2021-2023 Monitoring Report
Jones Road Landfill Site

Part of Lots 1 and 2 Concession I,
and Part of Lots 1 and 2, Concession II,
Townships of Pettypiece and Jackman,
District of Kenora

Prepared for:
The City of Kenora

Prepared by:
Azimuth Environmental
Consulting, Inc.

June 2024

AEC 23-020

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

June 20, 2024 AEC 23-020

City of Kenora
Waste Management Department
60 14th Street
Kenora, Ontario
P9N 4M9

Attention: Ted Horn
Solid Waste Supervisor

Re: **2021 - 2023 Report on the Monitoring Programs at the Jones Road Landfill Site**

Dear Mr. Horn:

Azimuth Environmental Consulting, Inc. (Azimuth) is pleased to present our report on the 2021 – 2023 monitoring program conducted at the Jones Road Landfill Site. In general, the monitoring data obtained over this period indicates that the landfill is not causing unacceptable impact on the surrounding environment, although leachate influence is measureable within the downstream surface water. This influence has been dominated by elevated boron concentrations, which had created Trigger Mechanism Program exceedances in 2016. With additional assessment of both the source and pathway, it was determined that it is sourced to leachate and possibly the ash material utilized in the cover material at the Site. The additional monitoring determined the migration pathway to be within the surface water flow within the wetlands of the Contaminant Attenuation Zone (CAZ). Stable conditions over the past six years and declining concentrations with distance from the waste mound have indicated that the current CAZ is adequate for the current Site conditions. The previous additional boron assessment also indicated that the PWQO value utilized for both surface water compliance and referenced in the creation of the trigger concentration is not the most representative criteria given its interim nature. As such, the Site surface water compliance for boron has been done relative to the Canadian Water Quality Guideline (CWQG) value which indicates that the Site is in compliance for boron. Similarly, a revised trigger concentration has been established for boron, which was originally proposed and submitted to the MECP in 2018. As formal endorsement of the revised

Trigger Mechanism values has yet to be received, it is requested that MECP provide comment on these revised values presented. Once approval or comment has been received, the City can submit an ECA amendment application to formalize the revised trigger program.

Beyond boron, the remaining data has shown general consistency with the historical dataset. Some minor increasing trends are noted in the ground water monitoring wells within the waste area, but given their location and a lack of similar trends noted in the downgradient locations, no leachate plume is migrating beyond the waste footprint area. The proposed monitoring program follows what is listed in the ECA with the inclusion of two additional surface water monitoring locations that have been implemented to refine the spatial distribution of leachate impacts downstream of the waste mound.

We would like to thank you for the opportunity to complete this project. If you have any questions or comments, please contact the undersigned.

Yours truly,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Devin McPhee, Dipl.
Environmental Technician

Attach:

Table of Contents

Table of Contents

List of Figures

List of Appendices

1.0 INTRODUCTION & BACKGROUND

The following information is provided as a summary of previous investigations to allow the reader to review this report in context. For more complete information, the reader should review the original documentation (see Section 5.0 References).

1.1 Location

The Jones Road landfill Site is located immediately to the north of Highway 671 (Jones Road), and approximately 22 km northeast of the City of Kenora. Specifically, the Site is located upon Part of Lots 1 and 2 of Concession I, and Part of Lots 1 and 2 of Concession II, in the Townships of Pettypiece and Jackman, of the District of Kenora (Figure 1). Construction of the Site began on June 1, 2000, and was essentially complete by the end of the calendar year. The Site is operated by the City of Kenora Solid Waste Department and is licensed by the Ministry of the Environment, Conservation & Parks (MECP) to receive "domestic, commercial, non-hazardous solid industrial and institutional, processed organic sewage sludge, sludge from future municipal or provincial fresh water treatment facilities, non-pathological agricultural and bio-medical, and grit and screenings from street cleaning and sediment basin clean-outs" under Environmental Compliance Approval #A612018 (replaced ECA #A612016 (former MNR landfill)). Subsequent amendments to the ECA have occurred to reflect changes to the monitoring program and operations over the years, which included reductions in monitoring requirements and the addition of composting operations at the Site. These amendments, as well as other correspondence with the MECP have been included in Appendix B.

1.2 Geology

The Jones Road landfill Site is situated within an interconnected bog/wetland complex that is surrounded by various bedrock ridges and knobs. In 1996, the local Quaternary and bedrock geology was characterized by Fenco MacLaren Inc. (Fenco) during an extensive field evaluation of the property. During this evaluation, they observed that the overburden within the bog was stratified, with three predominant layers observed, each of which is discussed in more detail below.

1.2.1 Peat

The surficial material existing within the bog consists of a dark brown to black peat. Field observations of the material indicate that the peat is fibrous at surface, consisting primarily of undecomposed organic material (*i.e.,* rootlets, leaf litter). With increasing depth, the material becomes more hemic (*i.e.,* muckier) as the proportion of decomposed

material increases. The thickness of the peat within the bog was assessed through drilling and seismic monitoring by Fenco, and was found to range from essentially zero at the outer boundary to greater than 3 m at the center of the bog.

Testing of the vertical hydraulic conductivity of the peat was also conducted by Fenco during their evaluation. The results of this testing indicated a rate of $5x10^{-7}$ to $9x10^{-8}$ m/s under natural Site conditions, given a porosity range of 0.81 to 0.95. Simulation of the vertical stress that the waste will potentially have upon the peat was also assessed through consolidation of the material under pressures of up to 800 kPa. In response to compaction, the vertical hydraulic conductivity of the material was observed to decrease by approximately three orders of magnitude to $5x10^{-11}$ m/s. The application of vertical pressure upon the peat also resulted in a decrease in the porosity of the material to about 0.67.

The horizontal hydraulic conductivity of the peat was only estimated during excavation of the peat, and was inferred to be much greater than vertical, in the order of about 10^{-5} m/s.

1.2.2 Clayey Silt

A layer of clayey silt exists beneath the surficial peat. Colouration of this material is variable, and provides an indicator of the degree of weathering the material has undergone. Unweathered material within this layer is generally blue-grey, while the weathered material possessed a green-brown colouration. During drilling by Fenco in 1996, it was determined that the material becomes siltier with depth, and that several thin, discontinuous sand seams were observed within the profile. The thickness of this material was found to range from approximately 2 to 8 m.

As with the overlying peat, vertical hydraulic conductivity testing was conducted in natural conditions as well as under the simulated load of the waste (*i.e.,* pressures of up to 800 kPa). This testing indicated a vertical hydraulic conductivity of $2x10^{-9}$ to $3x10^{-9}$ m/s under natural conditions, while under load, a decrease of approximately three orders of magnitude was observed ($8x10^{-12}$ m/s). The application of 800 kPa of pressure also resulted in a decrease in the void ratio of the material by two-thirds, suggesting that consolidation of the material will be relatively rapid in response to the increased loading pressure of the waste. This consolidation will result in a rapid increase in the tensile strength of the material; however it will also result in a substantial decrease in its permeability to the underlying sediments.

1.2.3 Silty Sand Till

A basal layer of silty sand till exists between the clayey silt layer and the bedrock. The till is locally gravelly, and possesses several discontinuous lenses and layers of sand throughout its profile. The material also appears more lacustrine in nature at sporadic locales throughout the Site. The thickness of this material underlying the bog at the landfill Site, as determined by Fenco, ranges from approximately 2 to 30 m.
The hydraulic conductivity of the till was determined through field and laboratory testing to range from $2x10^{-5}$ to $4x10^{-8}$ m/s, with a geometric mean of $8x10^{-7}$ m/s. Average linear ground water velocity in this unit ranges between 1 and 50 m/year based on the results provided.

1.2.4 Bedrock

The bedrock is granodioritic in composition (Barnett, *et al.*, 1991), and occurs at depths ranging from surficial exposure to greater than 20 m (based upon drilling and seismic monitoring) (Fenco, 1996). The rock quality designation (RQD) of the bedrock was noted by Fenco during coring of the bedrock at three locations throughout the area. RQD ranged from 63% to 100% within the three locations, suggesting that the bedrock is not highly fractured. Hydraulic conductivity testing was conducted by Fenco upon two wells drilled into the bedrock, indicating a range of $4x10^{-7}$ to $9x10^{-8}$m/s, with a geometric mean of $2x10^{-7}$m/s.

1.2.5 Hydrogeology

Overburden ground water flow in the vicinity of the property is controlled by the bedrock topography. Active natural ground water flow is restricted primarily to within the till, with the bedrock forming a lower boundary to the overburden aquifer. As discussed above, the mean hydraulic conductivity of the till and bedrock (*i.e.*, bulk hydraulic conductivity, K) units are $8x10^{-7}$ m/s and $2x10^{-7}$ m/s, respectively. The landfill is located near the top of a small, unnamed watershed. Ground water flow within this watershed is directed toward the northeast, parallel to the apex of a small bedrock valley (Figure 2). Flow rates range within the till range from 1 to 50 m/year. Leachate flow will be northeasterly with the migration of ground water toward an area of surface water existing immediately to the west of a culvert passing beneath Jones Road, at a distance of about 750 m northeast of the waste cells. Migration time of ground water from the landfill to the surface water within the peat is estimated at approximately 5 to 10 years. During the migration period, leachate contaminants will be attenuated and biodegraded.

1.2.6 Hydrology

As discussed in Section 1.2.5, the Site is near the top of a small, unnamed watershed that is situated between Crystal Bay (Silver Lake) to the north and Morgan Lake to the south. The watershed encompasses a total area of approximately 4 km^2, and ultimately discharges into Morgan Lake at a lateral distance of approximately 1.9 km southeast of the waste. Runoff from the area of the waste is directed primarily to the northeast through a bog/wetland complex toward a small surface water pond situated immediately upgradient of the Jones Road culvert. Surface water flow then continues northeasterly through a series of channels, bogs, wetlands, and beaver ponds a further 700 m before finally shifting southward toward the eastern end of Morgan Lake (1,600 m). Morgan Lake lies within the larger Nelson River drainage system that encompasses the Lake Winnipeg River system and its tributaries, including the Little Black Sturgeon River, which flows both into and out of Morgan Lake.

To the northeast of the waste cells, a depression is noted in the topography (known as "the saddle") that may allow for a portion of the surface drainage from the Site to migrate into Crystal Bay during spring freshet or in response to large precipitation events. Crystal Bay is located approximately 350 m north of the waste cells.

Along the southern extent of the Site parallel to Jones Road, a portion of the landfill property is situated within a second watershed to the south. Flow within this watershed drains southwesterly and ultimately into the western end of Morgan Lake (~450 m). To note, the boundary of this watershed lies greater than 50 m south of the waste cells.

2.0 SITE DESIGN & OPERATIONS

The Jones Road landfill began accepting construction and demolition wastes on November 27, 2000 to provide a stable footprint for the waste cells. The Site continued to collect these same waste materials through 2001 to 2009. As of November 18, 2009, the haul destination for all solid waste was revised from the Brady Road Landfill Site in Winnipeg, to the Jones Road Landfill. A summary of total annual quantities of waste received on a monthly basis at the Site over the period of 2021 - 2023 can be found in Appendix C.

The landfill has already filled sequence A-J, and is currently filling sequence K (~40% complete). It is noted that this sequence follows that outlined in the SNC-Lavalin monitoring plan (September, 1999) (Figure 3), while the final contours are provided in Appendix L, which is from the Design and Operations Plan (Fenco McLaren. 1997). The fill area is also illustrated spatially on Figure 4.

Based on scale readings from the incoming waste at the Site, the current waste mass as of December 2023 is 398,882 tonnes, or 49% of the total waste capacity (810,600 tonnes). The resulting remaining capacity for the Site based on average waste density and the final contour dimensions of the Site is 405,964 tonnes. Given the average annual waste acceptance rate from the past three years of 33,000 tonnes, there is a remaining lifespan for the Site of approximately 12 years. It should be noted that this capacity may fluctuate over time based on the variance in annual acceptance volumes at the Site and future waste diversion programs.

No complaints concerning the operation of the Jones Road Landfill Site were received by the City of Kenora over the period of 2021 – 2023.

2.1 Operation Changes

The Jones Road Landfill is currently being operated and filled in accordance to the requirements established in the ECA as well as the Design and Operations Plan (Fenco McLaren. 1997). There have been no significant changes in operations, sequencing, equipment, or procedures made or produced at the Jones Road Landfill. No operating difficulties have been encountered over the course of 2021-2023. The last change in operations at the Site was to implement composting operations at the Site in 2015, which was facilitated through an ECA amendment (Appendix B). Over the past nine years, the City has begun to operate a small composting area within the approved waste footprint, although the operations thus far have been limited. The summary details required under the ECA amendment are to be submitted to the MECP under separate cover by the City, such that they will not be summarized in this report.

2.2 Cover Requirements, Erosion Protection

The City has historically utilized a stockpile of soil on-site for cover material requirements. However, the City has recently begun to import material from an aggregate pit northwest of the landfill, which is owned by the City. Additionally, dewatered sewage sludge is mixed with industrial ash and the above noted soils and the resulting material is used along the waste slopes within the footprint to cover the waste. No erosion was noted in over the period of 2021 - 2023, which is expected given that the landfill is at the midpoint in its lifespan (*i.e.,* approximately half the height of the final design). Cover material and erosion protection material is inspected regularly by landfill staff and to date, there have been no issues.

3.0 SUMMARY OF 2021-2023 MONITORING PROGRAMS

The 2021-2023 monitoring of ground water and surface water was facilitated through the collection of field measurements and water samples for laboratory analysis by City of Kenora staff. In 2021, ground water samples were collected in June and August, while surface water samples were collected in June, August and October. In 2022, ground water samples were collected in May and August, while surface water samples were collected in May, August and October. In 2023, ground water samples were collected in June and August, and surface water samples were collected in June, August and October. This timing follows what is required in the ECA for seasonal sampling.

The locations of the sampling stations monitored between 2021 and 2023 are depicted upon Figure 4. In January, 2014 the ECA was amended to reduce the frequency of sediment sampling from 5 to 10 years, and removed thirteen monitoring wells (10/7, 12/4, 6/14, 7/4, 8/22, 9/6, 2/17, 13/6, 13/14, 14/6, 14/21, 15/5, and 15/17) from the sampling program. In addition, volatile organics were removed from the parameter list for all monitoring wells except for well 2/9. The above changes to the sampling program took effect at the start of the 2014 field season and have continued through the current monitoring period.

Additional monitoring was added beginning during the 2017 field season to address the boron trigger criteria exceedances at the Site with new locations RW-1, RW-2, RW-3, RW-4, and RW-5 implemented downstream of the waste mound (Figure 2). This was documented to the MECP in a letter dated April 13th 2018 (Appendix B).

The scope of the current monitoring program was based on the requirements outlined in the ECA (2014) for the Site with the revisions outlined above. The details of the current monitoring program are summarized in Table 1 below.

Table 1: Summary of the Required 2021-2023 Monitoring Programs

Monitor Location	Annual Frequency	Parameters
Ground Water		
1/17, 2/9, 2/13, 3/8, 4/6, 5/17, 6/5, 11/4, 16/15, 17/15, 19/16, 23/3, KGS-2 and 24/5	May & August	comprehensive list
2/9	August	VOC's
Surface Water		
SW-1, SW-2, SW-3, SW-4, SW-5 (August only) & (RW-2, & RW-5)*	August & October	comprehensive list
SW-1, SW-2, SW-3, SW-4 & (RW-2, & RW-5)*	May	indicator list
SW-2 and SW-3	May, August & October	flow measurement
SW-2	August every 2 years	VOC's
Seep / Spring	Any sampling event observed	indicator list
Sediment		
SB-1, SB-2, and SB-R	August every 10 years (next in 2032)	major and minor inorganics & grain size

* - additional monitoring locations added in 2018 to address boron trigger exccedances (Section 3.5)

** - Sediment monitoring requirements were revised to every 10 years (sample was collected during this monitoring period, next samples to be collected in 2032)

*** - all water quality samples collected require field electrical conductivity and pH, while all surface water samples require dissolved oxygen measurements

3.1 Monitoring Program Omissions

Over the 2021-2023 monitoring period a number of monitoring well samples were not available for analysis. According to the City's field notes, it was indicated that over the period of monitoring, some wells were either out of service (*i.e.,* damaged or requiring repair), or did not contain an adequate supply of water for sample collection on one or more occasion, such that samples were not able to be collected. The following table summarizes these omissions.

Table 2: Summary of Ground Water Sample Omissions

Monitors	Date	Reason Not Sampled
KGS-2	11-Aug-21	Insufficient water for sample collection
MW24-5	25-May-22	Well not accessible
MW24-5	10-Aug-22	Well not accessible
MW23-3	10-Aug-22	Well not accessible
MW23-3	25-May-22	Well not accessible
MW11-4	10-Jun-21	Insufficient water for sample collection
MW11-4	10-Aug-21	Insufficient water for sample collection
MW6-5	21-May-22	Well not accessible
MW6-5	10-Aug-22	Well not accessible
MW6-5	07-Jun-23	Well not accessible
MW6-5	23-Aug-23	Well not accessible
MW4-6	10-Jun-21	Insufficient water for sample collection
MW4-6	11-Aug-21	Insufficient water for sample collection
MW4-6	25-May-22	Well not accessible
MW5/17	10-Jun-21	Insufficient water for sample collection

It is noted that MW5/17 and MW11/4 have been noted to be dry on occasion historically. In all instances where dry monitors were encountered, similar conditions were observed historically. It is further noted that both MW5/17 and MW11/4 were noted to have been successfully sampled during the 2022 and 2023 monitoring periods, and insufficient water only occurred in 2021 for these monitors. The monitor at MW4/6 has been extended back into service, but held insufficient water in the 2021 monitoring period, and was inaccessible in May 2022.

During the 2021-2023 surface water monitoring period, no sample omissions were recorded, as all surface water stations had sufficient water to be sampled, which are mandated in the ECA. The additional location RW-2 was previously recommended to be sampled seasonally with the other surface water locations, but has on occasion not been sampled as it is not part of the required program..

3.2 Quality Assurance and Quality Control Results

As part of any routine sampling program, duplicate samples should be collected and analyzed for quality assurance purposes. Over the period of monitoring, five quality assurance/quality control (QA/QC) samples were collected during five of the monitoring events (August 2021, May 2022, August 2022, June 2023, & August 2023). The results indicated variance, with many instances >50-100 %. It is noted that the sample results

were found to be within the historical ranges for each such that the variance could be reflective of how the samples were split during collection. In the future, it is suggested that field staff ensure that the unfiltered bottles of all duplicate samples are "split" to minimize any potential natural variation in water chemistry (*i.e.,* sediment load). As well, it should be ensured that at least a single duplicate sample is collected during each monitoring event. This will remove potential variability from water quality within the well such that a better evaluation of the laboratory quality can be conducted.

The one parameter that indicated a more significant deviation to the historical range from the duplicate samples was DOC at MW4/6 during August 2022 (3.35 / 292 mg/L). Based on this more significant variance, this is likely reflective of issues with filtration on the more elevated sample.

3.3 Ground Water & Leachate (Schedule "F")

During sampling over the monitoring period, water level measurements were obtained by City staff prior to any disturbance of the piezometric surface within each monitor using an electronic water level meter (accuracy of +/- 0.5 cm) as per Condition 2.4, Schedule F, of the current ECA. Ground water samples were then collected following purging of at least two borehole volumes of water from each monitoring well using dedicated check valve pumps and tubing. ALS Environmental in Thunder Bay completed the analytical work for all of the 2021-2023 groundwater and surface water sampling events. All sample bottles were prepared and provided with preservatives for consistency, as required. Samples were maintained in coolers with freezer packs and were delivered to the required laboratory within 24 to 36 hours of collection. A summary of the current and historic analytical data is included in Appendix D.

3.3.1 Ground Water & Leachate Flow

Ground water measurements taken over the current monitoring period were compared to background data observed by Fenco during installation of several of the existing monitors in 1996. As detailed in Appendix E, in many locations the maximum ground water elevation value recorded over the 2021 -2023 monitoring period is below the value recorded in 1996, with the exception of MW2/13 and MW3/8, which have both consistently been close to slightly above the historic reference point since 2003. However; in general, the most recent water level data corresponds well with the available background data, indicating that ground water elevations in both the overburden as well as the shallow bedrock have remained relatively stable. In particular, the water level appears to have stabilized at MW19/6 between 2014 and 2023. Prior to 2014 the water level at this location was inconsistent, and was either dry or contained water at the ground surface. A greater deal of variability is noted in the more elevated locations to the south /

southwest (MW5/17 & MW11/4) and lower locations to the north beyond the saddle (MW14/6 & 14/21), while the locations within and immediately surrounding the waste area are the most consistent. This is somewhat expected given the topography in this area.

Active ground water flow occurs within the till and is constrained by the bedrock surface, which forms a physical barrier to further vertical migration of ground water (*i.e.*, like a bathtub). Within the bog, low topographic relief exists, as indicated by a surface elevation change of less than 2 m between the waste and the small pond at SW-1 (a total distance of ~750-800 m). For descriptive purposes, the water table elevations measured at all ground water monitors in August of 2023 have been included upon Figure 5. As can be observed, the slope of the water table corresponds well with the orientation of the local topography, with large lateral hydraulic gradients occurring at watershed boundaries represented by topographic / bedrock highs (*i.e.,* up to 0.24) and lower gradients occurring within the bog (*i.e.,* as low as 0.001).

A watershed divide exists to the northeast of the waste footprint, between monitors 2 and 13 (see Figure 4). This divide is due to a rise in the elevation of the bedrock topography related to the surrounding topographic highs to the east, west, and north that exist beneath the bog. Within this watershed divide, there is an area which is referred to as the "saddle" area. The saddle represents a depression in a bedrock ridge that extends to the northeast. Monitoring wells are located in and around this feature (Figure 4 & 5) to determine ground water flow directions and gradients. With the exception of May 2007, ground water elevations within the saddle have been elevated above those to the south by at least 0.15 m since 2002 (Figure 6) indicating there is a limited potential for leachate migration past this feature. It is unclear as to why the gradient reversed during May 2007.

3.3.2 Background Ground Water Quality

Background water quality is measured within MW11/4 (overburden) and MW5/17 (bedrock). The background ground water geochemistry at the Site is characterized by relatively low concentrations of most parameters (Table 3). Natural waters dissolve low quantities of elements through reaction with the soil minerals. Iron is derived through chemical weathering of soil and rock minerals and naturally occurs at levels approaching or greater than the Ontario Drinking Water Quality Standards (ODWQS) historically at this location.

Overall, the background water quality has shown consistency over time with the exception of DOC concentrations which were noted to exceed ODWQS and the historical

range in 2023. However, given the consistency for the remaining parameters, this is not considered reflective of leachate impacts. These conditions will be monitored over the next monitoring period to track any further developing trends.

All parameters at the background bedrock monitor (MW5/17) were below the ODWQS during the recent period of monitoring (2021 - 2023) and within the historical range at this location.

Time trend graphs have been included in Appendix F, which illustrate the consistency for the period of record for both these background locations, with the exception of the anomalous data discussed above. The table below provides a summary of the background water quality for the period of record.

Table 3: Background Chemistry

	Ca	Mg	Na	Cl	Alk.	SO4	NH3-N	TKN	Fe	Cond.	TDS
OWDS	**---**	**---**	**20 or 200**	**250**	**30-500**	**500**	**org N=0.15**	**---**	**0.3**	**---**	**500**
Overburden											
# of samples	29	29	29	28	28	28	29	7	28	27	28
Maximum	51	16	11	20	130	60	6	1.1	30	248	1750
Average	11	4	6	3	45	6	0.3	0.5	1	97	303
Minimum	6	2	4	1	30	3	0.01	0.1	0.01	57	10
STD	9	3	2	4	18	11	1	0.4	6	33	394
Bedrock											
# of samples	60	60	60	30	31	30	28	23	26	30	31
Maximum	51	48	42	8	106	10	0.12	1	5	216	184
Average	23	6	6	1	84	3	0.04	0.3	0.3	167	125
Minimum	14	3	3	1	53	1	0.01	0.05	0.01	139	92
STD	3	8	7	2	11	2	0.03	0.3	1	16	22

All values are given in mg/L. Overburden data are from monitor 11/4 and bedrock data is from monitor 5/17.

(STD = standard deviation, nd = not detected, n/a = not applicable, nt = not tested)

3.3.3 Leachate Quality

Leachate quality is controlled by the availability of soluble contaminants in the waste pile, the residence time of infiltrating water in the waste, and the physical conditions, such as temperature, redox potential, and pH of the solution. Compared to background waters, leachate that is produced from landfill waste typically possesses elevated concentrations (x10 or more) of magnesium, sodium, potassium, iron, zinc, chloride, alkalinity, ammonia, total kjeldahl nitrogen, conductivity, total dissolved solids and phenols. Since municipal wastes have only been accepted for a short time, and there is no dedicated leachate monitoring well, the ground water data from the monitoring wells in and around the active waste area can be used. With the current waste placement (Figure 4), the most representative leachate ground water monitor locations are MW1/17, MW4/6, MW23/3, MW24/5 & KGS/2, although a variable leachate influence is observed both spatially as well as over time, which is reflective of the active filling area.

Over the current monitoring period (2021 to 2023), some parameters (manganese, iron, DOC, alkalinity and total dissolved solids) are consistently higher than background water, historical conditions, and the ODWQS. These parameters are considered to be sourced to leachate, while iron and manganese can also be elevated owing to natural sourced. Although still under their respective ODWQS limit, some leachate indicator parameters (boron, calcium, ammonia & chloride), have indicated elevated concentrations since 2014, with concentration trends associated with the progression of the waste mound in proximity to the monitoring wells. Concentrations of leachate indicator parameters at these locations have generally been consistent over the current monitoring period.

Despite the measurable influence, the concentrations are noted to be minimal relative to dedicated leachate monitors at most landfill Sites with ammonia concentrations being <20 mg/L and chloride being <100 mg/L. The time trend graphs provided in Appendix F indicate variability of leachate impacts.

3.3.4 Downgradient Ground Water Quality

As in previous years, the 2021 - 2023 analytical data do not indicate that leachate generation from the waste has resulted in impact to ground water quality either immediately downgradient (MW2) of the waste or at any of the other monitors installed within the Contaminant Attenuation Zone (CAZ). Since the landfill commenced operation in the spring of 2001, the concentrations of parameters at all downgradient monitoring locations have remained at or very slightly above background levels, as can be observed in the time series graphs provided in Appendix F. These conditions are somewhat expected given the limited permeability of the overburden and bedrock beneath and downgradient of the waste area.

It should be noted that the ODWQS are met at all downgradient locations with the exception pH at a few locations and alkalinity at MW2/9 during the May 2022 monitoring event (1,120 mg/L). Although this concentration was an order of magnitude relative to all other historical concentrations, the remaining water quality did not show similar deviations. As such this value is considered anomolous.

A suite of volatile organic compounds (VOC's) was analyzed at MW2/9 annually (August) during the current monitoring period (2021 – 2023). No detections were noted for either of these locations. SW-2 was also supposed to be analyzed for VOC's every second year in August, but was not completed during this monitoring period. The City should ensure future August monitoring events (every 2nd year) include VOC analysis at

SW-2. A summary of detected VOCs between 2001 and 2020 can be found in Appendix G.

3.4 Surface Water (Schedule "C")

City staff collected surface water samples in May, June, August and October during 2021 to 2023, with the analytical data have been summarized and are included in Appendix H.

3.4.1 Surface Water Flow

Surface water from the area of the waste flows in a northeasterly direction through a large bog/wetland complex before eventually discharging into a pond at the west side of the Jones Road Culvert (SW-1) that serves as the headwaters of an unnamed creek. Discharge into the pond from the bog includes both surface flow and interflow within the peat.

From the pond, the creek flows beneath the roadway and in a northeasterly direction for approximately 700 m, before turning southward and eventually discharging into a further bog/wetland complex south of a logging road about 800 m upgradient of Morgan Lake (SW-2). Along its route, the creek is discontinuous as it passes through various bogs, wetlands, and beaver ponds. Periodic discharge from the Lunch Lake sub-watershed commingles with flow in the creek, providing additional flow at SW-2.

Approximately 150 m northwest of the waste footprint, a depression is noted in the landscape, known locally as the "saddle". This area allows a portion of surface drainage to migrate into Crystal Bay during spring freshet or in response to large precipitation events. Crystal Bay is located approximately 350 m north of the waste cells. Figure 2 shows the Site's hydrologic features.

Estimates of stream velocity are to be made by field Staff at SW-1, SW-2, SW-3, and SW-4 during the May and October sampling periods and at SW-1, SW-2, SW-3, SW-4 and SW-5 during June/August, as per Condition 2.4, Schedule C of the current ECA. Flow velocity measurements are summarized in the following table. As in previous years, flows are shown to be low and intermittent.

Table 4: Surface Water Flow Velocity Data

Location	Velocity (m/sec)								
	2021			2022			2023		
	May	June	Oct	May	Aug	Oct	May	Aug	Oct
SW-1	0.1	1.2	0.1	0.91	0.30	0.15	0.1	0	0.91
SW-2	0.1	1.2	0.1	0.91	0.30	0.3	0.1	2.4	0.91
SW-3	0	0	0	0.91	0	0	0	0	0
SW-4	0	0	0	0	0	0	0	0	0
SW-5	-	0	-	-	0	0	-	0	-

3.4.2 Surface Water Quality

Surface water quality data obtained over 2021 - 2023 were compared to the background quality data obtained at SW-1 and SW-2 prior to the construction of the Site in 2000, as well as to the Provincial Water Quality Objectives (PWQO). In general, the surface water quality has shown to become leachate influenced in close proximity to the landfill at SW-1 and SW-2 with elevations in a number of leachate indicator parameters, including boron, alkalinity, ammonia and chloride. These trends, as illustrated in the time-trend graphs (Appendix I) have been shown to be very consistent over the past ten years indicating the landfill is within a steady state condition. The leachate trends are most defined by elevated boron concentrations, which had been previously determined to be primarily sourced to ash cover material that had elevated boron content. As such, there was a more direct path from the waste mound to the downstream surface water features.

With the exception of boron, the remaining water quality parameters indicate a reduced but measurable influence downstream of the landfill with elevated alkalinity, ammonia, chloride, sulphate and TDS; however the concentrations are shown to be reduced with distance from the landfill indicating attenuative processes are active with declining concentrations between SW-1 and SW-2 further downstream within the wetland complex. The concentrations at SW-5 do not indicate leachate influence within the receiving water body Morgan Lake, such that the CAZ is adequate for attenuation of leachate impacts at the Site.

Additional surface water monitoring locations implemented following historical boron trigger exceedances have been maintained in the current monitoring program, including RW-2, which is a location immediately adjacent to the waste mound and RW-5, which represents the outlet of the wetland complex into Morgan Lake. The results from these locations support the overall Site interpretation that the CAZ is adequate to attenuate

leachate impacts within the current Site boundaries. Leachate influence is the largest at RW-2, while concentrations of all other leachate parameters at RW-5 are considered negligible with the exception of boron, which has a more persistent concentration and continued isolated PWQO exceedacnes.

Aside from the boron exceedances of PWQO, iron, total phosphorus, and phenols have exceeded PWQO during the current monitoring period. However, the parameters are naturally sourced as elevated and exceeded concentrations have been found both historically at SW-1 and SW-2 prior to landfilling was initiated and in background locations SW-3 & SW-4. Elevations of these parameters are expected in wetland conditions with shallow, stagnant water conditions, which routinely result in elevated suspended solids being collected in the bottles, which can artificially elevated parameter concentrations for total phosphorus and metals (iron), while also provide a natural phosphorus source though decay of organic material.

Despite these elevations, caution should be exercised when evaluating boron compliance with PWQO. Given the interim nature of the PWQO criteria for boron MECP Standards Branch was contacted to discuss the supporting information with respect to this parameter given its interim designation. It was communicated that given the limited toxicology dataset that was utilized during development of the PWQO criteria that the Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2003) value would be more appropriate to use as it utilized a more robust toxicological dataset and was developed by the MECP. The CWQG is based on impacts to Bluegill (*Lepomus macrochirus*) and rainbow trout (*Oncorhynchus mykiss*), which are reported in Rainy River District. The CWQG value for boron for long term exposure is 1.5 mg/L and includes conservative factors to be protective of aquatic species. It is noted that this criterion was met at all downstream surface water locations beyond the proximal location RW-2.

3.5 Trigger Mechanism Assessment

The Trigger Mechanism and Contingency Plan for the Site was revised and submitted and approved by the MECP in 2014. However, with the trigger exceedances documented in 2016 for boron within the surface water and further assessment of the source and migration pathway, a revised trigger program had been proposed to the MECP in the in 2018 Trigger Mechanism Exceedance Monitoring Summary (Azimuth, 2018 – Appendix B). The revision was mainly to reflect a new reference concentration for boron. The previous trigger concentration was based on the PWQO value of 0.2 mg/L; however, as noted in Section 3.4, the CWQG value of 1.5 mg/L is the more applicable criteria, which is endorsed by the MECP Standards branch. With the exception of boron

in surface water, all other trigger criteria has been maintained from the approved 2014 trigger program as summarized below.

The targeted parameters and associated trigger concentrations for ground water are summarized in the following table.

Table 5 Trigger Limits – MW3/8

Parameter	ODWQS	Background*	Trigger Limit at MW3/8	Maximum Concentration at MW3/8 (2021-2023)
Chloride	250	3	126	1.9
TDS	500	303	324	200
Alkalinity	500	45	284	106

* - average concentration from Table 3

It is noted that all concentrations at MW3/8 for these parameters have been less than the associated criteria for the reporting period (2021-2023). Although not identified originally as a trigger location, it is noted that the other downgradient monitoring well to the east (MW6/5) has shown similar compliance.

The trigger limits were also created for surface water at SW-2, as well as action criteria at SW-1, which is in place to provide additional review of the geochemical data to assess any potential trends prior to trigger limits being exceeded at SW-2. The criteria established are summarized in the following table.

