attendant tracking, and estimated annual volumes based on historical averages.

Starting in 2019, the volume deposited in the Fill Area was calculated through the application of two methods:

- 1) Temagami's daily record keeping of the volumes deposited at the Site; and
- 2) using RPAS data to generate digital elevation models of the Fill Area once per year and calculating the volumetric change of this surface over the year.

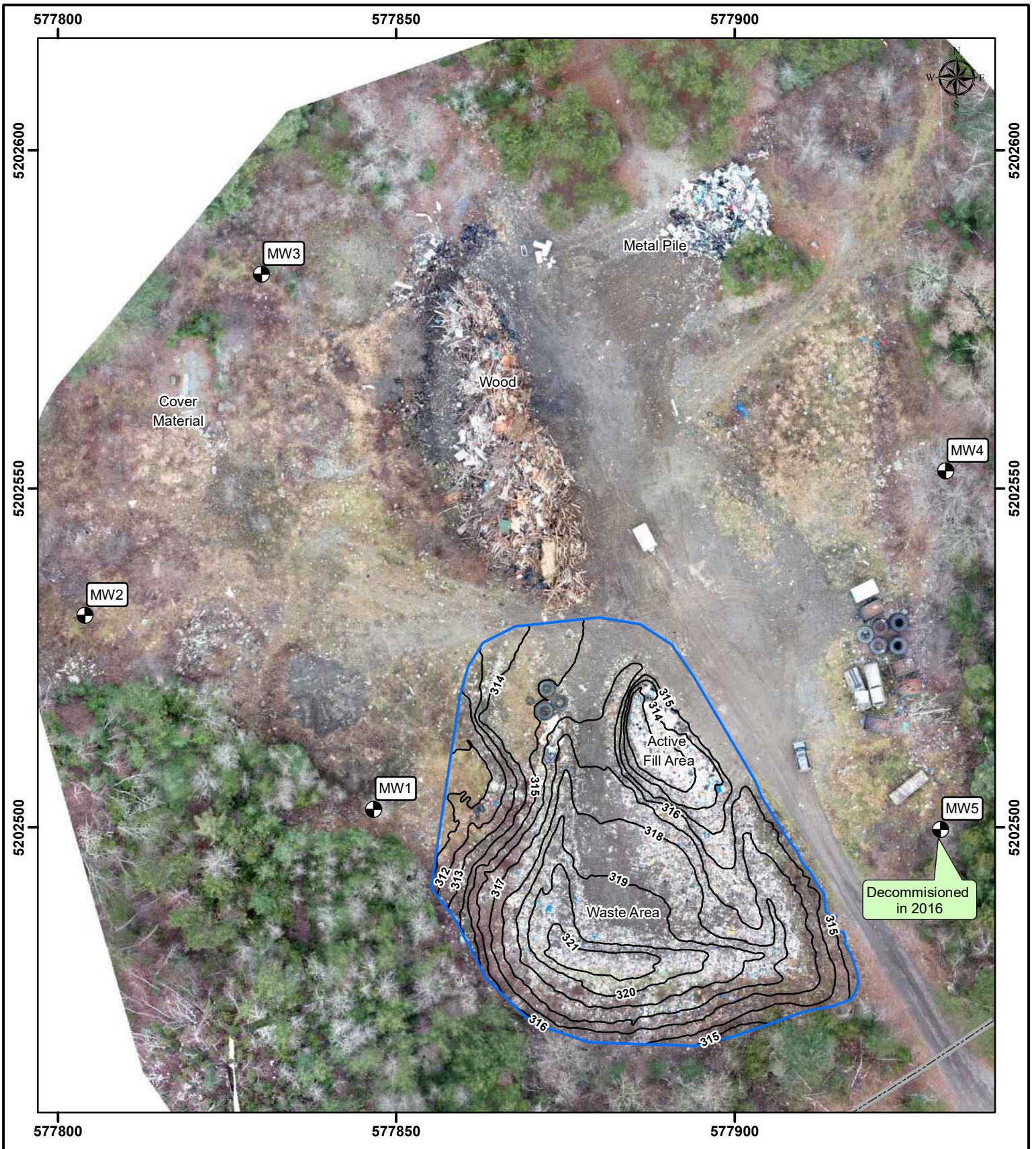
According to 2023 data collected by Temagami, 3707 m³ of non-compacted waste were deposited in the Fill Area (Table 3.2.1). This equates to 2141 m³ of compacted waste and cover material added to the Site in 2023 (Table 3.2.2). According to the RPAS surveys, there were 356 m³ of compacted waste and cover material added to the Site in 2023 (Table 3.2.2). The area surveyed by the RPAS, including contour lines, is illustrated on Figure 3.2.1.

The RPAS data are considered more accurate for estimating landfill volumes than the Public Works waste volume records. The volume of domestic waste derived from the RPAS data was 500 percent (%) lower than the volume recorded by Public Works. SEI will continue to use the RPAS data to determine waste deposition in the landfill. Temagami indicated that some waste compaction of the existing waste occurred in 2023. This is most likely responsible for the

discrepancy between Temagami's recorded waste deposition volumes and the estimated volumes obtained through the RPAS.

Approximately 31 974 m³ of material (compacted waste and cover material) are currently present within the landfill (as of November 2023) (Table 3.2.3). Since the approved capacity of the landfill is 40 000 m³, the remaining capacity for waste and cover material in the landfill is estimated to be 8026 m³(Table 3.2.3).

The amount of waste and cover material deposited in the landfill between the 2022 and 2023 RPAS surveys (a 12-month period), was 356 m³. The life expectancy for the landfill was calculated using the average volume deposited in the Fill Area, as determined using the RPAS survey results over the last five years (2019 = 465 m³, 2020 = 606 m³, 2021 = 833 m³, 2022 = 472 m³ and 2023 = 356 m³). Using this data, the average annual waste deposition rate was calculated to be 635 m³. Using this waste deposition rate and the estimated remaining capacity of 8026 m³(Table 3.2.3), the landfill will reach its licensed capacity in approximately 12 years. This life expectancy calculation should be assessed annually through collection of updated survey data and with any changes to the geometry of the permitted Fill Area.



Legend Monitoring Wells 2023 RPAS Survey Topographic Contours (1m Interval) Gate	NAD83 UTM Zone 17T Metres 0 3.75 7.5 15 	 STORY environmental		 MUNICIPALITÉ DE TEMAGAMI	
		Corporation of the Municipality of Temagami Briggs Landfill		Briggs Landfill Annual Report	
		Proj. No.: 048-01-33		Drawing No.: SEI-048-01-33-005	
Sources: Corporation of the Municipality of Temagami: Landfill Features 2022, RPAS Aerial imagery acquired by SEI on 16-Nov-2023, Contours based on DSM generated from orthoimagery. Locations are approximate.		Date: 21-Feb-2024 Drwn by: JALD Rvw'd by: MES		FIGURE 3.2.1	
2023 Topographic Survey					

Table 3.2.1 Town Tracking: Briggs Landfill Annual Waste Volumes (non-compacted)

Waste Stream Totals per Year (Non-compacted)								
Year	Diverted From Fill Area				Deposited in Fill Area			Total Waste
	Tires	Clean Wood/Brush	Refrigerators	Metal	Domestic Waste	Commercial Waste	Construction Waste	
2008	0	215	7	39	1556	1	24	1581
2009	0	377	0	187	1422	0	5	1426
2010	2	588	15	251	1446	65	105	1616
2011	0	422	0	318	1381	8	20	1409
2012	0	388	0	348	1335	0	0	1335
2013	0	497	0	275	1598	0	0	1598
2014	0	734	0	276	1818	0	37	1855
2015	0	251	0	215	1002	0	105	1107
2016	0	1177	0	414	2417	23	81	2521
2017	0	726	0	236	1713	0	35	1748
2018	0	127	0	232	1276	0	240	1516
2019	0	904	0	333	1862	0	457	2319
2020	0	1079	0	332	2158	4	154	2316
2021	0	770	0	417	2227	0	170	2397
2022	0	1124	0	473	2754	0	5	2759
2023	0	416	0	208	3627	0	80	3707

Notes:

1. All units are in cubic metres
2. All loads are estimated in cubic metres by the landfill attendant

Source:

R:\SE\048 Temagami\01_Briggs\Work\2024\048_Briggs Volumes_22Feb24_JTA.xlsx]2023 data

Table 3.2.2 Volume Added in 2023

	Town Records (m ³)	SEI RPAS (m ³)
Waste (non-compacted)	3707	-
Waste (compacted)	2039 ¹	338 ²
Cover (estimated to be ~5%)	102	18
Total Volume (Waste + Cover)	2141	356 ³

Notes:

1) Calculated assuming compacted waste is 55% of the volume of non-compacted waste

2) Calculated from Total Volume from SEI RPAS

3) From SEI RPAS data

Source:

R:\SEI\048 Temagami\01_Briggs\Work\2024\[048_Briggs_Remaining\Volume2023_22feb24_JTA.xls]2023

Table 3.2.3 Total Landfill Volumes and Remaining Capacity

	Volume (m ³)
Total Volume of Compacted Waste + Cover Material in Landfill to End of 2022	31 618
Volume of Compacted Waste + Cover Added in 2023 (SEI RPAS data)	356
Total Volume of Compacted Waste + Cover Material in Landfill to End of 2023	31 974
Capacity of Landfill	40 000
Remaining Capacity	8026

Source:

R:\SEI\048 Temagami\01_Briggs\Work\2024\[048_Briggs_Remaining\Volume2023_22feb24_JTA.xls]2023

3.3 Recommendations Regarding Operations

Based upon the review of 2023 operations, the following are the recommendations regarding landfill operations.

Waste in the form of plastic bags and other wind-blown debris is routinely observed outside of the Fill Area. This waste should be gathered, on a regular basis, and redeposited within the Fill Area. As well, portable fencing and a smaller working area would help prevent wind-blown debris.

A portion of the debris issue is due to bears carrying waste away from the Site, creating a secondary problem of wind-blown debris. In the summer of 2012, Temagami purchased electric bear fencing to address this issue. The electric bear fencing was installed at another landfill operated by Temagami, however it proved to be ineffective in diverting bears from that landfill, as the bears destroyed the fence shortly after installation. Therefore, Temagami did not proceed with the installation of the electric bear fencing at its landfill Sites.

The permitted Fill Area is not clearly defined and as illustrated in Figure 2.1.2 and Figure 2.1.3, consists of a polygon shape. To increase operational efficiency, the footprint configuration should be adjusted to a rectangle or square with clearly marked limits. Temagami plans, with the approval of the MECP, to update the shape so that it is more manageable from an operational perspective.

The Site should continue to be surveyed on an annual basis. Public Works should also continue to consolidate the waste volume data on a regular basis (e.g., quarterly throughout the year) to ensure that waste volume data are being routinely and accurately collected by the landfill attendant. In 2024, SEI requests that Temagami keeps records of when they perform compaction activities at their landfills. Compaction will reduce the volume of existing and new waste, therefore this information is important to understand how much compaction is conducted.

4 Water Quality Monitoring

4.1 Methods

4.1.1 Groundwater Sampling Methods

SEI conducted groundwater monitoring and sampling at the Site in 2023. The monitoring well installation details are provided in Table 2.2.1, the borehole logs are provided in Appendix B, and the location of the monitoring wells are provided on Figure 2.1.2.

Combustible vapour concentrations were measured in the monitoring wells with an RKI Eagle Combustible Gas Monitor. This was done by inserting the probe into a monitoring well and keeping the cap in place to the extent possible. The reading on the RKI was allowed to stabilize and then recorded.

Prior to sampling, the static water level in each monitoring well was measured using a Heron[®] oil/water Interface Probe and recorded. The probe was washed with phosphate free detergent and rinsed with deionized water between sampling locations. The recorded static water levels were used to calculate the volume of water required to purge the well of five casing volumes, using the following equation:

$$V_p = 5 \times \left[\frac{\pi}{4} \times d_w^2 (h_b - h_s) \times \left(\frac{1000L}{m^3} \right) \right]$$

where: V_p is the volume of groundwater to be purged (Litres);

h_b is the depth to the well bottom (m);

h_s is the depth to the water table (m); and

d_w is the well casing diameter (m).

The groundwater purging and sampling were completed using dedicated Waterra tubing and foot valves previously installed in the wells. Sampling staff wore a new pair of nitrile gloves during the sampling process at each well.

The groundwater pH, electrical conductivity, temperature, and dissolved oxygen were measured using a YSI Professional Plus multi-parameter meter (“YSI”) and the results were recorded on SEI field sheets. These parameters were measured at least three times during the process of purging each of the wells of up to five casing volumes (approximately 12 to 50 litres (“L”). The purged water was pumped into a 15 L bucket containing the YSI and the bucket was emptied after each third of the total required purged volume was collected (or 15 L, whichever was smaller, depending on the well). This procedure of measurements was used to ensure that the groundwater was approaching steady-state values for the field parameters prior to sampling.

After purging each well and completing the field measurements, samples were collected in the appropriately labelled laboratory-supplied sampling bottles by pumping groundwater directly from the dedicated Waterra tubing into the sample bottles. A 0.45-micron Waterra FHT-Groundwater filter was placed on the end of the tubing to filter the metals sample bottles (dissolved metals and mercury). All samples were placed in ice chilled coolers and shipped by overnight courier to Bureau Veritas Laboratories (“BV Labs”) in Mississauga, Ontario.

4.2 Quality Assurance and Quality Control

All laboratory analytical data are supported by a Certificate of Analysis which outlines the analyses performed, the methodology utilized, the instruments used, and provides a Certificate of Quality Control and a Certificate of Analysis. The Certificate of Quality Control specifies the obtained Quality Assurance and Quality Control (“QA/QC”) data, including results of process blanks and matrix spikes, along with the performance criteria. The laboratory Certificates of Analysis for groundwater samples collected during the 2023 monitoring events are provided in Appendix C.

As part of the QA/QC program, SEI collected a set of blind field replicate samples from one monitoring well located at Temagami’s Briggs Landfill in April 2023 and Temagami’s Sisk Landfill in November 2023. The blind field replicate samples collected at Briggs and Sisk Landfills were labelled as “Y1” for submission to the laboratory.

The blind field replicate sample results are presented in Tables 4.2.1 and 4.2.2. The Relative Percent Difference (“RPD”) is used to compare the two laboratory results. The RPD is defined as the absolute value of the difference between the two results, divided by the average of the two results, converted to a percentage. To conduct these RPD calculations, both results must exceed the laboratory’s Reportable Detection Limit (“RDL”) by at least five times (5x).

There were no RPD exceedances greater than 20% in the Briggs Landfill April sampling event (Table 4.2.1) and the Sisk Landfill November sampling event (Table 4.2.2) in 2023.

Table 4.2.1 Quality Control - Groundwater Blind Field Replicates April 2023

Parameters	Units	MW1	RDL	Y1	RDL	Diff.	RPD (%)
Total Alkalinity (as CaCO ₃)	mg/L	180	1	200	1	20	11
Total Ammonia (as N)	mg/L	<0.050	0.05	<0.050	0.05	0	nc
Dissolved Arsenic	mg/L	< 0.0010	0.001	< 0.0010	0.001	0	nc
Dissolved Barium	mg/L	0.01	0.002	0.011	0.002	0.001	nc
Biological Oxygen Demand	mg/L	< 2	2	<2	2	0	nc
Dissolved Boron	mg/L	0.081	0.01	0.076	0.01	0.005	6
Dissolved Cadmium	mg/L	< 0.000090	0.00009	< 0.000090	0.00009	0	nc
Dissolved Calcium	mg/L	59	0.2	58	0.2	1	2
Chloride	mg/L	<1.0	1	<1.0	1	0	nc
Dissolved Chromium	mg/L	< 0.0050	0.005	< 0.0050	0.005	0	nc
Dissolved Copper	mg/L	0.0034	0.0009	0.0037	0.0009	0.0003	nc
Dissolved Organic Carbon	mg/L	1.8	0.4	1.8	0.4	0	nc
Hardness (as CaCO ₃)	mg/L	190	1	190	1	0	0
Dissolved Iron	mg/L	< 0.1	0.1	< 0.1	0.1	0	nc
Dissolved Lead	mg/L	< 0.00050	0.0005	< 0.00050	0.0005	0	nc
Dissolved Magnesium	mg/L	11	0.05	11	0.05	0	0
Dissolved Manganese	mg/L	0.29	0.002	0.28	0.002	0.01	4
Nitrate (as N)	mg/L	< 0.1	0.1	<0.1	0.1	0	nc
Nitrate + Nitrite (as N)	mg/L	< 0.1	0.1	<0.1	0.1	0	nc
Nitrite (as N)	mg/L	<0.010	0.01	<0.01	0.01	0	nc
Total Phosphorus	mg/L	0.18	0.004	0.18	0.004	0	0
Dissolved Potassium	mg/L	5.5	0.2	5.5	0.2	0	0
Dissolved Sodium	mg/L	5.1	0.1	5.2	0.1	0.1	2
Sulphate	mg/L	7	1	7.7	1	0.7	10
Total Dissolved Solids	mg/L	155	10	165	10	10	6
Total Kjeldahl Nitrogen	mg/L	0.17	0.1	0.2	0.1	0.03	nc
Dissolved Zinc	mg/L	< 0.0050	0.005	< 0.0050	0.005	0	nc

Notes:

Y1 = label of blind field replicates submitted to laboratory

RDL = Reportable Detection Limit

nc = not calculated. RPD is only calculated when the concentration results for both the sample and its replicate are greater than the Practical Quantitation Limit, defined as five times (5x) the RDL.

Diff. = Absolute difference between sample and its replicate. Half the RDL is used when the result is <RDL.

RPD = Relative Percent Difference between sample and its replicate, calculated as: $\text{Diff.} / ((\text{sample} + \text{replicate}) / 2) * 100$.

Shaded cells highlight results with RPD values in excess of 20% for inorganics or 30% for organics.