Table 6: Surface Water Trigger Limits

Parameter	Background (SW-3)*	Action Level at SW-1	Maximum Concentration at SW-1 (2021-2023)	Trigger Limit at SW-2	Maximum Concentration at SW-2 (2021-2023)
Chloride	1.9	158	73	187	24
Boron	0.02	3.0**	1.09	1.5***	0.434
Ammonia (unionized)	0.0005	0.8	0.0028	0.02	0.00753

* - historical average

** - former (2014) value 0.8 mg/L

*** - former (2014) value 0.2 mg/L

Although the historical trigger exceedance concentrations for boron were exceeded during this monitoring period, the revised values indicate compliance along with unionized ammonia and chloride. As formal endorsement of the revised values has yet to be received, it is requested that MECP provide comment on these revised values presented here and in the January, 2018 correspondence (Appendix B). Once approval or

comment has been received, the City can submit an ECA amendment application to formalize the revised trigger program.

Beyond the water quality trigger criteria outlined above, there are also triggers established for ground water elevations at the Site in the "saddle" area (MW11/4, MW16/15 & MW19/16) and along Jones Road (MW5/17). These triggers are identified in Appendix E and reflect elevations where if exceeded, ground water flow patterns might flow north and south respectively. As identified in the data presented in Appendix E, all ground water elevations for the current monitoring period are well below the trigger elevations such that the Site is currently in compliance with respect ground water elevations.

3.6 Sediment (Schedule "D")

As per the 10-year monitoring period, City staff collected a sediment sample on August 29th, 2023 with the analytical data have been summarized and are included in Appendix O. In May of 2013, the ECA was amended to reduce the frequency of sediment sampling from 5 to 10 years. The last sediment samples were collected in 2011, while the next scheduled sediment sampling event is not until 2033.

In 2023, City staff collected sediment quality samples on August 29th at three locations as specified in the current C of A (*i.e.,* SB-1, SB-2 and SB-R). The 2023 analytical data have been summarized in Appendix O. SB-1 and SB-R are considered background locations with SB-1 located by SW-4 and SB-R located along the shore of Silver Lake northeast of the Site. SB-2 is located at the outlet of wetland complex at Morgan Lake.

The analytical data obtained from each of the samples were compared to the criteria outlined in, *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* (MOE, 1993). The background locations had exceedances of the lowest effect level for phosphorus, but at concentrations observed historically in the background. SB-2 had lowest effect level exceedances for copper, manganese, nickel and phosphorus, while exceeded severe effect levels for TKN and TOC. However, these concentrations generally fall within the historical range, which indicates variance over time. Given the overall surface water quality has not shown meaningful elevations in leachate indicator parameters, these elevations are likely attributable to alternative sources, which have been present since the Site was first developed.

Grain size analysis was performed on the sediment samples in 2023. The results are located in Appendix F. Samples indicate that SB-1 and SB-R were predominantly sand, while SB-2 was noted to be a clayey silt. The fine-grained nature of SB-2 may be the

source of the more elevated concentrations noted above as an increased organic content with the fine sediment could be nutrient rich associated with the decay or the organic matter.

3.7 Biological Effects (Schedule "E")

Benthic invertebrate monitoring was conducted from 2000 to 2003. The need for continued or additional benthic monitoring is not necessary, since the minimum of three (3) years of sampling, as stated in the ECA, has been fulfilled. As requested during the 2013 MECP inspection, the data from these previous studies has been included as an appendix for completeness (Appendix K).

3.8 Landfill Gas (Schedule "G")

Landfill gas was previously required according to the ECA Schedule "G" on a bi-monthly basis during frozen ground conditions and quarterly during all other periods at the two proposed landfill gas monitors outlined in the SNC-Lavalin monitoring plan (September, 1999). Landfill gas was removed from the monitoring program as documented in the MECP document dated April 23, 2013, however, as required in the letter, the monitoring locations were maintained for future use.

Although the potential for methane generation has increased with the commencement of domestic waste deposition at the Site in 2009, the limited size of the waste mound and relative small waste acceptance rate would still limit the methane generation at the Site. As well, the geochemical signature of the landfill leachate, which is most notable at MW1/17 (downgradient edge of waste) and MW23/3 and KGS-2 (middle of waste) still have a relatively low leachate signature with chloride concentrations less than 150 mg/L. Given these conditions, significant methane production has not likely yet developed at this point. However, some leachate signature parameters are noted to be increasing within the waste footprint. This time frame is deemed to be appropriate given the remoteness of the Site limits the potential for risk to the nearest residents. However, if a significant increasing trend in leachate concentrations develops in the interim, the City will conduct a round of methane measurements to document landfill gas concentrations such that an assessment regarding re-instatement of measurements as part of the monitoring program is necessary.

3.9 Geotechnical Monitoring (Schedule "H")

As required in Schedule "H" of the ECA, shear testing is required to be completed by a geotechnical engineer prior to filling in areas of Cell A. The last testing was completed in 2020 and 2021. The purpose of the testing was to determine the in-situ shear strengths

and pore water pressures along the east side of the landfill in order to confirm any changes from previous geotechnical information obtained in 2014 with the filling of this area being completed over the past six years. Eng-Tech drilled two (2) boreholes, while previously installed piezometers were monitored at eight (8) locations.

According to the Eng-Tech reports, the in-situ shear strength values obtained in 2020 ranged from 24 to 56 kPa and are above the minimum recommended 5.5 kPa value by R. Kerry Rowe Inc. in their report *Kenora Landfill* dated February 21, 1997. As such, Eng-Tech concluded that based on the soil stratigraphy and the shear strength values obtained on site, the 2020 results are in compliance with the values as stated in the previous Reports. Eng-Tech also supports the loading as recommended in the R. Kerry Rowe Inc (1997). Similarly, it was stated in 2020 that the ground water levels have not significantly changed for all of the piezometers over the history of loading of the landfill, such that the shear strength values that were measured are unchanged.

The complete Eng-Tech reports can be found in Appendix N.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Operation of the City of Kenora Jones Road Landfill Site is in compliance with the ECA and is performed as designed. The Site continues to generate leachate which is observed in the downstream surface water of the CAZ, although all applicable criteria are met within the receiving water body Morgan Lake. The Trigger Mechanism program was exceeded in 2016 for boron within the surface water. which led to additional assessment of both the source and pathway for this parameter. With this assessment and additional monitoring completed over the current monitoring period, it was determined that the boron source is likely associated with leachate and / or the ash material utilized in the cover material for the waste mound. However, with additional monitoring, the revised usage of the CWQG value as opposed to the PWQO value indicates that the Site is in compliance with respect to boron within the current CAZ. When incorporating these values, the Revised Trigger Program is met. As well, the 2021-2023 monitoring data continues to show the stable trend of boron concentrations on Site, possibly reflective of the solubility within the waste and / or ash material. The City has undertaken some mitigation measures to help to reduce leachate / boron contributions to the downstream surface water, including decreasing of the active the working area, shifting the active area further back from the downgradient toe in a new cell area, increasing the amount of cover material at the downgradient end of the waste mound and limiting the use of the ash material in areas of the waste mound which runoff would be directed into the wetland. This would generally limit the use of this ash material to the active working. The data collected over the current monitoring period would indicate that these measures have

proven effective in maintaining stable downgradient conditions. As formal endorsement of the revised Trigger Mechanism values has yet to be received, it is requested that MECP provide comment on these revised values presented here and in the January, 2018 correspondence (Appendix B). Once approval or comment has been received, The City can submit an ECA amendment application to formalize the revised trigger program.

The boron trends and elevated concentrations in the downstream surface water quality do illustrate the primary leachate migration pathway is currently within the surface water of the wetland feature downgradient of the Site. Despite this, attenuative processes are active such that leachate indicator parameters show a meaningful decline in concentrations with distance from the landfill, while concentrations within the downstream receptor (SW-5 – Morgan Lake) are similar to background indicating no observable leachate influence is present.

Finally, limited impacts to the ground water regime continue to be observed and are shown to be increasing only within either the landfill footprint or at monitors situated immediately downgradient of the waste cells such that the current CAZ is considered adequate given the current ground water conditions. These results support the primary leachate migration pathway as being through surface flow within the downstream wetland.

4.1 Proposed 2024-2026 Monitoring Program

It is recommended that the 2024-2026 monitoring program for the City of Kenora Jones Road Landfill Site remains the same as the current program, which will follow the current ECA No A612018. The additional surface water locations added in 2017 (RW-1, RW-2, & RW-3) and 2019 (RW-4 & RW-5) were implemented to assess the leachate / boron migration pathway. Based on the results collected and the fact the trends correlate to the historical locations SW-1 and SW-2, it is proposed that only two are of these locations are maintained. RW-2 is proposed to be maintained as it is located immediately adjacent to the waste mound such that it would be the best location to indicate any changes to leachate / boron contributions to the downstream surface water quality. This location has also shown to have the most consistent water level to facilitate routine sample collection. RW-5 will be maintained as it will allow of a better indication of the water quality at the downstream end of the CAZ such that potential impacts to Morgan Lake can be assessed. The proposed monitoring program is summarized in the table below.

Table 7: Summary of the Required 2024-2026 Monitoring Programs

Monitor Location	Annual Frequency	Parameters
Ground Water		
1/17, 2/9, 2/13, 3/8, 4/6, 5/17, 6/5, 11/4, 16/15, 17/15, 19/16, 23/3, KGS-2 and 24/5	May & August	comprehensive list
2/9	August	VOC's
Surface Water		
SW-1, SW-2, SW-3, SW-4, SW-5 (August only), RW-2* & RW-5*	August & October	comprehensive list
SW-1, SW-2, SW-3, SW-4, RW-2* & RW-5*	May	indicator list
SW-2 and SW-3	May, August & October	flow measurement
SW-2	August every 2 years	VOC's
Seep / Spring	Any sampling event observed	indicator list
Sediment		
SB-1, SB-2, and SB-R	August every 10 years (next in 2032)	major and minor inorganics & grain size

* - additional temporary monitoring locations added in 2018 to address boron trigger exccedances (Section 3.5)

** - Sediment monitoring requirements were revised to every 10 years (sampled during this monitoring period, next samples to be collected in 2032)

*** - all water quality samples collected require field electrical conductivity and pH, while all surface water samples require dissolved oxygen measurements

As per the current ECA (Appendix B), sediment sampling has been maintained in the monitoring program, however the frequency of sample collection is every 10 years with the next sample being required in 2033. However, it is also stated that if annual surface water samples in Morgan Lake or Crystal Bay show a significant increase in metal concentrations then the sediment sampling should be repeated and thereafter every five years. Based on the information outlined in Section 3.4.2, there does not appear to be a significant increase in metal concentrations at those locations, so it is therefore recommended that sediment sampling continue with the current sampling frequency of once in every ten years.

5.0 REFERENCES

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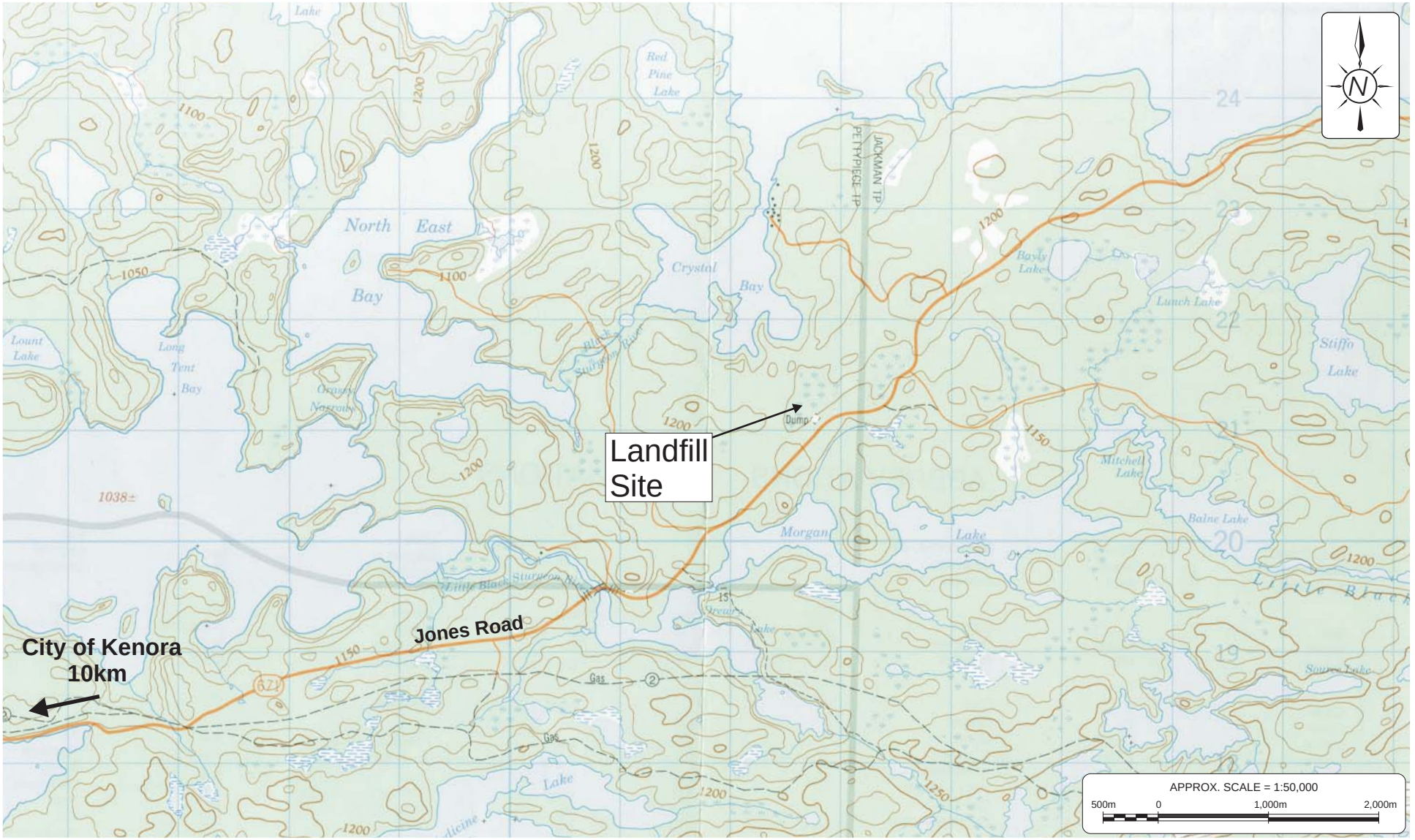
APPENDICES

APPENDIX A

Figures



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Source: Energy, Mines, and Resources Canada. 1996. 1:50,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

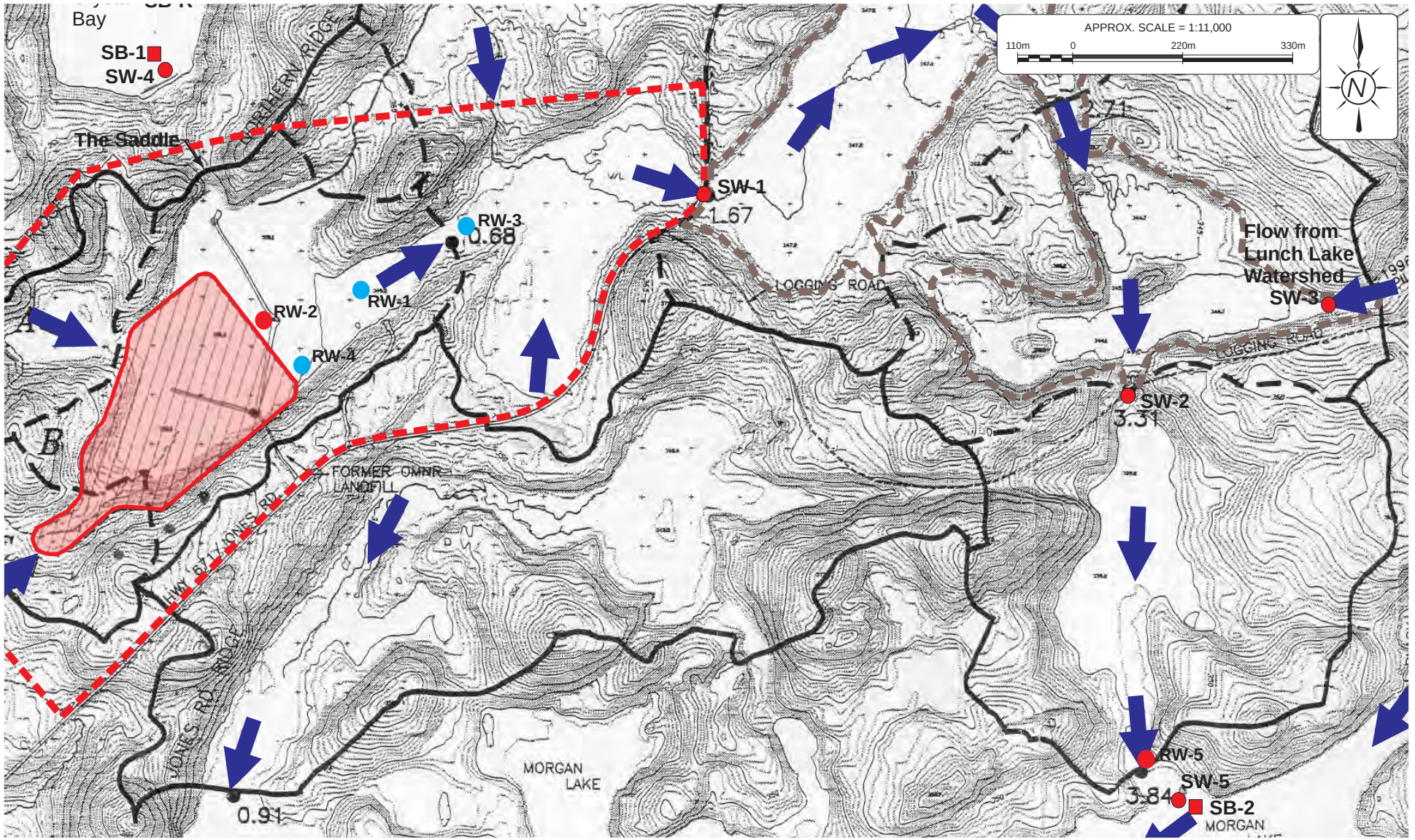
Site Location

Date Issued:	June 2024
Created By:	CMR
Project No.	23-020
File Name:	Figure 1 - Site Topo.CDR

Design & Operations Plan
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No.
1



Legend:

- Approved Waste Footprint
- Approximate Property Boundary
- Contaminant Attenuation Zone
- Watershed Boundary
- Sediment/Benthic Sampling Location
- Surface Water Sampling Location
- Temporary Action Plan Surface Water Sampling Locations
- Surface Water Flow

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

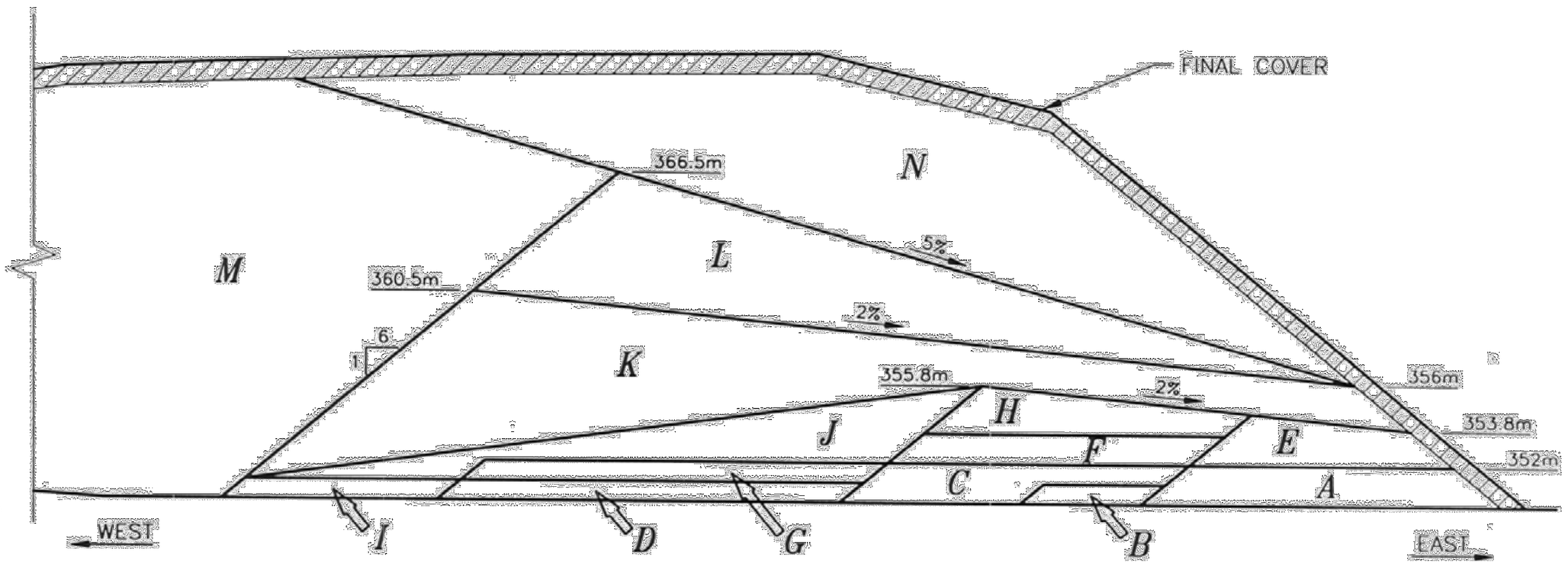
Hydrologic Features

Date Issued:	June 2024
Created By:	CMR
Project No.	23-020
File Name:	Figure 2 - Hydrologic Features.CDR

Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **2**



LANDFILL SEQUENCE	APPROX. YEAR OF DEVELOPMENT
A	1 – 3
B	4
C	5
D	6
E	7 – 8
F	9
G	10

LANDFILL SEQUENCE	APPROX. YEAR OF DEVELOPMENT
H	11
I	12
J	13
K	14 – 20
L	21 – 23
M	24 – 35
N	36 – 40

Fenco MacLaren
SNC·LAVALIN

KENORA AREA
WASTE MANAGEMENT MASTER PLAN
PROPOSED KENORA AREA LANDFILL

FIGURE S1-5.1

LANDFILL DEVELOPMENT SEQUENCE

SCALE HOR. 1" = 1500
VERT. 1" = 300

LEGEND:

Not to Scale

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

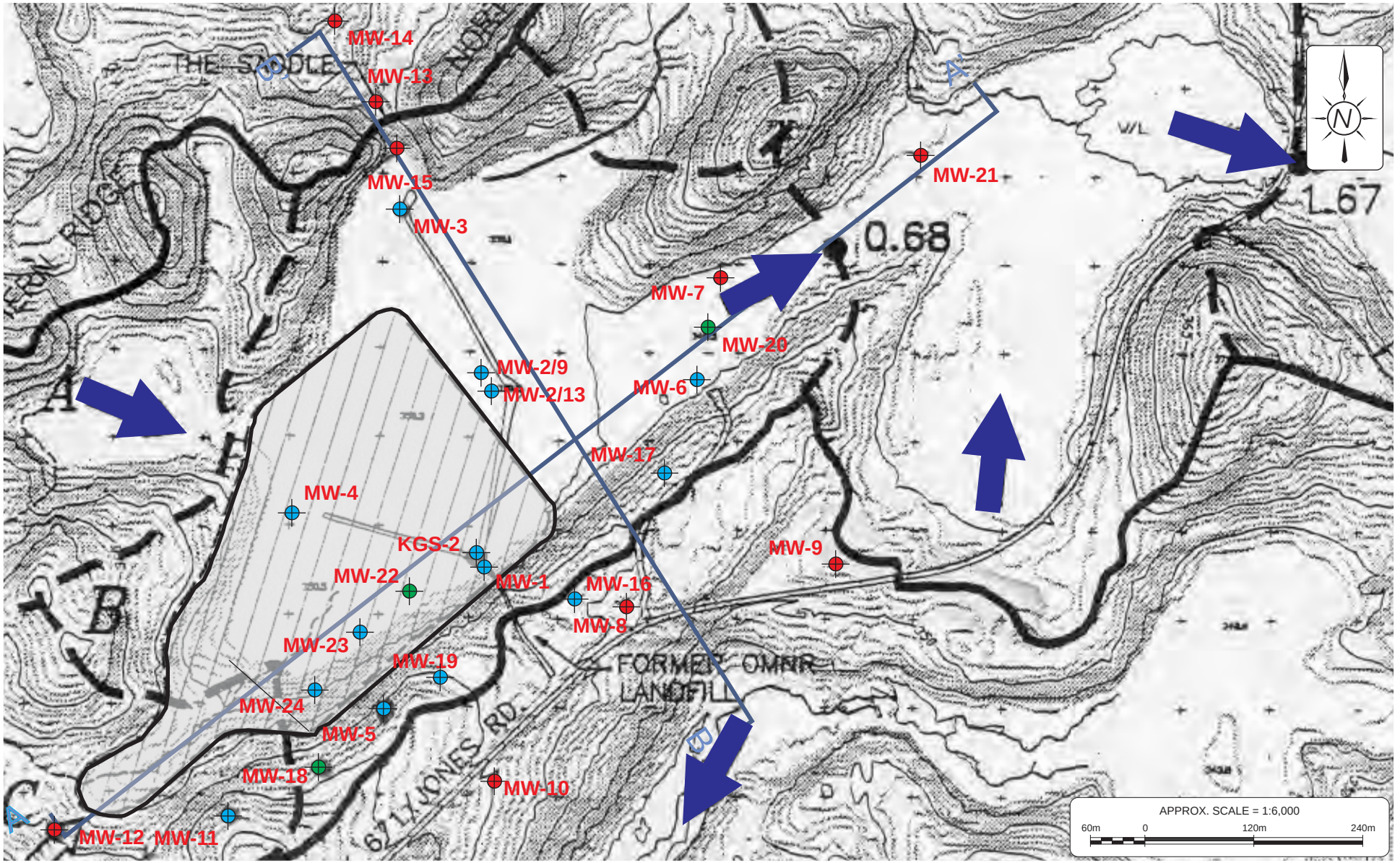
Landfill Development Sequence

Jones Road Landfill
City of Kenora

DATE ISSUED:	June 2018	Figure No.
CREATED BY:	JLM	3
PROJECT NO.:	17-020	
REFERENCE:		

DAYSTAMP: M:\17 Projects\17-020 2017 Jones Road Landfill Monitoring\04.0 - Drafting\17-020.dwg

Plotted by: JMCCARTNEY on June 7, 2018 at 10:38am
File: M:\17 Projects\17-020 2017 Jones Road Landfill Monitoring\04.0 – Drafting\17-020.dwg Layout: Figure 3 Plotscale: 0.1



Legend:

- Approved Waste Footprint
- Watershed Boundary
- Ground Water Monitor (maintained)
- Ground Water Monitor (removed from program)
- Ground Water Monitor (decommissioned)

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

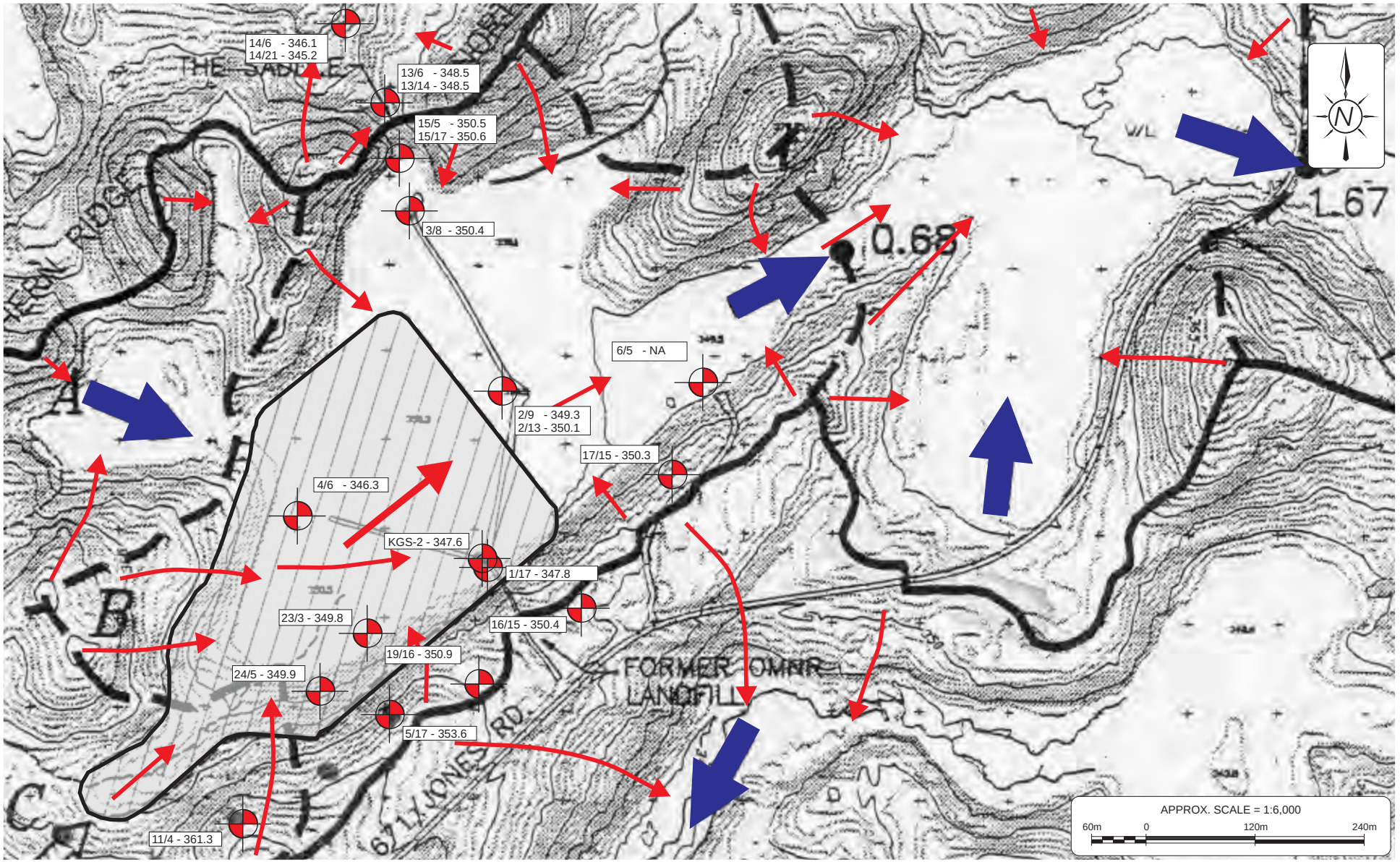
Ground Water Monitoring Network

Date Issued:	June 2024
Created By:	CMR
Project No.	23-020
File Name:	Figure 4 .CDR

Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. 4



Legend:

- Approved Waste Footprint
- Ground Water Monitor
- Watershed Boundary
- Ground Water Flow Direction
- Surface Water Flow Direction
- Sub-watershed Boundary

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Ground Water Monitoring (August 2023)

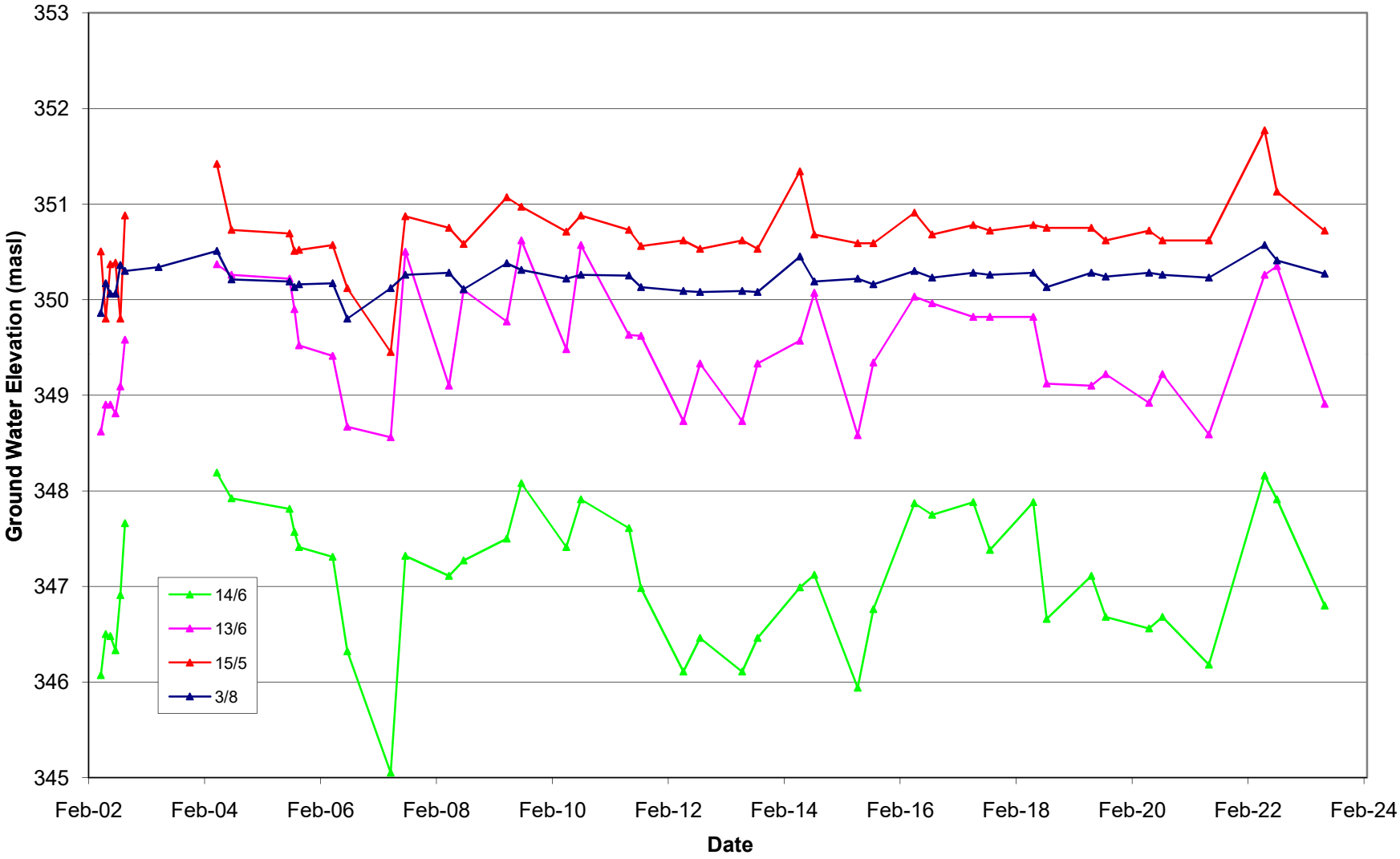
Date Issued:	June 2024
Created By:	CMR
Project No.	23-020
File Name:	Figure 5.CDR