Source:

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Table 4.2.2 Quality Control - Groundwater Blind Field Replicates November 2023 (from 2023 Sisk Landfill monitoring)

Parameters	Units	MW3	RDL	Y1	RDL	Diff.	RPD (%)
Total Alkalinity (as CaCO ₃)	mg/L	130	1	150	1	20	14
Total Ammonia (as N)	mg/L	< 0.050	0.05	< 0.050	0.05	0	nc
Dissolved Arsenic	mg/L	< 0.0010	0.001	< 0.0010	0.001	0	nc
Dissolved Barium	mg/L	0.013	0.002	0.013	0.002	0	0
Biological Oxygen Demand	mg/L	< 2	2	< 2	2	0	nc
Dissolved Boron	mg/L	< 0.01	0.01	< 0.01	0.01	0	nc
Dissolved Cadmium	mg/L	< 0.000090	0.00009	< 0.000090	0.00009	0	nc
Dissolved Calcium	mg/L	46	0.2	46	0.2	0	0
Chloride	mg/L	< 1.0	1	< 1.0	1	0	nc
Dissolved Chromium	mg/L	< 0.0050	0.005	< 0.0050	0.005	0	nc
Dissolved Copper	mg/L	0.0017	0.0009	0.0025	0.0009	0.0008	nc
Dissolved Organic Carbon	mg/L	3.9	0.4	4.1	0.4	0.2	5
Hardness (as CaCO ₃)	mg/L	150	1	150	1	0	0
Dissolved Iron	mg/L	0.35	0.1	0.37	0.1	0.02	nc
Dissolved Lead	mg/L	< 0.00050	0.0005	< 0.00050	0.0005	0	nc
Dissolved Magnesium	mg/L	7.7	0.05	8	0.05	0.3	4
Dissolved Manganese	mg/L	0.014	0.002	0.014	0.002	0	0
Nitrate (as N)	mg/L	< 0.10	0.1	< 0.10	0.1	0	nc
Nitrate + Nitrite (as N)	mg/L	< 0.10	0.1	< 0.10	0.1	0	nc
Nitrite (as N)	mg/L	< 0.010	0.01	< 0.010	0.01	0	nc
Total Phosphorus	mg/L	0.025	0.004	0.023	0.004	0.002	8
Dissolved Potassium	mg/L	0.63	0.2	0.65	0.2	0.02	nc
Dissolved Sodium	mg/L	1	0.1	1.1	0.1	0.1	10
Sulphate	mg/L	2.4	1	2.3	1	0.1	nc
Total Dissolved Solids	mg/L	140	10	145	10	5	4
Total Kjeldahl Nitrogen	mg/L	0.14	0.1	0.1	0.1	0.04	nc
Dissolved Zinc	mg/L	< 0.0050	0.005	< 0.0050	0.005	0	nc

Notes:

Y1 = label of blind field replicates submitted to laboratory

RDL = Reportable Detection Limit

than the Practical Quantitation Limit, defined as five times (5x) the RDL.

Diff. = Absolute difference between sample and its replicate. Half the RDL is used when the result is <RDL.

RPD = Relative Percent Difference between sample and its replicate, calculated as: $\text{Diff.} / ((\text{sample} + \text{replicate}) / 2) * 100$.

Shaded cells highlight results with RPD values in excess of 20% for inorganics or 30% for organics.

Source:

R:\SE\048 Temagami\02_Sisk\Work\2024\048_Sisk_RPD_10Jan24_EK.xlsx]14 Nov 2023

4.3 Groundwater Chemistry

4.3.1 Groundwater Chemistry Results

The Laboratory Certificates of Analysis for the 2023 monitoring are included in Appendix C.

The analytical data from the 2023 groundwater monitoring events and the historical analytical data, are provided in Tables D.1 to Table D.4, Appendix D.

To determine the potential impacts of landfill leachate upon local groundwater quality, historical data was reviewed to select eight indicator parameters for the Site: alkalinity, dissolved boron, dissolved chloride, dissolved organic carbon, dissolved manganese, dissolved sodium, dissolved sulphate, and total dissolved solids. Figures 4.3.1 to 4.3.8 present time series of parameter concentration versus time for these key indicator parameters for each of the Site groundwater wells.

MW2 parameter concentrations are most representative of background groundwater conditions. In this monitoring well, the eight indicator parameters have remained relatively stable since the monitoring program began in 2008 (Figures 4.3.1 to 4.3.8).

MW1, the monitoring well closest to the Active Fill Area, and MW3, show higher concentrations of the indicator parameters than the background well (i.e., MW2). However, as illustrated in Figures 4.3.1 to 4.3.8, all eight indicator parameters have been relatively stable since 2016 for these two monitoring wells, with the exception of increasing dissolved boron concentrations at MW3.