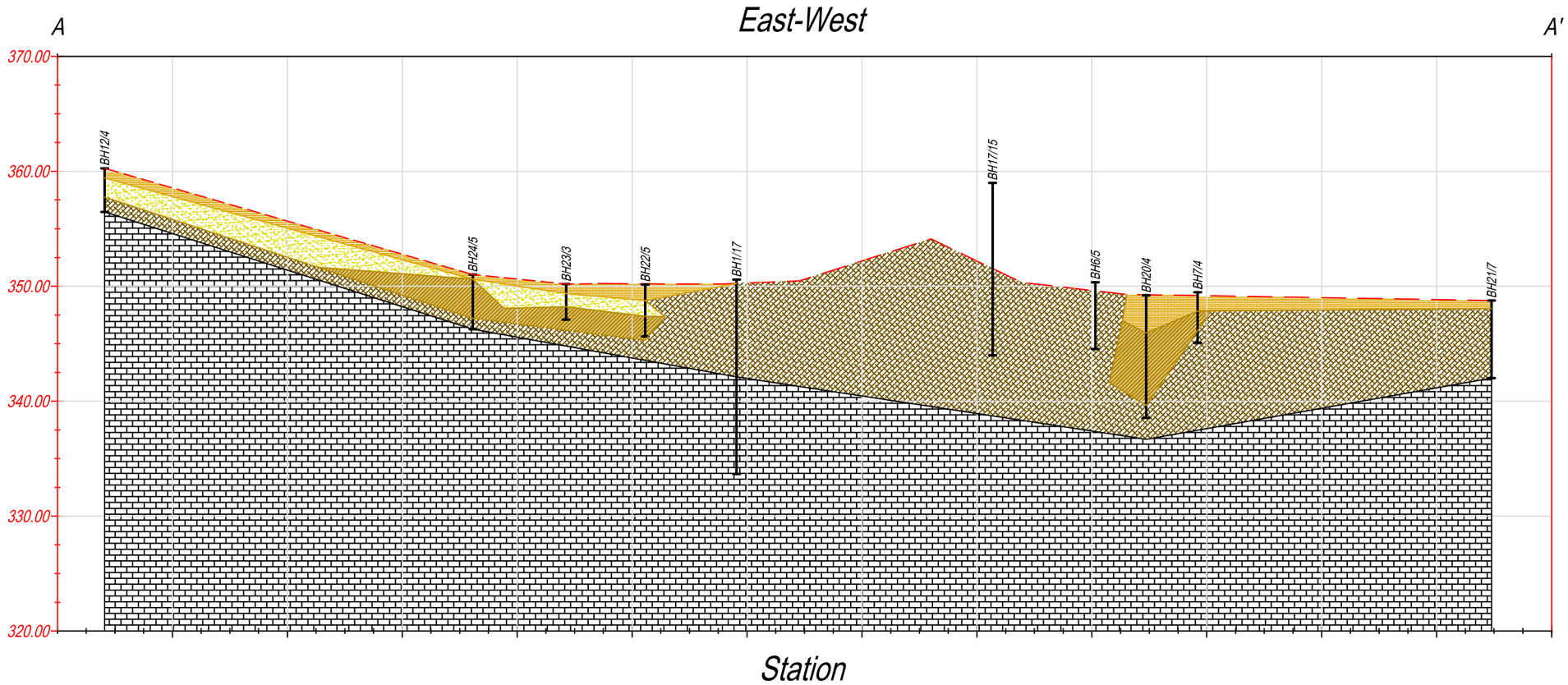
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **5**

Figure 6 - Saddle Ground Water Elevations (overburden)





LEGEND:

- Bedrock
- Peat
- Till
- Sand
- Clay

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

East-West Cross Section A-A'

Jones Road Landfill
City of Kenora

DATE ISSUED:	June 2018	Figure No. 7
CREATED BY:	JLM	
PROJECT NO.:	17-020	
REFERENCE:		

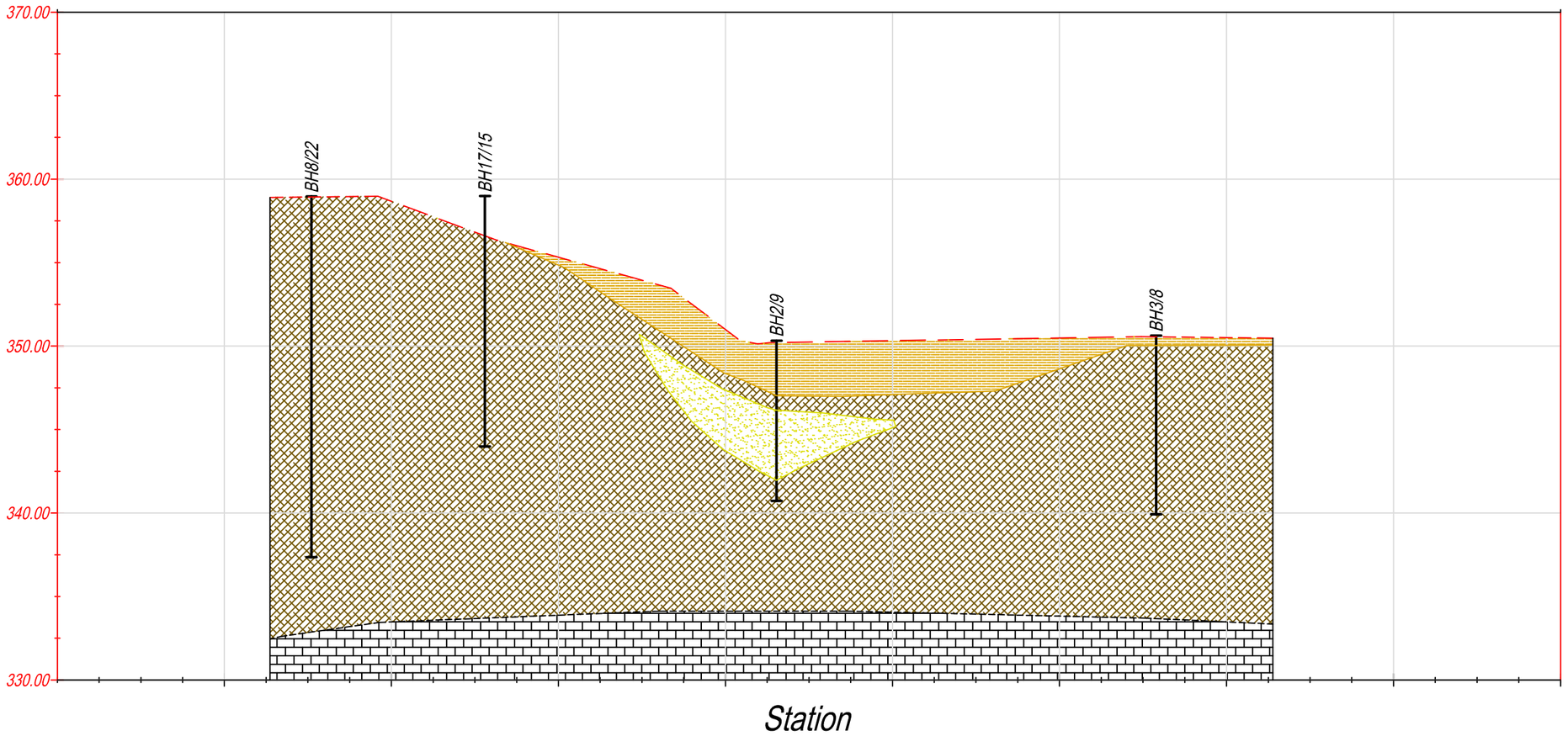
DAYSTAMP: M:\17 Projects\17-020 2017 Jones Road Landfill Monitoring\04.0 - Drafting\17-020.dwg

Plotted by: JMCCARTNEY on June 7, 2018 at 10:39am
File: M:\17 Projects\17--020 2017 Jones Road Landfill Monitoring\04.0 -- Drafting\17--020.dwg Layout: Figure 7 Plotscale: 0.1

B

South-North

B'



LEGEND:

- Bedrock
- Peat
- Till
- Sand

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

South-North Cross Section B-B'

Jones Road Landfill
City of Kenora

DATE ISSUED:	June 2018	Figure No.
CREATED BY:	JLM	8
PROJECT NO.:	17-020	
REFERENCE:		

DAYSTAMP: M:\17 Projects\17-020 2017 Jones Road Landfill Monitoring\04.0 - Drafting\17-020.dwg

Plotted by: JMCCARTNEY on June 7, 2018 at 10:40am
File: M:\17 Projects\17-020 2017 Jones Road Landfill Monitoring\04.0 - Drafting\17-020.dwg Layout: Figure 8 Plotscale: 0.1

APPENDIX B

MECP Correspondence and Certificates of Approval

Ontario

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

City of Kenora
1 Main Street South
Kenora, Ontario
P9N 3X2

for the use and operation of a 13.1 hectare landfilling area within a total site area of 108.1 hectares

all in accordance with the following plans and specifications:

as listed in Schedule "A"

Located: Parts of Lots 1 and 2, Concession I, and Parts of Lots 1 and 2, Concession II, Townships of Pettypiece and Jackman, District of Kenora

which includes the use of the site only for the disposal *of the following categories of waste (Note: Use of the site or additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval)* domestic, commercial, non-hazardous solid industrial and institutional, processed organic sewage sludge, sludge from future municipal or provincial fresh water treatment facilities, non-pathological agricultural and bio-medical, and grit and screenings from street cleaning and sediment basin clean-outs.

This Certificate of Approval Revokes and Replaces Certificate of Approval No. A 612016, dated November 5, 1999.

and subject to the following conditions:

DEFINITION OF TERMS

1. In this Provisional Certificate of Approval:

   a) "City" means the City of Kenora;

   b) "Director" means a Director of the Environmental Assessment and Approvals Branch, Ministry of the Environment;

   c) "Regional Director" means the Director , Ministry of the Environment, Northern Region;

   d) "District Manager" means the Kenora District Manager, Ministry of the Environment, Northern Region;

e) "Landfill" means Parts of Lots 1 and 2, Concession I, and Parts of Lots 1 and 2, Concession II, Townships of Pettypiece and Jackman, District of Kenora;

f) "MOE" means the Ministry of the Environment;

g) "ODWO" means the Ontario Drinking Water Objectives;

h) "O & M Manual" means the Operations and Maintenance Manual;

i) "PWQO" means the Provincial Water Quality Objectives;

j) "RUP" means the MOE's Reasonable Use Policy (Guideline B-7, formerly 15-08);

k) "This Certificate" means this Provisional Certificate of Approval as amended from time to time, including all Schedules attached to and forming part of this Certificate; and

l) LLC means the Landfill Liaison Committee.

GENERAL

2. The City shall establish a Board of Management in conjunction with the Town of Keewatin and the Town of Jaffray Melick who will act as its designated authority to oversee the development, operation, maintaining and monitoring of the Landfill.

The City shall be bound by the conditions of this Certificate. The conditions of this Certificate shall extend to and bind any successor or subsequent owner of the Landfill, which may be created through future restructuring.

3. No operation shall be carried out at the Landfill after 180 days from this condition becoming enforceable unless this Certificate has been registered by the City as an instrument in the appropriate Land Registry Office against title to the Landfill and a duplicate registered copy provided to the Director.

No operation shall be carried out at the Landfill after 180 days from this condition becoming enforceable unless the land control maps at the Ministry of Natural Resources and the Ministry of Northern Development and Mines (MNDM) show this Crown Site (the 108.1 ha site area identified in page 1) designated for sale and patent and the Ministry of Natural Resources (MNR) has issued an Interim Land Use Permit. Within 60 days of registration of the patent, this Certificate must be registered by the City as an instrument in the appropriate Land Registry Office against title to the Landfill and a duplicate registered copy provided to the Director.

4. Requirements specified in this Certificate are minimum requirements and do not abrogate the need to take all reasonable steps to avoid violating the provisions of other applicable legislation, regulations, approvals, orders, etc.

5. The requirements of this Certificate are severable. If any requirements of this Certificate to any circumstance is held invalid, the application of such requirement to other circumstance and the remainder of this Certificate shall not be affected thereby.

6. Despite any other term or condition in this Certificate, waste disposal shall be limited to:

   (i) the 13.1 ha landfilling area as shown on Fig. FW.2, Item 1 of Schedule "A", and

   (ii) the approved final contours as shown on Drawing S1-2, Item 1 of Schedule "A".

7. The City shall allow MOE personnel, or an MOE authorized representative(s), upon presentation of credentials, to:

   a) carry out any and all inspections authorized by the Environmental Protection Act, the Ontario Water Resources Act or the Pesticides Act, as amended from time to time, of any place to which this Certificate relates, and

   without restricting the generality of the foregoing, to:

   b) i) enter upon the premises or the location where the records required by the conditions of this Certificate are kept:

   ii) have access to and copy, at any reasonable time, any records required by the conditions of this Certificate;

   iii) inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations required by the conditions of this Certificate, and

   iv) sample and monitor, at reasonable times, for the purposes of assuring compliance with the conditions of this Certificate.

8. Schedules A, B, C, D, E, F, G and H are integral parts of these conditions.

LANDFILL OPERATIONS

General

9. The Landfill shall be developed, operated and maintained by the City in accordance with all of the plans and documents listed in Schedule "A". Should there be discrepancies between the documents listed in Schedule "A" and the conditions in this Certificate, the conditions shall take precedence. Should there be discrepancies between the documents listed in Schedule "A", the document bearing the most recent date shall take precedence.

10. a) The City shall operate the Landfill in accordance with an O & M Manual. The O & M Manual shall be prepared and submitted to the Regional Director and the LLC within 180 days of the date of issuance of this Certificate and shall cover the following issues:

- day-to-day operations and staff responsibilities;
- surface water management;
- equipment maintenance and inspection;
- stockpile management and use of daily and intermediate cover material;
- condition of applied cover and vegetation;
- odour, dust and litter control measures;
- traffic control measures;
- bird, bear, rodent and insect control measures;
- fire prevention measures;
- waste management control and record keeping procedures to ensure that only approved waste enters the site;
- operating instructions for management of any waste suspected to be hazardous which enters the site; and
- geotechnical and environmental monitoring procedures and protocols.

b) The O & M Manual shall also identify specific construction activities designed to minimize slope and bearing failures.

c) The O & M Manual may be revised based upon considerations or recommendations made to the Board of Management. These revisions shall be based upon information contained within the Annual Monitoring report mentioned in Condition 52, and directives contained within MOE regulations, policies and guidelines.

11. Scavenging of waste at the Landfill is prohibited.

Construction Activity

12. a) Heavy Equipment Usage

Heavy equipment shall not be used on the peat or, initially, on the waste over the bog unless the peat is sufficiently frozen to support the weight of this equipment.

b) Damage to Root Mat

Care shall be taken during construction to minimize damage to the root mat over the bog area. Areas where the mat is badly damaged shall be treated on a case-by-case basis.

13. **Side Slopes**

All temporary side slopes (i.e. prior to achieving final design grades) for the fill over the bog shall be held at 6H (horizontal):1V (vertical) (or less). The permanent side slopes for the finished portion of the Landfiill shall be restricted to 6H:1V for the east face, but may be up to 4H:1V elsewhere unless otherwise specified by the geotechnical engineer.

14. **Site Supervision**

The City shall ensure that the Site Supervisor has been adequately trained with respect to the following, without limitation:

i) conditions and schedules of this Certificate;

ii) the operation and management of the Landfill;

iii) relevant waste management regulations and legislation;

iv) environmental concerns related to the waste being handled at the Landfill;

v) occupational health and safety concerns pertaining to the waste being handled at the Landfill; and

vi) the placement of fill on the bog area in accordance with advice and/or specific instructions provided by a qualified geotechnical engineer.

Site Security & Operating Hours

15. The waste disposal operating hours of the Landfill shall be between 8:30 a.m. to 5:30 p.m., Monday to Saturday. The Landfill is closed on Sundays and statutory holidays.

16. The City shall not allow waste to be received for disposal at the Landfill except during operating hours when the Landfill is under the supervision of the Landfill attendants.

17. During non-operating hours, the Landfill entrance gate shall be locked by the City to secure against access by unauthorized persons.

18. In the event of a requirement to respond to emergency situations, waste may be received for disposal at the Landfill outside of the normal operating hours specified in Condition 15 above, under the supervision of the Landfill attendants and subject to the approval of the District Manager.

Site Entry Requirements

19. The City shall not allow the following wastes to be disposed of at the Landfill:
- hazardous wastes as defined under Regulation 347;
- industrial liquid or slurry wastes;
- hazardous biomedical wastes; and

- barrels, drums or other similar containers which have been contaminated by hazardous substances.

20. The City shall use the weigh scale to be installed at the central public drop-off depot to monitor and record all incoming wastes. Such a depot shall be established in a central location in the Tri-Municipal Area. If this off-site scale malfunctions, alternative methods for weight determinations shall be implemented as soon as possible but not later than in 3 days. These could include the use of alternate weigh scales, estimation of load weights from historical records for specific haulers, or waste generation areas.

21. The City shall ensure that all vehicles entering the Landfill shall be identified by a licence number on the weigh scale billing notice.

Waste Cover Requirements

22. The City shall ensure that waste is deposited in a manner that minimizes the area of exposed waste at the Landfill working face and shall be compacted before cover material is applied.

23. The City shall ensure that from May 15 till September 15 at the end of each working day, and within two hours of the entrance gate closure, cover material is applied to all exposed waste material. Cover material shall be applied on a weekly basis during the rest of the year. The average depth of this material when soil is used shall be 15 cm.

24. Alternative MOE approved materials such as tarps, foams or processed sewage sludge can be used for daily cover subject to the Regional Director's approval.

25. The City shall provide a contingency supply of cover material equal to two working days worth to ensure that adequate cover is always available for application pursuant to Condition 23.

26. The City shall ensure that in areas where landfilling is not to be carried out for the period of 90 days or more, at least 20 cm of compacted clean earth cover will be applied over the wastes. If necessary, these areas may be hydroseeded during the earliest spring or fall planting season to stabilize the surface against erosion.

27. The City shall ensure that in areas where landfilling has been completed to the approved final contours, a minimum 750 mm thickness of clean earth cover will be placed over the compacted wastes. The lower 600 mm will consist of previously excavated and compacted tills, and the top 150 mm will consist of locally derived topsoil mixed with peat. These areas shall be hydroseeded during the earliest spring or fall planting season to provide protection against erosion.

Base Contours

28. The City shall ensure that extent of excavation shall be limited to base grades shown on Drawing S1-3 of Item 1, Schedule "A".

29. The City shall ensure that no excavation shall occur for those portions of the landfilling area situated over

the bog.

Waste Burning

30. The City shall ensure that there is no burning of waste at the Landfill.

31. The City shall ensure that site operations shall incorporate the fire prevention measures identified in Item 1 of Schedule "A".

Bears, Birds, Rodents and Insect Control

32. Bears, birds, rodents and insect control shall be undertaken by the City in accordance with procedures outlined in Item 1, Schedule "A".

Litter Control

33. The City shall implement all necessary measures to prevent off-site litter impact from landfilling operations. These measures shall include but not be limited to the following:

- the use and maintenance of suitable portable netting and snow fencing;
- weekly site litter inspections and clean-up; and
- daily inspection and no less than weekly litter pick up on Highway 671 in the vicinity of the Landfill;

34. The City shall ensure that no disposal of waste occurs if weather conditions make it difficult to prevent litter from leaving the Landfill.

Dust Control

35. In order to keep mud and dust from the Landfill to a minimum, the City shall implement a dust control program. This program shall include, but not be limited to the following measures:

- during dry periods when there are visible dust emissions, regular wetting of soil cover material prior to its spreading by bulldozers over the working face;
- during dry periods wetting of the unpaved roads and the use of dust suppressants;
- installation of speed bumps near the site entrance;
- reducing on-site vehicle speeds by posting a maximum speed limit of 30 km/h;
- paving the site entrance area;
- construction of the on-site crushed stone or gravel roads;

- covering of dust laden waste material as soon as possible; and
- minimizing wind erosion by stabilizing inactive areas using vegetation.

Noise Control

36. Noise from or related to the operation of the Landfill shall be kept to a minimum and, in any event, the City shall comply with the noise level limits outlined in the MOE's February 1997 "Noise Guidelines for Landfill Sites" as contained in Schedule "B".

Traffic Control

37. The City shall ensure that sufficient queueing space is available on-site to accommodate the peak traffic volumes anticipated.

38. During the first year of operation the City shall monitor site related and non-site related traffic levels to assess the potential need for Highway 671 improvements at the site entrance.

Site Maintenance

39. The City shall conduct regular site inspection(s) to ensure that all facilities and site works are maintained in a tidy condition and good working order. Such inspections will check for:

- damage to perimeter fences and the maintenance of litter fences;
- interior access road damage;
- blowing litter and other nuisance concerns;
- leachate springs or breakouts;
- ponded water and blocked surface drainage works;
- slope failure/erosion and final cover settlement; and
- the condition of vegetation.

Any necessary repair/remedial works will be performed at the earliest possible opportunity.

LANDFILL CONTAMINANT ATTENUATION ZONE

40. Within 180 days of the issuance of this Certificate the City shall establish the proposed contaminant attenuation zone shown on Fig. FW- 2 of Item 1, Schedule "A". This will be established through an MNR Land Use Permit and an MOE Certificate of Prohibition.

SURFACE WATER MANAGEMENT SYSTEM

41. Site grading and contours shall be maintained by the City such that all surface water run-off from the landfilling area is directed into the perimeter surface water management system.

42. Within the first year of operation following the date of this Certificate being issued, the perimeter surface water management system consisting of swales, ditches, retention basins and the controlled outlet facilities shall be completed by the City. It shall be operated and maintained by the City in accordance with the procedures outlined in Item 1, Schedule "A".

    The perimeter ditching, external run-off channels, and northern storm water retention basin shall be completed in accordance with the sequence of landfilling shown on Figure S1-5.1, Item 1 of Schedule "A".

SURFACE WATER MONITORING

43. Surface water monitoring shall be undertaken by the City in accordance with Schedule "C".

SEDIMENT MONITORING

44. Sediment monitoring shall be undertaken by the City in accordance with Schedule "D".

BIOLOGICAL MONITORING

45. Biological monitoring shall be undertaken by the City in accordance with Schedule "E".

GROUNDWATER MONITORING

46. Groundwater monitoring shall be undertaken by the City in accordance with Schedule "F".

LANDFILL GAS MONITORING

47. Landfill gas monitoring shall be undertaken by the City in accordance with Schedule "G".

GEOTECHNICAL MONITORING

48. Geotechnical monitoring shall be undertaken by the City in accordance with Schedule "H".

PUBLIC CONSULTATION

Landfill Liaison Committee (LLC)

49. The LLC shall be established based upon the conditions generally described in Appendix S7-A of Item 1, Schedule "A" and identified below:

a) The LLC should be established to monitor Landfill operations for the life of the site, ensuring the fulfilment of conditions outlined in this Certificate;

b) Terms of Reference for the LLC should be established by the Board of Management, referred to in Condition 2;

c) The LLC will also act as a Dispute Resolution Committee. Individuals wishing to express concern regarding the operation, safety or security of the Landfill may make deputations to the LLC, who upon deliberation, will make recommendations to the Board of Management of the problem; and

d) The LLC, in monitoring operational practices of the Landfill will make recommendations to the Board of Management for mitigation of impacts from the Landfill to the environment.

PUBLIC INVOLVEMENT/COMPLAINTS

50. The City shall establish the public complaints procedure upon issuance of this Certificate that shall include:

a) designating specific City staff to receive any complaints and , as soon as possible, to respond in writing indicating the proposed action to be undertaken:

b) posting the Landfill complaints telephone number at the Landfill entrance and providing a written notice explaining the complaints procedure to surrounding landowners located within approximately one kilometre of the Landfill;

c) keeping an accurate record of the following Landfill related complaints information:

- the name and address of the complainant,
- the date and time,
- the nature of the complaint,
- details of the City's response to the complainant and actions taken; and

d) providing copies of complaint records to the LLC and receiving any proposed recommendations of the LLC;

e) summarizing all complaints concerning the Landfill and the City responses/actions in the Annual report mentioned in Condition 52; and

f) both the O&M Manual, as identified under Condition 10, and the Annual reports will be made available for review by the LLC as a basis for considering issues pertinent to the Landfill's operation.

51. The City in consultation with the Board of Management, the LLC and the District Manager, shall review the effectiveness of the public complaints procedure after two years of its commencement and may make revisions to the procedure, if required.

ANNUAL REPORT

52. The City shall prepare and submit an Annual report to the Regional Director by June 30th of the year following the calendar year covered by the report which shall include as a minimum, the following:

a) a summary of total annual quantities of waste received on a monthly basis at the site;

b) a drawing(s) of the Landfill indicating all groundwater, surface water, sediment, biological, gas, and geotechnical monitoring locations;

c) tables outlining monitoring locations, analytical parameters sampled, and frequency of sampling and measurements;

d) an analysis and interpretation of the surface water, sediment, biological, groundwater, leachate, gas and geotechnical monitoring data; a review of the adequacy of the monitoring programmes; conclusions of the monitoring data; and recommendations for any changes in monitoring programmes that may be necessary;

e) an assessment of surface water quality with respect to the PWQO Guidelines and trigger concentrations mentioned in Schedule "C";

f) an assessment of groundwater quality in relation to the RUP and ODWO;

g) an assessment of groundwater table elevations in relation to trigger elevations mentioned in Schedule "F";

h) an assessment of geotechnical conditions near the east face of the Landfill;

i) an assessment of the performance of the Contaminant Attenuation Zone;

j) an update of changes in operations, sequencing, equipment, or procedures made or produced at the Landfill, and any operating difficulties encountered;

k) drawings showing areas of fill, buffer areas, current Landfill contours, final Landfill contours, any recommended changes to the final contours, percentage of available space utilized, and an estimate of the remaining disposal capacity and Landfill site life;

l) a summary discussion of Landfill site daily and intermediate cover requirements and erosion protection;

m) a statement as to compliance with all Conditions and with the inspection and reporting requirements of the Conditions;

n) a summary of any complaints made regarding Landfill operation and the City's response and action taken;

o) an annual waste diversion statement that includes an updated summary of per capita waste diversion activities and quantity of waste diverted using 1987 as the base year;

p) recommendations respecting any proposed changes in the operation of the Landfill; and

q) any report of the LLC to the City.

CLOSURE PLAN

53. One year before the Landfill is expected to stop receiving waste, as determined according to Condition 6, the City shall develop and submit an updated Closure Plan. The Closure Plan shall be submitted for the Director's approval and outline post-closure maintenance and monitoring. The plan shall include, but not be limited to the following:

a) changes to the final contour plan that may have been previously identified in the annual reports or recommended in the development of the detailed Closure Plan;

b) fencing and access control;

c) details of any additional vegetative plantings planned;

d) the sequence and schedule for completion of final cover installation;

e) post-closure and end-use plans;

f) plans and schedules for the management and continued monitoring of surface water, groundwater, leachate and landfill gas;

g) plans and schedules for the routine monitoring and maintenance of the final cover, swales, ditches, retention basins and the controlled outlet facilities;

54. The final cover over the entire area which was landfilled shall be completed by the City within one full construction season following the date after the Landfill has stopped receiving waste. Formal notice shall be provided by the City to the Director upon receipt of the final load of waste to the Landfill.

SCHEDULE "A"

This Schedule "A" forms part of Provisional Certificate of Approval No. A 612018 *and contains documentation submitted in support to an application for the establishment and use of the Landfill.*

1. Kenora Area Waste Management Master Plan EPA Document prepared by Fenco MacLaren and dated February, 1997.

2. Letter dated April 10, 1997 - Fenco MacLaren (L. Torrens) to Ministry of Environment and Energy (E. Zaltsberg) - Subject: Application for a Certificate of Approval for a Waste Disposal Site.

3. Letter dated July 2, 1997 - Fenco MacLaren (T. Taylor) to Ministry of Environment and Energy (J. Barr) - Subject: Former Jones Road Waste Disposal Site.

4. Letter dated August 14, 1997 - Fenco MacLaren (L. Torrens) to Ministry of Environment and Energy (E. Zaltsberg) - Subject: Geotechnical Monitoring: Kenora Area WMMP EPA Studies Document

5. Kenora Area Waste Management Master Plan, October 1997 Photo supplements to EPA Studies Document prepared by Fenco MacLaren and dated February, 1997, and September, 1999.

6. Kenora Area Waste Management Master Plan EA Conditions of Approval Document prepared by SNC-Lavalin Engineers & Constructors Ltd. and dated January, 1999.

7. Figure S1-6.1 as amended September, 1999 - Proposed Monitoring Locations prepared by SNC-Lavalin Engineers & Constructors Ltd. and dated September 1999

8. Letter dated September 27, 1999 from Environment Canada (S. Michajluk) to the Ministry of the Environment (E. Zaltsberg), Subject: Kenora Area Waste Management Master Plan.

SCHEDULE "B"

This Schedule "B" forms part of Provisional Certificate of Approval No. A 612018. It contains the Ministry of the Environment's February 1997 "Noise Guidelines for Landfill Sites" referred to in condition 36.

1. SCOPE

This Publication establishes sound level limits for landfill operations affecting residential or other noise-sensitive areas. Three components of waste disposal operation are separately addressed in this guideline:

- the actual landfill site;
- facilities for reception, storage and mixing; and
- off-site source vehicles.

2. REFERENCES

Reference is made to the following technical publications:

(1) NPC-101 - Technical Definitions

(2) NPC-102 - Instrumentation

(3) NPC-103 - Procedures

(4) NPC-104 - Sound Level Adjustments

(5) NPC-205 - Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (urban)

(6) NPC-206 - Sound Levels due to Road Traffic

(7) NPC-232 - Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)

(8) NPC-233 - Information to be Submitted for Approval of Stationary Sources of Sound

(9) ORNAMENT, Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, Ontario Ministry of the Environment, ISBN 0-7729-6376 (1989).

References (1) to (4) can be found in the Model Municipal Noise Control By-Law, Ontario Ministry of Environment, Final Report, August 1978.

3. TECHNICAL DEFINITIONS

"Ambient sound level"

means Background sound level;

"Background sound level"

is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by sources such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level;

"Construction Equipment"

means any equipment or device designed and intended for use in construction, or material handling including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment;

"Conveyance"

includes a vehicle and any other device employed to transport a person or persons or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person;

"Point of Reception"

means any point on the premises of a person where sound or vibration originating from other than those premises is received.
For the purpose of noise impact assessment of a proposed landfill operation, or an expansion to an existing landfill operation, the point of reception may be located within 30 m of a dwelling or a camping area on any of the following existing or zoned for future use premises: permanent or seasonal residences, hotel/motels, nursing/retirement homes, rental residence, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship.

Other technical terms used in this publication are defined in Reference [1].

4. MEASUREMENTS, STANDARDS AND PROCEDURES

For the purpose of this Publication, all measurements shall be made in accordance with References [2], [3] and [4].

5. SOUND LEVEL LIMITS

(1) Landfill Site

(a) General Limits

The limits for sound levels due to the landfill site operation at a Point of Reception are 45dBA in any hour of the night, 7:00 PM - 7:00 AM, and 55 dBA in any hour of the day, 7:00 AM - 7:00 PM. These levels are expressed in terms of the One Hour Equivalent Sound Level (L_{eq}).

The above limits are applicable under the following conditions:

- the existing ambient noise climate is assumed to be rural, i.e. the daytime and nighttime environmental noise level is normally below the stated limitation. Should the environment be dominated by noise sources of man-made activity, such as industry, commerce or road transportation, which produce sound in excess of the above limits, the higher sound levels may be used as the limit, provided that the noise sources are not under consideration for noise abatement by the Municipality or the Ministry of Environment and Energy.

- landfill site operation involves only "construction equipment" or "conveyances", as defined in Section 3. In this case the landfill site itself is not considered a stationary noise source, and will not be governed by the limitations set out in References [5] or [7].

(b) Specific Limit - Impulsive Sounds

For impulsive sound from a pest control device employed in the operation of the landfill site, the sound level limit at a Point of Reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is 70 dBAI.

(2) Facilities for Reception, Storage and Mixing

A landfill site utilizing equipment that does not fall under the definition of "construction equipment" or "conveyance", as defined in Section 3 is considered a stationary noise source. The applicable sound level limits are those established for the assessment of stationary sources of sound given in References [5] and [7].

6. OFF-SITE SOURCE VEHICLES

For a landfill site employing off-site source vehicles which constitute a predominant component of the background noise, an access route shall be selected which will result in a minimum noise impact. The selection process shall be based on a detailed quantitative assessment of noise impact on individual receptors and the number of affected receptors along the alternative routes. The municipality and the affected residents must be clearly informed of any potential noise impact.

SCHEDULE "C"

This Schedule "C" forms part of Provisional Certificate of Approval No. A 612018. It describes the surface water monitoring program referred to in Condition 43.

1. OBJECTIVES

The objectives for the surface water monitoring program are:

- to evaluate background surface water quality;
- to evaluate the Landfill's impact on surface water quality downstream of the Landfill;
- to evaluate the efficiency of the proposed Contaminant Attenuation Zone;
- to monitor water quality at the downstream site/attenuation zone boundary and compare this quality with the MOE's PWQO; and
- to determine the need for a contingency implementation.