Figure 4.3.1 Alkalinity Time Series in Monitoring Wells

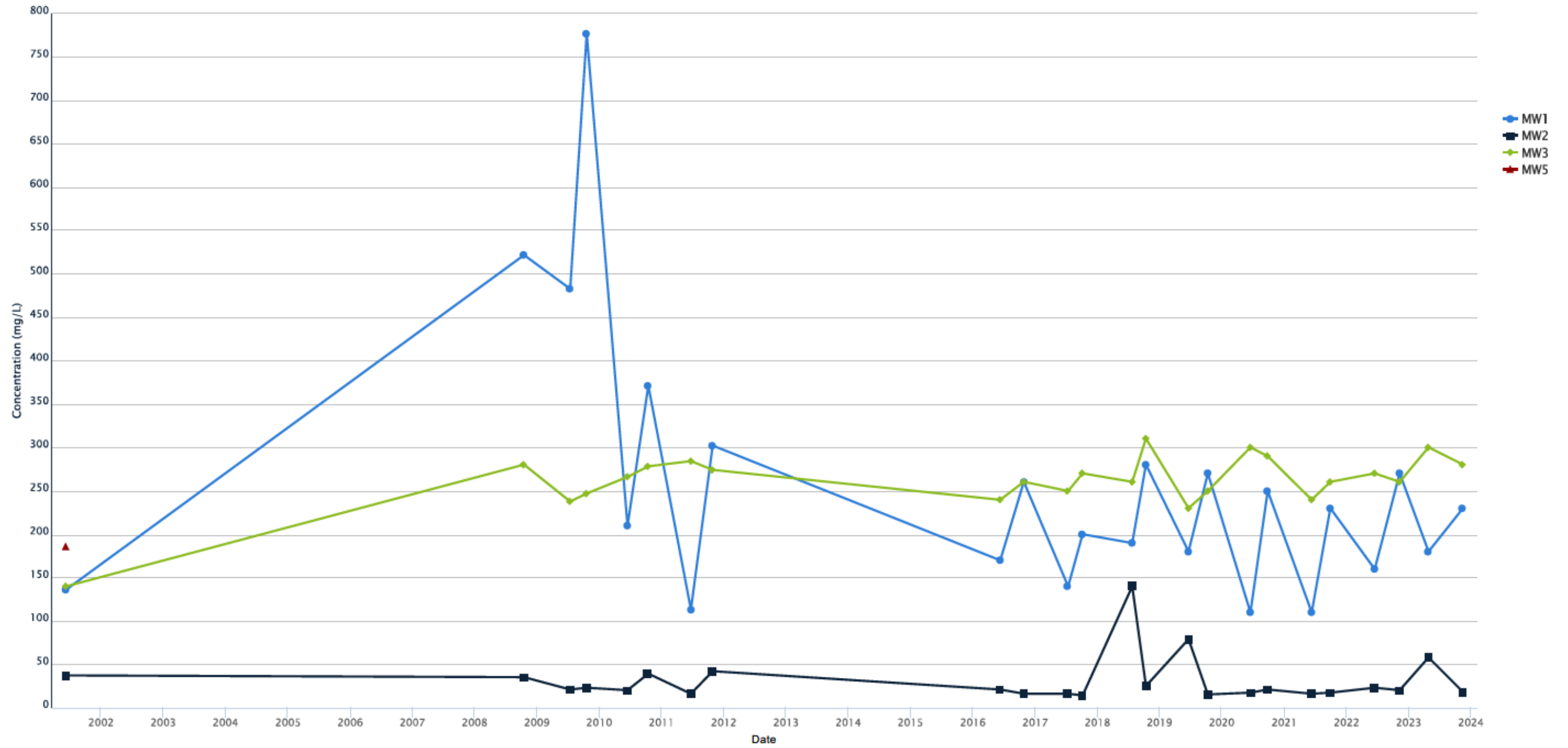


Figure 4.3.2 Dissolved Boron Time Series in Monitoring Wells

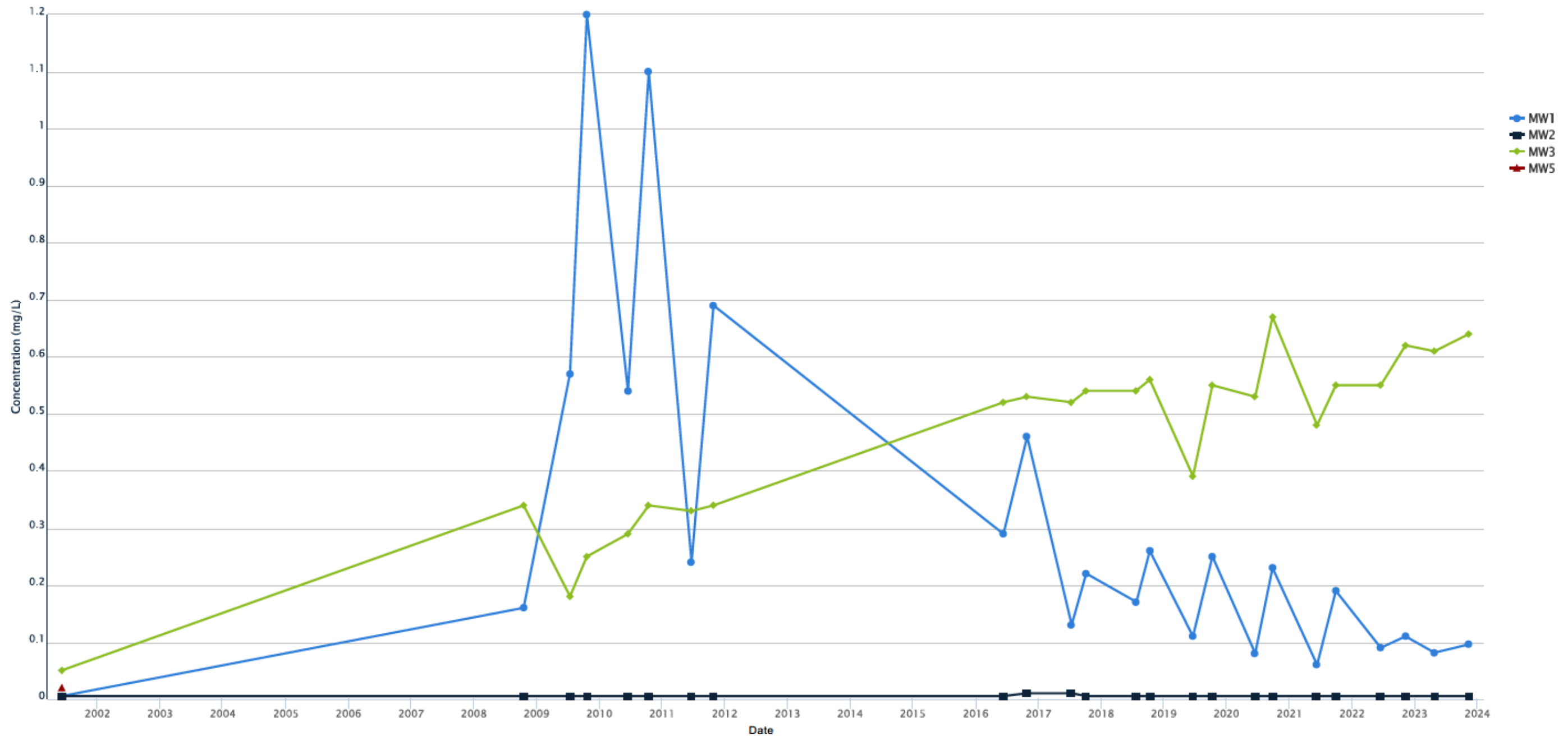


Figure 4.3.3 Dissolved Chloride Time Series in Monitoring Wells

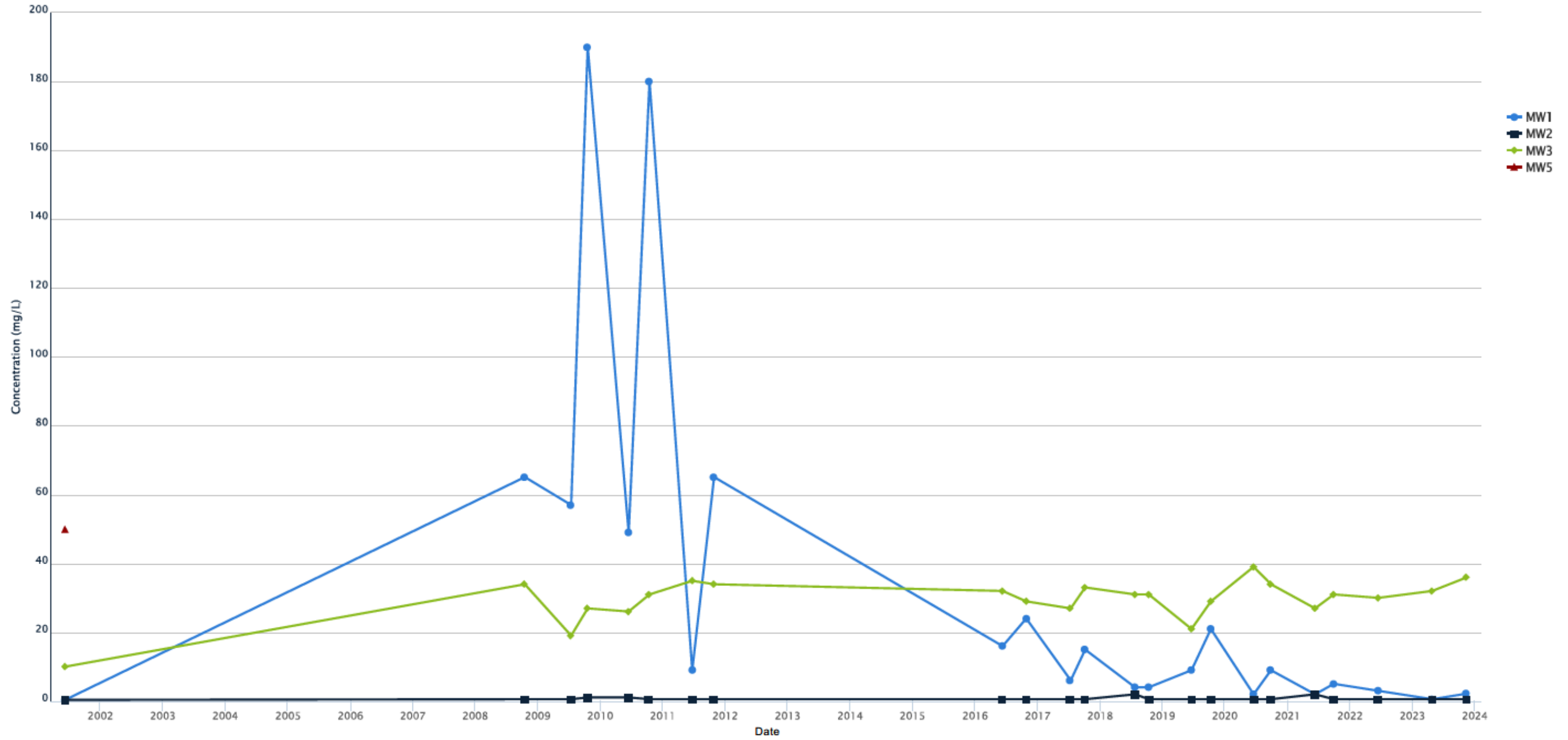


Figure 4.3.4 Dissolved Organic Carbon Time Series in Monitoring Wells

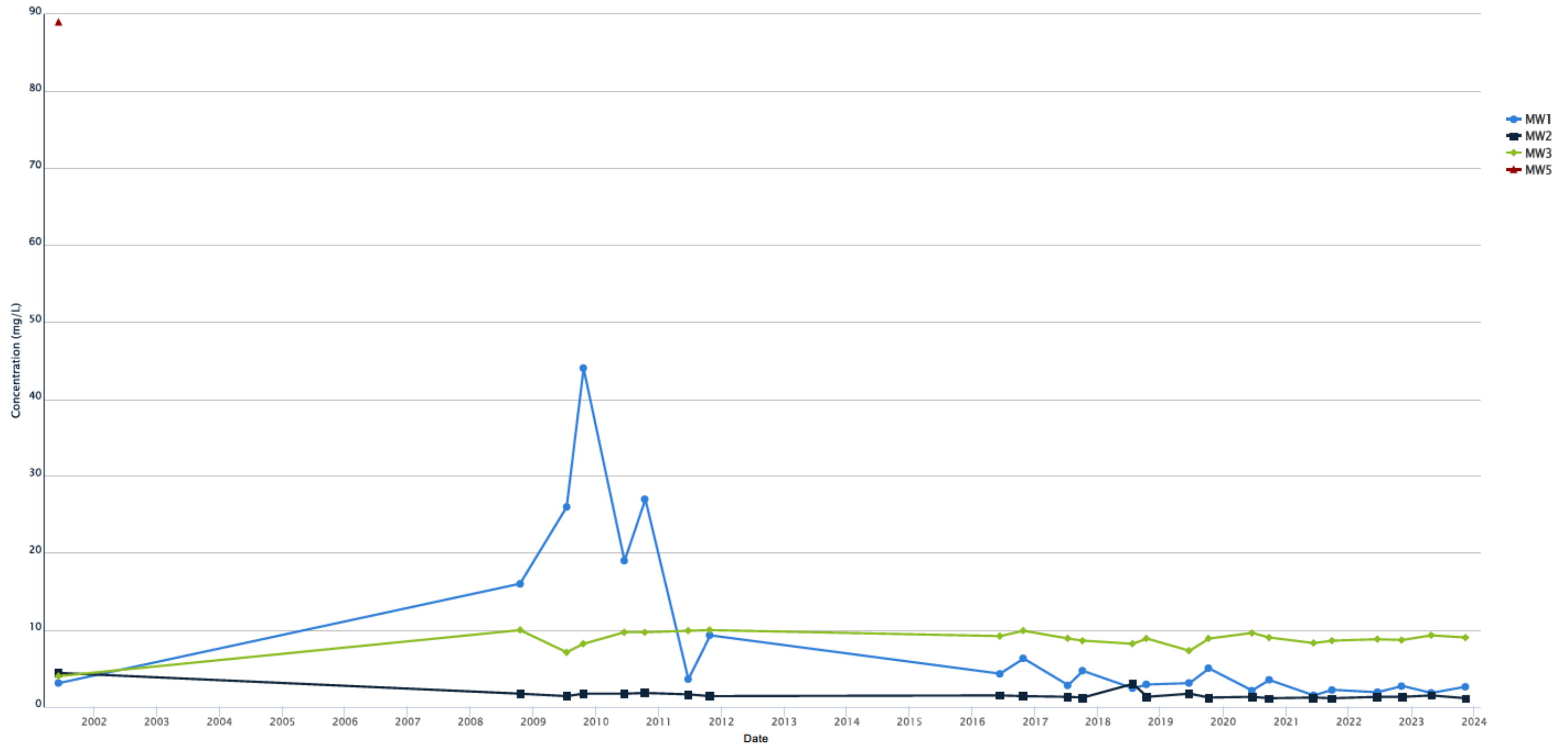


Figure 4.3.5 Dissolved Manganese Time Series in Monitoring Wells

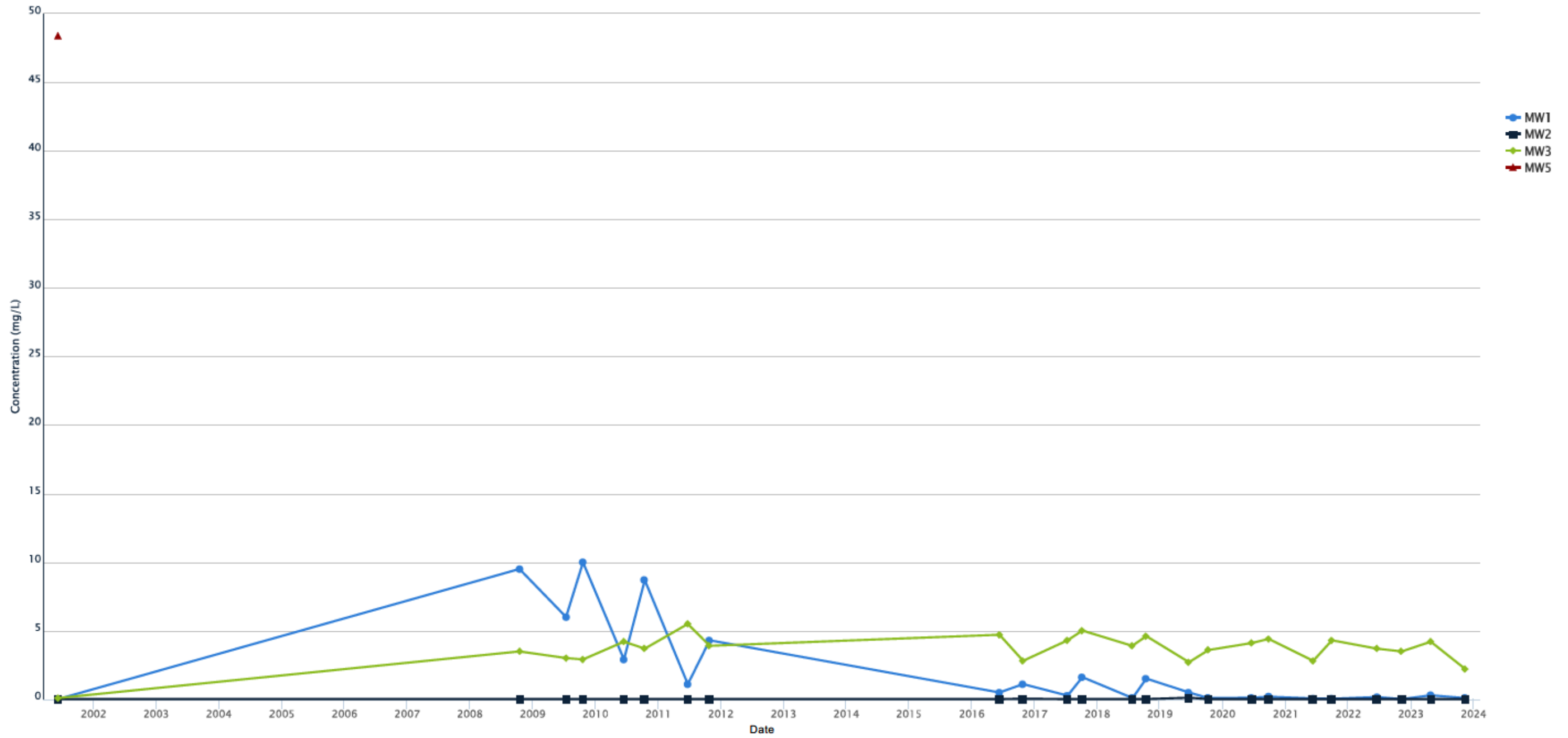


Figure 4.3.6 Dissolved Sodium Time Series in Monitoring Wells

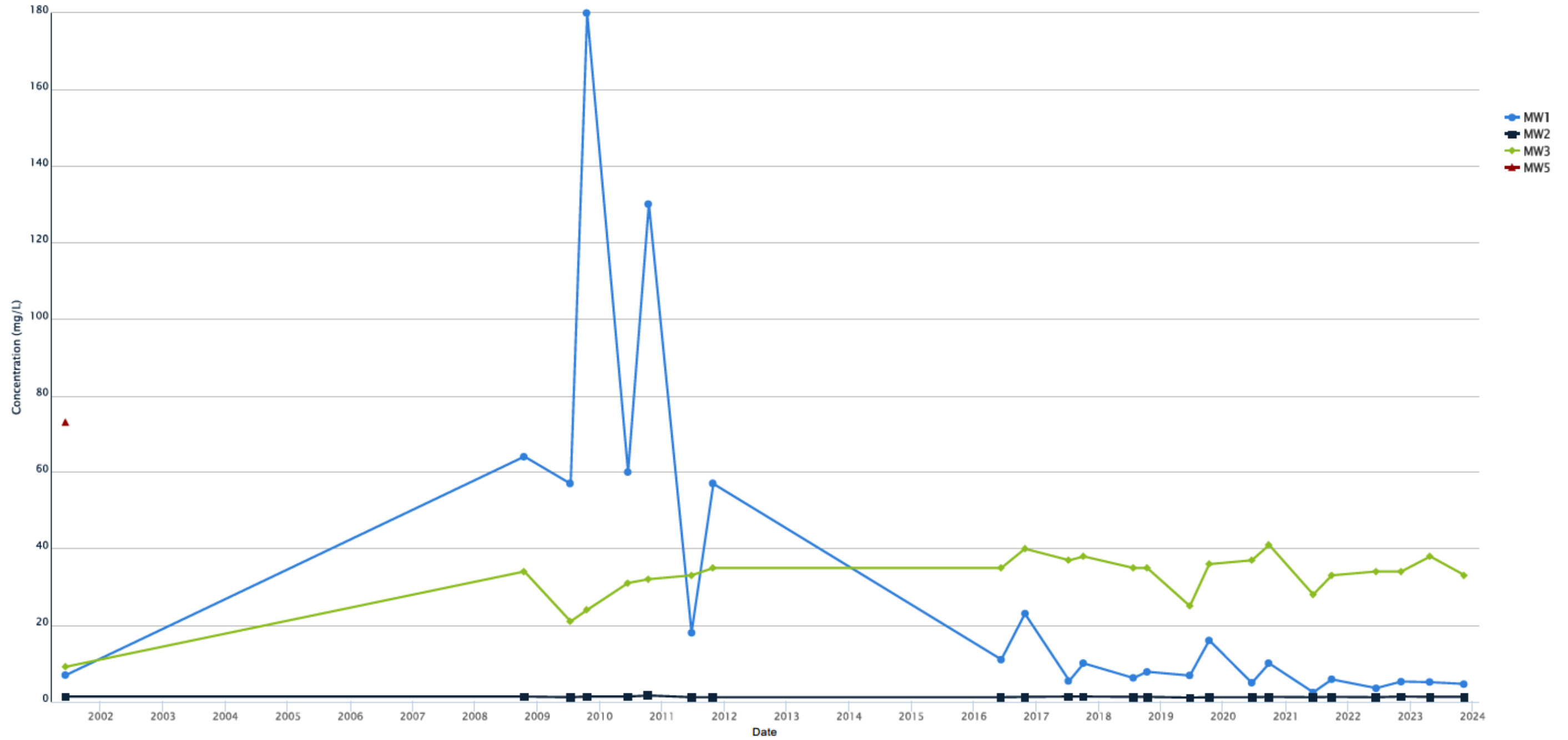


Figure 4.3.7 Dissolved Sulphate Time Series in Monitoring Wells

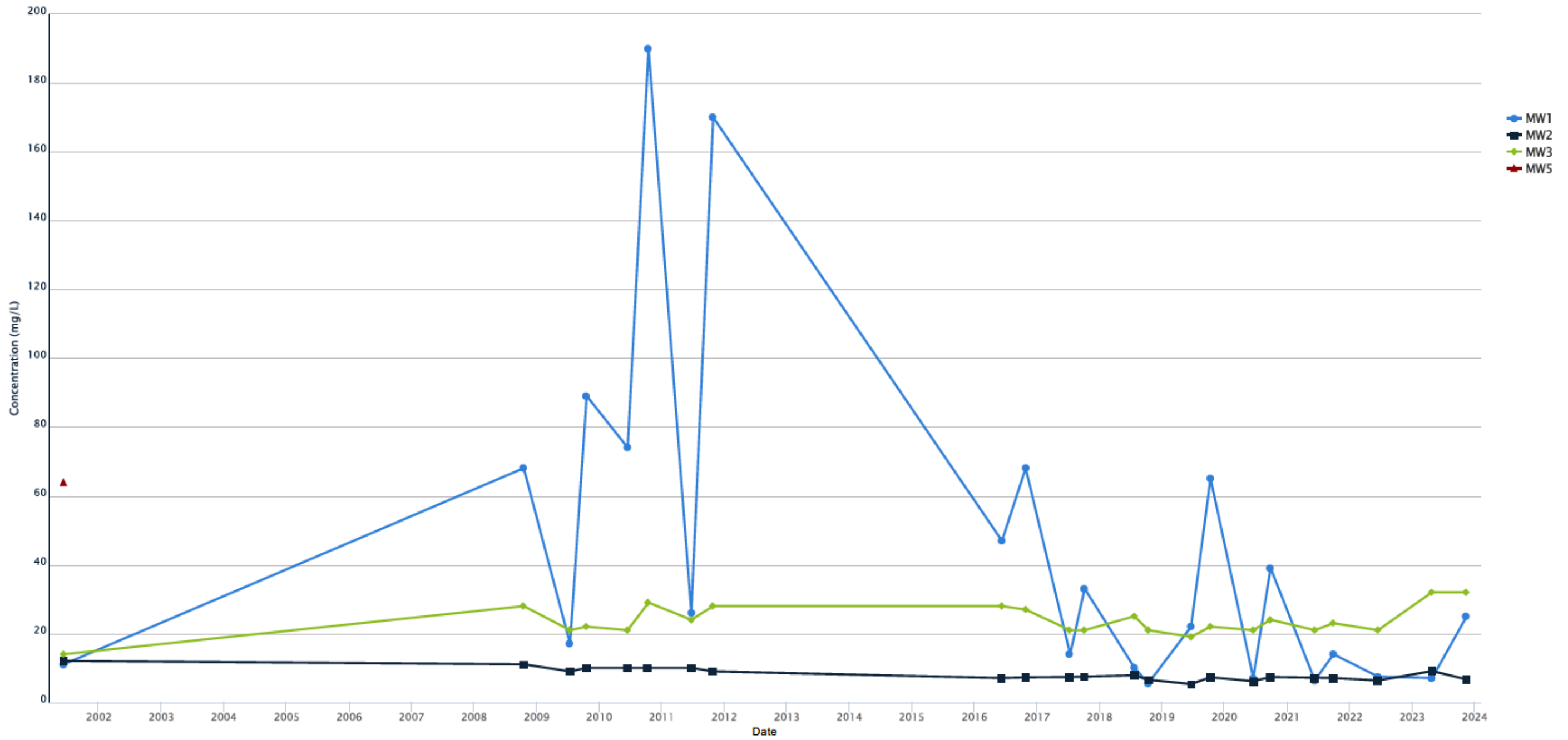
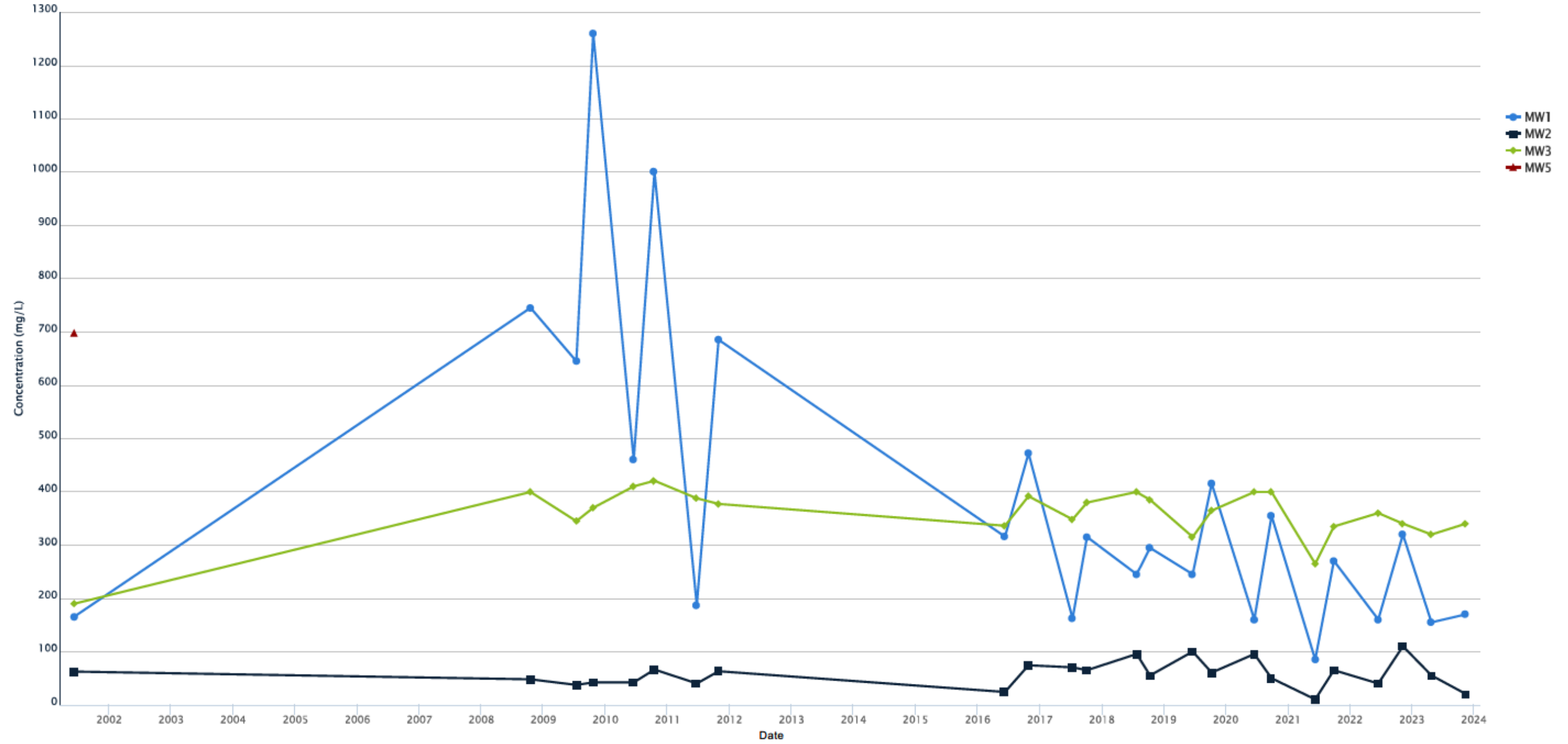


Figure 4.3.8 Total Dissolved Solids Time Series in Monitoring Wells



4.3.2 Compliance with Reasonable Use Concept

The MECP Guideline B-7 (MOE, 1986), for the Reasonable Use Concept (“RUC”), defines boundary criteria for the quality of groundwater leaving a landfill property. A background (non-impacted) well is used to apply the RUC to a site. SEI has used the concentrations from MW2 to represent the background conditions for this Site. It should be emphasized that the RUC is only strictly applicable at the Site’s property line. Exceedances of the RUC at groundwater monitoring locations near the Fill Area are expected and do not indicate non-compliance. Since MW1 and MW3 are within the Site near the Fill Area, the RUC is not technically applicable to these wells. The RUC was only used here to assess the degree of impact resulting from this proximity to the Fill Area. Once the full extent of the leachate plume has been established and additional monitoring wells further away from the Active Fill Area are available, this evaluation should be reconducted using more appropriate monitoring wells.

The results of the RUC analysis for the spring and fall sampling events in 2023 are presented in Tables 4.3.1 and 4.3.2. As expected, concentrations of some non-health related parameters including: alkalinity, dissolved organic carbon, hardness, organic nitrogen, total dissolved solids and dissolved manganese exceeded the RUC in samples collected from MW1 and MW3 which are located close to the Fill Area. MW3 exhibits more of these exceedances than MW1. No health-related parameters exceed the RUC. Due to the limited number of monitoring wells downgradient of the Fill Area, it is not possible to assess water quality compliance with RUC at the property boundary.

The total extent of leachate impacts at the Site is presently unknown due to the limited number of Site monitoring wells and the limited number of monitoring wells downgradient of the Fill Area. Concentrations at MW1 and MW3 have generally remained stable since 2016, with the exception of boron at MW3, and there are no exceedances of health-based RUC at these two monitoring locations, close to the Fill Area. However, due to the lack of monitoring wells more distant from the Fill Area and the increasing concentration of boron at MW3, the installation of additional downgradient monitoring wells should be considered in the coming years.

Table 4.3.1 Reasonable Use Concept Results April 2023

Parameters	Units	RUC Factor	ODWQS/ ODWO ¹	Background Well	Allowable Under RUC ^{3,4}	Monitoring Wells	
				MW2 ²		MW1	MW3
Health-Related Parameters							
Arsenic (As)-Dissolved	mg/L	0.25	0.01	< 0.0010	0.003	< 0.0010	< 0.0010
Barium (Ba)-Dissolved	mg/L	0.25	1	0.003	0.25	0.01	0.048
Boron (B)-Dissolved	mg/L	0.25	5	< 0.01	1.25	0.081	0.61
Cadmium (Cd)-Dissolved	mg/L	0.25	0.005	< 0.000090	0.001	< 0.000090	0.00014
Chromium (Cr)-Dissolved	mg/L	0.25	0.05	< 0.0050	0.01	< 0.0050	< 0.0050
Lead (Pb)-Dissolved	mg/L	0.25	0.01	0.00066	0.003	< 0.00050	< 0.00050
Nitrate (as N)	mg/L	0.25	10.0	0.23	2.7	< 0.10	0.3
Nitrite (as N)	mg/L	0.25	1.0	< 0.010	0.26	< 0.010	0.036
Non-Health Related Parameters							
Alkalinity (Total as CaCO ₃) ⁵	mg/L	0.5	500	58	279	180	300
Dissolved Chloride (Cl)	mg/L	0.5	250	< 1.0	125	< 1.0	32
Dissolved Organic Carbon	mg/L	0.5	5	1.5	3.3	1.8	9.3
Dissolved Sulphate (SO ₄)	mg/L	0.5	500	9.1	255	7	32
Hardness (CaCO ₃) ⁶	mg/L	0.5	100	51	76	190	260
Organic Nitrogen (Calculated)	mg/L	0.5	0.15	nc	0.075	0.15	0.6
Total Dissolved Solids (TDS)	mg/L	0.5	500	55	278	155	320
Copper (Cu)-Dissolved	mg/L	0.5	1	0.0017	0.5	0.0034	0.032
Iron (Fe)-Dissolved	mg/L	0.5	0.3	< 0.1	0.2	< 0.1	< 0.1
Manganese (Mn)-Dissolved	mg/L	0.5	0.05	< 0.0020	0.025	0.29	4.2
Sodium (na)-Dissolved	mg/L	0.5	200	1.2	101	5.1	38
Zinc (Zn)-Dissolved	mg/L	0.5	5	< 0.0050	2.5	< 0.0050	< 0.0050

Notes:

1. ODWQS = Ontario Drinking Water Quality Standard; ODWO= Ontario Drinking Water Quality Objectives, RUC = Reasonable Use Concept; "nc" = not calculated. Organic nitrogen not calculated if TKN and Total Ammonia are non detect or TKN<Total Ammonia
2. Background well used for Reasonable Use Concept ("RUC") calculations = MW2.
3. For health related parameters the allow able concentration = background + 25% of difference between ODWQS and background, or = background concentration if background exceeds ODWQS.
4. For non health related parameters the allow able concentration = background + 50% of difference between ODWQS and background, or = background concentration if background exceeds ODWQS. (In calculating the allow able concentrations, all background concentrations below the Reportable Detection Limit (RDL) were treated as being equal to one-half of the RDL.)
5. The ODWQS for alkalinity ranges from 30-500 mg/L, but only the upper limit is evaluated here.
6. The ODWQS for hardness ranges from 80-100 mg/L, but only the upper limit is evaluated here.
7. All parameter concentrations greater than the allow able concentration under the RUC are **bold** and underlined.

Source:

R:\SE\048 Temagami\01_Briggs\Work\2024\048_Briggs_RUC_10Jan24_EK.xlsx\April RUC

Table 4.3.2 Reasonable Use Concept Results November 2023

Parameters	Units	RUC Factor	ODWQS/ ODWO ¹	Background Well	Allowable Under RUC ^{3,4}	Monitoring Wells	
				MW2 ²		MW1	MW3
Health-Related Parameters							
Arsenic (As)-Dissolved	mg/L	0.25	0.01	< 0.0010	0.003	< 0.0010	< 0.0010
Barium (Ba)-Dissolved	mg/L	0.25	1	0.0023	0.25	0.013	0.052
Boron (B)-Dissolved	mg/L	0.25	5	< 0.01	1.25	0.096	0.64
Cadmium (Cd)-Dissolved	mg/L	0.25	0.005	< 0.000090	0.001	< 0.000090	< 0.000090
Chromium (Cr)-Dissolved	mg/L	0.25	0.05	< 0.0050	0.01	< 0.0050	< 0.0050
Lead (Pb)-Dissolved	mg/L	0.25	0.01	< 0.00050	0.003	< 0.00050	< 0.00050
Nitrate (as N)	mg/L	0.25	10.0	< 0.10	2.5	< 0.10	0.14
Nitrite (as N)	mg/L	0.25	1.0	< 0.010	0.26	< 0.010	0.125
Non-Health Related Parameters							
Alkalinity (Total as CaCO ₃) ⁵	mg/L	0.5	500	18	259	230	<u>280</u>
Dissolved Chloride (Cl)	mg/L	0.5	250	< 1.0	125	2.2	36
Dissolved Organic Carbon	mg/L	0.5	5	1.1	3.1	2.6	<u>9</u>
Dissolved Sulphate (SO ₄)	mg/L	0.5	500	6.6	253	25	32
Hardness (CaCO ₃) ⁶	mg/L	0.5	100	20	60	<u>230</u>	<u>260</u>
Organic Nitrogen (Calculated)	mg/L	0.5	0.15	nc	0.075	<u>0.19</u>	0.6
Total Dissolved Solids (TDS)	mg/L	0.5	500	20	260	170	<u>340</u>
Copper (Cu)-Dissolved	mg/L	0.5	1	0.0009	0.5	0.0035	0.038
Iron (Fe)-Dissolved	mg/L	0.5	0.3	< 0.1	0.2	< 0.1	< 0.1
Manganese (Mn)-Dissolved	mg/L	0.5	0.05	< 0.0020	0.025	<u>0.093</u>	<u>2.2</u>
Sodium (na)-Dissolved	mg/L	0.5	200	1.2	101	4.6	33
Zinc (Zn)-Dissolved	mg/L	0.5	5	< 0.0050	2.5	< 0.0050	< 0.0050

Notes:

1. ODWQS = Ontario Drinking Water Quality Standard; ODWO= Ontario Drinking Water Quality Objectives, RUC = Reasonable Use Concept; "nc" = not calculated. Organic nitrogen not calculated if TKN and Total Ammonia are non detect or TKN<Total Ammonia
2. Background well used for Reasonable Use Concept ("RUC") calculations = MW2.
3. For health related parameters the allow able concentration = background + 25% of difference between ODWQS and background, or = background concentration if background exceeds ODWQS.
4. For non health related parameters the allow able concentration = background + 50% of difference between ODWQS and background, or = background concentration if background exceeds ODWQS. (In calculating the allow able concentrations, all background concentrations below the Reportable Detection Limit (RDL) were treated as being equal to one-half of the RDL.)
5. The ODWQS for alkalinity ranges from 30-500 mg/L, but only the upper limit is evaluated here.
6. The ODWQS for hardness ranges from 80-100 mg/L, but only the upper limit is evaluated here.
7. All parameter concentrations greater than the allow able concentration under the RUC are **bold** and underlined.

Source:

R:\SE\048 Temagami\01_Briggs\Work\2024\048_Briggs_RUC_10Jan24_EK.xlsx\Nov RUC

4.3.3 Recommendations Regarding Groundwater

Monitoring of the groundwater quality at the Site should continue twice per year as required by the ECA. The concentrations of the indicator parameters obtained from monitoring wells at the Site have remained relatively consistent since 2016. Review of historical groundwater quality data led to omission of mercury and phenols from the analytical list for this site since 2016 because, no groundwater samples from the Site have detected mercury and phenols were detected only three times at MW1, at very low concentrations. No additional parameters are recommended for removal from the monitoring program at this time.

The total extent of leachate impacts at the Site is presently unknown due to the limited number of Site monitoring wells and the limited number of monitoring wells downgradient of the Fill Area. Concentrations at MW1 and MW3 have generally remained stable since 2016, with the exception of boron at MW3, and there are no exceedances of health-based RUC at these two monitoring locations, close to the Fill Area. However, due to the lack of monitoring wells more distant from the Fill Area and the increasing concentration of boron at MW3, the installation of additional downgradient monitoring wells should be considered over the coming years.

The installation of two wells to replace MW4 and MW5 should also be considered. The installation of a new well near MW4 would provide an upgradient background well for the Site and the replacement of MW5 would provide groundwater quality data for the southeast side of the Site.

Reports should continue to be submitted to the MECP annually.

4.4 Surface Water Chemistry

4.4.1 Surface Water Chemistry Results

Surface water samples were again not collected in 2023 because the adjacent stream (SW1) lacked sufficient and meaningful water flow. No other surface water was apparent near the Site.

4.4.2 Recommendations Regarding Surface Water

Surface water monitoring should continue at SW1 when representative samples can be collected, preferably twice per year as required by the ECA. Surface water conditions may be different in future years; therefore, it is recommended that this stream system continue to be assessed with each field visit to determine if suitable flows exist for sample collection.

4.5 Combustible Vapour Concentration in Monitoring Wells

During the field sampling, combustible vapour concentrations were measured in the monitoring wells with an RKI Eagle Combustible Gas Monitor. All the concentrations of combustible gas in the monitoring wells were low and did not approach combustible concentrations.

5 Conclusions and Recommendations

At the end of 2023, the estimated total volume of waste and cover material deposited at the Site was approximately 31 974 m³. Therefore, the remaining waste capacity is 8026 m³ and the life expectancy is approximately 12 years. SEI proposes to conduct annual topographic surveys of the Site using an RPAS to gather topographic information in an efficient manner. Annual RPAS data, will provide reliable annual estimates of the waste volume and cover material deposited at the Site.

The wind-blown debris at the landfill should be controlled by implementing a smaller working face in the Fill Area and maintaining temporary fencing around this area. To facilitate more efficient operation of the landfill, the configuration of the footprint should be altered, with MECP approval, into a rectangular or square shape. Once approved, the new configuration of the footprint should be clearly flagged with large visible posts to mark each corner.

The total extent of leachate impacts at the Site is presently unknown due to the limited number of Site monitoring wells and the limited number of monitoring wells downgradient of the Fill Area. Concentrations at MW1 and MW3 have generally remained stable since 2016, with the exception of boron at MW3, and there are no exceedances of health-based RUC at these two monitoring locations, close to the Fill Area. However, due to the lack of monitoring wells more distant from the Fill Area and the increasing concentration of boron at MW3, the installation of additional downgradient monitoring wells should be considered over the coming years.

The installation of two wells to replace MW4 and MW5 should also be considered. The installation of a new well near MW4 would provide an upgradient background well for the Site and the replacement of MW5 would provide groundwater quality data for the southeast side of the Site.

Finally, considering the findings obtained through the completion of 12 annual reports for this small landfill, the landfill monitoring and chemical sampling of surface water and groundwater should continue on a semi-annual basis, one event in the spring and one event in the fall, with a report submitted to the MECP annually. However, in the situation that an amendment is made to the current ECA, it is SEI's view that the reporting could be revised so that reports are submitted to the MECP every two years with continued semi-annual water quality monitoring.

6 References

- MOE, 1986. *Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities*, Ontario Ministry of the Environment Water Resources Branch, September 1986.
- ODM, 1967. *Ontario Department of Mines Preliminary Geological Map No. P. 394 Tomiko Sheet District of Nipissing*.
- ODNA, 1971. *Ontario Department of Northern Affairs Preliminary Map P. 678, Geological Series Tomiko Area (West Half) District of Nipissing*.
- OGS, 1979. *Northern Ontario Engineering Geology Terrain Study, Data Base Map, Tomiko, Ontario Geological Survey Map 5040, NTS 31L/NW*.
- WEG, 2001. *Hydrogeological Assessment Briggs Township MNR Landfill Site Temagami, Ontario, August 1991*, Waters Environmental Geosciences Ltd., Lively, Ontario, 9 pages + appendices.

7 Qualifications and Limitations

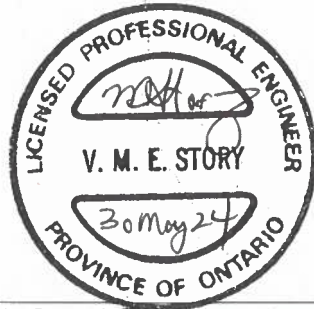
This document was prepared and reviewed by the undersigned.

Prepared by:



Janani Tamil Alagan, M.Eng
Environmental Engineering Intern

Reviewed
and Approved
by:



Maria Story P.Eng.
President

A description of the limitations, which are inherent to these types of studies, is outlined below. This information forms an integral part of this document.

This report is intended to provide information to The Corporation of the Municipality of Temagami. SEI is not a party to the various considerations underlying The Corporation of the Municipality of Temagami's business decisions and does not make recommendations regarding such business decisions. In providing this report, SEI accepts no liability or responsibility in respect of the site described in this report or for any business decisions relating to the site. SEI accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

The findings, conclusions, and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practicing under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions, and recommendations may be necessary.

The findings, conclusions, and recommendations presented by SEI in this report reflect SEI's best judgment based on the site conditions on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site, information available from historical databases, and interviews with people who are knowledgeable regarding the site. The findings cannot be extended to previous or future site conditions or to portions of the site, which were unavailable for direct observation.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, SEI should be requested to re-evaluate the findings, conclusions, and/or recommendations of this report, and to provide amendments as required.

Copying of this report is not permitted without the express permission of The Corporation of the Municipality of Temagami and SEI.

Appendix A

Environmental Compliance Approval



Ministry
of the
Environment

Ministère
de
l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A7206002
Notice No. 1
Issue Date: March 7, 2008

Her Majesty the Queen in the Right of Ontario
as represented by the Minister of Natural Resources
Box 38
Temagami, Ontario
POH 2H0

Site Location: Briggs Township Landfill
Unsurveyed
Temagami Municipality, District of Nipissing

You are hereby notified that I have amended Provisional Certificate of Approval No. A7206002 issued on January 29, 1981 for the use and operation of a 0.77 hectare landfill site within a total area of 9.25 hectares , as follows:

I. Definitions

The following definitions are added:

- (a) "Certificate" means this Provisional Certificate of Approval including all Notices of Amendment;
- (b) "Director" means Director, Section 39, *Environmental Protection Act*, R.S.O. 1990, C. E-19 as amended;
- (c) "District Manager" means the District Manager, North Bay District Office, Northern Region, Ontario Ministry of the Environment;
- (d) "*EPA*" means the *Environmental Protection Act*, R.S.O. 1990, C. E-19 as amended.
- (e) "Ministry" means the Ontario Ministry of the Environment;
- (f) "Owner" means the Ontario Ministry of Natural Resources
- (g) "Regional Director" means the Regional Director, Northern Region, Ontario Ministry of the Environment; and
- (h) "Regulation 347" means Ontario Regulation 347, R.R.O. 1990; as amended.

The following Conditions are hereby added:

The following Conditions are hereby added:

II. GENERAL

Compliance

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

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

In Accordance

4. Except as otherwise provided for in this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the EPA, the Conditions in this *Certificate*, and the supporting documentation listed in Schedule "A".

Interpretation

5. Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate*, and the conditions of this *Certificate*, the conditions in this *Certificate* shall take precedence.

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

7. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.

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

Other Legal Obligations

9. The issuance of, and compliance with, this *Certificate* does not:

- a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
- b. limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Certificate*;

Adverse Effect

10. 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.

11. Despite an *Owner*, *Operator* or any other person fulfilling any obligations imposed by this certificate the person remains responsible for any contravention of any other condition of this *Certificate* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

Change of Owner

12. 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*;
- 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;

13. 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 (if required) is deposited with the *Ministry* to ensure that these conditions will be carried out. In the event of any change in *Ownership* of the works, other than change to a successor

municipality, the *Owner* shall notify the successor of and provide the successor with a copy of this *Certificate*, and the *Owner* shall provide a copy of the notification to the *District Manager* and the *Director*.

Certificate of Prohibition

14. Unless exempt, pursuant to Section 197 of the *EPA*, no person having an interest in the *Site* shall deal in any way with the *Site* without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

15. Unless exempt, two (2) copies of a completed Certificate of Prohibition, containing a registerable description of the *Site*, shall be submitted to the *Director* for the *Director's* signature within 60 calendar days of the date of this *Certificate*.

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

Inspections

17. No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA*, the *EPA*, or the *PA*, of any place to which this *Certificate* relates, and without limiting the foregoing:

- a. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Certificate* are kept;
- b. to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate*;
- c. to inspect the *Site*, related equipment and appurtenances;
- d. to inspect the practices, procedures, or operations required by the conditions of this *Certificate*;
- and
- e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *EPA*, the *OWRA* or the *PA*.

Information and Record Retention

18. Any information requested, by the *Ministry*, concerning the *Site* and its operation under this *Certificate*, including but not limited to any records required to be kept by this *Certificate* shall be provided to the *Ministry*, upon request, in a timely manner. Records shall be retained for (5) five years except for as otherwise authorized in writing by the *Director*.

19. The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Certificate* or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:

- a. an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any term or condition of this *Certificate* or any statute, regulation or other legal requirement; or
- b. acceptance by the *Ministry* of the information's completeness or accuracy.

III. SITE OPERATIONS

Operations

20. (1) The *Site* shall be developed, operated and maintained in accordance with the documents listed in Schedule "A".

(2) Any changes to the *Site's* Design and Operation Manual shall be submitted to the *District Manager* prior to their implementation.

21. Only municipal waste as defined in the *EPA* may be landfilled at the site. No liquid industrial waste or hazardous waste

shall be disposed of at the landfill.

22. The site shall have a maximum volume capacity of **40,000** cubic meters.

23 A sign shall be posted in a prominent location at the *Site* entrance clearly stating the following:

- i. *Owner's* name;
- ii. Operator's name;
- iii. Provisional Certificate of Approval No.;
- iv. Type of Waste Accepted
- v. the hours of operation;
- vi. Public access to the *Site* is prohibited during non-operational hours; and
- vii. Contact telephone number to call with complaints or in the event of an emergency.

24. (i) Only clean wood and brush shall be permitted for burning. Burning of the materials shall be completed as per the Ministry of the Environment Guideline C-7 (Burning at Landfill Sites);

(ii) the clean wood/brush area shall be clearly marked with a sign(s) that prohibits the public from approaching the area when burning operations are occurring.

(iii) The *Owner* shall ensure there is a designated area for ash material.

Limit of Landfill

25. By **June 1, 2009**, the owner shall clearly define the boundaries of the limit of waste by installing permanent markers that can be visible year-round.

Hours of Operation

26. Waste shall only be accepted at the *Site* during the following time periods:

- i. Tuesdays and Thursdays 12:30 p.m. – 4:30 p.m.; and
- ii. Saturdays 8:00 a.m. - 12:00 p.m.

27. With the prior written concurrence of the *District Manager* the time periods may be reduced or extended to accommodate seasonal or unusual quantities of waste.

28. During non-operating hours, the site entrance and exit gates shall be locked and the *Site* shall be secured against access by unauthorized persons.

Cover Material

29. Cover shall be placed over the entire working face with a minimum thickness of 150 mm of soil cover or an approved thickness of alternative cover material as a minimum follows:

- i. From April 1 to December 1, daily cover shall be placed on a monthly basis
- ii. From December 2 to March 30 daily cover shall be placed as required.

30. Intermediate Cover shall be placed in areas where landfilling has been temporarily discontinued for six (6) months or more. A minimum thickness of 300 mm of soil cover or an approved thickness of alternative cover material shall be placed.

31. Type and thickness of alternative cover must be approved by the *Director* prior to implementation.

IV. INSPECTION AND MONITORING

32. An inspection of the entire *Site* and all equipment on the *Site* shall be conducted each day the *Site* is open for operation to ensure it is being operated in compliance with this *Certificate*.

33. The *Owner* shall maintain written records at the *Site* including as a minimum the following information:

- i. date of record;
- ii. categories and approximate quantities of waste received;
- iii. record of routine *Site* inspections;
- iv. record of complaints and other communications related to operational practices at the *Site* along with actions taken to address complaints or other communications issues;

34. (1) The *Owner* shall at least three times per year (once in each of the spring, summer and fall) collect groundwater elevations from the monitoring wells located on the site. The *Owner* shall provide the elevations in meter above sea level in the Annual Report required under Condition 38.

(2) The *Owner* shall at least once per year (fall) survey the top of water elevation for the un-named lake to the north of the landfill site. The *Owner* shall provide the information on water level elevations in meters above sea level in the Annual Report required under Condition 38.

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

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

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

- a. The *Owner* shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.
- b. All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the *Director* for abandonment, shall be decommissioned by the *Owner*, as required, in accordance with good standard practice that will prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the annual monitoring report for the period during which the well was decommissioned.