2. MONITORING PLAN

The surface water monitoring plan shall be carried out by the City to address the stated objectives and will include the following:

2.1 Stations

The surface water stations to be monitored are shown on Fig. S.1-6.1, Item 7, Schedule "A" and listed below:

- existing stations SW-1 (Jones Road culvert) and SW-2 (Beaubien Loop Logging Road culvert); and
- proposed stations SW-3 (Lunch Lake subwatershed control), SW-4 (Crystal Bay) and SW-5 (Morgan Lake).

2.2 Sampling Frequency

- During the first two years of the Landfill's operation water samples shall be taken at all stations monthly from April through October;
- Starting from the third year of the Landfill's operation water samples shall be taken three times per year in May, August and October at stations SW-1, SW-2, SW-3 and SW-4; station SW-5 shall be sampled annually in August.

- In addition, water samples shall be taken from any flowing spring or groundwater seepage identified within the saddle area during any sampling event.

2.3 Sample Analysis

During the first two years of operation the collected water samples shall be analyzed for the following lists of parameters:

a) the comprehensive list of parameters at all stations in May, August and October;

b) the indicator list of parameters at all stations in April, June, July and September;

c) volatile organic compounds, EPA method 624 at SW-2 in August of the second year; and

d) the indicator list of parameters at any flowing spring or groundwater seepage mentioned in 2.2.

Starting from the third year of operation, the collected water samples shall be analyzed for the following list of parameters:

a) the comprehensive list of parameters at all stations in August and October;

b) the indicator list of parameters at all stations in May;

c) volatile organic compounds, EPA method 624 at SW-2 in August, once every two years; and

d) the indicator list of parameters at any flowing spring or groundwater seepage mentioned in 2.2.

The comprehensive list includes the following parameters:

Inorganics

Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Chloride, Chromium, Conductivity, Copper, Iron, Lead, Mercury, Nitrate, Nitrite, Total Kjeldahl Nitrogen, pH, Total Phosphorus, Suspended Solids, Total Dissolved Solids, Sulphate, Zinc.

Organics

Biochemical Oxygen Demand (BOD_5), Chemical Oxygen Demand, Phenol.

Field Parameters

Temperature, pH, Conductivity, Dissolved Oxygen.

The indicator list includes the following parameters:

Inorganics

Alkalinity, Ammonia, Chloride, Conductivity, Iron, Nitrate, Nitrite, Total Kjeldahl Nitrogen, pH, Total Phosphorus, Suspended Solids, Sulphate.

Organics

Biochemical Oxygen Demand (BOD_5), Chemical Oxygen Demand, Phenol.

Field Parameters

Temperature, pH, Conductivity, Dissolved Oxygen.

For all parameters with the established PWQO the minimum detection limits (MDL) used will be below the corresponding PWQO.

2.4 Flow Measurements

Stream flow measurements shall be performed at stations SW-2 and SW-3 three times per year, in April, August and October simultaneously with sampling events.

3. DRAINAGE

3.1 Drainage Required

Since a build up of water on, behind or within the waste may result in the loss of stability and, potentially, slope failure, drainage shall be provided around the waste. Water shall not be permitted to "dam up" behind the waste or pond on the waste.

3.2 Inspection of Drainage

The drainage provided in the design shall be regularly inspected to ensure that it has not been blocked (e.g., by beavers or other causes). Any blockages shall be cleared immediately.

4. TRIGGER MECHANISM

Within two years of the issuance of this Certificate the City shall develop and submit for the Director's approval the comprehensive surface water trigger mechanism which shall include the following:

- trigger location(s), trigger parameters, trigger concentrations, and re-sampling procedures.

The comprehensive surface water trigger mechanism will be attached as subsequent schedule of this Certificate upon the Director's approval.

5. CONTINGENCY MEASURES

If trigger concentrations at trigger location(s) referred to in 4 are exceeded and these exceedances are due to landfilling operations, then one of the following contingency measures shall be implemented:

- construction of a control berm or weir downstream of the landfilling area to increase retention time for contaminated surface water flow within the buffer/attenuation zone;
- construction of a dispersion channel downstream of the landfilling area to force contaminated surface water into the peat layer and create a more uniform dispersion throughout the buffer/attenuation zone; and
- enlargement of the attenuation zone.

Prior to implementation, the appropriate contingency measure(s) shall be discussed with and approved by the Director.

6. SUBSEQUENT MODIFICATIONS

After two years of operation the monitoring plan shall be re-evaluated and revised if necessary. If there is any future need to modify the monitoring plan and/or the trigger mechanism, a formal application shall be made by the City to the Regional Director requesting his/her approval of the necessary changes, and these changes may not be made without such approval.

SCHEDULE "D"

This Schedule "D" forms part of the Provisional Certificate of Approval No. A 612018. It describes the sediment monitoring program referred to in Condition 44.

1. OBJECTIVES

The objectives for the sediment quality monitoring program are:

- to provide a statistical measure of sediment quality in surface water environs suitable for determining and comparing existing and future sediment quality conditions in Morgan Lake and Crystal Bay (Silver Lake);
- to evaluate the Landfill's impact on sediment quality in Morgan Lake and Crystal Bay (Silver Lake);
- to provide additional information for evaluating the efficiency of the proposed Contaminant Attenuation Zone;
- to provide an additional level of protection for detecting any contaminant migration from the Landfill site; and
- to determine the need for a contingency implementation.

2. MONITORING PROGRAM

The sediment quality monitoring program shall be carried out by the City to address the stated objectives and will include the following:

2.1 Stations

The sediment stations to be monitored are shown on Figure S1-6.1, Item 7 of Schedule "A" (as amended September 1999) and listed below:

- station SB-1 in Crystal Bay (Silver Lake) and SB-2 in Morgan Lake; and
- reference station SB-R to be located upstream of any potential influence within Silver Lake.

Sediment sampling stations correspond with benthic sampling stations outlined in Schedule "E".

2.2 Sampling Frequency

All stations will be sampled annually and will be completed in the last two weeks of August.

2.3 Sample Analysis

Samples shall be submitted to a qualified laboratory for analysis of the following parameters:

- Aluminum, Arsenic, Cadmium, Cobalt, Copper, Chromium, Manganese, Nickel, Iron, Lead, Zinc, Mercury, Total Organic Carbon, Total Kjeldahl Nitrogen, Total Phosphorus, Oil, Grease and Ammonia.

Grain size analysis shall be performed on sediment samples.

2.4 Interpretation of the Result

Interpretation of the results of sediment sampling should be based on comparison to Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario (MOE, 1992 and updates).

Ontario

SCHEDULE "E"

This Schedule "E" forms part of the Provisional Certificate of Approval No. A 612018. *It describes the biological effects monitoring program referred to in Condition 45.*

1. OBJECTIVE

The objectives for the biological effects monitoring program are:

- to provide a statistical measure of selected sensitive biological indicators (benthic and fish endpoints) suitable for determining and comparing existing and future ecological conditions in Morgan Lake and in Crystal Bay (Silver Lake);
- to evaluate the Landfill's impact on biological indicators and ecological conditions in Morgan Lake and Crystal Bay (Silver Lake);
- to permit evaluation of potential cause-effect relationships associated with any impacts detected in surface water and sediment quality monitoring as described in Schedule "C" and"D"; and
- to provide an additional level of protection regarding the need for a contingency implementation.

2. MONITORING PROGRAM

The biological effects monitoring program shall be carried out by the City to address the stated objectives and will include the following:

2.1 Benthic invertebrate community

2.1.1 Stations

The benthic invertebrate sampling stations to be monitored are shown on Figure S1-6.1, Item 7 of Schedule "A" (as amended September 1999) and listed below:

- station SB-1 in Crystal Bay (Silver Lake) and SB-2 in Morgan Lake; and
- reference station SB-R to be located upstream of any potential influence within Silver Lake.

Benthic sampling stations correspond with sediment sampling stations outlined in Schedule "D".

2.1.2 Sampling Frequency

All station will be sampled annually for a minimum of three (3) years. Sampling will be completed in the last two weeks of August.

The need for continued or additional benthic monitoring will be determined after the initial three year monitoring period.

2.1.3 Sample Collection Procedure and Analysis

Sampling procedures shall follow established protocols to be outlined in detail in the O&M Manual.

Samples shall be submitted to a qualified laboratory for taxonomic analysis. Biological endpoints to be evaluated will include:

- density (as number of organisms per square metre) of total benthic invertebrates; and
- density by taxon (to be identified in the O&M Manual).

2.2 Fish

2.1.1 Stations

Fish sampling shall be carried out in Morgan Lake and Crystal Bay (Silver Lake).

Fish sampling collections should be carried out in general proximity to sediment and benthic sampling stations SB-1 (Crystal Bay) and SB-2 (Morgan Lake) as shown on Figure S1-6.1, Item 7 of Schedule "A".

2.1.2 Sampling Frequency

Fish sampling shall be carried out proceeding or during the first year of operation in order to provide a baseline to permit comparison to any future conditions.

The need for continued or additional fish sampling will be determined if changes in surface water quality, sediment quality and/or the benthic invertebrate community are detected, which could indicate possible contaminant effects on these lakes.

2.1.3 Sample Collection Procedure and Analysis

A sentinel fish species and collection methods will be specified in the O&M Manual.

A total of 20 fish of the sentinel species will be sampled. The length, weight, sex, maturity and condition of each fish specimen will be recorded and a boneless, skinless fillet of dorsal muscle tissue will be submitted for chemical analysis according to standard MOE epaxial tissue sampling protocol. Tissue samples will be submitted to a qualified laboratory for analysis of the following parameters:

- Aluminum, Arsenic, Cadmium, Cobalt, Copper, Chromium, Manganese, Nickel, Iron, Lead, Zinc, Mercury, Polychlorinated Biphenyls, Total Polyaromatic Hydrocarbons, Dioxin and Furans.

Results of the biological monitoring program shall be analyzed statistically where appropriate, and interpreted by a qualified professional biologist and/or environmental scientist.

SCHEDULE "F"

This Schedule "F" forms part of Provisional Certificate of Approval No. A 612018 *. It describes the groundwater monitoring program referred to in Condition 46.*

1. OBJECTIVES

- to monitor groundwater quality in the refuse, the overburden and the bedrock;
- to identify and characterize movement of leachate-related contaminants in the overburden and the bedrock within the Landfill/Contaminant Attenuation Zone boundary;
- to monitor groundwater quality at the downgradient Landfill/Contaminant Attenuation Zone boundary and compare this quality with MOE's Objectives and Policies (ODWO, RUP);
- to confirm the existence of groundwater divides north and southeast of the landfilling area; and
- to determine the need for a contingency implementation.

2. MONITORING PLAN

The groundwater monitoring plan shall be carried out by the City to address the stated objectives and will include the following:

2.1 Monitors

The groundwater monitors to be sampled are shown on Fig. S1-6, Item 7, Schedule "A" and listed below:

- Existing monitors MW-1/17, MW-2/9, MW-2/13, KGS-2, MW-3/8, MW-4/6, MW-4/18, MW-5/17, MW-6/5, MW-6/14, MW-7/4, MW-8/22, MW-9/6, MW-10/17, -MW-13/16, MW-13/14, MW-14/6, MW-14/21, MW-15/5 and MW-15/17.
- proposed monitoring nests and single monitors MW-2, MW-11, MW-12, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23 and MW-24.

2.2 Sampling Frequency

All monitors shall be sampled twice a year in May and August.

2.3 Sample Analysis

The collected samples shall be analyzed for the following list of parameters:

a) the comprehensive list of parameters in wells:

MW-1/17, MW-4/6, MW-4/18, MW-2, MW-2/9, MW-2/13, MW-3/8, MW-6/5, MW-6/14, MW-20, MW-7/4, MW-21, MW-5/17, MW-16, once a year, in August.

b) the indicator list of parameters:

- in wells listed in a) once a year, in May; and
- in the remaining wells listed in 2.1 twice a year, in May and August.

The comprehensive list includes the following parameters:

Inorganics

Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Calcium, Chloride, Chromium, Conductivity, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nitrate, Nitrite, Total Kjeldahl Nitrogen, pH, Total Phosphorus, Potassium, Sodium, Suspended Solids (leachate only), Total Dissolved Solids, Sulphate, Zinc.

Volatile Organics

Benzene, 1,4 Dichlorobenzene, Dichloromethane, Toluene, Vinyl Chloride.

Other Organics

Biochemical Oxygen Demand (BOD_5, leachate only), Chemical Oxygen Demand, Dissolved Organic Carbon, Phenol.

Field Parameters

pH, Conductivity.

The indicator list includes the following parameters:

Inorganics

Alkalinity, Ammonia, Barium, Boron, Calcium, Chloride, Conductivity, Iron, Magnesium, Nitrate, pH, Sodium, Suspended Solids (leachate only), Total Dissolved Solids, Sulphate.

Organics

Biochemical Oxygen Demand (BOD_5, leachate only), Chemical Oxygen Demand, Dissolved Organic Carbon.

Field Parameters

pH, Conductivity.

For all parameters within the established ODWO the minimum detection limits (MDL) used shall be below the corresponding ODWO.

2.4 Measuring Water Levels

Water level measurements shall be conducted in all functional monitors twice per year, in May and August.

In addition, water level measurements shall be conducted once a month in June, July, September and October during the first two years of operation, in the following monitors:

MW-2/9, MW-3/8, MW-13/6, MW-13/14, MW-14/6, MW14/21, MW-15/5, MW-15/17, MW-11, MW-18, MW-5/17, MW-19, MW-16.

2.5 Monitoring System Maintenance

During each monitoring event, the monitoring network will be visually inspected. Changes in the physical conditions of each well will be noted and necessary repairs undertaken. Monitoring wells that are shown to be damaged beyond repair or whose integrity is in doubt for further monitoring, will be abandoned in accordance with standard procedures and replaced, if necessary.

3. TRIGGER MECHANISM

3.1 Based on the water level monitoring data from monitors MW-2, MW-3, MW-13, MW-14 and MW-15 and within two years of the issuance of this Certificate, the City shall develop and submit for the Director's approval the groundwater level trigger mechanism for contingency measure implementation(s)(if required) to protect water quality and aquatic life in Silver Lake.

3.2 Based on the water level monitoring data from monitors MW-11, MW-18, MW-5, MW-19, MW-16 and within two years of the issuance of this Certificate, the City shall develop and submit for the Director's approval the groundwater level trigger mechanism for contingency measure implementation(s) (if required) to protect water quality and aquatic life in Morgan Lake.

4. CONTINGENCY MEASURES

4.1 If groundwater level elevation(s) at trigger location(s) are equal or exceed trigger value(s), then one of the following contingency measures shall be implemented to protect water quality and aquatic life in Silver Lake:

- induce groundwater recharge by pumping water from Silver Lake into an infiltration gallery/

trench in order to sustain or enhance the existing groundwater divide in the saddle area;

- pressure grouting the overburden and the upper bedrock in the saddle area to eliminate contaminate migration through the subsurface;

- installation of a cut off wall in the saddle area to eliminate contaminant migration through the subsurface; and
- leachate collection system installation.

4.2 If groundwater level elevation(s) at trigger location(s) are equal to or exceed trigger value(s), then one of the following contingency measures shall be implemented to protect water quality and aquatic life in Morgan Lake:

- induce groundwater recharge by pumping water from Morgan Lake into an infiltration gallery/trench on the top of the ridge along the Jones Road in order to sustain or enhance the existing groundwater divide;

- installation of a cut off wall in the ridge along the Jones Road; and

- leachate collection system installation.

4.3 Prior to implementation, the appropriate contingency measure(s) shall be discussed with, and approved by, the Director.

5. SUBSEQUENT MODIFICATIONS

If there is any future need to modify the monitoring plan and/or trigger mechanisms, a formal application shall be made by the City to the Regional Director requesting his/her approval of the necessary changes and these changes may not be made without such approval.

SCHEDULE "G"

This Schedule "G" forms part of Provisional Certificate of Approval No. A 612018. It describes the landfill gas monitoring program referred to in Condition 47.

1. OBJECTIVE

To monitor combustible gas concentrations in the unsaturated zone along the southern buffer zone (drawing S1-2, Item 1, Schedule "A") between the landfill and the office/equipment storage building. The gas probes installed during the initial site construction works will ensure that there is no gas migration between the old MNR landfill (that is to be exhumed) and the office/equipment storage building.

2. MONITORING PLAN

The landfill gas monitoring plan shall be carried out by the City to address the stated objective and will include the following:

2.1 Gas Probes

Two gas probes to be sampled are shown on Fig. S.1-6.1, Item 7, Schedule "A".

2.2 Sampling Frequency

Two gas probes referred to in 2.1, shall be sampled bi-monthly during frozen ground conditions and quarterly otherwise using a portable combustible gas detector.

2.3 Sample Analysis

The collected samples shall be analyzed for combustible gas concentration (field instrument calibrated to methane)

3. SUBSEQUENT MODIFICATIONS

If there is any future need to modify the monitoring plan, a formal application shall be made by the City to the Regional Director requesting his/her approval of the necessary changes, and these changes may not be made without such approval.

4. CONTINGENCY MEASURES

Due to the relatively small portion of the Landfill below grade, the relatively high water table around the landfilling area and the distance separating this area from the on-site building, lateral migration of gases will not present a hazard. Therefore, it is not appropriate to develop any contingency measures at this time.

SCHEDULE "H"

This Schedule "H" forms part of Provisional Certificate of Approval No. A 612018. It describes the geotechnical monitoring program referred to in Condition 48.

1. OBJECTIVES

- to monitor pore pressures in the peat and very soft clay;
- to monitor the increase in the shear strength of the very soft clay with time; and
- to control the rate of landfilling (the thickness of waste and cover placed per day) and the Landfill development sequence.

2. PIEZOMETER INSTALLATIONS

2.1 At least four boreholes shall be drilled within Area A of the proposed landfilling area prior to the placement of waste over the peat. Their locations are shown on Figure S1-6.1, Item 7, Schedule "A". Each borehole shall be terminated 1 m below the soft clay/underlying deposit interface.

2.2 If unusual or unexpected conditions are encountered in any of the four boreholes mentioned in 2.1, additional boreholes may be drilled subject to the geotechnical engineer decision.

2.3 At each borehole location, one piezometer shall be installed near (within 0.3 m of) the peat/soft clay interface with the tip located within the peat layer. The second deeper peizometer shall be installed within the soft clay layer with the tip located approximately 0.4 m to 1.25m below the peat/soft clay interface depending on the thickness of the soft clay layer. In areas where the clay stratum is greater than 2m thick, the piezometer tip shall be located 0.75m to 1.25m below the peat/soft clay interface. In areas where the clay stratum is less than 2m thick, the tip shall be located 0.4m below the interface.

In order to ensure both a rapid response (no lag time) and accurate measurements of the stress induces porewater pressure changes, pneumatic type piezometers are recommended for installation.

3. INVESTIGATION

3.1 Initial Investigation

Prior to any landfilling operation, the initial geotechnical investigation shall be conducted in four boreholes mentioned in 2.1. The investigation shall include:

- obtaining field vane strength profiles in soft clay;
- obtaining samples of soft clay (using a piston sampler) and performing consolidation and strength

tests over a range of consolidation stress levels as necessary to provide parameters for use in stability analyses; and

- establishing the thickness of peat and soft clay layers, and the nature and hydraulic conductivity of the underlying firm deposit.

3.2 Geotechnical Analysis of Pore Pressures

Prior to any landfilling operation and based on the findings of the investigation mentioned in 3.1, a geotechnical engineer shall provide recommendations regarding the maximum pore pressure that can be developed in piezometers mentioned in 2.3 during the placement of waste and cover material.

3.3 Geotechnical Analysis of Shear Strength

Prior to any landfilling operation and based on the findings of the investigation stipulated in Section 3.1, a geotechnical engineer shall provide recommendations regarding the strength required in the very soft clay prior to the commencement of each new stage of construction.

4. MONITORING AND RESPONSE PLAN

4.1 Observations by Site Personnel

Site personnel shall advise the geotechnical engineer of any "unusual" behaviour or minor failures within the fill or peat/clay soil substrate, even if these can be readily fixed by site personnel as soon as they occur. Any such instances shall be evaluated by the geotechnical engineer in the context of the design and available information. The development plan shall be changed by the geotechnical engineer in order to prevent impacts on soil stability deemed to be geotechnically unacceptable.

4.2 Pore Pressure Monitoring

For the first year of each new stage of construction, the piezometers installed in the peat and soft clay shall be monitored daily during the first two weeks of landfilling and weekly for the remainder of the year. Subsequently, pore pressures may be measured once a month. The pore pressure data shall be reviewed monthly by the geotechnical engineer.

4.3 Rate of Landfilling

The measured pores pressures shall not be permitted to exceed the allowable levels mentioned in 3.2 without the written approval of the City's geotechnical engineer, otherwise, the rate of landfilling shall be reduced such that the allowable pore pressure levels are not exceeded.

The rate of landfilling (the thickness of waste and cover placed per day) in areas where there are no piezometer measurements shall not exceed the rate that was adopted in areas where pore pressures were measured.

4.4 Shear Strength Monitoring

At least four field vane tests shall be performed to confirm the shear strength increase in the soft clay prior to starting construction in each new stage near the east face and before placing final cover on the east face. The results from these tests shall be reviewed by the geotechnical engineer who shall give written approval before each new stage is commenced.

5. SUBSEQUENT MODIFICATIONS

This monitoring plan may be modified in accordance with experience gained during construction with the written notification of the Regional Director by the City and a supporting letter from the City's geotechnical engineer.

Modifications recommended by the geotechnical engineer shall be assessed as to their environmental significance by a qualified environmental consultant prior to the submission of the written notification to the Regional Director.

The Regional Director shall approve the necessary changes, and these changes shall not be made without such approval.

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

1. The reason for Condition No. 1 is to clarify the meaning of the terms used in this Certificate.

2. The reason for Condition No. 2 is to ensure that the City, its appointed agents or any successor or subsequent owner is bound by the Conditions of this Certificate.

3. The reason for Condition No. 3 is to ensure that this Certificate is registered against title in the appropriate Land Registry Office.

4. The reason for Condition No. 4 is to indicate that this Certificate of Approval identifies the minimum environmental requirements, and that the operation must have appropriate regard for other legislation, regulations, approvals and orders which may apply.

5. The reason for Condition No. 5 is to ensure that any circumstance that might lead to a specific condition being judged to be invalid, does not invalidate any of the other Conditions specified in this Certificate.

6. The reason for Condition No. 6 is to identify the landfilling area and final contours.

7. The reason for Condition No. 7 is to ensure that the appropriate MOE staff have ready access for inspection of the Landfill operating under this Certificate.

8. The reason for Condition No. 8 is to indicate that Schedules A, B, C, D, E, F and H are a part of this Certificate.

9. The reason for Condition No. 9 is to ensure that the Landfill shall be developed, operated, maintained and monitored by the City in accordance with all of the plans and documents listed in Schedule "A".

10. The reason for Condition No. 10 is to ensure that the City shall operate the Landfill in accordance with the O&M Manual.

11. The reason for Condition No. 11 is to ensure that scavenging of waste at the Landfill is prohibited.

12. The reason for Condition No. 12(a) is to ensure that heavy equipment shall not be used on the peat or on the waste over the bog unless the peat is frozen to support the weight of the equipment.

13. The reason for Condition No. 12(b) is to ensure that during the construction period care shall be taken to minimize damage to the root mat over the bog area.

14. The reason for Condition No. 13 is to specify the temporary and permanent side slopes at the Landfill.

15. The reason for Condition No. 14 is to ensure that the site Supervisor is adequately trained.

16. The reason for Condition No. 15 is to specify the operating hours of the Landfill.

17. The reason for Condition No. 16 is to ensure that the City will not allow waste to be received for disposal at the Landfill except during operating hours when the Landfill is under supervision of the Landfill attendant.

18. The reason for Condition No. 17 is to ensure that during non-operating hours, the Landfill entrance gate shall be locked by the City, to secure the Landfill against unauthorized persons.

19. The reason for Condition No. 18 is to allow the Landfill to accept waste beyond the normal operating hours at the discretion of the Board of Management, under conditions acceptable to the MOE.

20. The reason for Condition No. 19 is to identify those wastes that are not suitable for disposal at the Landfill.

21. The reason for Condition No. 20 is to ensure that an accurate record for all incoming waste is maintained by the City.

22. The reason for Condition No. 21 is to ensure that all vehicles entering the Landfill are identified by licence number on the weigh scale billing notice.

23. The reason for Condition No. 22 is to ensure that waste will be deposited in a manner that minimizes the Landfill working face and will be compacted before the cover material is applied.

24. The reason for Condition No. 23 is to ensure that cover material is applied daily from May 15th to September 15th and weekly during the rest of the year.

25. The reason for Condition No. 24 is to allow the use of a daily cover alternative material approved by the Regional Director.

26. The reason for Condition No. 25 is to ensure that the City will provide a contingency supply of cover material equal to two working days worth.

27. The reason for Condition No. 26 is to ensure that in areas where landfilling is not be carried out for a period of 90 days or more, at least 15cm of compacted, clean earth cover shall be applied over the waste.

28. The reason for Condition No. 27 is to ensure that areas that have reached approved limits, will be covered with final cover material and a suitable planting material will be employed to allow for effective re-vegetation.

29. The reason for Condition No. 28 is to ensure that the extent of the excavation will be limited to base grades shown on Drawing S1-3 of Item 1, Schedule "A".

30. The reason for Condition No. 29 is to ensure that no excavation shall occur for those portions of the landfilling area situated over the bog.

31. The reason for Condition No. 30 is to ensure that there will be no burning of waste at the Landfill.

32. The reason for Condition No. 31 is to ensure that site operations will incorporate the necessary fire prevention measures identified in Item 1 of Schedule "A".

33. The reason for Condition No. 32 is to ensure that bears, birds, rodents and insect control will be undertaken by the City in accordance with Item 1 of Schedule "A".

34. The reason for Condition No. 33 is to ensure that the City will implement all necessary measures to prevent any off-site litter impact from the landfilling operations.

35. The reason for Condition No. 34 is to ensure that no disposal of waste will occur if weather conditions make it difficult to prevent litter from leaving the Landfill.

36. The reason for Condition No. 35 is to ensure that a dust control program is implemented at the Landfill.

37. The reason for Condition No. 36 is to ensure that the City shall comply with the noise limits outlined in the MOE's February 1997 "Noise Guidelines for Landfill Sites".

38. The reason for Condition No. 37 is to ensure that sufficient queuing space will be available on-site to accommodate the peak traffic volumes anticipated.

39. The reason for Condition No. 38 is to ensure that the City will monitor site related and non-site related traffic levels to assess the potential need for Highway 671 improvements at the Site entrance.

40. The reason for Condition No. 39 is to ensure that the City will conduct regular site inspections in order to keep all facilities and site works in a tidy condition and good working order.

41. The reason for Condition No. 40 is to ensure that the City shall establish the proposed Contaminant Attenuation Zone shown on Figure FW-2 of Item 1, Schedule "A".

42. The reasons for Condition Nos. 41 and 42 are to ensure that the surface water management system will be in place.

43. The reason for Condition No. 43 is to ensure that surface water monitoring shall be conducted by the City in accordance with Schedule "C".

44. The reason for Condition No. 44 is to ensure that sediment monitoring shall be conducted by the City in accordance with Schedule "D".

45. The reason for Condition No. 45 is to ensure that biological monitoring shall be conducted by the City in accordance with Schedule "E".

Ministry of the Environment
808 Robertson Street, 2nd Floor
KENORA, ON P9N 1X9

Ministère de l'Environnement
808 rue Robertson 2e étage
KENORA ON P9N 1X9

Ontario

Kenora Area Office

Telephone: (807) 468-2718
Fax: (807) 468-2735

February 13, 2013

Mr. M. Pokharel
Environmental Supervisor
City of Kenora
60 Fourteenth Street North
Kenora, Ontario
P9N 4M9

Dear Mr. Pokharel:

Re: Review Comments for 2010/2011 Monitoring
Kenora Area Waste Disposal Site A612018

The Ministry of the Environment Northern Region Technical Support Section's review of the 2010 and 2011 monitoring reports for the Kenora Area Waste Disposal Site (A612018) has been completed. A copy of the review comments is enclosed.

The reviewer has stated that there are no significant concerns with the sampling and monitoring results presented in the report. The next monitoring report for this site is due on June 30, 2015.

In the review comments you will note that the reviewer has made reference to the Kenora Area Landfill Monitoring Program Assessment (2013). Review of the surface water portion of the assessment has been completed. Review of the groundwater portions of the assessment is still outstanding. I will contact you when all comments have been received so that we can discuss the process for implementing the recommendations.

I can be reached at 468-2728 if you would like to discuss the contents of this letter or the requirements of Ontario's environmental legislation.

Yours truly,

Ray Boivin
Senior Environmental Officer
Kenora Area

/RB
Enclosure

c. Rick Perchuk, Operations Manager City of Kenora

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A612018
Notice No. 3
Issue Date: May 13, 2013

The Corporation of the City of Kenora
60 Fourteenth St N
Kenora, Ontario
P9N 4M9

Site Location: Kenora Area Waste Disposal Site
Lot Part 1, 2, Concession 1, 2
Pettypiece Unorganized Township, District of Kenora

You are hereby notified that I have amended Approval No. A612018 issued on November 5, 1999 and subsequently amended on September 19, 2003 and July 25, 2011 for use and operation of a 13.1 hectare landfilling area within a total site area of 108.1 hectare , as follows:

In accordance with the Environmental Compliance Approval Application dated December 3, 2012, and the supporting documentation, Condition 52 or Notice dated July 25, 2011 is hereby changed to read:

52. (1) Effective immediately and commencing on ***June 30, 2015*** , the Owner shall prepare and submit a Monitoring Report to the District Manager once every three years which shall include the following: .

a. A summary of total annual quantities of waste received on a monthly basis at the *Site* ;

b. A drawing(s) of the *Landfill* indicating all groundwater, surface water, sediment, biological, landfill gas and geotechnical monitoring locations;

c. Tables outlining monitoring locations, analytical parameters sampled, and frequency of sampling and measurements;

d. An analysis and interpretation of the surface water, sediment, biological, groundwater, leachate, landfill gas and geotechnical monitoring data; a review of the adequacy of the monitoring programmes; conclusions of the monitoring data; and recommendations for any changes in monitoring programmes that may be necessary;

e. An assessment of surface water quality with respect to the PWQO Guidelines and trigger concentrations mentioned in Schedule "C";

f. As assessment of groundwater quality in relation to the RUP and ODWO;

g. An assessment of groundwater table elevations in relation to trigger elevations mentioned in Schedule "F";

h. An assessment of geotechnical conditions near the east face of the *Landfill* ;

i. An assessment of the performance of the Contaminant Attenuation Zone;

j. An update of changes in operations, sequencing, equipment, or procedures made or produced at the *Landfill* , and any operating difficulties encountered;

k. Drawings showing areas of fill, buffer areas, current Landfill contours, final Landfill contours, any recommended changes to the final contours, percentage of available space utilized, and an estimate of the remaining disposal capacity and *Landfill* site life;

l. A summary discussion of *Landfill* site daily and intermediate cover requirements and erosion protection;

m. A statement as to compliance with all Conditions and with the inspection and reporting requirements of the Conditions;

n. A summary of any complaints made regarding *Landfill* operation and the *Owner* 's response and action taken;

o. An annual waste diversion statement that includes an updated summary of per capita waste diversion activities and quantity of waste diverted using 1987 as the base year;

p. Recommendations respecting any proposed changes in the operation of the *Landfill* ; and

q. Any report of the *LLC* to the *Owner* .

The reason for this amendment to the Approval is to reduce the reporting frequency as requested by the Owner and supported by the Ministry of the Environment, Northern Region,Technical Support Section.

This Notice shall constitute part of the approval issued under Approval No. A612018 dated November 5, 1999 and subsequent amendments.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;

2. The grounds on which you intend to rely at the hearing in relation to each portion appealed

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment
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) 212-6349, Fax: (416) 314-3717 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 13th day of May, 2013

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

NP/
c: Area Manager, MOE Kenora Area Office
c: District Manager, MOE Thunder Bay - District
Mukesh Pokharel, The Corporation of the City of Kenora

Ministry of the Environment
808 Robertson Street, 2nd Floor
KENORA, ON P9N 1X9

Ministère de l'Environnement
808 rue Robertson 2e étage
KENORA ON P9N 1X9

Ontario

Kenora Area Office

Telephone: (807) 468-2718
Fax: (807) 468-2735

April 24, 2013

Mr. M. Pokharel
Environmental Supervisor
City of Kenora
60 Fourteenth Street North
Kenora, Ontario
P9N 4M9

Dear Mr. Pokharel:

Re: Request to Change Monitoring at Kenora Area Waste Disposal Site (A612018)

This letter is in response to the Kenora Area Landfill Monitoring Program Assessment, dated January 2013, in which you request changes to the sampling requirements contained in Certificate of Approval A612018. The assessment has been reviewed by the Ministry of the Environment Northern Region Technical Support Section and staff of the Kenora Area Office. The assessment was submitted as required by condition 55 of Notice No. 2 of Certificate of Approval A612018 in order to receive District Manager agreement for changes to the monitoring program.

I agree with the following changes:

Schedule "D" Sediment Monitoring Program

Collect samples consisting of the upper three to four centimetres of sediment once every ten years with the next sample occurring during the 2021 field season.

During the ten year sampling collect at least five replicate samples at each location in order that a statistical comparison can be made against the existing data set.

Remove oil, grease and ammonium from the parameter list in section 2.3 of Schedule "D" of Certificate of Approval A612018.

If annual surface water samples in Morgan Lake or Crystal Bay show a significant increase in metal concentrations then the sediment sampling should be repeated in 2016 and thereafter every five years.

Schedule "F" Groundwater Monitoring Program

The following monitors are to be sampled in May and August of each year: 11/4, 2/9, 1/17, 2/13, 3/8, 5/17, 6/5, 16/15, 17/15, 19/16, 23/3, 24/5 and KGS-2.

Damaged monitoring well 4/6 must be decommissioned and replaced so that it can be included in the 2015 sampling year. Once the well is replaced it is to be sampled in May and August of each year.