V. ANNUAL REPORT

38. By no later than **May 31, 2009** and then by every May 31 thereafter, the *Owner* shall submit to the *District Manager*, an annual report on the development, operation and environmental monitoring of the *Site*. The report shall include as a minimum the following:

- a. the results and an interpretive analysis of all leachate, groundwater, surface water and landfill gas monitoring; a report on the status of all monitoring wells;
- b. changes or improvements made to the *Site's* structure, features and operations;
- c. a summary of operational problems encountered at the *Site* and steps taken to resolve these problems;
- d. assessment of future monitoring needs, any recommended changes to the program,
- e. estimated calculations of the volume of waste, daily and intermediate cover and final cover deposited or placed at the *Site* during the reporting period, an estimate of the total volume of the *Site* capacity used in the reporting period;

- f. a calculation of the remaining capacity of the *Site* and an estimate of the remaining *Site* life;
- g. a summary of any complaints received and responses made; and
- h. any other information with respect to the *Site* which the Regional Director or District Manager may require from time to time.

VII. CLOSURE PLAN

39. At least two (2) years prior to the anticipated date of closure of this *Site*, the *Owner* shall submit to the *Director* for approval, with copies to the *District Manager*, a detailed Site Closure Plan pertaining to the termination of the landfilling operations at this *Site*. This plan shall include, as a minimum, a description of the work that will be done to facilitate the closure of the *Site* and the schedule for completion of that work; post closure inspection, maintenance and monitoring, and end use.

Schedule "A"

1. Application for a Certificate of Approval for a Waste Disposal Site, dated January 29, 2003 and signed by John Hodgson, the Municipality of Temagami.
2. Report entitled "Hydrogeological Assessment, Briggs Township, MNR Landfill Site, Temagami, Ontario", prepared by Waters Environmental Geosciences Ltd. and dated August 2001.
3. Report entitled "Landfill Operations Manual, Briggs Township Landfill Site, Temagami, Ontario", prepared by Waters Environmental Geosciences Ltd. and dated August 2002.
4. Letter dated August 3, 2005 addressed to the Ministry of Natural Resources from Kenneth D.N. Boal, Chief Administrative Officer, The Corporation of the Municipality of Temagami which indicates the Municipality's desire to purchase the landfill site.
5. Letter dated August 18, 2005 addressed to Mr. Don Farintosh, Ministry of Natural Resources from Kenneth D.N. Boal, Chief Administrative Officer, The Corporation of the Municipality of Temagami indicating that council resolved that the municipality proceed with the landfill acquisition.

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

1. *The reason for Conditions (2), (3), (4), (5), (6), (7), (8), (9), (10), (11) is to clarify the legal rights and responsibilities of the Owner under this Certificate of Approval.*
2. *The reasons for Condition (12) 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.*
3. *The reasons for Condition (13) are to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Certificate of Approval.*
4. *Condition (14), (15) and (16) is included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.*
5. *The reason for Condition (17) is to ensure that appropriate Ministry staff have ready access to the Site for inspection of*

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facilities, equipment, practices and operations required by the conditions in this Certificate of Approval. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the EPA and OWRA.

6. The reasons for Conditions (18) and (19) are to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this Certificate of Approval, the EPA and its regulations.

7. Condition No. 20 is included to ensure that the Site is operated 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.

8. Condition No. 21 is included to ensure the Owner is aware that only municipal waste is permitted for landfilling at the Site.

9. Condition No. 22 is included to clearly identify the Site's waste capacity.

10. Condition No. 23 and 24 are to ensure the landfill is operated in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

11. Condition No. 25 is included to ensure the owner installs permanent marker to allow the operator and Ministry staff to clearly see where the limits of landfilling are located. This will allow the operator to identify where waste can be placed. This is to ensure the long-term health and safety of the public and the environment.

12. Conditions Nos. 26 and 27 are included to specify the normal hours of operation for the landfill Site and a mechanism for amendment of the hours of operation.

13. Condition No. 28 is included to ensure controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no Site attendant is on duty.

14. Condition No. 29, 30 and 31 are included to ensure the owner places cover (daily or interim) over the waste.

15. Conditions Nos. 32 and 33 are included to ensure 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.

16. Condition No. 34 is included to require the Owner to monitor groundwater levels to ensure the groundwater flow direction is not towards the un-named lake and to ensure the Owner has an established an acceptable monitoring program for the groundwater and the surface water at the site should it be determined that groundwater flow at the site changes from the information presented in the Hydrogeological Report. This is to ensure the long-term health and safety of the public and the environment.

17. Conditions Nos. 35, 36, and 37 are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.

18. Condition No. 38 is included 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.

20. Condition No. 39 is included to ensure that final closure of the Site is completed in an esthetically pleasing manner and to ensure the long term protection of the natural environment.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A7206002 dated January 29, 1981

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

CONTENT COPY OF ORIGINAL

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of Environment and Energy
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 7th day of March, 2008

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

DG/
c: District Manager, MOE North Bay

Appendix B
Borehole Logs

Borehole BH - 1		Figure 3	Waters Environmental Geosciences Ltd.						
		Briggs Twp. MNR Landfill							
Project Number 20-106b		Date Started 21/04/2001	Date Completed 21/04/2001	Drawn by : PAR Checked by : PAR					
Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%)		
							20	40	60
	0.0	91.42 m		50 mm Topsoil, over Sand, trace of silt, fine grey, becoming wet below 1.37 m					
	1.0				SS1	6, 9, 9			
	2.0				SS2	6, 8, 13			
	3.0				SS3	9, 9, 8			
	3.0	88.38 m		Till, silt and sand, fine, grey, dense, wet	SS4	10, 16, 21			
		87.91 m							
	4.0			Refusal, on suspected bedrock or large boulder					
	5.0			NOTE: 1) Borehole BH-1 was advanced using 108 mm hollow stem augers. 2) Refer to the accompanying text for well construction details and an interpretation of this information.					
	6.0								
7.0									

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation. Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery. Water level on 07/06/2001 recorded as 91.03 m (relative to identified datum).

**Borehole
BH - 2**

Figure 4

Waters Environmental Geosciences Ltd.

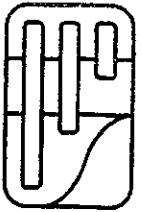
Briggs Twp. MNR Landfill

Project Number
20-106b

Date Started
21/04/2001

Date Completed
21/04/2001

Drawn by : PAR
Checked by : PAR



Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%)		
							20	40	60
	0.0	91.26 m		75 mm Topsoil, over Sand, trace of silt, fine grey, becoming wet below 0.76 m					
	1.0				SS1	8, 8, 10			
	2.0				SS2	3, 3, 6			
	3.0				SS3	4, 4, 6			
	3.0	88.21 m							
	4.0	87.09 m		Sand, trace gravel, trace silt, grey, wet	SS4	4, 5, 7			
	4.0				SS5	4, 6, 8			
	5.0			Borehole terminated, in sand at a depth of 4.17 m below grade NOTE: 1) Borehole BH-2 was advanced using 108 mm hollow stem augers. 2) Refer to the accompanying text for well construction details and an interpretation of this information.					
	6.0								
	7.0								

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation. Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery. Water level on 07/06/2001 recorded as 90.90 m (relative to identified datum).

**Borehole
BH - 3**

Figure 5

Waters Environmental Geosciences Ltd.

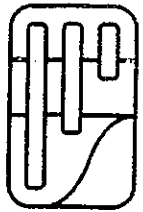
Briggs Twp. MNR Landfill

Project Number
20-106b

Date Started
21/04/2001

Date Completed
21/04/2001

Drawn by : PAR
Checked by : PAR



Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%)		
							20	40	60
	0.0	90.96 m		50 mm Topsoil, over Gravel and Sand, trace of silt, wet	SS1	8, 12, 14			
	1.0								
	2.0	88.98 m		Refusal, on suspected bedrock or large boulder	SS2	> 40			
	3.0								
	4.0								
	5.0								
	6.0								
	7.0								

NOTE:
 1) Borehole BH-3 was initially advanced 30 m south of the final location, using 108 mm hollow stem augers, and encountered refusal at a depth of 1.68 m below grade. The borehole was then relocated 10 m north, and again refusal was encountered at 0.91 m, before re-locating to the final site.
 2) Refer to the accompanying text for well construction details and an interpretation of this information.

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation. Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery. Water level on 07/06/2001 recorded as 90.52 m (relative to identified datum).

**Borehole
BH - 4**

Figure 6

Waters Environmental Geosciences Ltd.

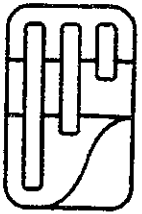
Briggs Twp. MNR Landfill

Project Number
20-106b

Date Started
21/04/2001

Date Completed
21/04/2001

Drawn by : PAR
Checked by : PAR

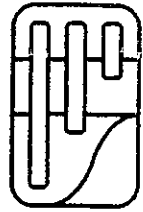


Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%)		
							20	40	60
	0.0	96.26 m							
	1.0			Garbage and Fill , domestic refuse with sand and gravel fill	SS1	2, 3, 3			
		94.74 m							
	2.0			Sand , silty, brown, oxidized	SS2	2, 2, 2			
		94.13 m							
				Sand , silty, with trace gravel, grey, wet	SS3	6, 7, 10			
		93.52 m							
3.0			Refusal , on suspected bedrock or large boulder						
4.0									
5.0									
6.0									
7.0									

NOTE:

- 1) Borehole BH-4 was advanced using 108 mm hollow stem augers.
- 2) Refer to the accompanying text for well construction details and an interpretation of this information.

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation. Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery. Water level on 07/06/2001 recorded as < 93.66 m (relative to identified datum).



Borehole BH - 5	Figure 7	Waters Environmental Geosciences Ltd.	
	Briggs Twp. MNR Landfill		
Project Number 20-106b	Date Started 22/04/2001	Date Completed 22/04/2001	Drawn by : PAR Checked by : PAR

Well Construction	Depth (m)	Elevation (m) Relative to Datum	Stratigraphy	Description	Sample Type	Standard Penetration Test (counts)	Natural Moisture Content (%)		
							20	40	60
	0.0	96.89 m							
	1.0		[Pattern]	Garbage and Fill, domestic refuse and sand and gravel fill	SS1	3, 3, 5			
		95.37 m							
	2.0		[Pattern]	Sand, some gravel, grey	SS2	2, 3, 3			
	3.0								
		93.84 m							
	4.0		[Pattern]	Sand, medium, grey	SS4	4, 6, 7			
	5.0								
		92.32 m							
	6.0		[Pattern]	Till, gravelly sand, some silt, wet	SS5	4, 6, 8			
		90.95 m							
	7.0		[Pattern]	Refusal, on suspected bedrock or large boulder					

NOTE:
 1) Borehole BH-5 was advanced using 108 mm hollow stem augers.
 2) Refer to the accompanying text for well construction details and an interpretation of this information.

NOTE : Stratigraphic boundaries are approximate, and in-situ transitions between the identified soil types may be gradual. Refer to the accompanying text for an interpretation. Samples indicated as (AS) auger sample, (SS) split spoon or (NR) no recovery. Water level on 07/06/2001 recorded as 91.80 m (relative to identified datum).

Appendix C

Laboratory Certificates of Analysis



Your Project #: 048-01-33
 Site#: Briggs Landfill
 Site Location: Briggs Landfill
 Your C.O.C. #: 928783-01-01

Attention: Beata Bradley

Story Environmental Inc
 332 Main Street
 P.O. Box 716
 Haileybury, ON
 CANADA P0J 1K0

Report Date: 2024/04/09
 Report #: R8100410
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3C0122

Received: 2023/04/28, 09:35

Sample Matrix: Water
 # Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity	1	N/A	2023/05/03	CAM SOP-00448	SM 23 2320 B m
Alkalinity	3	N/A	2023/05/04	CAM SOP-00448	SM 23 2320 B m
Biochemical Oxygen Demand (BOD)	4	2023/04/29	2023/05/04	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	3	N/A	2023/05/02	CAM SOP-00463	SM 23 4500-Cl E m
Chloride by Automated Colourimetry	1	N/A	2023/05/03	CAM SOP-00463	SM 23 4500-Cl E m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2023/05/02	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	4	N/A	2023/05/03	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	4	N/A	2023/05/03	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	4	N/A	2023/05/04	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2023/05/02	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/05/03	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Sulphate by Automated Turbidimetry	3	N/A	2023/05/02	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphate by Automated Turbidimetry	1	N/A	2023/05/03	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	4	2023/05/02	2023/05/03	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	3	2023/05/03	2023/05/03	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2023/05/03	2023/05/04	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	4	2023/05/03	2023/05/03	CAM SOP-00407	SM 23 4500-P I

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.



Your Project #: 048-01-33
Site#: Briggs Landfill
Site Location: Briggs Landfill
Your C.O.C. #: 928783-01-01

Attention: Beata Bradley

Story Environmental Inc
332 Main Street
P.O. Box 716
Haileybury, ON
CANADA P0J 1K0

Report Date: 2024/04/09
Report #: R8100410
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3C0122

Received: 2023/04/28, 09:35

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

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

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

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

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VRD452		VRD453			VRD454		
Sampling Date		2023/04/26 12:35		2023/04/26 13:00			2023/04/26 13:20		
COC Number		928783-01-01		928783-01-01			928783-01-01		
	UNITS	MW1	QC Batch	MW2	RDL	QC Batch	MW3	RDL	QC Batch
Calculated Parameters									
Hardness (CaCO3)	mg/L	190	8635122	51	1.0	8635122	260	1.0	8635122
Inorganics									
Total Ammonia-N	mg/L	<0.050	8641483	<0.050	0.050	8641483	4.7	0.050	8641483
Total BOD	mg/L	<2	8636710	<2	2	8636710	<2	2	8636710
Total Dissolved Solids	mg/L	155	8640116	55	10	8640088	320	10	8640116
Total Kjeldahl Nitrogen (TKN)	mg/L	0.17	8643235	<0.10	0.10	8643235	5.3	0.20	8643235
Dissolved Organic Carbon	mg/L	1.8	8639597	1.5	0.40	8639597	9.3	0.40	8639597
Total Phosphorus	mg/L	0.18	8642934	0.043	0.004	8642934	0.027	0.004	8642934
Dissolved Sulphate (SO4)	mg/L	7.0	8640919	9.1	1.0	8640919	32	1.0	8640919
Alkalinity (Total as CaCO3)	mg/L	180	8640557	58	1.0	8640557	300	1.0	8640557
Dissolved Chloride (Cl-)	mg/L	<1.0	8640915	<1.0	1.0	8640915	32	1.0	8640915
Nitrite (N)	mg/L	<0.010	8640577	<0.010	0.010	8640577	0.036	0.010	8640577
Nitrate (N)	mg/L	<0.10	8640577	0.23	0.10	8640577	0.30	0.10	8640577
Nitrate + Nitrite (N)	mg/L	<0.10	8640577	0.23	0.10	8640577	0.34	0.10	8640577
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VRD455		
Sampling Date		2023/04/26		
COC Number		928783-01-01		
	UNITS	Y1	RDL	QC Batch
Calculated Parameters				
Hardness (CaCO ₃)	mg/L	190	1.0	8635122
Inorganics				
Total Ammonia-N	mg/L	<0.050	0.050	8641483
Total BOD	mg/L	<2	2	8636710
Total Dissolved Solids	mg/L	165	10	8640088
Total Kjeldahl Nitrogen (TKN)	mg/L	0.20	0.10	8643235
Dissolved Organic Carbon	mg/L	1.8	0.40	8639597
Total Phosphorus	mg/L	0.18	0.004	8642934
Dissolved Sulphate (SO ₄)	mg/L	7.7	1.0	8639401
Alkalinity (Total as CaCO ₃)	mg/L	200	1.0	8639372
Dissolved Chloride (Cl ⁻)	mg/L	<1.0	1.0	8639391
Nitrite (N)	mg/L	<0.010	0.010	8639142
Nitrate (N)	mg/L	<0.10	0.10	8639142
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	8639142
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		VRD452	VRD453	VRD454	VRD455		
Sampling Date		2023/04/26 12:35	2023/04/26 13:00	2023/04/26 13:20	2023/04/26		
COC Number		928783-01-01	928783-01-01	928783-01-01	928783-01-01		
	UNITS	MW1	MW2	MW3	Y1	RDL	QC Batch
Metals							
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	8641183
Dissolved Barium (Ba)	ug/L	10	3.0	48	11	2.0	8641183
Dissolved Boron (B)	ug/L	81	<10	610	76	10	8641183
Dissolved Cadmium (Cd)	ug/L	<0.090	<0.090	0.14	<0.090	0.090	8641183
Dissolved Calcium (Ca)	ug/L	59000	13000	74000	58000	200	8641183
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	8641183
Dissolved Copper (Cu)	ug/L	3.4	1.7	32	3.7	0.90	8641183
Dissolved Iron (Fe)	ug/L	<100	<100	<100	<100	100	8641183
Dissolved Lead (Pb)	ug/L	<0.50	0.66	<0.50	<0.50	0.50	8641183
Dissolved Magnesium (Mg)	ug/L	11000	4500	19000	11000	50	8641183
Dissolved Manganese (Mn)	ug/L	290	<2.0	4200	280	2.0	8641183
Dissolved Potassium (K)	ug/L	5500	410	17000	5500	200	8641183
Dissolved Sodium (Na)	ug/L	5100	1200	38000	5200	100	8641183
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	8641183
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

TEST SUMMARY

Bureau Veritas ID: VRD452
Sample ID: MW1
Matrix: Water

Collected: 2023/04/26
Shipped:
Received: 2023/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8640557	N/A	2023/05/04	Kien Tran
Biochemical Oxygen Demand (BOD)	DO	8636710	2023/04/29	2023/05/04	Gurjot Kaur
Chloride by Automated Colourimetry	SKAL	8640915	N/A	2023/05/02	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8639597	N/A	2023/05/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		8635122	N/A	2023/05/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8641183	N/A	2023/05/03	Nan Raykha
Total Ammonia-N	LACH/NH4	8641483	N/A	2023/05/04	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8640577	N/A	2023/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	8640919	N/A	2023/05/02	Alina Dobreanu
Total Dissolved Solids	BAL	8640116	2023/05/02	2023/05/03	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	8643235	2023/05/03	2023/05/03	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	8642934	2023/05/03	2023/05/03	Sachi Patel

Bureau Veritas ID: VRD453
Sample ID: MW2
Matrix: Water

Collected: 2023/04/26
Shipped:
Received: 2023/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8640557	N/A	2023/05/04	Kien Tran
Biochemical Oxygen Demand (BOD)	DO	8636710	2023/04/29	2023/05/04	Gurjot Kaur
Chloride by Automated Colourimetry	SKAL	8640915	N/A	2023/05/02	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8639597	N/A	2023/05/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		8635122	N/A	2023/05/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8641183	N/A	2023/05/03	Nan Raykha
Total Ammonia-N	LACH/NH4	8641483	N/A	2023/05/04	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8640577	N/A	2023/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	8640919	N/A	2023/05/02	Alina Dobreanu
Total Dissolved Solids	BAL	8640088	2023/05/02	2023/05/03	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	8643235	2023/05/03	2023/05/03	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	8642934	2023/05/03	2023/05/03	Sachi Patel

Bureau Veritas ID: VRD454
Sample ID: MW3
Matrix: Water

Collected: 2023/04/26
Shipped:
Received: 2023/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8640557	N/A	2023/05/04	Kien Tran
Biochemical Oxygen Demand (BOD)	DO	8636710	2023/04/29	2023/05/04	Gurjot Kaur
Chloride by Automated Colourimetry	SKAL	8640915	N/A	2023/05/02	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8639597	N/A	2023/05/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		8635122	N/A	2023/05/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8641183	N/A	2023/05/03	Nan Raykha
Total Ammonia-N	LACH/NH4	8641483	N/A	2023/05/04	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8640577	N/A	2023/05/03	Chandra Nandlal



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

TEST SUMMARY

Bureau Veritas ID: VRD454
Sample ID: MW3
Matrix: Water

Collected: 2023/04/26
Shipped:
Received: 2023/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate by Automated Turbidimetry	SKAL	8640919	N/A	2023/05/02	Alina Dobreanu
Total Dissolved Solids	BAL	8640116	2023/05/02	2023/05/03	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	8643235	2023/05/03	2023/05/04	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	8642934	2023/05/03	2023/05/03	Sachi Patel

Bureau Veritas ID: VRD455
Sample ID: Y1
Matrix: Water

Collected: 2023/04/26
Shipped:
Received: 2023/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8639372	N/A	2023/05/03	Kien Tran
Biochemical Oxygen Demand (BOD)	DO	8636710	2023/04/29	2023/05/04	Gurjot Kaur
Chloride by Automated Colourimetry	SKAL	8639391	N/A	2023/05/03	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8639597	N/A	2023/05/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		8635122	N/A	2023/05/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8641183	N/A	2023/05/03	Nan Raykha
Total Ammonia-N	LACH/NH4	8641483	N/A	2023/05/04	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8639142	N/A	2023/05/02	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	8639401	N/A	2023/05/03	Alina Dobreanu
Total Dissolved Solids	BAL	8640088	2023/05/02	2023/05/03	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	8643235	2023/05/03	2023/05/03	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	8642934	2023/05/03	2023/05/03	Sachi Patel

Bureau Veritas ID: VRD455 Dup
Sample ID: Y1
Matrix: Water

Collected: 2023/04/26
Shipped:
Received: 2023/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8639597	N/A	2023/05/02	Gyulshen Idriz



GENERAL COMMENTS

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

Package 1	2.3°C
-----------	-------

Revised Report [2024/01/09]:Sample(s) ID revised as per client.
Revised Report [2024/04/09]:Sample(s) ID revised as per client.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8636710	GUJ	QC Standard	Total BOD	2023/05/04		94	%	80 - 120
8636710	GUJ	Method Blank	Total BOD	2023/05/04	<2		mg/L	
8636710	GUJ	RPD	Total BOD	2023/05/04	NC		%	30
8639142	C_N	Matrix Spike	Nitrite (N)	2023/05/02		108	%	80 - 120
			Nitrate (N)	2023/05/02		92	%	80 - 120
8639142	C_N	Spiked Blank	Nitrite (N)	2023/05/02		107	%	80 - 120
			Nitrate (N)	2023/05/02		92	%	80 - 120
8639142	C_N	Method Blank	Nitrite (N)	2023/05/02	<0.010		mg/L	
			Nitrate (N)	2023/05/02	<0.10		mg/L	
8639142	C_N	RPD	Nitrate (N)	2023/05/02	NC		%	20
8639372	KIT	Spiked Blank	Alkalinity (Total as CaCO3)	2023/05/03		100	%	85 - 115
8639372	KIT	Method Blank	Alkalinity (Total as CaCO3)	2023/05/03	<1.0		mg/L	
8639372	KIT	RPD	Alkalinity (Total as CaCO3)	2023/05/03	0.15		%	20
8639391	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2023/05/03		99	%	80 - 120
8639391	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2023/05/03		98	%	80 - 120
8639391	ADB	Method Blank	Dissolved Chloride (Cl-)	2023/05/03	<1.0		mg/L	
8639391	ADB	RPD	Dissolved Chloride (Cl-)	2023/05/03	1.6		%	20
8639401	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2023/05/03		98	%	75 - 125
8639401	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2023/05/03		100	%	80 - 120
8639401	ADB	Method Blank	Dissolved Sulphate (SO4)	2023/05/03	<1.0		mg/L	
8639401	ADB	RPD	Dissolved Sulphate (SO4)	2023/05/03	7.2		%	20
8639597	GID	Matrix Spike [VRD455-05]	Dissolved Organic Carbon	2023/05/02		94	%	80 - 120
8639597	GID	Spiked Blank	Dissolved Organic Carbon	2023/05/02		99	%	80 - 120
8639597	GID	Method Blank	Dissolved Organic Carbon	2023/05/02	<0.40		mg/L	
8639597	GID	RPD [VRD455-05]	Dissolved Organic Carbon	2023/05/02	1.9		%	20
8640088	RTB	QC Standard	Total Dissolved Solids	2023/05/03		97	%	N/A
8640088	RTB	Method Blank	Total Dissolved Solids	2023/05/03	<10		mg/L	
8640088	RTB	RPD	Total Dissolved Solids	2023/05/03	3.7		%	20
8640116	RTB	QC Standard	Total Dissolved Solids	2023/05/03		95	%	N/A
8640116	RTB	Method Blank	Total Dissolved Solids	2023/05/03	<10		mg/L	
8640116	RTB	RPD	Total Dissolved Solids	2023/05/03	5.7		%	20
8640557	KIT	Spiked Blank	Alkalinity (Total as CaCO3)	2023/05/04		99	%	85 - 115
8640557	KIT	Method Blank	Alkalinity (Total as CaCO3)	2023/05/04	<1.0		mg/L	
8640557	KIT	RPD	Alkalinity (Total as CaCO3)	2023/05/04	0.013		%	20
8640577	C_N	Matrix Spike	Nitrite (N)	2023/05/03		NC	%	80 - 120
			Nitrate (N)	2023/05/03		NC	%	80 - 120
8640577	C_N	Spiked Blank	Nitrite (N)	2023/05/03		108	%	80 - 120
			Nitrate (N)	2023/05/03		104	%	80 - 120
8640577	C_N	Method Blank	Nitrite (N)	2023/05/03	<0.010		mg/L	
			Nitrate (N)	2023/05/03	<0.10		mg/L	
8640577	C_N	RPD	Nitrite (N)	2023/05/03	0.93		%	20
			Nitrate (N)	2023/05/03	0.28		%	20
8640915	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2023/05/02		NC	%	80 - 120
8640915	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2023/05/02		92	%	80 - 120
8640915	ADB	Method Blank	Dissolved Chloride (Cl-)	2023/05/02	<1.0		mg/L	
8640915	ADB	RPD	Dissolved Chloride (Cl-)	2023/05/02	1.5		%	20
8640919	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2023/05/02		NC	%	75 - 125
8640919	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2023/05/02		102	%	80 - 120
8640919	ADB	Method Blank	Dissolved Sulphate (SO4)	2023/05/02	<1.0		mg/L	
8640919	ADB	RPD	Dissolved Sulphate (SO4)	2023/05/02	1.9		%	20
8641183	N_R	Matrix Spike	Dissolved Arsenic (As)	2023/05/03		100	%	80 - 120



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
				Dissolved Barium (Ba)	2023/05/03		104	%	80 - 120
				Dissolved Boron (B)	2023/05/03		94	%	80 - 120
				Dissolved Cadmium (Cd)	2023/05/03		103	%	80 - 120
				Dissolved Calcium (Ca)	2023/05/03		NC	%	80 - 120
				Dissolved Chromium (Cr)	2023/05/03		96	%	80 - 120
				Dissolved Copper (Cu)	2023/05/03		101	%	80 - 120
				Dissolved Iron (Fe)	2023/05/03		99	%	80 - 120
				Dissolved Lead (Pb)	2023/05/03		102	%	80 - 120
				Dissolved Magnesium (Mg)	2023/05/03		101	%	80 - 120
				Dissolved Manganese (Mn)	2023/05/03		NC	%	80 - 120
				Dissolved Potassium (K)	2023/05/03		103	%	80 - 120
				Dissolved Sodium (Na)	2023/05/03		NC	%	80 - 120
				Dissolved Zinc (Zn)	2023/05/03		98	%	80 - 120
8641183	N_R		Spiked Blank	Dissolved Arsenic (As)	2023/05/03		101	%	80 - 120
				Dissolved Barium (Ba)	2023/05/03		101	%	80 - 120
				Dissolved Boron (B)	2023/05/03		91	%	80 - 120
				Dissolved Cadmium (Cd)	2023/05/03		100	%	80 - 120
				Dissolved Calcium (Ca)	2023/05/03		95	%	80 - 120
				Dissolved Chromium (Cr)	2023/05/03		96	%	80 - 120
				Dissolved Copper (Cu)	2023/05/03		98	%	80 - 120
				Dissolved Iron (Fe)	2023/05/03		100	%	80 - 120
				Dissolved Lead (Pb)	2023/05/03		100	%	80 - 120
				Dissolved Magnesium (Mg)	2023/05/03		99	%	80 - 120
				Dissolved Manganese (Mn)	2023/05/03		98	%	80 - 120
				Dissolved Potassium (K)	2023/05/03		98	%	80 - 120
				Dissolved Sodium (Na)	2023/05/03		101	%	80 - 120
				Dissolved Zinc (Zn)	2023/05/03		100	%	80 - 120
8641183	N_R		Method Blank	Dissolved Arsenic (As)	2023/05/03	<1.0		ug/L	
				Dissolved Barium (Ba)	2023/05/03	<2.0		ug/L	
				Dissolved Boron (B)	2023/05/03	<10		ug/L	
				Dissolved Cadmium (Cd)	2023/05/03	<0.090		ug/L	
				Dissolved Calcium (Ca)	2023/05/03	<200		ug/L	
				Dissolved Chromium (Cr)	2023/05/03	<5.0		ug/L	
				Dissolved Copper (Cu)	2023/05/03	<0.90		ug/L	
				Dissolved Iron (Fe)	2023/05/03	<100		ug/L	
				Dissolved Lead (Pb)	2023/05/03	<0.50		ug/L	
				Dissolved Magnesium (Mg)	2023/05/03	<50		ug/L	
				Dissolved Manganese (Mn)	2023/05/03	<2.0		ug/L	
				Dissolved Potassium (K)	2023/05/03	<200		ug/L	
				Dissolved Sodium (Na)	2023/05/03	<100		ug/L	
				Dissolved Zinc (Zn)	2023/05/03	<5.0		ug/L	
8641183	N_R		RPD	Dissolved Boron (B)	2023/05/03	1.3		%	20
				Dissolved Calcium (Ca)	2023/05/03	2.8		%	20
				Dissolved Iron (Fe)	2023/05/03	NC		%	20
				Dissolved Magnesium (Mg)	2023/05/03	0.59		%	20
				Dissolved Manganese (Mn)	2023/05/03	1.4		%	20
				Dissolved Sodium (Na)	2023/05/03	1.7		%	20
8641483	KPJ		Matrix Spike	Total Ammonia-N	2023/05/04		99	%	75 - 125
8641483	KPJ		Spiked Blank	Total Ammonia-N	2023/05/04		96	%	80 - 120
8641483	KPJ		Method Blank	Total Ammonia-N	2023/05/04	<0.050		mg/L	
8641483	KPJ		RPD	Total Ammonia-N	2023/05/04	7.1		%	20



QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8642934	SPC	Matrix Spike	Total Phosphorus	2023/05/03		99	%	80 - 120
8642934	SPC	QC Standard	Total Phosphorus	2023/05/03		96	%	80 - 120
8642934	SPC	Spiked Blank	Total Phosphorus	2023/05/03		99	%	80 - 120
8642934	SPC	Method Blank	Total Phosphorus	2023/05/03	<0.004		mg/L	
8642934	SPC	RPD	Total Phosphorus	2023/05/03	10		%	20
8643235	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2023/05/03		107	%	80 - 120
8643235	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/05/03		100	%	80 - 120
8643235	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/05/03		100	%	80 - 120
8643235	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/05/03	<0.10		mg/L	
8643235	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2023/05/03	NC		%	20

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

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

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

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

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

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

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



BUREAU
VERITAS

Bureau Veritas Job #: C3C0122
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, 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.

28-Apr-23 09:35

Sara Singh



C3C0122

Presence of Visible Particulate/Sediment

Maxxam Analytics

CAM FCD-01013/5

Page 1 of 1

When there is >1cm of visible particulate/sediment, the amount will be recorded in the field below

SWP ENV-1408

Bottle Types

Sample ID	All	Inorganics							Organics										Hydrocarbons						Volatiles				Other							
		CrVI	CN	General	Hg	Metals (Diss.)	Organic 1 of 2	Organic 2 of 2	PCB 1 of 2	PCB 2 of 2	Pest/Herb 1 of 2	Pest/Herb 2 of 2	SVOC/ABN 1 of 2	SVOC/ABN 2 of 2	PAH 1 of 2	PAH 2 of 2	Dioxin/Furan	F1 Vial 1	F1 Vial 2	F1 Vial 3	F1 Vial 4	F2-F4 1 of 2	F2-F4 2 of 2	F4G	VOC Vial 1	VOC Vial 2	VOC Vial 3	VOC Vial 4								
1 MW01-4-23	TS																																			
2 MW02-4-23	TS																																			
3 MW03-4-23	TS																																			
4 Y1-4-23	TS																																			
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

Comments:

Except metal bottles

Legend:

P	Suspended Particulate
TS	Trace Settled Sediment (just covers bottom of container or less)
S	Sediment greater than (>) Trace, but less than (<) 1 cm

Recorded By: (signature/print)

Sara Singh SHWETA PATEL



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

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		28-Apr-23 09:35		Order #:
Company Name: #725 Story Environmental Inc		Company Name: Beata Bradley		Quotation #: C30221		Sara Singh		83
Attention: Central Accounting		Attention: Beata Bradley		P.O. #:		C3C0122		Manager:
Address: 332 Main Street P.O. Box 716		Address:		Project: 048-01-33		Singh		
Haileybury ON P0J 1K0				Project Name: Briggs Landfill				
Tel: Fax: (705) 672-3325		Tel: Fax:		Site #:				
Email: accounting@storyenvironmental.com; beata.bradley@st		Email: beata.bradley@storyenvironmental.com		Sampled By:		SWP ENV-1408		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY						ANALYSIS REQUESTED (PLEASE BE SPECIFIC)												Please provide advance notice for rush projects				
Regulation 153 (2011)			Other Regulations			Special Instructions															Regular (Standard) TAT:	
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Medium/Fine	<input type="checkbox"/> CCME	<input type="checkbox"/> Sanitary Sewer Bylaw																Regular (Standard) TAT: <input checked="" type="checkbox"/>		
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> Reg 558	<input type="checkbox"/> Storm Sewer Bylaw																Standard TAT = 5-7 Working days for most tests.		
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other	<input type="checkbox"/> For RSC	<input type="checkbox"/> MISA	Municipality																Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.		
<input type="checkbox"/> Table			<input type="checkbox"/> PWQO	<input type="checkbox"/> Reg 406 Table																Job Specific Rush TAT (if applies to entire submission)		
Include Criteria on Certificate of Analysis (Y/N)?																		Date Required: _____ Time Required: <input type="checkbox"/>				
																		Rush Confirmation Number: _____ (call lab for #)				
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr / V													# of Bottles	Comments			
1	MW01_05_23 MW01-4-23	26 Apr 23	12:35	GW	Y	X													7			
2	MW02_05_23 MW02-4-23	26 Apr 23	13:00	GW	Y	X													7			
3	MW03_05_23 MW03-4-23	26 Apr 23	13:20	GW	Y	X													7			
4	MW04_05_23					X																
5	Y01_05_23 Y1-4-23	26 Apr 23		GW	Y	X													7			
6																						
7																						
8																						
9																						
10																						

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only				
J. Wright		27 Apr 23	9:00	J Wright		27/04/23	09:35		Time Sensitive	Temperature (°C) on Recept	Custody Seal Present	Yes	No
										0/3/14	Intact	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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

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

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

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

White: Bureau Veritas Yellow: Client



Your Project #: 048-01-33
 Site Location: Briggs Landfill
 Your C.O.C. #: 951689-01-01

Attention: Beata Bradley

Story Environmental Inc
 332 Main Street
 P.O. Box 716
 Haileybury, ON
 CANADA P0J 1K0

Report Date: 2024/04/09
 Report #: R8100344
 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3Z9593

Received: 2023/11/16, 08:58

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity	3	N/A	2023/11/20	CAM SOP-00448	SM 24 2320 B m
Biochemical Oxygen Demand (BOD)	3	2023/11/17	2023/11/22	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	3	N/A	2023/11/17	CAM SOP-00463	SM 23 4500-Cl E m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2023/11/16	CAM SOP-00446	SM 24 5310 B m
Hardness (calculated as CaCO3)	3	N/A	2023/11/22	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	3	N/A	2023/11/20	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	3	N/A	2023/11/21	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/11/20	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Sulphate by Automated Turbidimetry	3	N/A	2023/11/17	CAM SOP-00464	SM 23 4500-SO42- E m
Total Dissolved Solids	3	2023/11/20	2023/11/21	CAM SOP-00428	SM 23 2540C m
Total Kjeldahl Nitrogen in Water	2	2023/11/20	2023/11/21	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2023/11/20	2023/11/22	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/11/17	2023/11/18	CAM SOP-00407	SM 23 4500-P I

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. 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 #: 048-01-33
Site Location: Briggs Landfill
Your C.O.C. #: 951689-01-01

Attention: Beata Bradley

Story Environmental Inc
332 Main Street
P.O. Box 716
Haileybury, ON
CANADA P0J 1K0

Report Date: 2024/04/09
Report #: R8100344
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3Z9593

Received: 2023/11/16, 08:58

dilution methods.

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

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

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

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:

Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633

=====

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.