The parameter list in section 2.3 of Schedule "F" of Certificate of Approval A612018 remains unchanged with the exception that volatile organics only need to be analyzed in samples collected from monitoring well 2/9.

The following monitoring wells can be removed from the sampling program: 10/17, 12/4, 6/14, 7/4, 8/22, 9/6, 21/7, 13/6, 13/14, 14/6, 14/21, 15/5 and 15/17. These wells are to be maintained for future use.

Groundwater elevation measurements should be collected from the following monitors in the saddle area: 13/6, 13/14, 14/6, 14/21, 15/5 and 15/17. If the groundwater flow direction across the saddle or groundwater quality at monitor 3/8 changes significantly then groundwater sampling and analysis as these monitors will need to resume.

The following groundwater monitors are to be decommissioned in accordance with Ontario Regulation 903 (Wells): 4/6, 4/18, 20/4, 18/6, 19/6 and 22/5.

Note that all other requirements of Certificate of Approval A612018 remain in effect.

Please note that for this change to be finalized you must forward a copy of this correspondence to the Director at Environmental Approvals Access and Service Integration Branch requesting that the certificate be amended to reflect the proposed changes. See condition 55 of Notice No. 2 to Certificate of Approval A612018.

Please contact Senior Environmental Officer Ray Boivin at 807-468-2728 if you would like to discuss the contents of this letter or the requirements of Ontario's environmental legislation

Yours truly,

Trina Rawn
Thunder Bay/Kenora District

/RB

c. Rick Perchuk, Operations Manager, City of Kenora
b.c. Kenora File DK PT JO 250 A612018

Ministry of the Environment
808 Robertson Street, 2nd Floor
KENORA, ON P9N 1X9

Ministère de l'Environnement
808 rue Robertson 2e étage
KENORA ON P9N 1X9

Ontario

Kenora Area Office

Telephone: (807) 468-2718
Fax: (807) 468-2735

April 24, 2013

Mr. M. Pokharel
Environmental Supervisor
City of Kenora
60 Fourteenth Street North
Kenora, Ontario
P9N 4M9

Dear Mr. Pokharel:

Re: Request to Change Monitoring at Kenora Area Waste Disposal Site (A612018)

This letter is in response to the Kenora Area Landfill Monitoring Program Assessment, dated January 2013, in which you request changes to the sampling requirements contained in Certificate of Approval A612018. The assessment has been reviewed by the Ministry of the Environment Northern Region Technical Support Section and staff of the Kenora Area Office. The assessment was submitted as required by condition 3 of Schedule "G" of Certificate of Approval A612018 in order to receive Regional Director approval for changes to the landfill gas monitoring program.

The requirement for landfill gas monitoring was suspended in correspondence dated December 23, 2002 from the Regional Director Northern Region Ministry of the Environment to the Solid Waste Supervisor City of Kenora. The suspension included a requirement that a statement regarding the need for landfill gas monitoring be included in each annual report. The suspension was also contingent on no significant change in the type of waste being deposited in the landfill. Note that in December 2009 the City of Kenora began to deposit domestic waste at the site.

The ministry concurs that landfill gas monitoring can once again be removed from the monitoring program but recommends that the monitoring locations be maintained for future use. The change is contingent upon the city including a statement in each monitoring report regarding the need for landfill gas monitoring. This will ensure that this issue is not lost over time and that landfill gas monitoring will be implemented should it be warranted by a change of operation at the site.

Note that all other requirements of Certificate of Approval A612018 remain in effect.

Please contact Senior Environmental Officer Ray Boivin at 807-468-2728 if you would like to discuss the contents of this letter or the requirements of Ontario's environmental legislation

Yours truly,

John Taylor
Regional Director
Northern Region

/RB

c. Rick Perchuk, Operations Manager, City of Kenora
b.c. Kenora File DK PT JO 250 A612018

Ontario

Ministry of the Environment
Ministère de l'Environnement

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the City of Kenora, Business/Facility Name: Planning, Building and Engineering Building Mailing Address: 60 Fourteenth St N, Kenora, Ontario, Canada, P9N 4M9 Physical Address: 60 Fourteenth St N, Kenora, City, District of Kenora, Ontario, Canada, P9N 4M9 Telephone: (807)467-2990, FAX: (807)467-2992, email: mpokharel@kenora.ca Client #: 4163-4J3RTV, Client Type: Municipal Government, NAICS: 913910		
Inspection Site Address:	Kenora Area Waste Disposal Site Address: Lot: Part 1 2, Concession: 1 2, Geographic Township: PETTYPIECE, Pettypiece, Unorganized Township, District of Kenora District Office: Kenora GeoReference: Map Datum: NAD83, Zone: 15, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 412893, UTM Northing: 5521117, UTM Location Description: Jones Road, LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 49.8239, Longitude: -94.2139		
Contact Name:	Mukesh Pokharel	**Title:**	Environmental Supervisor
Contact Telephone:	(807)467-2990 ext	**Contact Fax:**	(807)467-2933
Last Inspection Date:	2009/08/07		
Inspection Start Date:	2013/05/22	**Inspection Finish Date:**	2013/05/28
Region:	Northern		

1.0 INTRODUCTION

The purpose of this inspection is to review the operation of the Kenora Area Waste Disposal Site as it relates to Certificate of Approval A612018 and the General Waste Regulation (347). All aspects of the site operation were inspected.

The certificate of approval for this site is A612018 which was issued on April 10, 2000. In addition to this, the certificate includes three notices and three amending letters. The certificate, notices and amending letters are detailed documents with a number of requirements designed to protect human health and the environment. Specifically:

- condition 9 requires that the landfill be developed, operated and maintained in accordance with all of the plans and documents listed in Schedule "A" Schedule "A" includes the Kenora Area Waste Management Master Plan which stipulates how waste is to be deposited within the fill area. During the inspection the site manager indicated that there had been some deviation from the fill sequence contained in the master plan and that efforts were underway to resume filling in accordance with the plan.

- condition 12 requires that care be taken to avoid damaging the root mat and peat during equipment use and construction within the landfill construction area. The city has completed this requirement.

- condition 17 requires that the site be locked during non-operating hours. The city is complying with this requirement.

- condition 19 prohibits the deposition of liquid industrial and hazardous wastes within the landfill site. The city is complying with this requirement

- condition 30 prohibits any burning of waste at the landfill site. The city is complying with this requirement.

- conditions 43 to 48 require the city to undertake surface water, sediment, biological, groundwater, landfill gas and geotechnical monitoring. The city is doing the necessary monitoring.

- Notice number 1, issued September 19, 2003, adds conditions 55 and 56 to the certificate outlining the surface and groundwater trigger mechanisms.

- Notice number 2, issued July 25, 2011, updates the Certificate of Approval by redefining the owner of the site as the City of Kenora and changing the wording in conditions related to the owner. The notice also amends conditions 49 and 52 which ultimately allows the owner to dispense with the Landfill Liaison Committee with the concurrence of the Ministry of the Environment District Manager. Condition 52 stipulates the requirement for the monitoring report (see Notice number 3) and states in condition 52(2) that the owner must place a copy of the waste disposal site monitoring report in the municipal office (for public viewing) and on the city web site. The notice also adds condition 55 which outlines the requirements to change the monitoring programs outlined in conditions 43, 44, 45 or 46.

- the letter from the Ministry of the Environment Thunder Bay/Kenora District Manager to the City of Kenora Municipal Engineer, dated January 20, 2012, suspends the requirement for a Landfill Liaison Committee. A copy of the waste disposal site monitoring report is required to be kept on the City of Kenora web site. At the time of inspection the most recent monitoring report was not available on the city web site.

- the letter from the Ministry of the Environment Thunder Bay/Kenora District Manager to the City of Kenora Environmental Supervisor Pokharel, dated April 24, 2013, amends the Schedule "D" Sediment Monitoring Program and the Schedule "F" Groundwater Monitoring Program.

- the letter from Ministry of the Environment Regional Director Taylor to City of Kenora Environmental Supervisor Pokharel, dated April 24, 2013, removes landfill gas monitoring from the program but recommends that the city include a statement regarding the need for landfill gas monitoring in each monitoring report.

- Notice number 3, issued May 13, 2013, changes condition 52 of Certificate of Approval A612018 by making the next monitoring report due on June 30, 2015 and every three years thereafter.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):
A612018 including three notices and three letters.

2.1 FINANCIAL ASSURANCE:

Specifics:
Financial assurance is not required for sites owned by municipalities.

2.2 APPROVED AREA OF THE SITE:

Specifics:
The approved total area of the site is 108.1 hectares. The approved landfilling area (footprint) is 13.1 hectares.

At the time of inspection the city appeared to have good control over the boundaries of the fill area. Wastes are not being deposited outside of the approved fill area. The footprint of the landfill has been totally cleared.

2.3 APPROVED CAPACITY:

Specifics:
The site does not have an approved capacity although the site design includes a very specific final contour which, when completed, will require closure of the site. It is anticipated that the site will have sufficient capacity to last until at least 2040.

2.4 ACCESS CONTROL:

Specifics:
Access to the site is controlled by a locked gate and fencing along the roadway.

2.5 COVER MATERIAL:

Specifics:
Conditions 22 - 27 of the Certificate of Approval stipulate the requirements for cover material. Daily cover is required

from May 15 to September 15 and weekly cover from September 16 to May 14.

In December 2009 the city began depositing domestic waste at the site as opposed to just demolition debris, sewage sludge, ash, contaminated soil and asbestos. This has resulted in an increased need for cover to prevent windblown litter. Windblown litter is becoming a problem as the ground inside the gate and the forest along the edge is becoming contaminated with litter. In addition, there are plastic bags becoming caught in the crowns of the trees bordering the site. Also there is exposed compacted waste throughout the site.

2.6 **WASTE BURNING:**

Specifics:
There is no evidence of burning at this site.

2.7 **GROUNDWATER/SURFACEWATER IMPACT:**

Specifics:
There is no obvious evidence of groundwater or surface water impact from this site. The site is built in a spruce bog upstream of Morgan Lake. The bog is generally wet and deposition of waste began with waste placed on top of felled trees without disturbance of the root mass or peat.

2.8 **LEACHATE CONTROL SYSTEM:**

Specifics:
A leachate control system has not been installed at this site. This site is a natural attenuation landfill.

2.9 **METHANE GAS CONTROL SYSTEM:**

Specifics:
A methane gas control system has not been installed at this site. Condition 47 of the site Certificate of Approval requires that landfill gas monitoring be conducted. On December 23, 2002, the city received authorization to postpone the gas monitoring until such time as the type of waste received at the site changes significantly, In December 2009 the city began depositing domestic waste at the site and landfill gas monitoring was resumed. On April 24, 2013 the city once again received authorization to suspend landfill gas monitoring with the caveat that a statement regarding the need for landfill gas monitoring be included in each monitoring report.

2.10 **OTHER WASTES:**

Specifics:
There is no evidence that wastes other than solid non-hazardous wastes are being deposited at this site.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

Inspection Report - August 7, 2009

1. Condition 49 of the site certificate of approval requires the establishment of a Landfill Liaison Committee. Since the committee has not met in a number of years it is recommended that a meeting be convened in the near future. *The city has complied with this requirement by amending the Certificate of Approval to allow the city, with the District Manager's concurrence, to suspend the Landfill Liaison Committee.*

2. The successful operation of the contaminant attenuation zone is based on maintaining water levels at the site outlet as low as possible. During the inspection it was noted that water levels at the pond on the west side of Jones Road were very high and there was no flow through the two culverts draining the pond. Both culverts were plugged. It is recommended that the city start a weekly inspection program during the ice free period (May - October) to ensure that water levels in the discharge pond are maintained at the lowest level possible. *At the time of inspection the culvert was partially blocked with debris.*

3. All on-site wells should be locked and wells within the fill area should be protected from damage with a section of sewer access pipe or culvert. Wells MW 4-6 and MW 4-18 were unprotected within the fill area although they were marked with a brightly painted wooden marker. *The city is complying with this requirement.*

Incident Reports August 2009 - May 2013

5581-8BVNVT - December 3, 2010 - on a routine visit to the Kenora Area Waste Disposal Site I noted the presence of a vacuum truck and observed the operator dumping a partial load of dirty water into the waste disposal site. I spoke with the operator and advised him that the site was not approved to receive liquid and that the water should be decanted into the sanitary sewer prior to the grit and solids being deposited at the site. The operator indicated that the water was from a sewer access hole cleanout. The operator indicated that it was not normal city procedure to bring

liquids to the waste disposal site and that he wasn't given specific instructions to decant prior to dumping at the site. It appeared to me that the operator was taking a Friday afternoon shortcut. I advised the operator that he was being warned to ensure that liquids were not brought to the site and that a reoccurrence would result in possible enforcement action. Note that Certificate of Approval A612018 authorizes the disposal of grit and screenings from street cleaning and sediment basin clean-outs but does not authorize the deposit of liquids at the site.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:
A copy of the monitoring report should be available at the municipal office and on the city web site

5.0 ACTION(S) REQUIRED

1. Ensure that the placement of waste at the site corresponds with the fill sequence outlined in the Kenora Area Waste Management Master Plan (1997).
2. Ensure that a copy of the most recent monitoring report is available at the City of Kenora municipal office and on the City of Kenora web site. This is a requirement of condition 52(2) of Certificate of Approval A612018.
3. Review the waste cover requirements contained in Certificate of Approval A612018 and take all necessary steps to ensure that waste is adequately covered.
4. Resume weekly inspections of the discharge culvert to ensure that the culvert remains clear and that water levels within the attenuation zone remain as low as possible.

6.0 OTHER INSPECTION FINDINGS

1. The 2011 annual report concluded that the Kenora Area Waste Disposal Site is not having any detectable impacts on the surrounding environment.

2. The operations and maintenance manual required by condition 10 of the Certificate of Approval is the Kenora Area

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A612018
Issue Date: January 15, 2014

The Corporation of the City of Kenora
60 Fourteenth St N
Kenora, Ontario
P9N 4M9

Site Location: Kenora Area Waste Disposal Site
Jones Road (Highway 671)
Zone 15 041289E/5521117 N
Township of Pettypiece, District of Kenora

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

for the use and operation of a 13.1 hectare landfilling area within a total site area of 108.1 hectares

all in accordance with the following plans and specifications:

as listed in Schedule "A"

Located: Jones Road (Highway 671), Zone 15 041289E / 5521117 N , Parts of Lots 1 and 2, Concession I, and Parts of Lots 1 and 2, Concession II, Townships of Pettypiece, District of Kenora

which includes the use of the site only for the disposal of the following categories of waste (Note: Use of the site or additional categories of wastes requires a new application and amendments to the Environmental Compliance Approval) domestic, commercial, non-hazardous solid industrial and institutional, processed organic sewage sludge, sludge from future municipal or provincial fresh water treatment facilities, non-pathological agricultural and bio- medical, and grit and screenings from street cleaning and sediment basin clean-outs;

and subject to the following conditions:

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

DEFINITION OF TERMS

"Approval" means this Environmental Compliance Approval and any Schedules to it, including application and supporting documentation listed in Schedule "A";

"Director" means any Ministry employee appointed in writing by the Minister pursuant to Section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;

"Regional Director" means the Director, Ministry of the Environment, Northern Region;

"District Manager" means the Thunder Bay / Kenora District Manager, Ministry of the Environment;

"Landfill" or "Site" means Kenora Area Waste Disposal Site;

"MOE" means the Ontario Ministry of the Environment;

"ODWS" means the Ontario Drinking Water Standards;

"O & M Manual" means the Operations and Maintenance Manual;

"Owner" means the Corporation of the City of Kenora;

"PWQO" means the Provincial Water Quality Objectives; and

"RUP" means the MOE's Reasonable Use Policy (Guideline B-7, formerly 15-08).

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

GENERAL

Compliance

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of the Approval and the conditions herein and shall take all reasonable measures to ensure the person complies with the same.

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

In Accordance

3. Except as otherwise provided for in this Approval, the Owner shall ensure the Site is designed, developed, constructed, operated and maintained in accordance with the Conditions in this Approval and the supporting documentation listed in Schedule “A”.

Other Legal Obligations

4. The issuance of, and compliance with, this Approval does not:

a. relieve any person of any obligation to comply with any provision of the EPA or any other 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 request that any further information related to compliance with this Approval be provided to the Ministry ;

unless a provision of this Approval specifically refers to the other requirement or authority and clearly states that the other requirement or authority is to be replaced or limited by this Approval.

Adverse Effect

5. The Owner or Operator remain responsible for any contravention of any other condition of this Approval or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect or impairment of air and/or water quality.

Furnish Information

6. Any information requested by the Director or a Provincial Officer concerning the Site and its operation under this Approval, including but not limited to any records required to be kept by this Approval shall be provided in a timely manner.

7. The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this Approval or under any statute, regulation or subordinate legal instrument, in relation to the information, shall not be construed as:

i. an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any condition of this Approval or any statute, regulation or other subordinate legal requirement; or

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

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

Interpretation

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

10. 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 in writing **.**

11. 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.

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

No Transfer or Encumbrance

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 is satisfied with the arrangements made to ensure that all conditions of this Approval will be carried out and that sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

Change of Owner

14. 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
e. the name of the corporation where the Owner or Operator is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the Corporations Information Act , R. S. O. 1990, c. C.39, shall be included in the notification.

15. In the event of any change in the ownership of the Site, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forward to the Director and District Manager .

LANDFILL OPERATIONS

16. The Landfill shall be developed, operated and maintained by the Owner in accordance with all of the plans and documents listed in Schedule "A".

17. a. The Owner shall operate the Landfill in accordance with the O & M Manual. The O & M Manual shall cover the following issues:

- day-to-day operations and staff responsibilities;
- surface water management;
- equipment maintenance and inspection;
- stockpile management and use of daily and intermediate cover material;
- condition of applied cover and vegetation;
- odour, dust and litter control measures;
- traffic control measures;
- bird, bear, rodent and insect control measures;
- fire prevention measures;
- waste management control and record keeping procedures to ensure that only approved waste enters the Site;
- operating instructions for management of any waste suspected to be hazardous which enters the Site; and
- geotechnical and environmental monitoring procedures and protocols.

b. The O & M Manual shall also identify specific construction activities designed to minimize slope and bearing failures.

18. Scavenging of waste at the Site is prohibited.

Construction Activity

19. a. Heavy Equipment Usage: Heavy equipment shall not be used on the peat or, initially, on the waste over the bog unless the peat is sufficiently frozen to support the weight of this equipment.

b. Damage to Root Mat: Care shall be taken during construction to minimize damage to the root mat over the bog area. Areas where the root mat is badly damaged shall be treated on a case-by-case basis.

Side Slopes

20. All temporary side slopes (i.e. prior to achieving final design grades) for the fill over the bog shall be held at 6H (horizontal) : 1V (vertical) (or less). The permanent side slopes for the finished portion of the Landfill shall be restricted to 6H:1V for the east face, but may be up to 4H:1V elsewhere unless

otherwise specified by a geotechnical engineer.

Site Supervision

21. The Owner shall ensure that the Site Supervisor has been adequately trained with respect to the following without limitation:

i. conditions and schedules of this Approval;
ii. the operation and management of the Landfill;
iii. relevant waste management regulations and legislation;
iv. environmental concerns related to the waste being handled at the Landfill;
v. occupational health and safety concerns pertaining to the waste being handled at the Landfill; and
vi. the placement of fill on the bog area in accordance with advice and/or specific instructions provided by a qualified geotechnical engineer.

Site Security & Operating Hours

22. The waste disposal operating hours of the Landfill shall be between 8:30 a.m. to 5:30 p.m . , Monday to Saturday. The Landfill is closed on Sundays and statutory holidays.

23. The Owner shall not allow waste to be received for disposal at the Landfill except during operating hours when the Landfill is under the supervision of the Landfill attendants.

24. During non-operating hours, the Landfill entrance gate shall be locked by the Owner to secure against access by unauthorized persons.

25. In the event of a requirement to respond to emergency situations, waste may be received for disposal at the Landfill outside of the normal operating hours specified in Condition 22 above, under the supervision of the Landfill attendants and subject to the approval of the District Manager.

Site Entry Requirements

26. The Owner shall not allow the following wastes to be disposed of at the Landfill:

• hazardous wastes as defined under Regulation 347;
• industrial liquid or slurry wastes;
• hazardous biomedical wastes; and
• barrels, drums or other similar containers which have been contaminated by hazardous substances.

27. The Owner shall use the weigh scale to monitor and record all incoming wastes.

28. The Owner shall ensure that all vehicles entering the Landfill shall be identified by a licence number on the weigh scale billing notice.

Waste Cover Requirements

29. The Owner shall ensure that waste is deposited in a manner that minimizes the area of exposed waste at the Landfill working face and shall be compacted before cover material is applied.

30. The Owner shall ensure that from May 15 till September 15 at the end of each working day, and within two hours of the entrance gate closure, cover material is applied to all exposed waste material. Cover material shall be applied on a weekly basis during the rest of the year. The average depth of this material when soil is used shall be no less than 15 cm.

31. Alternative MOE approved materials such as tarps, foams or processed sewage sludge can be used for daily cover subject to the Director's approval.

32. The Owner shall provide a contingency supply of cover material equal to two working days worth to ensure that adequate cover is always available for application pursuant to Condition 30.

33. The Owner shall ensure that in areas where landfilling is not to be carried out for the period of 90 days or more, at least 20 cm of compacted clean earth cover will be applied over the wastes. If necessary, these areas may be hydroseeded during the earliest spring or fall planting season to stabilize the surface against erosion.

34. The Owner shall ensure that in areas where landfilling has been completed to the approved final contours, a minimum 750 mm thickness of clean earth cover will be placed over the compacted wastes. The lower 600 mm will consist of previously excavated and compacted tills, and the top 150 mm will consist of locally derived topsoil mixed with peat. These areas shall be hydroseeded during the earliest spring or fall planting season to provide protection against erosion.

Base Contours

35. The Owner shall ensure that extent of excavation shall be limited to base grades shown on Drawing S1-3 of Item 1, Schedule "A".

36. The Owner shall ensure that no excavation shall occur for those portions of the landfilling area situated over the bog.

Waste Burning

37. The Owner shall ensure that there is no burning of waste at the Landfill.

38. The Owner shall ensure that Site operations shall incorporate the fire prevention measures identified in Item
1, Schedule "A".

Bears, Birds, Rodents and Insect Control

39. Bears, birds, rodents and insect control shall be undertaken by the Owner in accordance with procedures outlined in Item 1, Schedule "A".

Litter Control

40. The Owner shall implement all necessary measures to prevent off-site litter impact from landfilling operations.These measures shall include but not be limited to the following:

- the use and maintenance of suitable portable netting and snow fencing;
- weekly Site litter i nspections and clean-up; and
- daily inspection and no less than weekly litter pick up on Highway 671 in the vicinity of the Landfill;

41. The Owner shall ensure that no disposal of waste occu r s if weather conditions make it difficult to prevent litter from leaving the Landfill.

Dust Control

42. In order to keep mud and dust from the Landfill to a minimum, the Owner shall implement a dust control program. This program shall include, but not be limited to the following measures:

• during dry periods when there are visible dust emissions, regular wetting of soil cover material prior to its spreading by bulldozers over the working face;
• during dry periods wetting of the unpaved roads and the use of dust suppressants;
• installation of speed bumps near the Site entrance;
• reducing on-Site vehicle speeds by posting a maximum speed limit of 30 km/h;
• paving the Site entrance area;
• construction of the on-Site crushed stone or gravel roads;
• covering of dust laden waste material as soon as possible; and
• minimizing wind erosion by stabilizing inactive areas using vegetation.

Noise Control

43. Noise from or related to the operation of the Landfill shall be kept to a minimum and, in any event, the Owner shall comply with the noise level limits outlined in the MOE's February 1997 "Noise Guidelines for Landfill Sites" as contained in Schedule "B".

Traffic Control

44. The Owner shall ensure that sufficient queueing space is available on-Site to accommodate the peak traffic volumes anticipated.

45. During the first year of operation the Owner shall monitor Site related and non-Site related traffic levels to assess the potential need for Highway 671 improvements at the Site entrance.

Site Maintenance

46. The Owner shall conduct regular Site inspection(s) to ensure that all facilities and Site works are maintained in a tidy condition and good working order. Such inspections will check for:

• damage to perimeter fences and the maintenance of litter fences;
• interior access road damage;
• blowing litter and other nuisance concerns;
• leachate springs or breakouts;
• ponded water and blocked surface drainage works;
• slope failure/erosion and final cover settlement; and
• the condition of vegetation.

Any necessary repair/remedial works will be performed at the earliest possible opportunity.

LANDFILL CONTAMINANT ATTENUATION ZONE

47. The Owner shall maintain the contaminant attenuation zone shown on Fig. FW- 2 of Item 1, Schedule "A" through an MNR Land Use Permit and and maintain a Certificate of Requirement at the local Land Registry Office.

SURFACE WATER MANAGEMENT SYSTEM

48.1 Site grading and contours shall be maintained by the Owner such that all surface water run-off from the landfilling area is directed into the perimeter surface water management system.

48.2 The perimeter surface water management system consisting of swales, ditches, retention basins and the controlled outlet facilities shall be completed by the Owner . It shall be operated and maintained by the Owner in accordance with the procedures outlined in Item 1, Schedule "A". The

wetland outlet at Highway 671(Jones Road) is to be inspected every two weeks to ensure that the outlet is not blocked.

48.3 The perimeter ditching, external run-off channels, and northern storm water retention basin shall be completed in accordance with the sequence of landfilling shown on Figure S1-5.1, Item 1 of Schedule "A".

SURFACE WATER MONITORING

49. Surface water monitoring shall be undertaken by the Owner in accordance with Schedule "C".

SEDIMENT MONITORING

50. Sediment monitoring shall be undertaken by the Owner in accordance with Schedule "D".

GROUNDWATER MONITORING

51. Groundwater monitoring shall be undertaken by the Owner in accordance with Schedule "E".

LANDFILL GAS MONITORING

52. Landfill gas monitoring shall be undertaken by the Owner in accordance with Schedule "F".

GEOTECHNICAL MONITORING

53. Geotechnical monitoring shall be undertaken by the Owner in accordance with Schedule "G".

SURFACE WATER MONITORING PROGRAM TRIGGER MECHANISM

54. The Owner shall implement the proposed trigger mechanism relating to the surface water monitoring program as detailed in Section 3.5 of the document entitled "2001 Annual Report on the monitoring Programs for the Jones Road Landfill Site" dated June 2002 and amended as Item 9, Schedule "A".

GROUNDWATER MONITORING PROGRAM TRIGGER MECHANISM

55. The Owner shall implement the proposed trigger mechanism relating to the groundwater monitoring program as detailed in Section 3.5 of the document entitled "2001 Annual Report on the monitoring Programs for the Jones Road Landfill Site" dated June 2002 and amended as Item 9, Schedule "A".

CHANGES TO THE MONITORING PROGRAM

56.1 For any proposed changes to the monitoring program(s) outlined in Conditions 49, 50, 51, and 52, the Owner shall submit a letter to the District Manager detailing the proposed changes to the monitoring program.

56.2 Within fourteen (14) days of receiving written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the monitoring program, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager, to the Director requesting the Approval be amended to reflect proposed changes.

56.3 Changes to the monitoring program can not be implemented until written concurrence from

District Manager and approval by the Director has been received.

PUBLIC COMPLAINTS

57. The Owner shall establish the public complaints procedure upon issuance of this Approval that shall include:

a. designating specific staff to receive any complaints and, as soon as possible, to respond in writing indicating the proposed action to be undertaken;

b. posting the Landfill complaints telephone number at the Landfill entrance;

c. keeping an accurate record of the following Landfill related complaints information:

- the name and address of the complainant,
- the date and time,
- the nature of the complaint,
- details of the Owner's response to the complainant and actions taken; and

d. summarizing all complaints concerning the Landfill and the Owner responses/actions in the Monitoring Report.

MONITORING REPORT

58.1 Effective immediately and commencing on **June 30, 2015** , the Owner shall prepare and submit a Monitoring
Report to the District Manager once every three years which shall include the following: .

a. A summary of total annual quantities of waste received on a monthly basis at the Site;

b. A drawing(s) of the Landfill indicating all groundwater, surface water, sediment, biological, landfill gas and geotechnical monitoring locations;

c. Tables outlining monitoring locations, analytical parameters sampled, and frequency of sampling and measurements;

d. An analysis and interpretation of the surface water, sediment, biological, groundwater, leachate, landfill gas and geotechnical monitoring data; a review of the adequacy of the monitoring programmes; conclusions of the monitoring data; and recommendations for any changes in monitoring programmes that may be necessary;

e. An assessment of surface water quality with respect to the PWQO Guidelines and trigger concentrations mentioned in Schedule "C";

f. As assessment of groundwater quality in relation to the RUP and ODWO;

g. An assessment of groundwater table elevations in relation to trigger elevations mentioned in Schedule "E";

h. An assessment of geotechnical conditions near the east face of the Landfill;

i. An assessment of the performance of the Contaminant Attenuation Zone;

j. An assessment of the need for landfill gas monitoring;

k. An update of changes in operations, sequencing, equipment, or procedures made or produced at the Landfill, and any operating difficulties encountered;

l. Drawings showing areas of fill, buffer areas, current Landfill contours, final Landfill contours, any recommended changes to the final contours, percentage of available space utilized, and an estimate of the remaining disposal capacity and Landfill site life;

m. A summary discussion of Landfill site daily and intermediate cover requirements and erosion protection;

n. A statement as to compliance with all Conditions and with the inspection and reporting requirements of the Conditions;

o. A summary of any complaints made regarding Landfill operation and the Owner's response and action taken;

p. An annual waste diversion statement that includes an updated summary of per capita waste diversion activities and quantity of waste diverted using 1987 as the base year; and

q. Recommendations respecting any proposed changes in the operation of the Landfill.

58.2 The Owner shall post a copy of the Monitoring Report on their website by no later than June 30 of each year
and provide a copy of the Monitoring Report to any member of the public who may request one, within five business
days.

CLOSURE PLAN

59. One year before the Landfill is expected to stop receiving waste, the Owner shall develop and submit an updated Closure Plan. The Closure Plan shall be submitted for the Director's approval and outline post-closure maintenance and monitoring. The plan shall include, but not be limited to the following:
a. changes to the final contour plan that may have been previously identified in the monitoring reports or
recommended in the development of the detailed Closure Plan;
b. fencing and access control;
c. details of any additional vegetative plantings planned;
d. the sequence and schedule for completion of final cover installation;
e. post-closure and end-use plans;
f. plans and schedules for the management and continued monitoring of surface water, groundwater, leachate and landfill gas;
g. plans and schedules for the routine monitoring and maintenance of the final cover, swales, ditches, retention basins and the controlled outlet facilities;

60. The final cover over the entire area which was landfilled shall be completed by the Owner within

one full construction season following the date after the Landfill has stopped receiving waste. Formal notice shall be provided by the Owner to the Director upon receipt of the final load of waste to the Landfill.

SCHEDULE "A"

This Schedule "A" forms part of Approval No. A 612018 *and contains documentation submitted in support to an application for the establishment and use of the Landfill.*

1. Kenora Area Waste Management Master Plan EPA Document prepared by Fenco MacLaren and dated
February 1997.

2. Letter dated April 10, 1997- Fenco MacLaren (L. Torrens) to Ministry of Environment and Energy (E.
Zaltsberg)- Subject: Application for a Certificate of Approval for a Waste Disposal Site.

3. Letter dated July 2, 1997- Fenco MacLaren (T. Taylor) to Ministry of Environment and Energy (J. Barr)- Subject: Former Jones Road Waste Disposal Site.

4. Letter dated August 14, 1997- Fenco MacLaren (L. Torrens) to Ministry of Environment and Energy (E.
Zaltsberg) - Subject: Geotechnical Monitoring: Kenora Area WMMP EPA Studies Document.

5. Kenora Area Waste Management Master Plan, October 1997 Photo supplements to EPA Studies Document prepared by Fenco MacLaren and dated February 1997, and September 1999.

6. Kenora Area Waste Management Master Plan EA Conditions of Approval Document prepared by SNC- Lavalin Engineers & Constructors Ltd. and dated January 1999.

7. Figure S1-6.1 as amended September, 1999- Proposed Monitoring Locations prepared by SNC-Lavalin
Eng i neers & Constructors Ltd. and dated September 1999.

8. Letter dated September 27, 1999 from Environment Canada (S. Michajluk) to the Ministry of the
Environment (E. Zaltsberg), Subject: Kenora Area Waste Management Master Plan.

9. Document entitled "2001 Annual Report on the monitoring Programs for the Jones Road Landfill Site" dated June 2002 and prepared by Azimuth Environmental Consulting Inc.

SCHEDULE "B"

This Schedule "B"forms part of Environmental Compliance Approval No. A 612018. *It contains the Ministry of the Environment's February 1997 "Noise Guidelines for Landfill Sites" referred to in condition 43.*

1. SCOPE

This Publication establishes sound level limits for landfill operations affecting residential or other noise-
sensitive areas . Three components of waste disposal operation are separately addressed in this guideline:

• the actual landfill Site;
• facilities for reception, storage and mixing; and
• off-site source vehicles.

2. **REFERENCES**

Reference is made to the following technical publications:

(1) NPC-101 -Technical Definitions *
(2) NPC-102- Instrumentation *
(3) NPC-103- Procedures *
(4) NPC-104- Sound Level Adjustments *
(5) NPC-205 - Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (urban) (6) NPC-206- Sound Levels due to Road Traffic
(6) NPC-232 - Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)
(7) NPC-233 - Information to be Submitted for Approval of Stationa ry Sources of Sound
(8) ORNAMENT, Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, Ontario Ministry of the Environment, ISBN 0-7729-6376 (1989).

* Found in the Model Municipal Noise Control By-Law, Ontario Ministry of Env i ronment, Final Report, August 1978.

3. **TECHNICAL DEFINITIONS**

"Ambient sound level" means Background sound level; "Background sound level" is the sound level that is present in the environment, produced by noise sources other than the source under impact assessment. Highly intrusive short duration noise caused by sources such as an aircraft fly-over or a train pass-by is excluded from the determination of the background sound level;

"Construction Equipment" means any equipment or device designed and intended for use in construction, or material handling including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment;

"Conveyance" includes a vehicle and any other device employed to transport a person or persons or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person;

"Point of Reception"means any point on the premises of a person where sound or vibration originating from other than those premises is received. For the purpose of noise impact assessment of a proposed landfill operation, or an expansion to an existing landfill operation, the point of reception may be located within 30m of a dwelling or a camping area on any of the following existing or zoned for future use premises: permanent or seasonal residences, hotel/motels, nursing/retirement homes, rental residence, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship.

Other technical terms used in this publication are defined in Reference (1).

4. **MEASUREMENTS, STANDARDS AND PROCEDURES**

For the purpose of this Publication, all measurements shall be made in accordance with References (2), (3) and (4).

5 . **SOUND LEVEL LIMITS**

(1) Landfill Site

(a) General Limits: The limits for sound levels due to the landfill site operation at a Point of Reception are 45 dBA in any hour of the night, 7:00PM-7:00AM, and 55 dBA in any hour of the day, 7:00 AM-7:00 PM. These levels are expressed in terms of the One Hour Equivalent Sound Level (Leq).

The above limits are applicable under the following conditions:

• the existing ambient noise climate is assumed to be rural, i.e. the daytime and night time environmental noise level is normally below the stated limitation. Should the environment be dominated by noise sources of man-made activity, such as industry, commerce or road transportation, which produce sound in excess of the above limits, the higher sound levels may be used as the limit, provided that the noise sources are not under consideration for noise abatement by the Municipality or the Ministry of Environment and Energy.

• landfill site operation involves only "construction equipment" or "conveyances", as defined in Section 3. In this case the landfill site itself is not considered a stationary noise source, and will not be governed by the limitations set out in References [5] or [7].

(b) Specific Limit- Impulsive Sounds: For impulsive sound from a pest control device employed in the operation of the
landfill site, the sound level limit at a Point of Reception expressed in terms of the Logarithmic Mean Impulse Sound Level (LLM) is 70 dBA.

(2) Facilities for Reception, Storage and Mixing: A landfill site utilizing equipment that does not fall under the
definition of "construction equipment" or "conveyance", as defined in Section 3 is considered a stationary noise source. The applicable sound level limits are those established for the assessment of stationary sources of sound given in References [5] and [7].

6. **OFF -SITE SOURCE VEHICLES**

For a landfill site employing off-site source vehicles which constitute a predominant component of the background noise, an access route shall be selected which will result in a minimum noise impact. The selection process shall be based on a detailed quantitative assessment of noise impact on individual receptors and the number of affected receptors along the alternative routes. The municipality and the affected residents must be clearly informed of any potential noise impact.

SCHEDULE "C"

This Schedule "C" *forms part of Environmental Compliance Approval No. A* 612018. *It describes the surface water monitoring program referred to in Condition 49.*

1. OBJECTIVES

The objectives for the surface water monitoring program are:
• to evaluate background surface water quality;
• to evaluate the Landfill's impact on surface water quality downstream of the Landfill;
• to evaluate the efficiency of the proposed Contaminant Attenuation Zone;
• to monitor water quality at the downstream site/attenuation zone boundary and compare this quality with the MOE's PWQO; and
• to determine the need for a contingency implementation.

2. **MONITORING PLAN**

The surface water monitoring plan shall be carried out by the Owner to address the stated objectives and in accordance with the details in the following table:

Location	**Frequency**	**Parameters**
SW-1 (Jones Road Culvert), SW-2 (Beaubien Loop Logging Road Culvert) SW-3 (Lunch Lake subwater shed control) SW-4 (Crystal Bay)	May (Indicator List) August and October (Comprehensive List)	**Field Parameters:** Temperature, pH, Conductivity, Dissolved Oxygen **Comprehensive List:** In-organics: Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Chloride, Chromium, Conductivity, Copper, Iron, Lead, Mercury, Nitrate, Nitrite, Total Kjeldahl Nitrogen, pH, Total Phosphorus, Suspended Solids, Total Dissolved Solids, Sulphate, Zinc Organics: Biological Oxygen Demand (BOD5), Chemical Oxygen Demand, Phenol **Indicator List:** In-organics: Alkalinity, Ammonia, , Chloride, Conductivity, Iron, Nitrate, Nitrite, Total Kjeldahl Nitrogen, pH, Total Phosphorus, Suspended Solids, Sulphate. Organics: Biological Oxygen Demand (BOD5), Chemical Oxygen Demand, Phenol
SW-5 (Morgan Lake)	August	**Field Parameters and Comprehensive List**
SW-2 (Beaubien Loop Logging Road Culvert)	August/ once every two years	Volatile Organic Compounds, EPA method 642
Any flowing spring or groundwater seepage identified within the saddle area	any sampling event	**Indicator List**
SW-2 (Beaubien Loop Logging Road Culvert) SW-3 (Lunch Lake subwater shed control)	May, August and October	Flow measurements

3. **DRAINAGE**

3.1 Drainage Required: Since a build up of water on, behind or within the waste may result in the loss of stability and, potentially, slope failure, drainage shall be provided around the waste. Water

shall not be permitted to "dam up" behind the waste or pond on the waste.

3.2 Inspection of Drainage: The drainage provided in the design shall be regularly inspected to ensure that it has not been blocked (e.g., by beavers or other causes). Any blockages shall be cleared immediately.

4. **CONTINGENCY MEASURES**

If trigger concentrations at trigger location(s) referred to in Condition 54 are exceeded and these exceedances are due to landfilling operations, then one of the following contingency measures shall be implemented:

• construction of a control berm or weir downstream of the landfilling area to increase retention time for contaminated surface water flow within the buffer/attenuation zone;

• construction of a dispersion channel downstream of the landfilling area to force contaminated surface water into the peat layer and create a more uniform dispersion throughout the buffer/attenuation zone; and

• enlargement of the attenuation zone.

Prior to implementation, the appropriate contingency measure(s) shall be discussed with and approved by the Director.

SCHEDULE "D"

This Schedule "D "forms part of the Environmental Compliance Approval No. A 612018. *It describes the sediment monitoring program referred to in Condition 50.*

1. OBJECTIVES

The objectives for the sediment quality monitoring program are:

• to provide a statistical measure of sediment quality in surface water environs suitable for determining and comparing existing and future sediment quality conditions in Morgan Lake and Crystal Bay (Silver Lake);

• to evaluate the Landfill's impact on sediment quality in Morgan Lake and Crystal Bay (Silver Lake);

• to provide additional information for evaluating the efficiency of the proposed Contaminant Attenuation Zone;

• to provide an additional level of protection for detecting any contaminant migration from the Landfill site; and

• to determine the need for a contingency implementation.

2. **MONITORING PROGRAM**

The sediment quality monitoring program shall be carried out by the Owner to address the stated

objectives and in accordance with the following table. The interpretation of the results of sediment sampling should be based on comparison to Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario (MOE, 1992 and updates).

Location	Frequency	Parameters
SB-1 in Crystal Bay (Silver Lake) SB-2 in Morgan Lake; and SB-R (reference station) to be located upstream of any potential influence within Silver Lake. Note 1: Sediment locations shown on Figure S1-6.1, Item 7, Schedule "A" as amended on Sep 1999. Note 2: Sediment sampling stations correspond with benthic sampling stations outlined in Schedule "E".	Once every ten years (next event 2021) During the ten year sampling collect five replicate samples at each location in order that a statistical comparison can be made against existing data. If annual surface water samples in Morgan Lake or Crystal Bay show a significant increase in metals concentrations, then sediment sampling should be repeated in 2016 and thereafter every five years.	Grain size analysis Aluminum, Arsenic, Cadmium, Cobalt, Copper, Chromium, Manganese, Nickel, Iron, Lead, Zinc, Mercury, Total Organic Carbon, Total Kjeldahl Nitrogen, Total Phosphorus.

SCHEDULE "E"

This Schedule "E"forms part of Environmental Compliance Approval No. A 612018. *It describes the groundwater monitoring program referred to in Condition 51.*

1. OBJECTIVES

• to monitor groundwater quality in the refuse, the overburden and the bedrock;

• to identify and characterize movement of leachate-related contaminants in the overburden and the bedrock within the Landfill/Contaminant Attenuation Zone boundary;

• to monitor groundwater quality at the downgradient Landfill/Contaminant Attenuation Zone boundary and compare this quality with MOE's Objectives and Policies (ODWO, RUP);

• to confirm the existence of groundwater divides north and southeast of the landfilling area; and

• to determine the need for a contingency implementation.

2. **MONITORING PLAN**

2.1 The groundwater monitoring plan shall be carried out by the Owner to address the stated objectives and will include the following:

Location	**Frequency**	**Parameters**
KGS-2, 4/6, 11/4, 2/9, 1/17, 2/13, 3/8, 5/17, 6/5, 16/15, 17/15, 19/16, 23/3, 24/5	May and August	**Field Parameters:** pH and Conductivity **Comprehensive List:** In-Organics: Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Calcium, Chloride, Chromium, Conductivity, Copper,

		Iron, Lead, Magnesium, Manganese, Mercury, Nitrate, Nitrite, Total Kjeldahl Nitrogen, pH, Total Phosphorus, Potassium, Sodium, Suspended Solids (leachate only), Total Dissolved Solids, Sulphate, Zinc. Organics: Benzene, 1,4 Dichlorobenzene, Dichloromethane, Toluene, Vinyl Chloride, Biochemical Oxygen Demand (BOD5 leachate only), Chemical Oxygen Demand, Dissolved Organic Carbon, Phenol. Volatile Organics (well 2/9 only)
All functioning monitors and the following monitors from the saddle area: 13/6, 13/14, 14/6, 14/21, 15/5, 15/17.	May and August	Water Levels

2.1.a Gorundwater monitoring wells 10/17, 12/4, 6/14, 7/4, 8/22. 9/6, 21/7, 13/6, 13/14, 14/6. 14/21, 15/5, and 15/17 must be maintained in accordance with O.Reg. 903 for future use if needed.

2.1.b If the groundwater flow direction across the saddle changes or groundwater quality at monitoring well 3/8 changes significantly then groundwater sampling and analysis of wells in the saddle area must be undertaken as described for monitoring well 3/8.

2.2 Monitoring System Maintenance: During each monitoring event, the monitoring network will be visually inspected. Changes in the physical conditions of each well will be noted and necessary repairs undertaken. Monitoring wells that are shown to be damaged beyond repair or whose integrity is in doubt for further monitoring, will be abandoned in accordance with standard procedures and replaced, if necessary.

3. CONTINGENCY MEASURES

3.1 If groundwater level elevation(s) at trigger location(s) are equal or exceed trigger value(s), then one of the following contingency measures shall be implemented to protect water quality and aquatic life in Silver Lake:

• induce groundwater recharge by pumping water from Silver Lake into an infiltration gallery/ trench in order to sustain or enhance the existing groundwater divide in the saddle area;

• pressure grouting the overburden and the upper bedrock in the saddle area to eliminate contaminate migration through the subsurface;

• installation of a cut off wall in the saddle area to eliminate contaminant migration through the subsurface; and

• leachate collection system installation.

3.2 If groundwater level elevation(s) at trigger location(s) are equal to or exceed trigger value(s), then one of the following contingency measures shall be implemented to protect water quality and aquatic life in Morgan Lake:

• induce groundwater recharge by pumping water from Morgan Lake into an infiltration gallery/trench on the top of the ridge along the Jones Road in order to sustain or enhance the existing groundwater divide;

• installation of a cut off wall in the ridge along the Jones Road; and

• leachate collection system installation.

3.3 Prior to implementation, the appropriate contingency measure(s) shall be discussed with, and approved by the Director.

SCHEDULE "F"

This Schedule "F" *forms part of Environmental Compliance Approval No. A 612018. It describes the landfill gas monitoring program referred to in Condition 52.*

OBJECTIVE: To monitor combustible gas concentrations in the unsaturated zone along the southern buffer zone (drawing S1-2, Item 1, Schedule "A") between the landfill and the office/equipment storage building. The gas probes installed during the initial site construction works will ensure that there is no gas migration between the old MNR landfill (that is to be exhumed) and the office/equipment storage building.

1.a The landfill gas monitoring plan is hereby suspended.

1.b The Owner shall maintain the existing gas probes for future monitoring should the need arise.

1.c The Owner shall include a statement in each Monitoring Report regarding the need for landfill gas monitoring at the Site.

*SCHEDULE **"G"***

This Schedule "G" forms part of Environmental Compliance Approval No. A 612018. It describes the geotechnical monitoring program referred to in Condition 53.

1. OBJECTIVES

• to monitor pore pressures in the peat and very soft clay;

• to monitor the increase in the shear strength of the very soft clay with time; and

• to control the rate of landfilling (the thickness of waste and cover placed per day) and the Landfill development sequence.

2. **PIEZOMETER INSTALLATIONS**

2.1 At least four boreholes shall be drilled within Area A of the proposed landfilling area prior to the placement of waste over the peat. Their locations are shown on Figure S1-6.1, Item 7, Schedule "A". Each borehole shall be terminated 1 m below the soft clay/underlying deposit interface.

2.2 If unusual or unexpected conditions are encountered in any of the four boreholes mentioned in 2.1, additional boreholes may be drilled subject to the geotechnical engineer decision.

2.3 At each borehole location, one piezometer shall be installed near (within 0.3 m of) the peat/soft clay interface with the tip located within the peat layer. The second deeper peizometer shall be

installed within the soft clay layer with the tip located approximately 0.4 m to 1.25 m below the peat/soft clay interface depending on the thickness of the soft clay layer. In areas where the clay stratum is greater than 2 m thick, the piezometer tip shall be located 0.75 m to 1.25 m below the peat/soft clay interface. In areas where the clay stratum is less than 2 m thick, the tip shall be located 0.4 m below the interface.

In order to ensure both a rapid response (no lag time) and accurate measurements of the stress induces porewater pressure changes, pneumatic type piezometers are recommended for installation.

3. **INVESTIGATION**

3.1 Initial Investigation: Prior to any landfilling operation, the initial geotechnical investigation shall be conducted in four boreholes mentioned in 2.1. The investigation shall include:

• obtaining field vane strength profiles in soft clay;

• obtaining samples of soft clay (using a piston sampler) and performing consolidation and strength tests over a range of consolidation stress levels as necessary to provide parameters for use in stability analyses; and

• establishing the thickness of peat and soft clay layers, and the nature and hydraulic conductivity of the underlying firm deposit.

3.2 Geotechnical Analysis of Pore Pressures: Prior to any landfilling operation and based on the findings of the investigation mentioned in 3.1, a geotechnical engineer shall provide recommendations regarding the maximum pore pressure that can be developed in piezometers mentioned in 2.3 during the placement of waste and cover material.

3.3 Geotechnical Analysis of Shear Strength: Prior to any landfilling operation and based on the findings of the investigation stipulated in Section 3.1, a geotechnical engineer shall provide recommendations regarding the strength required in the very soft clay prior to the commencement of each new stage of construction.

4. **MONITORING AND RESPONSE PLAN**

4.1 Observations by Site Personnel: Site personnel shall advise the geotechnical engineer of any "unusual" behaviour or minor failures within the fill or peat/clay soil substrate, even if these can be readily fixed by site personnel as soon as they occur. Any such instances shall be evaluated by the geotechnical engineer in the context of the design and available information. The development plan shall be changed by the geotechnical engineer in order to prevent impacts on soil stability deemed to be geotechnically unacceptable.

4.2 Pore Pressure Monitoring: For the first year of each new stage of construction, the piezometers installed in the peat and soft clay shall be monitored daily during the first two weeks of landfilling and weekly for the remainder of the year. Subsequently, pore pressures may be measured once a month. The pore pressure data shall be reviewed monthly by the geotechnical engineer.

4.3 Rate of Landfilling: The measured pores pressures shall not be permitted to exceed the allowable levels mentioned in 3.2 without the written approval of the Town's geotechnical engineer, otherwise, the rate of landfilling shall be reduced such that the allowable pore pressure levels are not exceeded. The rate of landfilling (the thickness of waste and cover placed per day) in areas where there are no piezometer measurements shall not exceed the rate that was adopted in areas where pore pressures were measured.

4.4 Shear Strength Monitoring: At least four field vane tests shall be performed to confirm the shear strength increase in the soft clay prior to starting construction in each new stage near the east face and before placing final cover on the east face. The results from these tests shall be reviewed by the geotechnical engineer who shall give written approval before each new stage is commenced.

5. **SUBSEQUENT MODIFICATIONS**

This monitoring plan may be modified in accordance with experience gained during construction with the written notification of the Director by the City and a supporting letter from the City's geotechnical engineer.

Modifications recommended by the geotechnical engineer shall be assessed as to their environmental significance by a qualified environmental consultant prior to the submission of the written notification to the Director.

The Director shall approve the necessary changes, and these changes shall not be made without such approval.

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

1. Conditions 1 through 15 are added to clarify legal rights and responsibilities of the Owner.

2. Condition 16 is to ensure that the Landfill is developed, operated, maintained and monitored by the Owner in accordance with all of the plans and documents listed in Schedule "A".

3. Condition 17 is to ensure that the Owner shall operate the Landfill in accordance with the O&M Manual.

4. Condition 18 is to ensure that scavenging of waste at the Landfill is prohibited.

5. Condition 19.a is to ensure that heavy equipment shall not be used on the peat or on the waste over the bog unless the peat is frozen to support the weight of the equipment.

6. Condition 19.b is to ensure that during the construction period care shall be taken to minimize damage to the root mat over the bog area.

7. Condition 20 is to specify the temporary and permanent side slopes at the Landfill.

8. Condition 21 is to ensure that the site Supervisor is adequately trained.

9. Condition 22 is to specify the operating hours of the Landfill.

10. Condition 23 is to ensure that the Owner will not allow waste to be received for disposal at the Landfill except during operating hours when the Landfill is under supervision of the Landfill attendant.

11. Condition 24 is to ensure that during non-operating hours, the Landfill entrance gate shall be locked by the Owner, to secure the Landfill against unauthorized persons.

12. Condition 25 is to allow the Landfill to accept waste beyond the normal operating hours under the supervision of the attendant and under conditions acceptable to the MOE.

13. Condition 26 is to identify those wastes that are not suitable for disposal at the Landfill.

14. Condition 27 is to ensure that an accurate record for all incoming waste is maintained by the Owner.

15. Condition 28 is to ensure that all vehicles entering the Landfill are identified by licence number on the weigh scale billing notice.

16. Condition 29 is to ensure that waste will be deposited in a manner that minimizes the Landfill

working face and will be compacted before the cover material is applied.

17. Condition 30 is to ensure that cover material is applied daily from May 15th to September 15th and weekly during the rest of the year.

18. Condition 31 is to allow the use of a daily cover alternative material approved by the Director.

19. Condition 32 is to ensure that the Owner will provide a contingency supply of cover material equal to two working days worth.

20. Condition 33 is to ensure that in areas where landfilling is not be carried out for a period of 90 days or more, at least 15cm of compacted, clean earth cover shall be applied over the waste.

21. Condition 34 is to ensure that areas that have reached approved limits, will be covered with final cover material and a suitable planting material will be employed to allow for effective re-vegetation.

22. Condition 35 is to ensure that the extent of the excavation will be limited to base grades shown on Drawing S1-3, Item 1, Schedule "A".

23. Condition 36 is to ensure that no excavation shall occur for those portions of the landfilling area situated over the bog.

24 Condition 37 is to ensure that there will be no burning of waste at the Landfill.

25. Condition 38 is to ensure that site operations will incorporate the necessary fire prevention measures identified in Item 1 of Schedule "A".

26. Condition 39 is to ensure that bears, birds, rodents and insect control will be undertaken by the Owner in accordance with Item 1 of Schedule "A".

27. Condition 40 is to ensure that the Owner will implement all necessary measures to prevent any off-site litter impact from the landfilling operations.

28. ·Condition 41 is to ensure that no disposal of waste will occur if weather conditions make it difficult to prevent litter from leaving the Landfill.

29. Condition 42 is to ensure that a dust control program is implemented at the Landfill.

30. Condition 43 is to ensure that the Owner shall comply with the noise limits outlined in the MOE's February 1997 "Noise Guidelines for Landfill Sites".

31. Condition 44 is to ensure that sufficient queuing space will be available on-site to accommodate the peak traffic volumes anticipated.

32. Condition 45 is to ensure that the Owner will monitor site related and non-site related traffic levels to assess the potential need for Highway 671 improvements at the Site entrance.

33. Condition 46 is to ensure that the Owner will conduct regular site inspections in order to keep all facilities and site works in a tidy condition and good working order.

34. Condition 47 is to ensure that the Owner shall establish the proposed Contaminant Attenuation Zone shown on Figure FW-2 of Item 1, Schedule "A".

35. Conditions 48.1, 48.2 and 48.3 are to ensure that the surface water management system will be in place.

36. Condition 49 is to ensure that surface water monitoring shall be conducted by the Owner in accordance with Schedule "C".

37. Condition 50 is to ensure that sediment monitoring shall be conducted by the Owner in accordance with Schedule "D".

38. Condition 51 is to ensure that groundwater monitoring shall be conducted by the Owner in accordance with Schedule "E".

39. Condition 52 is to ensure that Landfill gas monitoring shall be conducted by the Owner in accordance with Schedule "F".

40. Condition 53 is to ensure that geotechnical monitoring shall be conducted by the Owner in accordance with Schedule "G".

41. Condition 54 and 55 are to ensure that trigger mechanisms approved by the Director are followed by the Owner.

42. Conditions 56.1, 56.2, and 56.3 are to clarify the requirements for amending the monitoring programs.

43. Condition 57 is to ensure complaints at the Site are handled properly.

44. Condition 58 is to ensure that a Monitoring Report shall be prepared by the Owner and submitted to District Manager.

45. Condition 59 is to ensure that one year before the Landfill is expected to stop receiving waste, the Owner shall submit an updated Closure Plan for the Director's approval.

46. Condition 60 is to ensure that the final cover over the entire landfilling area shall be completed by the Owner within one full construction season following the date after the Landfill has stopped receiving waste.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A612018 issued on November 5, 1999 and all subsequent amendments.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

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

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

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

This Notice must be served upon:

The Secretary*****
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment
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) 212-6349, Fax: (416) 314-3717 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 15th day of January, 2014

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

NP/
c: Area Manager, MOE Kenora
c: District Manager, MOE Thunder Bay - District
Mukesh Pokharel P. Eng., The Corporation of the City of Kenora

Ministry of the Environment and Climate Change

435 James Street South
Suite 331
Thunder Bay ON P7E 6S7
Tel.: (807) 475-1546
Fax: (807) 475-1754

Ministère de l'Environnement et de l'Action en matière de changement climatique

435, rue James sud
Bureau 331
Thunder Bay ON P7E 6S7
Tél. : (807) 475-1546
Téléc.: (807) 475-1754

Ontario

November 25, 2014

MEMORANDUM

TO: Ray Boivin
Senior Environmental Officer
Kenora Area Office

FROM: Shannon Heggie
Regional Hydrogeologist
Thunder Bay Office

RE: 2014 Revised Triggers and Contingency Plan
City of Kenora
Kenora Municipal Landfill (Jones Road)
Kenora, ON
C of A #A612018, amended January 15, 2014

Introduction and Purpose

As requested, I have reviewed the groundwater-related portions of the report prepared by Azimuth Environmental Consulting (the consultant), entitled: *"Revised Trigger Mechanism and Contingency Plan, Kenora Area Landfill"*, dated September 2014.

The following document was referenced for background site information: Ministry of the Environment memorandum: *"Re: Kenora Area Landfill, Monitoring Program Assessment – 2013, C. of A. No: A612018"*, prepared by Simon Haslam (Regional Hydrogeologist), dated November 20, 2014.

The purpose of this memo is to evaluate the proposed revised trigger mechanisms and contingency plan. I have forwarded this review to the appropriate Ministry of the Environment and Climate Change Surface Water Specialist, for review of the proposed surface water triggers for the site.

Background

The Kenora Municipal Landfill (the site) is located immediately north of Highway 671 (Jones Road), ~22 km northeast of the City of Kenora, Ontario. The site began operations in 2000, and received construction and demolition waste materials from 2000 to 2009 to provide a stable footprint for the waste cells. Since 2009, the site has received solid waste from the City of Kenora. In 2011, cover material and dewatered sewage sludge was applied to level the working surface. The site has a current waste area of 4 ha, the approved waste footprint is 13.1 ha, and total site area is 108.1 ha (C of A #A612018, amended Jan. 15, 2014).

The site is located near the top of a small watershed located between Crystal Bay in Silver Lake to the north (~400 m), and Morgan Lake to the south (~400 m). Surface drainage and run-off is primarily to the northeast, through a bog and wetland complex toward a small surface water pond adjacent to a culvert beneath Jones Road. This surface water flow continues through several channels, bogs, wetlands and ponds into Morgan Lake (~1600 m). A topographic depression is also located northeast of the waste cells ("saddle"), which may allow some site drainage to migrate into Crystal Bay during high flow events. An additional minor drainage path is located south of the site and parallel to Jones Road, and may permit some flow towards the south and Morgan Lake.

Subsurface soils within the bog and wetland complex forming the base of the landfill are composed of a surficial layer of peat ($\leq$ 3 m thick), overlying clayey silt (2-8 m thick) on silty sand till (~2-30 m thick), on granodiorite bedrock. Groundwater elevation measurements and borehole logs indicate that overburden groundwater flow is controlled by bedrock topography and is towards the northeast within a small bedrock valley underlying the bog and wetland complex. Hydraulic conductivity measurements within the till suggest that flow rates may range from 1-50 m/year. MOECC data sources indicate that there are no registered private water supply wells within 2 km of the site.

Discussion and Recommendations

Based on groundwater and surface water monitoring and sampling results from 2000-2013, the consultant has recommended amending the established groundwater and surface water trigger criteria for the site and associated contingency measures, as required by the C of A (#A612018). Specifically, this includes the groundwater level triggers for the "saddle" area and along Jones Road, and the down-gradient surface water quality triggers.

With respect to the trigger limits on water levels through the bedrock "saddle" area to the north of the waste area, the consultant has proposed a requirement for groundwater elevations at MW15/5 to be higher than at MW3/8. Historically the groundwater elevations in the "saddle" area consistently show flow towards the site, with the exception of one occurrence in May 2007 during high flow conditions. If groundwater elevations do not meet the proposed criteria in the "saddle" area, then a review of groundwater quality at MW3/8 would be conducted to assess the risk for off-site leachate migration. Groundwater quality triggers for chloride, total dissolved solids (TDS) and alkalinity were established for MW3/8, based on the MOE Guideline B-7. MW3/8 is not currently impacted by landfill leachate, therefore average water quality values from this well were used for background in the trigger limit calculations. If both groundwater elevation requirements and trigger criteria are not met, then further evaluation would be conducted along with a remedial strategy.

- It is my opinion that the proposed groundwater elevation criteria for the bedrock "saddle" area and the associated groundwater trigger criteria are appropriate, and I am in agreement with the proposed amendments and contingency measures. However, it is recommended that monitoring wells MW13/6 and MW14/6 are maintained, in order to assess down-gradient groundwater quality if the amended trigger elevations are exceeded for MW3/8 and MW15/5.

With respect to the groundwater levels along Jones Road for MW5/17, MW11/4, MW16/15, MW18/6 and MW19/16, the consultant has stated that the established trigger elevations have not been exceeded during the past ten (10) years of monitoring at the site. Specifically, groundwater levels have not been within 2.5 m of the trigger elevations, with the majority being >5 m lower than the trigger elevations. The consultant has recommended that the use of groundwater level triggers along Jones Road is discontinued.

- While the groundwater levels in monitoring wells along Jones Road have not exceeded the trigger elevations over the past 10 years, there is no certainty that groundwater elevations will remain within this range during landfilling operations over the long term, due to potential mounding of the groundwater table and other climate-related effects. Therefore, I do not agree with the discontinuation of the use of groundwater level triggers along Jones Road.

The down-gradient surface water quality triggers are used to ensure that leachate reaching the peat bog and Morgan Lake is sufficiently attenuated. The consultant has proposed new surface water trigger parameters and limits based on dilution within the watershed.

- It is recommended that a MOECC Surface Water Specialist reviews the proposed surface water trigger parameters and limits for this site.

Closure

If you have any questions regarding the above comments and recommendations, do not hesitate to contact me. The purpose of the preceding review is to provide advice to the Ministry of the Environment and Climate Change regarding groundwater and subsurface soil conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise specifically noted. The Ministry cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

Shannon Heggie, M.Sc., P.Geo.
Regional Hydrogeologist

c: Paula Spencer, Surface Water Specialist, MOECC Northern Region

File DK PT JO 610 (CofA #A612018)
(U:\2_Landfills\Kenora_Municipal_Landfill_Jones_Road_Monitoring\2014_Kenora_Municipal_Landfill_Revised_Triggers_&_Contingency_Plan_251114_SH_FINAL.doc)

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

June 29, 2015 AEC 15-020

City of Kenora
Waste Management Department
1 Main Street South
Kenora, Ontario
P9N 3X2

Attention: Mukesh Pokharel, P.Eng.
Environmental Supervisor

Re: Response to MOECC Comments Regarding the Revised Trigger Mechanism & Contingency Plan – Kenora Area Landfill

Dear Mukesh:

This letter is intended to address the Ministry of Environment and Climate Change (MOECC) comments regarding the proposed revised trigger mechanism & contingency Plan for the Kenora Area (Jones Road) Landfill (Azimuth, September - 2014).

The MOECC response document (November, 2014), which was provided to the City via email on June 23, 2015 included comments related to the ground water component of the revised trigger mechanism document. In reviewing this document, the comments provided by the MOECC seem appropriate and revisions to the revised trigger mechanism document can be made to re-incorporate the trigger ground water elevations along Jones Road. The one item of note is that although the MOECC reviewer would like MW18/6 remain in the trigger assessment, it has been removed from the monitoring program and decommissioned as part of the 2012 monitoring program assessment completed by Azimuth and approved by the MOECC in April 2013. The rationale for this removal / decommission was that the location was routinely dry and redundant based on the other monitoring wells in the area. However, as MW5/17, 11/4, 16/15 & 19/16 are all part of the current ground water monitoring program, water levels are already conducted at these locations such that the trigger assessment can be readily conducted and provide appropriate coverage for establishment of ground water elevations along Jones Road.

As no comments have been received for the proposed surface water trigger revisions at this time, it is proposed that incorporation of the MOECC comments to the revised trigger mechanisms and contingency plan be deferred such that the document can be updated to incorporate all comments.

If you have any questions or comments, please call us.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Colin Ross, B.Sc., P.Geo.
Hydrogeologist

Ontario

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

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A612018
Notice No. 1
Issue Date: September 11, 2015

The Corporation of the City of Kenora
60 Fourteenth St N
Kenora, Ontario
P9N 4M9

Site Location: Kenora Area Waste Disposal Site
Lot Part 1, 2, Concession 1, 2
Pettypiece Unorganized Township, District of Kenora

You are hereby notified that I have amended Approval No. A612018 issued on January 15, 2014 for a 13.1 hectare landfilling area and a composting facility within a total site area of 108.1 hectares, *as follows:*

I. The pre-amble is amended to read as follows:

for the use and operation of a waste disposal site encompassing a 13.1 hectare landfilling area and a composting facility within a total site area of 108.1 hectares

II. The following definition replaces previously defined term:

"**MOECC**" means the Ontario Ministry of the Environment and Climate Change and it replaces the term: "MOE" previously defined as the Ontario Ministry of the Environment;

III. The following definitions are added:

"**Compost**" has the same meaning as set out in the document *"Ontario Compost Quality Standards"* dated July 25, 2012, as amended;

"**Composting**" has the same meaning as set out in the document *"Ontario Compost Quality Standards"* dated July 25, 2012, as amended. Furthermore, Composting must be conducted under controlled engineered conditions designed to decompose and stabilize organic matter. Exposure of organic matter under non-engineered conditions resulting in uncontrolled decay is not considered Composting;

Compost Quality Standards" means the Ministry standards for Category A Compost as set out in the document entitled *"Ontario Compost Quality Standards"* dated July 25, 2012, as amended;

"Curing" means a biodegradation process that has a slower rate of decomposition, and lower biological activity and oxygen demand. This phase of the process is characterized by: reduced temperatures, lower moisture content and lower odour generation than previous phases of the operation;

" **Compost**" means the Leaf and Yard Waste that has been fully processed, as required, and is considered ready for sampling and testing for compliance with the Compost Quality Standards;

"**Immature Compost**" means the Leaf and Yard Waste which has been thermophilically Composted but not Cured and screened or screened but not cured, or screened and cured but failed the maturity requirement;

"**Leaf and Yard Waste**" means waste consisting of grass, leaves and other plant materials but not Christmas trees, tree limbs or other woody materials in excess of 7 centimetres in diameter;

"**Standards Document**" means the Ministry's document entitled *"Ontario Compost Quality Standards"* dated July 25, 2012, as amended;

"**Residual Waste**" means waste resulting from the Leaf & Yard Waste processing activities at the Composting Facility and that is destined for final disposal or further off-Site processing at a Ministry-approved waste disposal site;

"**Rejected Waste**" means the incoming waste inadvertently received at the Composting Facility and deemed by Owner to contain waste that does not meet the incoming Leaf & Yard Waste quality criteria set out in this Approval or that cannot be Composted and that is destined for final disposal or further off-Site processing at a Ministry-approved waste disposal site;

"**Trained Composting Facility Personnel**" means an employee trained or knowledgeable through instruction and/or practice and able to carry out any necessary duties related to Composting and Curing of the Leaf & Yard Waste as approved in this Approval;

"**Untested Compost**" means the Leaf & Yard Waste that has been fully processed, as required, and is considered ready for sampling and testing for compliance with the Compost Quality Standards;

IV. The following Conditions are amended to read as follows:

Litter Control

40. The Owner shall implement all necessary measures to prevent off-Site litter impacts from the Site. These measures shall include but not be limited to the following:

    a. the use and maintenance of suitable portable netting and snow fencing;
    b. weekly Site litter inspections and clean-up; and
    c. daily inspection and no less than weekly litter pick up on Highway 671 in the vicinity of the Site;

Dust Control

42. a. during dry periods when there are visible dust emissions, regular wetting of soil cover material prior to its spreading by bulldozers over the working face and regular wetting of the windrows in the Composting Facility;

CLOSURE PLAN

59. h. closure of the Composting Facility including removal of waste and compost and any permanent infrastructure and equipment used at the Composting Facility.