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		XPS173	XPS176			XPS177		
Sampling Date		2023/11/14 17:00	2023/11/14 17:20			2023/11/14 17:40		
COC Number		951689-01-01	951689-01-01			951689-01-01		
	UNITS	MW1	MW2	RDL	QC Batch	MW3	RDL	QC Batch
Calculated Parameters								
Hardness (CaCO3)	mg/L	230	20	1.0	9053077	260	1.0	9053077
Inorganics								
Total Ammonia-N	mg/L	<0.050	<0.050	0.050	9056589	5.0	0.050	9056589
Total BOD	mg/L	<2	<2	2	9055116	6	2	9055116
Total Dissolved Solids	mg/L	170	20	10	9059250	340	10	9059239
Total Kjeldahl Nitrogen (TKN)	mg/L	0.21	<0.10	0.10	9059590	5.6	0.20	9059590
Dissolved Organic Carbon	mg/L	2.6	1.1	0.40	9052391	9.0	0.40	9052391
Total Phosphorus	mg/L	0.045	0.19	0.004	9056464	0.013	0.004	9056464
Dissolved Sulphate (SO4)	mg/L	25	6.6	1.0	9052123	32	1.0	9052123
Alkalinity (Total as CaCO3)	mg/L	230	18	1.0	9053603	280	1.0	9053603
Dissolved Chloride (Cl-)	mg/L	2.2	<1.0	1.0	9052122	36	1.0	9052122
Nitrite (N)	mg/L	<0.010	<0.010	0.010	9052491	0.125	0.010	9052491
Nitrate (N)	mg/L	<0.10	<0.10	0.10	9052491	0.14	0.10	9052491
Nitrate + Nitrite (N)	mg/L	<0.10	<0.10	0.10	9052491	0.26	0.10	9052491
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		XPS173	XPS176	XPS177		
Sampling Date		2023/11/14 17:00	2023/11/14 17:20	2023/11/14 17:40		
COC Number		951689-01-01	951689-01-01	951689-01-01		
	UNITS	MW1	MW2	MW3	RDL	QC Batch
Metals						
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	<1.0	1.0	9056929
Dissolved Barium (Ba)	ug/L	13	2.3	52	2.0	9056929
Dissolved Boron (B)	ug/L	96	<10	640	10	9056929
Dissolved Cadmium (Cd)	ug/L	<0.090	<0.090	<0.090	0.090	9056929
Dissolved Calcium (Ca)	ug/L	69000	5200	75000	200	9056929
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	5.0	9056929
Dissolved Copper (Cu)	ug/L	3.5	0.90	38	0.90	9056929
Dissolved Iron (Fe)	ug/L	<100	<100	<100	100	9056929
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	<0.50	0.50	9056929
Dissolved Magnesium (Mg)	ug/L	13000	1800	19000	50	9056929
Dissolved Manganese (Mn)	ug/L	93	<2.0	2200	2.0	9056929
Dissolved Potassium (K)	ug/L	5700	430	19000	200	9056929
Dissolved Sodium (Na)	ug/L	4600	1200	33000	100	9056929
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	9056929
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

TEST SUMMARY

Bureau Veritas ID: XPS173
Sample ID: MW1
Matrix: Water

Collected: 2023/11/14
Shipped:
Received: 2023/11/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9053603	N/A	2023/11/20	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	9055116	2023/11/17	2023/11/22	Nusrat Naz
Chloride by Automated Colourimetry	SKAL	9052122	N/A	2023/11/17	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9052391	N/A	2023/11/16	Gyulshen Idriz
Hardness (calculated as CaCO3)		9053077	N/A	2023/11/22	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9056929	N/A	2023/11/20	Nan Raykha
Total Ammonia-N	LACH/NH4	9056589	N/A	2023/11/21	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9052491	N/A	2023/11/20	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9052123	N/A	2023/11/17	Alina Dobreanu
Total Dissolved Solids	BAL	9059250	2023/11/20	2023/11/21	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9059590	2023/11/20	2023/11/21	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9056464	2023/11/17	2023/11/18	Muskan

Bureau Veritas ID: XPS173 Dup
Sample ID: MW1
Matrix: Water

Collected: 2023/11/14
Shipped:
Received: 2023/11/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9056929	N/A	2023/11/22	Nan Raykha

Bureau Veritas ID: XPS176
Sample ID: MW2
Matrix: Water

Collected: 2023/11/14
Shipped:
Received: 2023/11/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9053603	N/A	2023/11/20	Surinder Rai
Biochemical Oxygen Demand (BOD)	DO	9055116	2023/11/17	2023/11/22	Nusrat Naz
Chloride by Automated Colourimetry	SKAL	9052122	N/A	2023/11/17	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9052391	N/A	2023/11/16	Gyulshen Idriz
Hardness (calculated as CaCO3)		9053077	N/A	2023/11/22	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9056929	N/A	2023/11/20	Nan Raykha
Total Ammonia-N	LACH/NH4	9056589	N/A	2023/11/21	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9052491	N/A	2023/11/20	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9052123	N/A	2023/11/17	Alina Dobreanu
Total Dissolved Solids	BAL	9059250	2023/11/20	2023/11/21	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9059590	2023/11/20	2023/11/21	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9056464	2023/11/17	2023/11/18	Muskan

Bureau Veritas ID: XPS177
Sample ID: MW3
Matrix: Water

Collected: 2023/11/14
Shipped:
Received: 2023/11/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9053603	N/A	2023/11/20	Surinder Rai



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

TEST SUMMARY

Bureau Veritas ID: XPS177
Sample ID: MW3
Matrix: Water

Collected: 2023/11/14
Shipped:
Received: 2023/11/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Biochemical Oxygen Demand (BOD)	DO	9055116	2023/11/17	2023/11/22	Nusrat Naz
Chloride by Automated Colourimetry	SKAL	9052122	N/A	2023/11/17	Alina Dobreanu
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9052391	N/A	2023/11/16	Gyulshen Idriz
Hardness (calculated as CaCO3)		9053077	N/A	2023/11/22	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9056929	N/A	2023/11/20	Nan Raykha
Total Ammonia-N	LACH/NH4	9056589	N/A	2023/11/21	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9052491	N/A	2023/11/20	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9052123	N/A	2023/11/17	Alina Dobreanu
Total Dissolved Solids	BAL	9059239	2023/11/20	2023/11/21	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9059590	2023/11/20	2023/11/22	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9056464	2023/11/17	2023/11/18	Muskan

Bureau Veritas ID: XPS177 Dup
Sample ID: MW3
Matrix: Water

Collected: 2023/11/14
Shipped:
Received: 2023/11/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	9056589	N/A	2023/11/21	Shivani Shivani
Total Kjeldahl Nitrogen in Water	SKAL	9059590	2023/11/20	2023/11/22	Rajni Tyagi



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
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Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

GENERAL COMMENTS

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

Package 1	6.3°C
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Revised Report [2024/04/09]: Sample(s) ID revised as per client.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
Report Date: 2024/04/09

Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9052122	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2023/11/17		98	%	80 - 120
9052122	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2023/11/17		96	%	80 - 120
9052122	ADB	Method Blank	Dissolved Chloride (Cl-)	2023/11/17	<1.0		mg/L	
9052122	ADB	RPD	Dissolved Chloride (Cl-)	2023/11/17	NC		%	20
9052123	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2023/11/17		96	%	75 - 125
9052123	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2023/11/17		98	%	80 - 120
9052123	ADB	Method Blank	Dissolved Sulphate (SO4)	2023/11/17	<1.0		mg/L	
9052123	ADB	RPD	Dissolved Sulphate (SO4)	2023/11/17	0.30		%	20
9052391	GID	Matrix Spike	Dissolved Organic Carbon	2023/11/16		90	%	80 - 120
9052391	GID	Spiked Blank	Dissolved Organic Carbon	2023/11/16		97	%	80 - 120
9052391	GID	Method Blank	Dissolved Organic Carbon	2023/11/16	<0.40		mg/L	
9052391	GID	RPD	Dissolved Organic Carbon	2023/11/16	0.71		%	20
9052491	C_N	Matrix Spike	Nitrite (N)	2023/11/20		367 (1)	%	80 - 120
			Nitrate (N)	2023/11/20		0 (1)	%	80 - 120
9052491	C_N	Spiked Blank	Nitrite (N)	2023/11/20		109	%	80 - 120
			Nitrate (N)	2023/11/20		86	%	80 - 120
9052491	C_N	Method Blank	Nitrite (N)	2023/11/20	<0.010		mg/L	
			Nitrate (N)	2023/11/20	<0.10		mg/L	
9052491	C_N	RPD	Nitrite (N)	2023/11/20	NC		%	20
			Nitrate (N)	2023/11/20	NC		%	20
9053603	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2023/11/20		98	%	85 - 115
9053603	SAU	Method Blank	Alkalinity (Total as CaCO3)	2023/11/20	<1.0		mg/L	
9053603	SAU	RPD	Alkalinity (Total as CaCO3)	2023/11/20	0.31		%	20
9055116	NNA	QC Standard	Total BOD	2023/11/22		92	%	80 - 120
9055116	NNA	Method Blank	Total BOD	2023/11/22	<2		mg/L	
9055116	NNA	RPD	Total BOD	2023/11/22	5.6		%	30
9056464	MUM	Matrix Spike	Total Phosphorus	2023/11/18		98	%	80 - 120
9056464	MUM	QC Standard	Total Phosphorus	2023/11/18		111	%	80 - 120
9056464	MUM	Spiked Blank	Total Phosphorus	2023/11/18		109	%	80 - 120
9056464	MUM	Method Blank	Total Phosphorus	2023/11/18	<0.004		mg/L	
9056464	MUM	RPD	Total Phosphorus	2023/11/18	1.6		%	20
9056589	SSV	Matrix Spike [XPS177-07]	Total Ammonia-N	2023/11/21		94	%	75 - 125
9056589	SSV	Spiked Blank	Total Ammonia-N	2023/11/21		98	%	80 - 120
9056589	SSV	Method Blank	Total Ammonia-N	2023/11/21	<0.050		mg/L	
9056589	SSV	RPD [XPS177-07]	Total Ammonia-N	2023/11/21	0.71		%	20
9056929	N_R	Matrix Spike [XPS173-03]	Dissolved Arsenic (As)	2023/11/20		102	%	80 - 120
			Dissolved Barium (Ba)	2023/11/20		101	%	80 - 120
			Dissolved Boron (B)	2023/11/20		100	%	80 - 120
			Dissolved Cadmium (Cd)	2023/11/20		101	%	80 - 120
			Dissolved Calcium (Ca)	2023/11/20		NC	%	80 - 120
			Dissolved Chromium (Cr)	2023/11/20		102	%	80 - 120
			Dissolved Copper (Cu)	2023/11/20		103	%	80 - 120
			Dissolved Iron (Fe)	2023/11/20		104	%	80 - 120
			Dissolved Lead (Pb)	2023/11/20		99	%	80 - 120
			Dissolved Magnesium (Mg)	2023/11/20		102	%	80 - 120
			Dissolved Manganese (Mn)	2023/11/20		99	%	80 - 120
			Dissolved Potassium (K)	2023/11/20		103	%	80 - 120
			Dissolved Sodium (Na)	2023/11/20		100	%	80 - 120
			Dissolved Zinc (Zn)	2023/11/20		101	%	80 - 120
9056929	N_R	Spiked Blank	Dissolved Arsenic (As)	2023/11/20		99	%	80 - 120
			Dissolved Barium (Ba)	2023/11/20		99	%	80 - 120



BUREAU
VERITAS

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Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Boron (B)	2023/11/20		98	%	80 - 120
			Dissolved Cadmium (Cd)	2023/11/20		98	%	80 - 120
			Dissolved Calcium (Ca)	2023/11/20		100	%	80 - 120
			Dissolved Chromium (Cr)	2023/11/20		100	%	80 - 120
			Dissolved Copper (Cu)	2023/11/20		101	%	80 - 120
			Dissolved Iron (Fe)	2023/11/20		100	%	80 - 120
			Dissolved Lead (Pb)	2023/11/20		97	%	80 - 120
			Dissolved Magnesium (Mg)	2023/11/20		99	%	80 - 120
			Dissolved Manganese (Mn)	2023/11/20		97	%	80 - 120
			Dissolved Potassium (K)	2023/11/20		100	%	80 - 120
			Dissolved Sodium (Na)	2023/11/20		100	%	80 - 120
			Dissolved Zinc (Zn)	2023/11/20		100	%	80 - 120
9056929	N_R	Method Blank	Dissolved Arsenic (As)	2023/11/20	<1.0		ug/L	
			Dissolved Barium (Ba)	2023/11/20	<2.0		ug/L	
			Dissolved Boron (B)	2023/11/20	<1.0		ug/L	
			Dissolved Cadmium (Cd)	2023/11/20	<0.090		ug/L	
			Dissolved Calcium (Ca)	2023/11/20	<200		ug/L	
			Dissolved Chromium (Cr)	2023/11/20	<5.0		ug/L	
			Dissolved Copper (Cu)	2023/11/20	<0.90		ug/L	
			Dissolved Iron (Fe)	2023/11/20	<100		ug/L	
			Dissolved Lead (Pb)	2023/11/20	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2023/11/20	<50		ug/L	
			Dissolved Manganese (Mn)	2023/11/20	<2.0		ug/L	
			Dissolved Potassium (K)	2023/11/20	<200		ug/L	
			Dissolved Sodium (Na)	2023/11/20	<100		ug/L	
			Dissolved Zinc (Zn)	2023/11/20	<5.0		ug/L	
9056929	N_R	RPD [XPS173-03]	Dissolved Arsenic (As)	2023/11/22	NC		%	20
			Dissolved Barium (Ba)	2023/11/22	3.3		%	20
			Dissolved Boron (B)	2023/11/22	5.9		%	20
			Dissolved Cadmium (Cd)	2023/11/22	NC		%	20
			Dissolved Calcium (Ca)	2023/11/22	4.3		%	20
			Dissolved Chromium (Cr)	2023/11/22	NC		%	20
			Dissolved Copper (Cu)	2023/11/22	0.12		%	20
			Dissolved Iron (Fe)	2023/11/22	NC		%	20
			Dissolved Lead (Pb)	2023/11/22	NC		%	20
			Dissolved Magnesium (Mg)	2023/11/22	0.26		%	20
			Dissolved Manganese (Mn)	2023/11/22	1.9		%	20
			Dissolved Potassium (K)	2023/11/22	1.2		%	20
			Dissolved Sodium (Na)	2023/11/22	1.9		%	20
			Dissolved Zinc (Zn)	2023/11/22	NC		%	20
9059239	RTB	Spiked Blank	Total Dissolved Solids	2023/11/21		100	%	80 - 120
9059239	RTB	Method Blank	Total Dissolved Solids	2023/11/21	<10		mg/L	
9059239	RTB	RPD	Total Dissolved Solids	2023/11/21	3.5		%	20
9059250	RTB	Spiked Blank	Total Dissolved Solids	2023/11/21		95	%	80 - 120
9059250	RTB	Method Blank	Total Dissolved Solids	2023/11/21	<10		mg/L	
9059250	RTB	RPD	Total Dissolved Solids	2023/11/21	2.0		%	20
9059590	RTY	Matrix Spike [XPS177-06]	Total Kjeldahl Nitrogen (TKN)	2023/11/22		NC	%	80 - 120
9059590	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/11/21		101	%	80 - 120
9059590	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/11/21		101	%	80 - 120
9059590	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/11/21	<0.10		mg/L	



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
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Story Environmental Inc
Client Project #: 048-01-33
Site Location: Briggs Landfill
Sampler Initials: JW

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
	9059590	RTY	RPD [XPS177-06]	Total Kjeldahl Nitrogen (TKN)	2023/11/22	2.8		%	20
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>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)</p> <p>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).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p>									



BUREAU
VERITAS

Bureau Veritas Job #: C3Z9593
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Story Environmental Inc
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VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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



NONT-2023-11-347



Katherine Szozda

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name: #725 Story Environmental Inc	Company Name:	Attention: Beata Bradley	Quotation #: C30221	P.O. #:	
Attention: Central Accounting	Address:	Address:	Project: 048-01-33	Project Name:	
332 Main Street P.O. Box 716			Site #: Briggs Landfill	Sampled By:	
Haileybury ON P0J 1K0					
Tel: Fax: (705) 672-3325	Tel: Fax:				
Email: accounting@storyenvironmental.com;beata.bradley@st	Email: beata.bradley@storyenvironmental.com;stephanie.derui				

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

Regulation 153 (2011) <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Medium/Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> For RSC <input type="checkbox"/> Table _____		Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> Reg 558 <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> MISA Municipality _____ <input type="checkbox"/> PWQO <input type="checkbox"/> Reg 406 Table _____ <input type="checkbox"/> Other _____		Special Instructions 	
Turnaround Time (TAT) Required: Please provide advance notice for rush projects.				Regular (Standard) TAT: (will be applied if Rush TAT is not specified) <input checked="" type="checkbox"/> Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ <input type="checkbox"/> Rush Confirmation Number: _____ (call lab for #)					

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr / VI	Briggs Landfill (048-01-33) - Groundwater	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)								# of Bottles	Comments
1	MW01	14 Nov 23	17:00	GW	Y	X										7
2	MW02	14 Nov 23	17:20	GW	Y	X										7
3	MW03	14 Nov 23	17:40	GW	Y	X										7
4	MW04					X										
5																
6																
7																
8																
9																
10																

* RELINQUISHED BY: (Signature/Print) Jillian Wright		Date: (YY/MM/DD) 15 Nov 23	Time 19:00	RECEIVED BY: (Signature/Print) KATHERINE SZOZDA		Date: (YY/MM/DD) 2023/11/16	Time 08:58	# Jars used and not submitted	Laboratory Use Only			
								Time Sensitive	Temperature (°C) on Receipt 8/5/8	Custody Seal Present	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