V. The following Conditions are added:

48.4 The Owner shall ensure that the leachate generated at the Composting Facility is contained and inflitrates into the Landfill footprint area.

48.5 The Owner shall ensure that the run-off from the Composting area is directed away from the Curing area and from the Untested Compost and Compost areas.

MONITORING REPORT

58.1 r. The following information regarding the operation of the Composting Facility:

(i) annual amount and quality of Compost produced and used at the Site;

(ii) number of Composting and Curing windrows and the status of processing at the end of the operating year;

(iii) amount of unprocessed Leaf & Yard Waste temporarily stored at the Site at the end of the operating year;

(iv) amount of Compost temporarily stored (unused) at the Site at the end of the operating year.

61. COMPOSTING FACILITY

61.1 (a) The Composting Facility is hereby approved to operate in accordance with Items #10 through #13 in Schedule "A" and the Conditions in this Approval.

(b) The Leaf and Yard Waste received at the Composting Facility shall not exceed the maximum concentrations for metals listed in Column 2, Table 3.2 of the Standards Document.

61.2 All Leaf and Yard Waste arriving at the Composting Facility shall be inspected by an attendant, prior to its acceptance at the Site, to ensure it meets the requirements of this Approval.

61.3 The Owner shall ensure that any Residual Waste resulting from handling of the Leaf and Yard Waste at the Composting Facility or any waste that is not the Leaf and Yard Waste inadvertently accepted at the Composting Facility, are removed from the Composting Facility by the end of the operating day in which it was received and landfilled at the Site, as approved.

61.4 The Leaf and Yard Waste shall be incorporated into windrows upon arrival at the Site.

61.5 All Leaf and Yard Waste Composting and Curing shall take place within the approved landfilling footprint and it shall be undertaken by the Trained Personnel.

61.6 All Leaf and yard Waste that is accepted at the Composting Facility shall be processed in accordance with the following or or as required in the Standards Document for production of Category A Compost:

(1) COMPOSTING WINDROWS

(a) the constituents of the Leaf and Yard Waste shall be mixed to ensure that the incoming feedstocks are evenly blended prior to Composting and so that the Carbon to Nitrogen ratio of 25:1 to 30:1 is achieved in the waste destined for the Composting windrows;

(b) Composting windrows shall be constructed at bulk densities which promote aerobic conditions; and

(c) the height of the Composting windrows shall not exceed 2 metres as proposed in Item #12 included in the attached Schedule "A".

(2) COMPOSTING REQUIREMENTS

(a) all Leaf and Yard Waste being composted shall be held at a temperature of at least 55 °C for a minimum of fifteen (15) days cumulative to ensure effective pathogen inactivation;

(b) for sections of the Composting windrow constructed during the same time period, the temperature readings shall be taken every 15 metres along the length of the Composting windrow section or at six (6) representative locations, whichever method yields more readings locations;

(c) during active Composting, the temperature of the Leaf and Yard Waste being Composted shall be monitored and recorded daily during the pathogen inactivation period and a minimum of weekly during the remainder of the active Composting process;

(d) (i) during the fifteen (15)-day pathogen inactivation period of the Composting process, the windrows shall be turned at least five (5) times;

(ii) following the completion of the pathogen inactivation period of the Composting process, regular turning shall be carried out to provide aeration so that aerobic conditions are maintained within the Composting windrows and to optimize the Composting temperatures.

(3) CURING REQUIREMENTS

(a) the Owner shall not start the Curing process until the active Composting is completed as shown by a slower rate of decomposition, and lower biological activity and oxygen demand which are characterized by:
(i) reduced temperatures;
(ii) lower moisture content; and
(iii) lower odour generation than previous phases of the operation.

(b) Immature Compost shall be cured for six (6) months or if Immature Compost is cured for less than six (6) months, it shall meet the following maturity requirements:

(i) has been cured for a minimum period of 21 days from the day the last portion of material went into the batch, and the respiration rate is:

(A) less than, or equal to, 400 milligrams of oxygen per kilogram volatile solids (on a dry weight basis) per hour; or,

(B) less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter (on a dry weight basis) per day.

(c) (i) during Curing, the Immature Compost shall be turned at least once per month, or more frequently as required to maintain aerobic conditions;

(ii) in circumstances where it is not feasible to turn the Curing windrows as required in this Approval (ie during the extreme weather conditions or cold causing frozen material) and the turning frequency is decreased, the minimum curing durations shall account for the time periods during which the biological activity becomes dormant or turning is not feasible and the minimum Curing duration period shall be as long as it takes to turn the Curing windrow once for each month of the required Curing, with at least one (1) month between turns;

(d) during the first six (6) months of the Immature Compost Curing, the temperature of the Curing windrows shall be measured and recorded at least weekly.

(4) COMPOSTING & CURING MOISTURE REQUIREMENTS

(a) moisture levels in the windrows during the Composting and during the Curing shall be maintained between 40 and 55%;

(b) only clean water shall be used to irrigate the Composting and Curing windrows and for windrows dust control purposes as proposed in Item #12 included in the attached Schedule "A";

(5) WINDROWS MANAGEMENT

(a) Composting and Curing windrows shall be arranged in a manner which permits equipment access to the processing and storage areas for efficient turning of the windrows and to allow access for emergency vehicles;

(b) turning of the Curing windrows shall only take place during favourable wind conditions to minimize potential off-site odour impacts;

(6) PROCESS PROGRESSION TRACKING

(a) all sections of the Composting windrow constructed during the same time period shall be marked by a sign or label that shall be clearly visible for the purpose of tracking the active Composting / Curing process, inspection and record keeping.

61.7 The Owner shall characterize the incoming Leaf and Yard Waste in accordance with the feedstock characterization requirements set out in Part IV of the Standards Document.

61.8 Prior to being used as Compost at the Site, the Untested Compost shall be monitored for quality as follows:

(a) composite samples shall be collected in accordance with the methodology and frequency stated in Part IV of the Standards Document;

(b) samples shall be analyzed for criteria listed in Table 3.1 and Table 3.3 of the Standards Document; and

(c) all production records shall be reviewed to ensure temperature and residency time requirements for pathogen inactivation and Compost maturity have been meet.

61.9 (a) Compost that meets the Category A Compost Quality Standards may be used at the Site as a soil supplement.

(b) Before any off-Site use of the Category A Compost produced at the Site, the Owner shall notify the District Manager a minimum of fifteen (15) days prior to the proposed use.

(c) Before any Category A Compost produced at the Site is sold or distributed for an off-Site use, the Owner shall demonstrate compliance with the labelling requirements of the Category A Compost Quality Standards.

(d) The processed Leaf and Yard Waste that is assumed to satisfy the Category A Compost Quality Standards and which does not exceed the maximum concentrations for metals as set out in Table 3.1 of the Standards Document and which complies with the foreign matter quality requirements, the pathogen reduction requirements and the pasteurization temperature and residency time requirements but not with the maturity requirements set out in the Standards Document is considered to be an Immature Compost and shall:

(i) continue to undergo curing at the Site;
(ii) be landfilled at the Site within the approved footprint area if the processed Leaf and Yard Waste quality is in compliance with the landfilling requirements of the Approval; or
(iii) be transferred off-Site as a waste and be disposed of or be further processed at a waste disposal site approved by the Ministry, or its equivalent if in jurisdictions outside of Ontario, to accept such waste.

(e) The processed Leaf and Yard Waste that is assumed to satisfy the Category A Compost Quality Standards and which does not exceed the maximum concentrations for metals as set out in Table 3.1 of the Standards Document and which complies with the foreign matter quality requirements, the maturity requirements but not with the pathogen reduction requirements and/or the pasteurization temperature and residency time requirements set out in the Standards Document is considered to be a waste and shall:

(i) be returned to the Composting process for pasteurization as set out in this Approval;
(ii) be landfilled at the Site within the approved footprint area if the processed Leaf and Yard Waste quality is in compliance with the requirements of the Approval; or
(iii) be transferred off-Site as a waste and be disposed of or further processed at a waste disposal site approved by the Ministry, or its equivalent if in jurisdictions outside of Ontario, to accept such waste.

(f) If the processed Leaf and Yard Waste that is assumed to satisfy the Category A Compost Quality Standards exceeds the maximum concentrations for metals in Compost, as set out in Table 3.1 of the Standards Document, but meets the maximum concentrations for metals in the feedstock listed in Table 3.2 of the Standards Document, it shall

(i) be landfilled at the Site within the approved footprint area if the processed Leaf and Yard Waste quality is in compliance with the requirements of the Approval; or
(ii) be transferred off-Site as a waste and be disposed of or further processed at a waste disposal site approved by the Ministry, or its equivalent if in jurisdictions outside of Ontario, to accept such waste.

RECORDS KEEPING

61.10 The Owner shall maintain the following records as relevant to the operation of the Composting Facility:

(1) Daily Activities

(a) The Owner shall maintain a written or digital record of activities undertaken at the Composting Facility. All measurements shall be recorded in consistent metric units of measurement. The record shall include, as a minimum, the following information:

(i) date, quantity, source and type of the Organic Waste (including any analytical data), received at the Site;
(ii) date, quantity, type and the destination of Compost, used at the Site;
(iii) date, quantity, type and the destination of the total Residual Waste, landfilled at the Site or transferred from the Site for final disposal;
(iv) date, quantity, type and the destination of the Rejected Waste landfilled at the Site or transferred off-Site;
(v) waste processing activities undertaken at the Site, including windrow construction, irrigation and turning activities;
(vi) monitoring and sampling activities; and
(v) housecleaning activities.

(2) Sampling & Testing Records

(a) The Owner shall establish and maintain a written or digital record of all sampling and testing activities at the Composting Facility. This record shall include, as a minimum, the following information:

(i) waste sampled, sample collection locations and volume collected;
(ii) day and time of collection;
(iii) sample handling procedures;
(iv) name of the person undertaking the sampling;
(v) parameters tested for and the results;
(vi) name of the laboratory facility conducting the testing, if applicable;
(vii) conclusions drawn with respect to the results of the monitoring and testing.

(3) Monitoring Records

(a) The Owner shall establish and maintain a written or digital record of all monitoring activities at the Composting Facility as required by this Approval. This record shall include, as a minimum, the following information:

(i) temperature in the Leaf and Yard Waste Composting and Curing windrows; and
(ii) moisture level in the Leaf and Yard Waste Composting and Curing windrows.

IV. The following documents are are added to Schedule "A":

10. Environmental Compliance Approval Application dated February 7, 2014, signed by Richard Perchuk, The Corporation of the City of Kenora.

11. Letter dated April 28, 2014, from Mukesh Pokharel, The Corporation of the City of Kenora, to Sara Sideris, Ontario Ministry of the Environment and Climate Change, including an attachment entitled "Kenora Area Landfill Design and Operations Report" prepared by the City of Kenora and dated 2014.

12. Letter dated October 29, 2014, from Mukesh Pokharel, The Corporation of the City of Kenora, to Margaret Wojcik, Ontario Ministry of the Environment and Climate Change, providing additional information on the composting process parameters, the design of the composting facility and the proposed location of the composting facility on the site plan.

13. Letter dated March 6, 2015, from Mukesh Pokharel, The Corporation of the City of Kenora, to Margaret Wojcik, Ontario Ministry of the Environment and Climate Change, providing additional information on the proposal.

VII. The following reasons are added:

Conditions 61.1 through 61.10 are included is to ensure the Composting Facility is constructed and operated in accordance with the Owner's application, supporting documentation and the requirements of the Standards Document.

The reason for this amendment to the Approval is as follows:

to approve composting of the leaf and yard waste at the Site and the use of the Compost as a soil supplement at the Site.

This Notice shall constitute part of the approval issued under Approval No. A612018 dated January 15, 2014, as amended.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

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

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

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

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-3717 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 11th day of September, 2015

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

MW/
c: Area Manager, MOECC Kenora
c: District Manager, MOECC Thunder Bay - District
Mukesh Pokharel / Richard Perchuk, The Corporation of the City of Kenora

Content Copy Of Original

Ontario

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

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A612018
Notice No. 2
Issue Date: September 15, 2015

The Corporation of the City of Kenora
60 Fourteenth Street North
Kenora, Ontario
P9N 4M9

Site Location: Kenora Area Waste Disposal Site
Lot Part 1, 2, Concession 1, 2
Pettypiece Unorganized Township, District of Kenora

You are hereby notified that I have amended Approval No. A612018 issued on January 15, 2014 for use and operation of a 13.1 hectare landfilling area within a total site area of 108.1 hectare , as follows:

A) Site Security and Operating Hours

I. Condition 22 of the Environmental Compliance Approval No. A612018 is hereby amended such that the revised Condition 22 read as follows;

22. The waste disposal operating hours of the *Landfill* shall be between 8:30 a.m. to 5:30 p.m., Monday to Saturday. The *Landfill* shall remain closed on statutory holidays.

II. The following Condition 22.1 is added to the Environmental Compliance Approval No. A612018;

22.1 Notwithstanding Condition No. 22, the *Landfill* site can undergo limited operation on Sundays from 10 a.m to 4 p.m. subject to the following restictions;

a) Only construction and demolition wastes are to be moved from the Kenora Area Waste Transfer Site to the *Landfill* site. No other types of waste are to be moved on Sundays.

b) Once deposited at the site, the construction and demolition waste is not to be moved or otherwise pushed.

c) The *Landfill* site gate is to remain closed when loads are being dumped at the site and locked between the loads in order to prevent access to the site by unauthorized persons.

B) Revised Surface Water and Groundwater Trigger Mechanism & Contingency Plan

I. Revised Trigger Mechanism & Contingency Plan, as outlined in Report listed as item No. 49 of the Schedule A, is hereby approved.

II. Condition 54 of the Environmental Compliance Approval No. A612018 is hereby revoked and replaced as follows;

54. The *Owner* shall implement the Revised Trigger Mechanism and Contingency Plan as outlined in item No. 49 of the Schedule A entitled "Revised Trigger Mechanism & Contingency Plan, Kenora Area Landfill, prepared for City of Kenora by Azimuth Environmental Consulting Inc., dated July 2015."

III. Condition 55 of the Environmental Compliance Approval No. A612018 is hereby revoked and replaced as follows;

55. Within fourteen (14) days of receiving written correspondence from the District Manager confirming that the *District Manager* is in agreement with the proposed Contingency Plan as per Section 3.8 and 3.9 of the Revised Trigger Mechanism & Contingency Plan (item No. 49 of the Schedule A), the *Owner* shall forward a letter identifying the proposed Contingency Plan and a copy of the correspondences from the *District Manager,* to the *Director* for Approval .

IV. Section 4 of Schedule "C" entitled 'Contingency measures", is hereby revoked.

V. Section 3 of Schedule "E" entitled 'Contingency measures", is hereby revoked.

C) Monitoring Report

I. Condition 58.1(g)of the Environmental Compliance Approval No. A612018 is hereby amended such that the revised Condition 58.1(g) read as follows;

58.1(g) An assessment of groundwater table elevations in relation to trigger elevations as outlined in item No. 49 of the Schedule A entitled "Revised Trigger Mechanism & Contingency Plan, Kenora Area Landfill, prepared for City of Kenora by Azimuth Environmental Consulting Inc., dated July 2015."

D) Schedule A

The following Items are hereby added to Schedule "A" and form part of the Environmental Compliance Approval No. A612018;

47. Application for amendment of the Environmental Compliance Approval dated October 17, 2014, and supporting documentation.

48. Report entitled Revised Trigger Mechanism & Contingency Plan, Kenora Area Landfill, prepared for City of Kenora by Azimuth Environmental Consulting Inc., dated September 2014.

49. Report entitled "Revised Trigger Mechanism & Contingency Plan, Kenora Area Landfill, prepared for City of Kenora by Azimuth Environmental Consulting Inc., dated July 2015."

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

1. The reason for amending Condition No. 22 and 58.1(g) is all in accordance with the application for approval October 17, 2014 and received on October 21, 2014, and supporting information and documentation.

2. The reason for adding Condition No. 22.1 is to allow the limited operation of the waste disposal site on Sundays for accepting the construction and demolition waste.

3. The reason for replacing Condition No. 55 is to implement the Contingency Plan in order to prevent impacts from the landfill operations.

4. The reason for revoking Section 4 of the Schedule C and Section 3 of the Schedule E is that specific Contingency measures will now be undertaken as outlined in Section 3.8 of the currently approved Revised Trigger Mechanism and Contingency Plan (item No. 49 of the Schedule A).

This Notice shall constitute part of the approval issued under Approval No. A612018 dated January 15, 2014.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

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

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

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

This Notice must be served upon:

The Secretary*****
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

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

*** Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-3717 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 15th day of September,

2015

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

KH/
c: Area Manager, MOECC Kenora
c: District Manager, MOECC Thunder Bay - District
Mukesh Pokharel, The Corporation of the City of Kenora

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

June 7, 2017 AEC 17-020

Ministry of Environment & Climate Change
Thunder Bay District Office
435 James St South
Suite 331B
Thunder Bay, ON
P7E 6S7

Attention: Drew Stajkowski – District Manager

Re: **Jones Road Landfill Site — Proposed Contingency Action Plan for Trigger Mechanism Exceedance**

Dear Mr. Stajkowski:

The purpose of this correspondence is to provide the Ministry of Environment & Climate Change (MOECC) District Office notice that the Jones Road landfill Site has encountered an exceedance of the current Trigger Mechanism & Contingency Plan (Azimuth, 2014).

This exceedance was for boron in the downstream surface water location SW-2, which indicated concentrations above the trigger limit of 0.2 mg/L for two of the three monitoring events in 2016 (0.3 mg/L – May & 0.21 mg/L - October). As the established trigger is for parameter exceedances on more than half the monitoring events in a given sampling year, confirmatory sampling was initiated with the first of the two confirmatory samples being collected on November 18, 2016. Analysis for all three trigger parameters (ammonia, chloride and boron) was completed, while duplicates were submitted to separate laboratories (Maxxam –Winnipeg & ALS – Thunder Bay), both of which are CALA accredited laboratories. The results which are summarized in the appended surface water chemistry tables for SW-1 and SW-2, indicate that the boron concentrations remained above trigger criteria, albeit only minimally. It is also noted that the concentrations have remained relatively consistent throughout 2016 into 2017, despite the exceedance, while other trigger parameters are well below their associated trigger values. Although two sampling events are required within a two month period, the winter

conditions did not permit surface water samples to be collected until the Spring 2017 monitoring event.

Given the persistent, albeit only slightly exceeded boron concentrations, further action is required to more adequately assess the boron source and migration mechanism. Currently, the closest downgradient monitoring overburden well MW2/9 has not shown impacts and boron concentrations are typically below detection limits. Similar results are observed a MW6, which is further downgradient and upstream of SW-1.

Given the lack of leachate impacts in the downgradient ground water, specifically boron, as well as the lack of surface water seepage or flow in the area intervening the waste mound and SW-1, it is uncertain as to why the boron concentrations are elevated in the downstream surface water features. In order to gain a better understanding of the boron source as well as the potential transport mechanism involved the following action plan is being proposed. It is a staged approach with additional action items proposed if the initial work warrants the additional tasks.

It is also noted that the City will be applying additional cover material in the northeastern (downgradient) end of the waste mound. The first lift in this area has been completed and the active working area is moving west, further from the wetland area. It is surmised that this increase in separation distance between the surface water receiver and the active waste area may result in an improvement in surface water quality, which will be tracked throughout 2016.

PHASE I – ADDITIONAL WATER QUALITY SAMPLES

Although the boron concentrations have exceeded their trigger values, the concentrations are only slightly above these criteria. As such, it is proposed that additional monitoring be completed to better delineate the boron impacts within the surface water regime. Given the lack of leachate seeps at the waste mound and flow channels present between the landfill and SW-1, it is proposed that additional surface water samples be collected in 2017 in this forested wetland area, which was already commenced in April with two samples collected between the waste mound and SW-1. Additional sample locations will also be targeted closer to SW-1 (near MW7 and MW21)

It is also proposed that additional water quality samples be collected from MW7 and MW21, which are downgradient monitors that were previously removed from the monitoring program given the lack of ground water leachate impacts observed beyond the waste footprint. As these monitoring wells are shallow (<4 m), they might provide more

insight as to whether the leachate (i.e. boron) is now migrating higher in the overburden aquifer profile. Similarly, there appears to be a correlation between the pH and boron concentrations such that it would be beneficial to assess whether this correlation is related to the overall surface water quality or is also found within the ground water regime.

This additional monitoring is proposed to be completed twice during 2017 to assess potential trends and can be correlated to the data from across the entire monitoring network.

PHASE II – AQUATIC ASSESSMENT & ADDITIONAL MONITORS

Upon completion of the additional sampling proposed in Phase I, additional actions may be required. Although a more specific plan may be developed based on the results of Phase I, the following is proposed as a potential secondary action item.

Given the limited exceedance above PWQO for boron at SW-2 (0.2 mg/L), it is proposed that an aquatic assessment be completed in the surface water features at SW-1 and SW-2 to characterize the aquatic environment in more detail such that a proper risk assessment can be completed for boron. This may include looking into boron thresholds or criteria established in other guidelines (i.e. Canadian Water Quality Objectives -CWQO) or jurisdictions. An aquatic Biological Assessment was completed for the area as part of Kenora Area Waste Management Master Plan (Fenco MacLaren, 1997) that indicated the fish habitat above High Lake Road (formerly Beaubien Road) is limited due poor channel definition and fish movement would be limited due to waterfalls present immediately downstream of SW-2. It is possible that this aquatic assessment could be updated with an updated field assessment of water course / wetland feature that is present between the landfill and SW-2.

The second item that could be considered following review of the Phase I results is the addition of a shallow monitoring well immediately downgradient of the waste, in proximity to MW2. As the current shallow monitor at MW2 is 9 m deep, it is possible that the leachate impacts may be migrating shallower in the horizon such that this monitor does not provide sufficient characterization of the downgradient water quality. As the water level at MW2/9 is approximately 1.3 m bgs and relatively consistent over time, a new monitor targeting a depth of approximately 4 m could provide additional data to help refine the understanding of an downgradient plume originating from the Site.

It is noted that any deviations from the work proposed in this work plan will be detailed in an update letter to the MOECC District Office.

Please contact either the City or Azimuth if you have any questions regarding the above noted action plan.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Attach:

cc: Mukesh Pokharel – City of Kenora

Station: SW-1

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Action**	QA/QC		0.8																
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4/8/2003									6.04						1.33	0.118	66	10.8	56
5/21/2003		<0.002	0.013	0.014		<0.0001	< 0.005	0.001	0.55	< 0.00005				120	1.04	0.019	84	0.8	4
6/10/2003									0.70						0.88	0.011	70	1.0	3
7/17/2003									1.20						1.29	0.035	95	1.6	10
8/6/2003		< 0.002	0.017	0.015		< 0.0001	< 0.005	1.130	1.13	< 0.0005				154	0.85	0.013	84	< 0.5	3
9/25/2003									1.03						2.10	0.029	148	1.5	3
10/28/2003		< 0.002	0.024	0.024		< 0.0001	< 0.005	0.005	0.54	< 0.00005				294	1.26	0.015	95	0.8	2
5/26/2004									0.50						2.16	0.053	82	1.0	5
8/19/2004		< 0.002	0.057	0.021	27.40	< 0.0001	< 0.005	0.001	0.54	< 0.0001	22.5	6.5	0.015	276	1.10	0.160	129	0.9	2
10/14/2004		< 0.002	0.062	0.028		< 0.0001	< 0.005	< 0.005	0.27					362	1.19	0.017	99	1.0	2
8/3/2005		0.002	0.065	0.029	25.00	< 0.0001	< 0.005	0.004	3.20		12	5.3	0.081		2.40	0.228	120	< 2	110
9/2/2005		0.0012	0.058	0.03		< 0.0001	< 0.005	0.0015	11	< 0.0001				304	1.70	0.114	81	5.0	26
10/21/2005		< 0.001	0.090	0.034		< 0.0001	< 0.005	< 0.001	2.30	< 0.0001				258	1.30	0.055	89	< 2	14
5/16/2006									0.35					96	1.40	0.009	78	< 2	< 1
8/29/2006		< 0.001	0.060	0.039		< 0.0001	< 0.005	0.002	17	< 0.0001				216	1.90	0.130	96	10.0	75
5/31/2011		< 0.2	0.040	0.040		< 0.005	< 0.01	< 0.02	8.2	< 0.0001				213	1.40	0.061	54	5.0	9
5/15/2007									0.43					183	2.00	0.043	92	<2	<1
8/15/2007		<0.2	0.170	0.070		<0.005	<0.01	<0.02	4.7	<0.0001				418	3.00	0.320	150	5.0	7
10/18/2007		<0.2	0.080	0.050		<0.005	<0.01	<0.02	1.7	<0.0001				246	3.00	0.120	140	3.0	5
5/21/2008									0.67						1.30	0.052	87	< 2	< 1
8/20/2008		<0.2	0.230	0.050		<0.005	<0.01	<0.02	1.8	<0.0001				270	3.30	0.530	280	6.0	14
10/24/2008		<0.2	0.130	0.030		<0.005	<0.01	<0.02	1.5	<0.0001				420	2.50	0.210	120	3.0	6
5/19/2009									0.29						1.30	0.096	81	2.0	< 1
8/18/2009		<0.2	0.120	0.050		<0.005	<0.01	<0.02	1.6	<0.0001				266	2.40	0.740	200	5.0	10
10/22/2009		<0.2	0.160	0.040		<0.005	<0.01	<0.02	1.2	<0.0001				335	1.90	0.130	100	< 2	5
5/18/2010									0.32						1.90	0.092	100	5.0	3
8/25/2010	*no sample*																		
10/21/2010		<0.2	0.130	0.040		<0.005	<0.01	<0.02	0.38	<0.0001				506	1.50	0.210	90	<2	1
5/31/2011									0.39						1.50	0.210	89	<2	4
8/24/2011		<0.2	0.330	0.040		<0.005	<0.01	<0.02	0.51	<0.0001				470	2.00	0.400	110	<2	3
10/25/2011		<0.2	0.130	0.030		<0.005	<0.01	<0.02	0.88	<0.0001				344	2.00	0.200	110	<2	2
5/18/2012									0.29						1.80	0.150	90	<2	3
8/30/2012		<0.2	0.250	0.070		<0.005	<0.01	<0.02	2.5	<0.0001				752	3.40	0.810	160	4.0	54
10/23/2012		<0.2	0.230	0.040		<0.005	<0.01	<0.02	0.26	<0.0001				696	1.80	0.370	120	<2	2
5/24/2013									0.24						2.80	0.004	110	<2	2
8/29/2013		<0.2	0.470	0.470		<0.005	<0.01	<0.02	7.3	<0.0001				780	4.70	0.830	150		56
10/17/2013		<0.2	0.390	0.070		<0.005	<0.01	<0.02	1.9	<0.0001				680	2.10	0.370	130	2.0	7
5/23/2014									0.4						2.40	0.150	96	<2	5
8/21/2014		<0.2	0.810	0.150		<0.005	<0.01	<0.02	6.8	<0.0001				1230	4.40	0.940	180	11.0	55
10/9/2014		<0.2	0.610	0.075		<0.005	<0.01	<0.02	1.9	<0.0001				788	2.30	0.290	110	<2	3
5/21/2015									0.5						1.60	0.170	100	<2	5
8/25/2015		<0.2	0.750	0.027		<0.005	<0.01	<0.02	0.57	<0.0001				762	1.60	0.600	140	<2	<1
10/20/2015		<0.2	0.820	0.053		<0.005	<0.01	<0.02	0.33	<0.001				1040	1.80	0.260	130	2.0	3
5/10/2016									0.48						4.15	0.161	104		19.3
9/8/2016		0.002	0.995	0.036	39.8	<0.00001	0.0002	0.001	0.46	<0.00001	155	23.9	0.021	676	2.58	0.480	151	<8	<4.0
11/1/2016		0.001	0.730	0.031		<0.00001	0.001	0.0004	0.246	<0.00001				414	1.58	0.171	105	<8	<4.0
11/18/2016			0.836																
11/18/2016	*Duplicate*		0.826																
5/17/2017			0.846																
5/17/2017	*Duplicate*		0.882																

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Action**					187							0.96							
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/21/2003			< 0.0005	0.008	4.5	< 0.2	< 0.2	39.0	5.85	7	0.18	0.00001		142	< 0.001	15	6.60	4.0	110
6/10/2003					5.2	< 0.2	< 0.2	53.8	5.95	7	< 0.03	<0.0003		170	< 0.001	9	5.60	7.0	170
7/17/2003					5.3	< 0.2	< 0.2	44.0	5.87	11	0.05	0.00001		149	< 0.001	8	5.90	19.5	130
8/6/2003			< 0.0005	0.006	3.6	< 0.2	< 0.2	39.3	6.07	11	0.06	0.00002		145	< 0.001	15	5.70	18.5	110
9/25/2003					15.6	< 0.2	< 0.2	114.0	6.58	25	0.61	0.00037		374	< 0.001	10	5.60	8.0	340
10/28/2003			< 0.0005	< 0.005	15.6	< 0.2	0.20	95.3	6.64	8	0.36	0.00015		337	< 0.001		5.80	2.0	280
5/26/2004					8.5	< 0.2	< 0.2	40.4	7.08	44	1.29	0.00193		218	< 0.001	6	6.20	5.0	230
8/19/2004			< 0.0005	0.056	8.8	< 0.2	< 0.2	45.2	7.65	62	NA			246	0.001	6		10.0	
10/14/2004			< 0.0005	< 0.005	10.2	< 0.2	< 0.2	48.1	7.63	136	0.03	0.00016		420	< 0.001	5	6.80	5.0	440
8/3/2005			0.0022	0.036	5	< 0.3	< 0.2	11.1	7.58	75	0.09	0.00114		175	0.002	10	4.50	17.8	170
9/2/2005			< 0.0005	0.072	17	< 0.3	1.6	10.4	7.49	133	0.26	0.00197		294	< 0.001	19	6.00	13.7	270
10/21/2005			< 0.0005	0.092	10	< 0.01	< 0.1	11.0	7.78	115	0.08	0.00079		230	< 0.001	13	3.70	8.5	20
5/16/2006					8	< 0.01	< 0.1	14.0	7.70	85	< 0.05	<0.0005		221	< 0.001	10	7.30	17.2	
8/29/2006			< 0.0005	0.100	21	< 0.01	< 0.1	1.0	7.10	117	0.14	0.00057		291	0.001	11	6.71	17.4	
10/17/2006			< 0.02	0.250	30	< 0.01	< 0.1	30.0	7.60	113	0.46	0.00310		353	0.001	6	6.24	8.9	
5/15/2007					14	0.020	0.7	105.0	7.40	66	0.05	0.00034		417	<0.001	12	6.93	14.8	
8/15/2007			<0.05	0.200	21	<0.01	<0.1	33.0	8.00	306	0.58	0.01745		624	0.005	8	7.6	16.7	687
10/18/2007			<0.05	0.010	14	<0.01	<0.1	33.0	7.90	181	0.09	0.00141		458	0.004	6	7.21	11	
5/21/2008					10	<0.01	< 0.1	52.0	7.80	121	< 0.05	<0.0005		370	0.001	10	7.5	10.9	
8/20/2008			<0.05	<0.005	<1	<0.01	< 0.1	23.0	8.00	181	0.23	0.00901		402	<0.001	6	7.37	20.4	
10/24/2008			<0.05	<0.005	17	<0.01	< 0.1	< 2	8.20	280	0.05	0.00126		656	<0.001	9	7.06	8.4	309
5/19/2009					12	<0.01	< 0.1	48.0	7.00	99	< 0.05	<0.0005		322	<0.001	9	7.35	n/a	326
8/18/2009			<0.05	0.020	<1	<0.01	< 0.1	< 2	7.40	188	0.17	0.00133		438	0.005	4	7.52	16.9	480
10/22/2009			<0.05	0.030	20	<0.01	< 0.1	74.0	7.50	147	0.09	0.00043		514	<0.001	10	7.74	7.4	498
5/18/2010					19	<0.01	<0.1	35.0	8.10	159	0.16	0.00771		455	<0.001	8	7.72	20.2	430
8/25/2010	*no sample*															7	6.64	16	692
10/21/2010			<0.05	<0.01	28	<0.01	<0.1	85.0	8.01	254	<0.05	<0.0005		779	<0.001	9	7.94	5.1	784
5/31/2011					19	<0.01	<0.1	54.0	7.88	182	<0.05	<0.0005		552	<0.001	4	7.42	11.8	490
8/24/2011			<0.05	<0.01	27	<0.01	<0.1	27.0	8.02	262	<0.05	<0.0005		691	<0.001	6	8.14	18.1	699
10/25/2011			<0.0001	<0.01	24	<0.01	<0.1	13.0	7.71	185	0.22	0.00139		502	0.007	4	7	4.9	509
5/18/2012					26	<0.01	<0.1	31.0	7.76	170	<0.05	<0.0005		510	0.007	10	6.6	18	540
8/30/2012			<0.05	<0.01	61	<0.01	<0.1	13.0	8.18	400	0.3	0.01628		1000	<0.001	9	7.68	19.4	1259
10/23/2012			<0.05	<0.01	62	<0.01	<0.1	71.0	7.84	310	0.092	0.00083		960	<0.001	9	7.76	5.7	694
5/24/2013					31	0.025	0.31	9.0	7.94	220	0.63	0.01050		620	0.004	10	9.51	10.6	604
8/29/2013			<0.05	<0.01	68	<0.01	<0.1	<1	7.76	440	1.0	0.00843		1100	<0.001	6	7.37	18.8	1297
10/17/2013			<0.05	<0.01	60	0.011	<0.1	20.0	7.96	340	0.16	0.00110		940	0.011	6	7.65	7.7	801
5/23/2014					29	<0.01	0.24	30.0	7.87	210	1.5	0.01625		580	0.011	8	7.61	14.8	566
8/21/2014			<0.05	0.070	90	<0.05	<0.5	<1	7.94	570	0.32	0.01060		1400	<0.001	6	8.37	19.9	1290
10/9/2014			<0.05	0.020	71	<0.01	<0.10	20.0	7.87	380	0.33	0.00161		1000	0.017	4	7.54	6.6	886
5/21/2015					39	<0.01	<0.10	18.0	7.72	200	<0.05	<0.0005		600	<0.001	7	8.17	16.1	537
8/25/2015			<0.05	<0.01	43	<0.01	<0.10	<1	7.92	280	0.097	0.00020		740	<0.001	6	6.89	14.4	626
10/20/2015			<0.05	<0.01	100	<0.01	<0.10	45.0	8.09	590	0.098	0.00140		1600	<0.001	6	8.01	6.6	1146
5/10/2016					47	0.57*		18.4	7.99	330	2.4	0.12241		853	0.008	7	8.53	8	542
9/8/2016		48.5	<0.0002		60	<0.2	0.014	7.5	8.26	390	0.36	0.00000		976	0.005				
11/1/2016			<0.0002		44	0.004	<0.2	30.2	8.12	288	0.047	0.00023		758	0.002	7	7.56	6	317
11/18/2016					48						0.027	0.00029					8.05	2	
11/18/2016	*Duplicate*				48						<0.02	<0.0002					8.05	2	
5/17/2017					35.4						<0.02	<0.0002				7	8.4	8.8	408
5/17/2017	*Duplicate*				34.9						<0.02	<0.0002				7	8.4	8.8	408