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

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

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

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

White: Bureau Veritas Yellow: Client

Appendix D

Groundwater Chemistry

Table D.1 MW1 Analytical Data 2001 – 2023

Sample ID		MW1																							
Date		07 Jun 2001	16 Oct 2008	14 Jul 2009	20 Oct 2009	15 Jun 2010	14 Oct 2010	22 Jun 2011	27 Oct 2011	09 Jun 2016	26 Oct 2016	12 Jul 2017	05 Oct 2017	24 Jul 2018	12-Oct-18	19-Jun-19	10-Oct-19	17-Jun-20	24-Sep-20	10-Jun-21	27-Sep-21	15-Jun-22	08-Nov-22	26-Apr-23	14-Nov-23
Parameter	Units																								
Conductivity Field	µS/cm	-	1263	1049	2100	727	1694	328	1118	503	750	311	453	383	528	401	681	223	559	215	462	343	563	420	521
Dissolved Oxygen Field	mg/L	-	3.2	3.9	2.8	3.3	3.3	3.6	4.8	5.2	5.3	5.4	3.1	3.2	2.3	5.8	5.4	6.6	3.3	7.9	4.4	3.7	9.5	7.91	8.51
ORP Field	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	62	-	103	-	113	133	262	134	324	110	106
pH Field	s.u.	-	7.1	7.3	7.2	7.5	7.1	-	7.2	7.5	7.1	7	7.3	7.6	7.2	7.2	7.1	7.6	7.4	7.4	7	6.8	7.1	7.3	7.2
Temperature Field	°C	-	11	12	9.9	9.4	11	9.1	10	8.2	11	11	12	13	11	8.4	11	8	11	8.3	12	8.8	8.6	2.4	7.9
Alkalinity, Total (as CaCO3)	mg/L	136	522	483	777	210	371	113	302	170	260	140	200	190	280	180	270	110	250	110	230	160	270	180	230
Ammonia, Total (as N)	mg/L	< 0.03	0.12	2	9	5	10	-	1.8	0.57	0.55	0.11	0.2	< 0.05	0.14	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	< 0.050	< 0.050
Biological Oxygen Demand	mg/L	-	< 2	3	3	3	< 2	4	< 2	-	-	-	-	-	-	-	-	-	-	-	-	< 2	< 2	< 2	< 2
Chloride	mg/L	< 0.5	65	57	190	49	180	9	65	16	24	6	15	4	4	9	21	2	9	2	5	3	7.7	< 1.0	2.2
Dissolved Organic Carbon	mg/L	3.1	16	26	44	19	27	3.6	9.3	4.3	6.3	2.8	4.7	2.4	2.9	3.1	5	2.1	3.5	1.5	2.2	1.9	2.7	1.8	2.6
Hardness (as CaCO3)	mg/L	153	540	350	650	160	440	76	370	160	260	110	180	160	240	180	300	94	280	90	220	140	290	190	230
Nitrate (as N)	mg/L	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.16	0.45	0.22	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Nitrate + Nitrite (as N)	mg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	0.42	0.53	0.22	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Nitrite (as N)	mg/L	< 0.2	< 0.01	< 0.01	< 0.01	0.02	< 0.01	0.12	0.01	0.26	0.09	< 0.01	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	0.02	0.011	< 0.010	< 0.010
Organic Nitrogen (Calculated)	mg/L	-	2.88	3	1	1.5	4	-	1.1	0.33	0.35	0.19	0.3	0.18	0.06	0.18	0.38	0.18	0.18	nc	0.18	0.08	0.06	0.15	0.19
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38	0.27	0.18	0.045
Sulphate	mg/L	11	68	17	89	74	190	26	170	47	68	14	33	10	5.5	22	65	7	39	6.3	14	7.4	25	7	25
Total Dissolved Solids	mg/L	165	745	645	1260	460	1000	187	685	316	472	162	315	245	295	245	415	160	355	85	270	160	320	155	170
Total Kjeldahl Nitrogen	mg/L	-	3	5	10	6.5	14	-	2.9	0.9	0.9	0.3	0.5	0.2	0.2	0.2	0.4	0.2	0.2	< 0.1	0.2	0.1	0.15	0.17	0.21
Arsenic - Dissolved	mg/L	-	0.001	0.014	0.027	0.011	0.015	0.003	0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0010	< 0.0010
Barium - Dissolved	mg/L	0.015	0.032	0.04	0.13	0.036	0.17	0.023	0.11	0.036	0.059	0.017	0.032	0.019	0.027	0.026	0.033	0.008	0.021	0.006	0.019	0.008	0.018	0.01	0.013
Boron - Dissolved	mg/L	< 0.01	0.16	0.57	1.2	0.54	1.1	0.24	0.69	0.29	0.46	0.13	0.22	0.17	0.26	0.11	0.25	0.08	0.23	0.06	0.19	0.09	0.11	0.081	0.096
Cadmium - Dissolved	mg/L	< 0.005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.000090	< 0.000090
Calcium - Dissolved	mg/L	50	160	120	210	53	140	25	120	53	84	36	58	49	75	57	92	29	86	28	69	43	89	59	69
Chromium - Dissolved	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0050	< 0.0050
Copper - Dissolved	mg/L	< 0.005	0.013	0.002	0.002	0.003	0.003	0.002	0.002	0.006	0.014	0.006	0.007	0.006	0.006	0.006	0.007	0.004	0.006	0.003	0.003	0.003	0.0038	0.0034	0.0035
Iron - Dissolved	mg/L	0.11	< 0.1	6.7	18	2.9	12	0.74	2.8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.15	0.4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lead - Dissolved	mg/L	0.05	< 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	< 0.0005	< 0.0005	< 0.00050	< 0.00050
Magnesium - Dissolved	mg/L	6.9	31	13	28	6.6	20	3.1	15	8	13	6	9.3	8.9	12	9.1	16	4.8	15	5.2	12	8.4	17	11	13
Manganese - Dissolved	mg/L	0.021	9.5	6	10	2.9	8.7	1.1	4.3	0.49	1.1	0.26	1.6	0.093	1.5	0.49	0.093	0.11	0.19	0.058	0.045	0.15	0.018	0.29	0.093
Potassium - Dissolved	mg/L	1	2.6	5.4	25	17	59	22	50	28	38	19	26	16	16	9.5	16	5.8	11	5.3	10	5	8.4	5.5	5.7
Sodium - Dissolved	mg/L	6.9	64	57	180	60	130	18	57	11	23	5.4	10	6.2	7.8	6.8	16	4.9	10	2.4	5.8	3.5	5.2	5.1	4.6
Zinc - Dissolved	mg/L	0.218	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0050	< 0.0050

Notes:
1. "-" indicates that no data is available

Source:
R:\SEI048 Temagami\01_Briggs\Work\2024\048_Briggs GW Quality_10Jan24_EK.xlsx\MW1

Table D.2 MW2 Analytical Data 2001 – 2023

Sample ID	Date	MW2																							
		07-Jun-01	16-Oct-08	14-Jul-09	20-Oct-09	15-Jun-10	14-Oct-10	22-Jun-11	27-Oct-11	09-Jun-16	26-Oct-16	12-Jul-17	05-Oct-17	24-Jul-18	12-Oct-18	19-Jun-19	10-Oct-19	17-Jun-20	24-Sep-20	10-Jun-21	27-Sep-21	15-Jun-22	08-Nov-22	26-Apr-23	14-Nov-23
Parameter	Units																								
Conductivity Field	µS/cm	-	57	53	64	54	94	56	98	48	51	50	41	266	62	193	50	52	51	50	49	54	49	134	51
Dissolved Oxygen Field	mg/L	-	7.3	8.1	7.9	9.4	7.1	9.7	8.6	10	7.6	8.3	6.8	6.3	7.2	6.3	8.5	8.8	7.7	8.9	7.9	9.6	8.2	9.3	8.2
ORP Field	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	150	-	157	-	144	196	304	191	281	115	153
pH Field	s.u.	-	7.4	6.5	6.7	7.3	6.7	6.9	7	6.5	6.1	6.5	7	7.3	6.2	7	5.9	6.5	6.1	5.9	5.7	5.8	6.4	7.1	6.2
Temperature Field	°C	-	10	9.4	9.8	11	11	7.8	9.7	6.3	11	8.7	11	14	11	8.1	10	6.9	10	6.8	11	7.8	8.8	3.7	8.8
Alkalinity, Total (as CaCO3)	mg/L	37	35	21	23	20	39	16	42	21	16	16	14	140	25	79	15	17	21	16	17	23	20	58	18
Ammonia, Total (as N)	mg/L	< 0.03	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.075	< 0.050	< 0.050	< 0.050
Biological Oxygen Demand	mg/L	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	-	-	-	-	-	-	< 2	< 2	< 2	< 2
Chloride	mg/L	< 0.5	< 1	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L	4.4	1.7	1.4	1.7	1.7	1.8	1.6	1.4	1.5	1.4	1.3	1.2	3	1.3	1.7	1.2	1.3	1.1	1.2	1.1	1.3	1.3	1.5	1.1
Hardness (as CaCO3)	mg/L	46	25	20	28	23	47	23	43	23	21	22	20	140	25	58	19	21	21	18	20	23	20	51	20
Nitrate (as N)	mg/L	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.34	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.23	< 0.10
Nitrate + Nitrite (as N)	mg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.34	< 0.1	0.12	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.23	< 0.10
Nitrite (as N)	mg/L	< 0.2	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 0.010
Organic Nitrogen (Calculated)	mg/L	nc	nc	0.88	nc	nc	1.98	-	0.68	0.08	nc	nc	nc	0.38	nc	0.08	0.18	nc	nc	nc	0.08	nc	nc	nc	nc
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18	0.66	0.043	0.19
Sulphate	mg/L	12	11	9	10	10	10	10	9	7	7.2	7.3	7.5	7.9	6.5	5.3	7.2	6.1	7.3	7.1	7	6.3	7.1	9.1	6.6
Total Dissolved Solids	mg/L	62	48	37	42	42	66	40	63	24	74	70	65	95	55	100	60	95	50	10	65	40	110	55	20
Total Kjeldahl Nitrogen	mg/L	-	< 0.5	0.9	< 0.5	< 0.5	2	-	0.7	0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	0.1	0.2	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.10	< 0.10
Arsenic - Dissolved	mg/L	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0010	< 0.0010
Barium - Dissolved	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.003	0.002	0.003	0.003	0.003	0.006	0.002	0.01	0.003	< 0.002	0.002	0.002	0.003	0.002	0.0022	0.003	0.0023
Boron - Dissolved	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium - Dissolved	mg/L	< 0.005	< 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	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.000090	< 0.000090
Calcium - Dissolved	mg/L	12	6.4	5.3	7.5	6	13	6.2	12	6.3	5.6	5.7	4.9	36	6.5	17	5	5.6	5.3	4.5	5	6.1	5.1	13	5.2
Chromium - Dissolved	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0050	< 0.0050	
Copper - Dissolved	mg/L	< 0.005	< 0.001	< 0.001	0.003	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.002	< 0.001	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.0064	0.0017	0.0009
Iron - Dissolved	mg/L	0.03	< 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	< 0.1	< 0.1	< 0.1	< 0.1
Lead - Dissolved	mg/L	< 0.001	< 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	< 0.0005	< 0.0005	0.00066	< 0.00050
Magnesium - Dissolved	mg/L	4.3	2.2	1.7	2.1	2.1	3.7	1.8	3.3	1.6	1.8	1.8	1.8	12	2	3.9	1.6	1.6	1.8	1.7	1.7	1.8	1.7	4.5	1.8
Manganese - Dissolved	mg/L	0.009	0.004	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.004	0.024	0.003	< 0.002	< 0.002	< 0.002	0.11	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.0020	< 0.0020
Potassium - Dissolved	mg/L	< 1	0.6	0.4	0.4	0.4	0.5	0.4	0.3	0.5	0.5	0.5	0.5	0.4	0.4	0.8	0.5	0.4	0.5	0.4	0.5	0.4	0.43	0.41	0.43
Sodium - Dissolved	mg/L	1.3	1.3	1.1	1.3	1.3	1.6	1.1	1.1	1.1	1.2	1.3	1.3	1.2	1.2	1	1.1	1.1	1.2	1.1	1.2	1.1	1.3	1.2	1.2
Zinc - Dissolved	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0050	< 0.0050	< 0.0050

Notes:
1. "-" indicates that no data is available

Source:
R:\SEN048 Temagami\01_Briggs\Work\2024\048_Briggs GW Quality_10Jan24_EK.xlsx\MW2

Table D.3 MW3 Analytical Data 2001 – 2023

Sample ID		MW3																							
Parameter	Units	07-Jun-01	16-Oct-08	14-Jul-09	20-Oct-09	15-Jun-10	14-Oct-10	22-Jun-11	27-Oct-11	09-Jun-16	26-Oct-16	12-Jul-17	05-Oct-17	24-Jul-18	12-Oct-18	19-Jun-19	10-Oct-19	17-Jun-20	24-Sep-20	10-Jun-21	27-Sep-21	15-Jun-22	08-Nov-22	26-Apr-23	14-Nov-23
Conductivity Field	µS/cm	-	678	544	569	629	680	674	669	607	483	585	645	634	698	497	606	693	682	576	642	671	648	705.5	702
Dissolved Oxygen Field	mg/L	-	3.2	3.4	3.6	4.5	3.3	3.4	5	3.2	6.1	4.8	4.5	4	1.4	2.1	6.2	1.8	2.2	1.7	2.8	2.5	6.5	3.5	4.3
ORP Field	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	130	-	97	-	130	172	303	158	304	131	155
pH Field	s.u.	-	7	7	7	7	6.8	-	6.9	6.9	6.7	6.6	6.7	7.1	6.7	6.8	6.8	6.9	6.9	6.8	6.4	6.6	6.8	9.7	6.7
Temperature Field	°C	-	11	12	8.9	11	11	10	10	10	10	12	12	13	11	9.3	11	10	11	11	12	10	9.1	5.9	8.5
Alkalinity, Total (as CaCO3)	mg/L	140	280	238	247	266	278	284	274	240	260	250	270	260	310	230	250	300	290	240	260	270	260	300	280
Ammonia, Total (as N)	mg/L	< 0.03	0.65	0.46	0.78	1.7	0.96	-	1.2	2.2	1.6	2.2	2.4	2.2	3.2	2.3	2.9	4	3.2	4.4	3.4	4.8	3.7	4.7	5
Biological Oxygen Demand	mg/L	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	-	-	-	-	-	-	2	13	< 2	6
Chloride	mg/L	10	34	19	27	26	31	35	34	32	29	27	33	31	31	21	29	39	34	27	31	30	30	32	36
Dissolved Organic Carbon	mg/L	4	10	7.1	8.2	9.7	9.7	9.9	10	9.2	9.9	8.9	8.6	8.2	8.9	7.3	8.9	9.6	9	8.3	8.6	8.8	8.7	9.3	9
Hardness (as CaCO3)	mg/L	166	300	230	240	280	290	270	250	210	230	210	210	220	250	210	210	250	240	200	230	230	230	260	260
Nitrate (as N)	mg/L	< 0.2	< 0.1	< 0.1	0.2	< 0.1	0.7	< 0.1	0.3	< 0.1	0.35	0.18	0.4	1.1	< 0.1	< 0.1	1.35	0.12	0.25	< 0.1	0.85	0.14	0.88	0.3	0.14
Nitrate + Nitrite (as N)	mg/L	-	< 0.1	< 0.1	0.2	< 0.1	0.7	< 0.1	0.3	0.13	0.42	0.22	0.43	1.13	0.14	< 0.1	1.41	0.18	0.29	< 0.1	0.85	0.17	0.98	0.34	0.26
Nitrite (as N)	mg/L	< 0.2	0.02	< 0.01	0.01	< 0.01	0.02	0.03	0.02	0.07	0.07	0.04	0.03	0.03	0.05	< 0.01	0.06	0.06	0.04	0.03	< 0.01	0.03	0.1	0.036	0.125
Organic Nitrogen (Calculated)	mg/L	-	0.75	0.54	0.42	0.5	0.84	-	0.5	0.7	0.4	0.4	0.4	0.2	0.2	0.4	0.4	1	0.4	0.1	0.4	1.3	0.2	0.6	0.6
Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.041	0.027	0.013
Sulphate	mg/L	14	28	21	22	21	29	24	28	28	27	21	21	25	21	19	22	21	24	21	23	21	25	32	32
Total Dissolved Solids	mg/L	190	400	345	370	410	420	388	377	336	392	348	380	400	385	315	365	400	400	265	335	360	340	320	340
Total Kjeldahl Nitrogen	mg/L	-	1.4	1	1.2	2.2	1.8	-	1.7	2.9	2	2.6	2.8	2.4	3.4	2.7	3.3	5	3.6	4.5	3.8	6.1	3.9	5.3	5.6
Arsenic - Dissolved	mg/L	-	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0010	< 0.0010	
Barium - Dissolved	mg/L	0.018	0.026	0.019	0.024	0.031	0.035	0.037	0.034	0.028	0.034	0.026	0.032	0.026	0.035	0.031	0.04	0.037	0.041	0.03	0.046	0.043	0.048	0.048	0.052
Boron - Dissolved	mg/L	0.05	0.34	0.18	0.25	0.29	0.34	0.33	0.34	0.52	0.53	0.52	0.54	0.54	0.56	0.39	0.55	0.53	0.67	0.48	0.55	0.55	0.62	0.61	0.64
Cadmium - Dissolved	mg/L	< 0.005	0.0001	< 0.0001	< 0.0001	0.0001	0.0002	0.0002	0.0001	0.00022	0.00013	0.00013	< 0.0001	0.00011	0.00013	0.00012	0.00013	0.0001	0.00013	< 0.00009	0.00015	0.00011	0.00014	0.00014	< 0.000090
Calcium - Dissolved	mg/L	50	82	64	67	79	79	76	69	58	64	59	60	64	70	60	57	70	68	57	66	63	66	74	75
Chromium - Dissolved	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0050	< 0.0050	
Copper - Dissolved	mg/L	0.005	0.028	0.008	0.019	0.021	0.033	0.026	0.032	0.028	0.033	0.028	0.031	0.026	0.028	0.019	0.032	0.031	0.032	0.028	0.033	0.031	0.042	0.032	0.038
Iron - Dissolved	mg/L	0.33	< 0.1	0.92	0.1	0.23	< 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 - Dissolved	mg/L	< 0.001	< 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	< 0.0005	< 0.00050	< 0.00050	
Magnesium - Dissolved	mg/L	10	23	16	17	21	21	19	19	16	17	15	15	15	18	14	15	18	18	14	17	17	16	19	19
Manganese - Dissolved	mg/L	0.084	3.5	3	2.9	4.2	3.7	5.5	3.9	4.7	2.8	4.3	5	3.9	4.6	2.7	3.6	4.1	4.4	2.8	4.3	3.7	3.5	4.2	2.2
Potassium - Dissolved	mg/L	3	5.1	3.4	4.6	7.8	8.9	13	8.8	12	13	12	12	14	15	13	15	19	17	16	18	19	19	17	19
Sodium - Dissolved	mg/L	9.1	34	21	24	31	32	33	35	35	40	37	38	35	35	25	36	37	41	28	33	34	34	38	33
Zinc - Dissolved	mg/L	0.228	< 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	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0050	< 0.0050	

Notes:

1. "-" indicates that no data is available

Source:

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Table D.5 MW5 Analytical Data 2001

Sample ID		MW5
Date		07 Jun 2001
Parameter	Units	
Alkalinity, Total (as CaCO ₃)	mg/L	186
Ammonia, Total (as N)	mg/L	2.92
Chloride	mg/L	50
Dissolved Organic Carbon	mg/L	89
Hardness (as CaCO ₃)	mg/L	318
Nitrate (as N)	mg/L	61.1
Nitrite (as N)	mg/L	1.9
Sulphate	mg/L	64
Total Dissolved Solids	mg/L	698
Barium - Dissolved	mg/L	0.077
Boron - Dissolved	mg/L	0.02
Cadmium - Dissolved	mg/L	< 0.005
Calcium - Dissolved	mg/L	78
Chromium - Dissolved	mg/L	< 0.005
Copper - Dissolved	mg/L	0.021
Iron - Dissolved	mg/L	0.09
Lead - Dissolved	mg/L	0.003
Magnesium - Dissolved	mg/L	30
Manganese - Dissolved	mg/L	48.4
Potassium - Dissolved	mg/L	7
Sodium - Dissolved	mg/L	73
Zinc - Dissolved	mg/L	0.148

Source:

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