Notes:

Bold denotes exceedance of PWQO (1994) criteria
NA - Not Analyzed
Underline indicates exceedance of Action Criteria
*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration
** - action level according to trigger mechanism

Station: SW-2

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -			0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Trigger -		0.1	0.2																
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4/8/2003									1.50						0.87	0.057	47	5.6	6
5/21/2003		<0.002	0.007	0.011		<0.0001	< 0.005	0.001	0.36	< 0.00005				66	0.85	0.025	63	0.8	5
6/10/2003									0.48						0.84	0.019	70	1.0	10
7/17/2003									1.02						1.40	0.044	93	1.0	9
8/6/2003		< 0.002	0.008	0.014		< 0.0001	< 0.005	0.940	0.94	< 0.0005				94	1.02	0.033	78	< 0.5	2
9/25/2003									0.67						1.04	0.019	110	1.2	2
10/28/2003		< 0.002	0.008	0.020		< 0.0001	< 0.005	0.001	0.54	< 0.00005				170	0.77	0.010	90	0.8	1
5/26/2004									0.29						0.66	0.036	64	0.7	4
8/19/2004		< 0.002	0.010	0.014	8.60	< 0.0001	< 0.005	0.002	0.95	< 0.0001	5.9	3.4	0.042	138	0.98	0.024	105	0.9	1
10/14/2004		< 0.002	0.009	0.017		< 0.0001	< 0.005	< 0.0005	0.5					156	1.02	0.013	113	1.3	1
8/3/2005		0.001	0.016	0.020	16	< 0.0001	< 0.005	0.003	1.1		5.1	4.8	0.120		1.10	0.033	77	< 2	3
9/2/2005		< 0.001	0.019	0.019		< 0.0001	< 0.005	0.001	0.94	0.0001				194	1.10	0.035	64	< 2	8
10/21/2005		< 0.001	0.019	0.017		< 0.0001	< 0.005	0.001	0.71	< 0.0001				198	0.90	0.024	73	< 2	8
5/16/2006									0.25					50	1.50	0.008	61	< 2	1
8/29/2006		0.001	0.018	0.020		< 0.0001	0.012	0.001	1.7	< 0.0001				105	1.50	0.081	60	< 2	< 1
10/17/2006		< 0.2	< 0.02	< 0.02		< 0.005	< 0.1	< 0.02	0.19	< 0.0001				113	0.60	0.009	33	< 2	< 1
5/31/2007									0.29					69	1.50	0.017	72	<2	<1
8/15/2007		<0.2	0.05	0.03		<0.005	<0.01	<0.02	1.6	<0.0001				146	1.70	0.050	110	<2	3.0
10/18/2007		<0.2	0.05	0.02		<0.005	<0.01	<0.02	0.37	<0.0001				124	1.20	0.021	78	<2	<1
5/21/2008									0.41						1.00	0.010	63	<2	<10
8/20/2008		<0.2	0.05	0.05		<0.005	<0.01	<0.02	4.2	<0.0001				150	2.10	0.076	110	<2	40
10/24/2008		<0.2	0.04	<0.02		<0.005	<0.01	<0.02	0.33	0.0003				325	1.60	0.190	83	<2	<1
5/19/2009									0.17						0.80	0.020	71	<2	<1
8/18/2009		<0.2	0.05	0.03		<0.005	<0.01	<0.02	2.1	<0.0001				155	1.70	0.044	120	<2	2
10/22/2009		<0.2	0.03	<0.02		<0.005	<0.01	<0.02	0.36	<0.0001				140	1.10	0.014	72	<2	1
5/18/2010									0.58						1.40	0.019	75	<2	4
8/25/2010		<0.2	0.04	0.03		<0.005	<0.01	<0.02	1.8	<0.0001				200	1.70	0.073	97	<2	2
10/21/2010		<0.2	0.03	0.03		<0.005	<0.01	<0.02	0.36	<0.0001				192	0.70	0.016	64	<2	<1
5/31/2011									0.51						1.30	0.050	72	<2	3
8/24/2011		<0.2	0.05	0.03		<0.005	<0.01	<0.02	0.97	<0.0001				228	1.30	0.090	91	<2	228
10/25/2011		<0.2	0.03	0.02		<0.005	<0.01	<0.02	0.4	<0.0001				224	7.30	0.042	68	<2	2
5/18/2012									0.44						1.10	0.081	72	<2	2
8/30/2012		<0.2	0.05	0.03		<0.005	<0.01	<0.02	0.69	<0.0001				180	1.70	0.099	96	<2	11
10/23/2012		<0.2	0.03	<0.02		<0.005	<0.01	<0.02	0.37	<0.0001				184	1.30	0.011	78	<2	<1
5/24/2013									0.30						1.50	0.043	69	<2	<1
8/29/2013		<0.2	0.06	0.048		<0.005	<0.01	<0.02	1.5	<0.0001				334	1.90	0.130	110		6
10/17/2013		<0.2	0.05	0.028		<0.005	<0.01	<0.02	0.9	<0.0001				272	1.40	0.049	96	2	<1
5/23/2014									0.26						1.20	0.032	79	<2	<1
8/21/2014		<0.2	0.1	0.065		<0.005	<0.01	<0.02	3.8	<0.0001				382	2.20	0.310	120	2	10
10/9/2014		<0.2	0.09	0.038		<0.005	<0.01	<0.02	1.4	<0.0001				292	1.30	0.065	75	2	9
5/21/2015									0.45						1.10	0.042	68	<2	<1
8/25/2015		<0.2	0.14	0.035		<0.005	<0.01	<0.02	2.6	<0.0001				348	1.60	0.140	98	2	5
10/20/2015		<0.2	0.14	0.034		<0.005	<0.01	<0.02	2.3	<0.001				322	1.00	0.110	95	<2	4
5/10/2016									0.704						1.18	0.050	82		6
9/8/2016		0.0009	0.297	0.025	20.6	<0.00001	<0.001	0.0003	0.544	<0.00001	48.7	10.4	0.006	292	1.53	0.097	104	<6	<4.0
11/1/2016		0.0005	0.210	0.028		<0.00001	<0.001	0.0004	0.236	<0.00001				276	1.21	0.030	89	<6	<4.0
11/18/2016			0.202																
11/18/2016	*Duplicate*		0.217																
5/17/2017			0.233																
5/17/2017	*Duplicate*		0.199																

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Trigger -		50			125							0.02							
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
4/8/2003					5.9	< 0.2	< 0.2	2.3	6.70	30	0.18	0.00007		6.9	0.002	13	6.20	0.0	30
5/21/2003			< 0.0005	< 0.005	4.0	< 0.2	< 0.2	8.5	7.11	13	0.06	0.00008		85	< 0.001	16	6.20	3.0	50
6/10/2003					4.4	< 0.2	< 0.2	12.1	6.67	19	0.03	0.00003		88	< 0.001	15	6.10	10.0	70
5/31/2011					5.3	< 0.2	< 0.2	4.2	6.71	28	0.05	0.00009		87	< 0.001	8	6.50	18.5	70
8/6/2003			< 0.0005	< 0.005	4.1	< 0.2	< 0.2	1.1	6.88	31	0.06	0.00018		90	< 0.001	8	6.60	20.0	70
9/25/2003					6.2	< 0.2	< 0.2	31.4	6.53	15	0.03	0.00002		141	< 0.001	14	5.60	8.5	110
10/28/2003			< 0.0005	< 0.005	8.4	< 0.2	< 0.2	38.7	6.62	12	< 0.03	<0.0003		168	< 0.001	19	6.10	2.0	160
5/26/2004					4.9	< 0.2	<0.2	20.9	6.81	18	0.04	0.00004		113	<0.001	8	5.80	8.0	120
8/19/2004		4.9	< 0.0005	< 0.005	5.0	< 0.2	< 0.2	6.8	7.24	30	NA			96	0.001	6		11.5	
10/14/2004			< 0.0005	< 0.005	6.1	< 0.2	< 0.2	13.6	7.15	38	< 0.03	<0.0003		146	<0.001	7	6.40	6.0	140
8/3/2005			0.0003	< 0.005	6.0	< 0.3	< 0.2	3.0	7.55	54	< 0.05	<0.0005		126	0.002	9	5.20	22.1	110
9/2/2005			< 0.0005	< 0.005	7.0	< 0.3	< 0.2	15.3	7.56	50	< 0.05	<0.0005		116	< 0.001	13	6.00	14.2	110
10/21/2005			< 0.0005	< 0.005	7.0	< 0.01	< 0.1	< 1	7.57	44	< 0.05	<0.0005		102	< 0.001	11	3.90	7.1	10
5/16/2006					7	< 0.01	< 0.1	2	7.40	37	< 0.05	<0.0005		109	< 0.001	9	6.20	16.4	
8/29/2006			< 0.0005	0.008	7	< 0.01	< 0.1	2	7.50	55	0.09	0.00098		134	< 0.001	6	6.90	18.3	
10/17/2006			< 0.05	0.020	14	< 0.01	< 0.1	5	7.80	48	< 0.05	<0.0005		154	< 0.001	12	7.42	7.5	
5/15/2007					7	<0.01	<0.1	30	7.00	26	<0.05	<0.0005		152	0.004	13	6.77	12.1	
8/15/2007			<0.05	<0.01	6	<0.01	<0.1	<1	7.90	88	0.11	0.00265		201	0.002	7	7.55	16.7	212
10/18/2007			<0.05	<0.01	9	<0.01	<0.1	28	7.70	49	<0.05	<0.0005		187	<0.001	5	7.04	11.4	
5/21/2008					6	<0.01	<0.1	19	7.40	43	<0.05	<0.0005		150	<0.001	7	7.53	8	
8/20/2008			<0.05	<0.01	11	<0.01	<0.1	<1	8.00	98	<0.05	<0.0005		223	<0.001	6	7.45	22.9	
10/24/2008			<0.05	<0.01	10	<0.01	<0.1	1	8.20	195	<0.05	<0.0005		516	<0.001	11	7.56	7.3	166
5/19/2009					6	<0.01	<0.1	<1	6.90	47	<0.05	<0.0005		161	<0.001	8	7.37	n/a	242
8/18/2009			<0.05	<0.01	<1	<0.01	<0.1	<1	7.40	102	<0.05	<0.0005		232	<0.001	9	7.74	18.1	244
10/22/2009			<0.05	<0.01	10	<0.01	<0.1	<1	7.40	84	<0.05	<0.0005		213	<0.001	11	7.74	4	196
5/18/2010					8	<0.01	<0.1	<1	7.40	67	0.05	0.00040		177	<0.001	8	7.63	17	171
8/25/2010			<0.05	<0.01	14	<0.01	<0.1	<1	7.70	123	<0.05	<0.0005		301	<0.001	5	7.30	18.6	
10/21/2010			<0.05	<0.01	14	<0.01	<0.1	<1	7.55	109	<0.05	<0.0005		587	<0.001	7	8.17	6.7	
5/31/2011					6	<0.01	<0.1	<1	7.59	74	<0.05	<0.0005		199	<0.001	7	7.18	11.4	199
8/24/2011			<0.05	<0.01	13	<0.01	<0.1	<1	7.63	122	<0.05	<0.0005		292	<0.001	6	8.19	18.1	306
10/25/2011			<0.05	<0.01	15	<0.01	<0.1	<1	7.93	111	<0.05	<0.0005		292	0.003	10	7.66	4.3	337
5/18/2012					13	<0.01	<0.1	<1	7.48	100	<0.05	<0.0005		260	0.005	8	6.29	18	540
8/30/2012			<0.05	<0.01	16	<0.01	<0.1	<1	7.74	130	0.058	0.00109		320	<0.001	7	7.50	16.3	435
10/23/2012			<0.05	<0.01	13	<0.01	<0.1	<1	7.37	72	0.076	0.00023		210	<0.001	9	7.71	5.3	216
5/24/2013					14	<0.01	<0.1	<1	7.66	88	0.073	0.00070		250	0.005	8	9.57	11.6	278
8/29/2013			<0.05	<0.01	26	<0.01	<0.1	<1	7.60	160	0.083	0.00179		420	<0.001	5	7.49	18.3	545
10/17/2013			<0.05	<0.01	23	<0.01	<0.1	<1	7.70	120	<0.05	<0.0005		340	0.006	7	7.70	5.5	314
5/23/2014					15	<0.01	<0.1	<1	7.46	96	<0.05	<0.0005		270	0.009	8	7.80	14.1	313
8/21/2014			<0.05	0.010	25	<0.05	<0.5	<1	7.71	160	0.096	0.00154		410	<0.001	7	8.35	17	468
10/9/2014			<0.05	<0.01	26	<0.01	<0.1	<1	7.64	140	0.096	0.00057		370	0.001	9	7.40	6.1	352
5/21/2015					13	<0.01	<0.1	<1	6.88	75	<0.05	<0.0005		200	<0.001	9	6.52	9.2	197
8/25/2015			<0.05	<0.01	21	<0.01	<0.1	<1	7.31	110	0.062	0.00031		310	<0.001	6	6.54	13.5	295
10/20/2015			<0.05	<0.01	28	<0.01	<0.10	<1	7.74	140	<0.05	<0.0005		400	<0.001	6	7.32	5.4	367
5/10/2016					18	<0.20*		<1	7.90	129	0.063	0.00099		330	0.005	9	8.88	11	297
9/8/2016		19.5	<0.0002		25	<0.20	0.005	5.1	7.96	155	0.086	0.00064		388	0.003				
11/1/2016			<0.0002		28	0.003	<0.2	<0.5	8.02	186	0.044	0.00060		467	0.002	9	7.25	5.7	290
11/18/2016					26						<0.02	<0.0002					7.95	2.5	
11/18/2016	*Duplicate*				27						<0.02	<0.0002					7.95	2.5	
5/17/2017					16.8						0.081	0.01912				10	9.16	11.8	277
5/17/2017	*Duplicate*				16.9						0.041	0.00968				10	9.16	11.8	277

Notes:

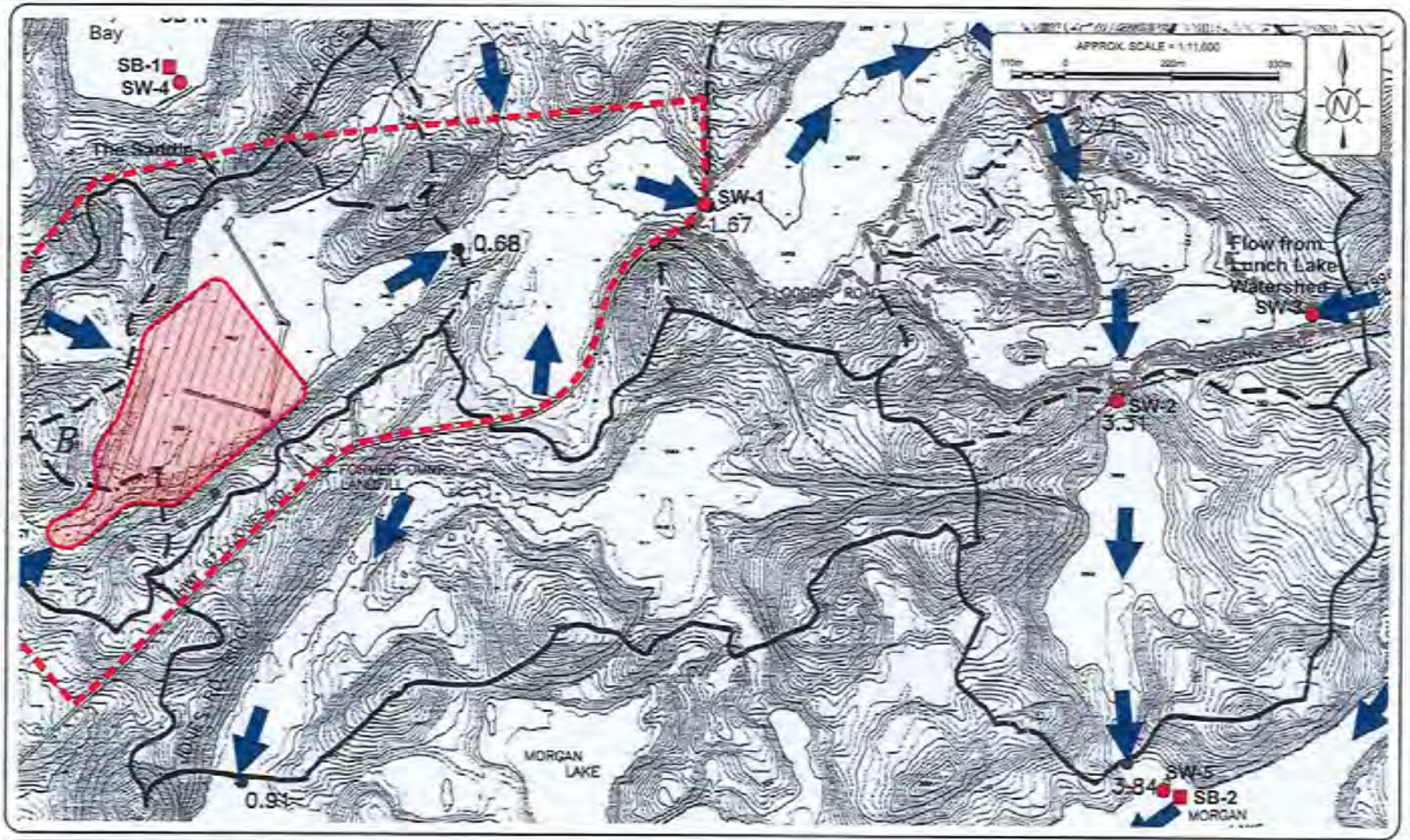
Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Trigger Criteria

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration



Legend:

- Approved Waste Footprint
- Approximate Property Boundary
- Contaminant Attenuation Zone
- Watershed Boundary
- Surface Water Sampling Location
- Sediment/Benthic Sampling Location
- Surface Water Flow

Base Drawing: Fenco MacLaren (1997), Figure S3.1

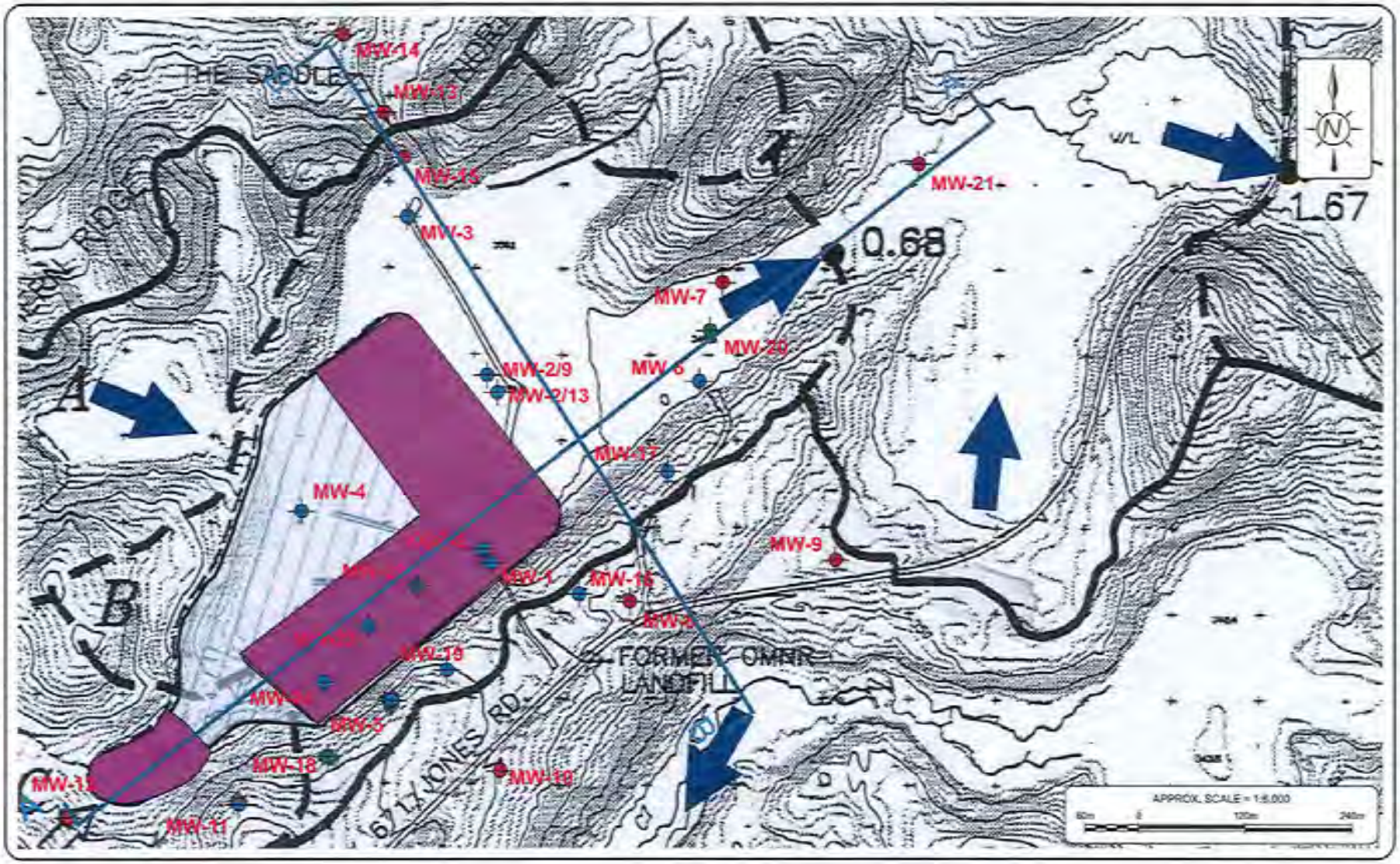
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Hydrologic Features

Date Issued:	June 2016
Created By:	CMR
Project No.	15-C03
File Name:	Figure 2 - Hydrologic Features.CDR

2015 Annual Monitoring Report
Jones Road Landfill Site
City of Kenora
MOE Certificate of Approval No. A512018

Figure No. 2



Legend:

- Approved Waste Footprint
- Ground Water Monitor (maintained)
- Ground Water Monitor (removed from program)
- Ground Water Monitor (decommissioned)
- Watershed Boundary
- Active Footprint Area

Base Drawing: Fenco MacLaren (1997), Figure S3.1

ASHBURY ENVIRONMENTAL CONSULTING INC.

Ground Water Monitoring Network

Date Issued:	June 2016
Created By:	CMR
Project No.	15-020
File Name:	Figure 4 .CDR

2015 Annual Monitoring Report
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. 4

Ministry of the Environment and Climate Change
Northern Region
Kenora Area Office
808 Robertson Street
Kenora, ON P9N 1X9
Fax: (807) 468-2735
Telephone: (807) 468-2718

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction régionale du Nord
Bureau du secteur de Kenora
808 rue Robertson
Kenora, ON P9N 1X9
Télécopieur: (807) 468-2735
Téléphone: (807) 468-2718

Ontario

July 17, 2017

Mr. M. Pokharel
Supervisor, Kenora Area Waste Disposal Site
60 Fourteenth Street North
Kenora, Ontario
P9N 4M9

Dear Mr. Pokharel:

SUBJECT: Kenora Area Waste Disposal Site – Exceed Trigger Level for Boron
ECA A612018

This letter will confirm receipt of correspondence dated June 7, 2017 and received by the Ministry of the Environment and Climate Change (MOECC) on June 20, 2017. The correspondence provides information about measured exceedances of the trigger value for boron at sample site SW-2 and describes an action plan for investigating the cause of the exceedance.

I have reviewed the action plan and have no specific comments or issues with the proposed actions.

The plan has been sent to the ministry's Northern Region Technical Support Section for review and comment. Any suggestions resulting from this review will be forwarded to you when they become available.

I can be reached at 807-468-2728 if you would like to discuss the contents of this letter or the requirements of Ontario's environmental legislation.

Yours truly,

Ray Boivin
Senior Environmental Officer
Kenora Area

/RB

c. Colin Ross, Azimuth Environmental Consulting, Inc.

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

April 3, 2018 AEC 17-020

Ministry of Environment & Climate Change
Northern Region
Kenora Area Office
808 Robertson Street
Kenora, ON
P9N 1X9

Attention: Ray Boivin – Senior Environmental Officer

Re: **Jones Road Landfill Site — 2017 Trigger Mechanism Exceedance Monitoring Summary**

Dear Mr. Boivin:

The purpose of this correspondence is to provide the Ministry of Environment & Climate Change (MOECC) District Office an update on the monitoring completed as part of the 2017 Trigger Mechanism Exceedances for boron in the surface water at the Jones Road landfill Site. The plan which was outlined in a June 2017 letter notification letter proposed a phased approach which included collection of additional samples from both surface and ground water locations in 2017 to assess the mechanism in which the elevated boron concentrations were migrating downstream within the established Contaminant Attenuation Zone (CAZ). The following represents a brief summary of these results, which will also be included in the annual monitoring report due to the MOECC by June 30, 2018.

2017 Trigger Mechanism Exceedance Action Plan Monitoring

As indicated in the Trigger Mechanism Exceedance Action Plan presented in June 2017, monitoring was completed at additional surface water locations in the forested wetland area between the waste mound and SW-1. A total of three locations were targeted at various distances from the waste mound. As illustrated in the appended figures, RW-1 is located adjacent the MW-20, RW-2 is located adjacent to MW-2/13 and RW-3 was located between MW-20 and MW-21. It is noted that these locations were targeted by

City staff based on sufficient depth to facilitate a representative sample. There is no defined flow channels in this area and surface water migration is assumed to braided based on local subtle topographic variation.

The results, which have been appended along with updated surface water summary tables for the existing monitoring locations indicates boron concentrations were elevated at all three locations. The following table summarizes the boron as well as other notable leachate indicator parameters which were analyzed at all six locations and observed to be elevated. pH was also added as it was previously discussed in a correlation between pH and boron concentrations.

Table 1: Leachate Indicator Parameter Concentration Comparison

Parameter	PWQO	RW-1 11-Apr-17	RW-2 11-Apr-17	RW-3 5-Oct-17	SW-1 17-May-17	SW-2 17-May-17	SW-5* 29-Aug-17
Boron	0.2	**3.48**	**1.36**	**1.6**	**0.86**	**0.23**	<0.02
Chloride		180	62	69	34	17	5.0
Alkalinity		2070	768	517	254	138	8.5
Total Ammonia		70	14	0.13	<0.02	0.081	0.038
Unionized Ammonia	0.02	**1.25**	**0.42**	0.0047	<0.0002	0.0191	0.0001
pH	6.5-8.5	7.99	8.22	8.31	8.00	8.05	6.90

* only sampled in August monitoring event

As can be observed, the most significant elevations are found at RW-1, which is not immediately adjacent to the waste as is RW-2, which might suggest that impacts are migrating from the waste mound in specific locations south of RW-2. The results in the table also illustrate that there is attenuation observed for all the leachate indicator parameters indicating attenuation is occurring within the CAZ.

In addition to the surface water monitoring, samples were also collected from MW-7/4 and MW-21/7 in October 2017 to assess the potential for migration of the boron impacts within the shallow ground water. This was proposed as the closest monitoring wells downgradient of the waste (MW-2 nest) are relatively deep wells (9 & 13 m), while MW-7/4 and MW-21/7 had been removed from the monitoring program in 2012 due to a lack of observable leachate influence within the ground water within the waste area.

The results have been appended in updated chemistry summary tables for these two locations. It is noted that the water quality has remained consistent with that collected historically with no observable leachate influence. A slightly elevated nitrate concentration was observed at both locations (0.92 & 1.8 mg/L respectively), where the historical results are routinely below detection limits. However, a similarly elevated concentration (2.30 mg/L) was observed at MW-7/4 in 2005. Given that no other leachate indicator parameters showed elevated concentrations and this parameter has

been shown to have an isolated detection in the past, the 2017 concentrations are not interpreted to be related to landfill leachate within the ground water downgradient of the waste mound.

The additional ground and surface water quality data collected in 2017 confirms the presence of leachate within the surface water is consistent between the waste mound and SW-1, while similar impacts are not observed in the underlying ground water. This would suggest that the primary leachate migration pathway is within the surface water downgradient of the waste mound. This is supported by the fact the underlying soils have limited permeability with a dominance of silt and clay.

The other aspect of the surface water quality that was reviewed as part of this action plan was the relationship between pH and boron concentrations. Although there appears to be elevated pH levels where elevated boron is observed in the surface water network (SW-1 & SW- relative to SW-5), the longer term trends for pH at the impacted locations do not show a meaningful increase over time that would coincide with the increasing trends observed for boron. It is noted that there still may be a relationship between the two parameters; however, the magnitude would indicate that it is insufficient that it could be considered as part of any mitigation measure.

The final item of note with respect to the surface water quality monitoring completed in 2017 is that the boron concentrations are indicating relative stability at SW-1 since 2014 with concentrations falling within a range of 0.610 & 0.995 mg/L. Although concentrations at SW-2 are still showing a slight increasing trend over the past two years (0.21 to 0.36 mg/), there is a bit of a time lag with respect to the onset of the elevated boron concentrations such that it would not be surprising to see a similar consistency over the next year or two. This time lag is also reflective in the operational mitigative strategies that are being employed by the City with the decreasing of the active working area, shifting the active area further back from the downgradient toe in a new cell area and increasing the amount of cover material at the downgradient end of the waste mound. Continued monitoring in 2018 will help to assess the effectiveness with these operational changes.

Phase II Action Items

Aquatic Assessment (Update)

As discussed in the original action plan, it was proposed that an update to the historic aquatic assessment (Fenco MacLaren, 1997) could be completed with an updated field assessment of the water course / wetland feature that is present between the landfill and SW-2. Given the understanding developed with respect to the migration pathway being

completely through surface water flow, it is suggested that this work proceed in 2018 such that a site specific ecological risk assessment can be completed with respect to boron. As noted in the 2017 action plan, it may be appropriate to evaluate the boron concentration on alternative criteria such as Canadian Water Quality Objectives (CWQO), which have a larger threshold than that in the PWQO, while CWQO also has specific rationale for its threshold that could be related and interpreted based on the results of the aquatic assessment. CWQO also describes thresholds for both chronic and acute exposures.

Although the original aquatic assessment was limited to the defined CAZ lands, it is recommended that the proposed assessment would extend further downstream through to the outlet of the wetland feature at Morgan Lake. Although the current monitoring program has not indicated any impacts to Morgan Lake (SW-5), this assessment would benefit from developing an understanding of the ecological importance of the outlet area.

Additional Monitoring Locations

Given the results collected during 2017, there is an understanding that the boron impacts are the result of surface water flow from the waste area into the adjacent wetland area. Although it was confirmed that impacts are not most elevated immediately adjacent to the waste mound at MW-2, it would be beneficial to refine the migration pathway by establishing an additional surface water location between MW-2 and the bedrock ridge to the south. As such it is proposed that RW-4 be established in this area if sufficient water is present, while RW-1, RW-2 & RW-3 be included with the routine surface water monitoring program for the Site such that boron trends (i.e. stability) can be further delineated. We note that the RW series of sampling locations is primarily pooled and stagnant water within the wetland, and would not normally be subject to PWQO.

Finally, an additional surface water location (RW-5) is proposed at the outlet of the wetland tributary at Morgan Lake such that this information can be utilized as part of the aquatic assessment.

The continued monitoring of these additional locations will be reassessed following review of the 2018 data.

Boron Source Assessment

A final item within the work plan for 2018 includes an assessment to potentially identify the specific source of boron within the waste stream. It is understood that boron is potentially contained in a number of construction and demolition (C & D) wastes as both a fire retardant (wallboard) and preservative (treated wood), but the amounts and leaching

potential for these materials is not well understood. As such, it is proposed that some common C & D wastes be assessed in 2018 for leachable boron content. It is proposed that the City isolate these wastes (pressure treat wood, wallboard and particle board) in separate containers on site such that they are exposed to local conditions and that these containers can collect the leached rainfall from these materials between spring melt and midsummer, when samples from these isolated leachate containers can be collected and submitted for laboratory analysis, similar to the routine monitoring program. The results may provide a primary waste stream source for the boron such that operations at the Site can be developed to handle and isolate these materials from the regular waste stream in an effort to reduce the contribution to the adjacent surface water features.

Similarly, a soil sample is proposed to be collected from the cap material used at the Site to assess the potential for this material contributing boron into the watershed.

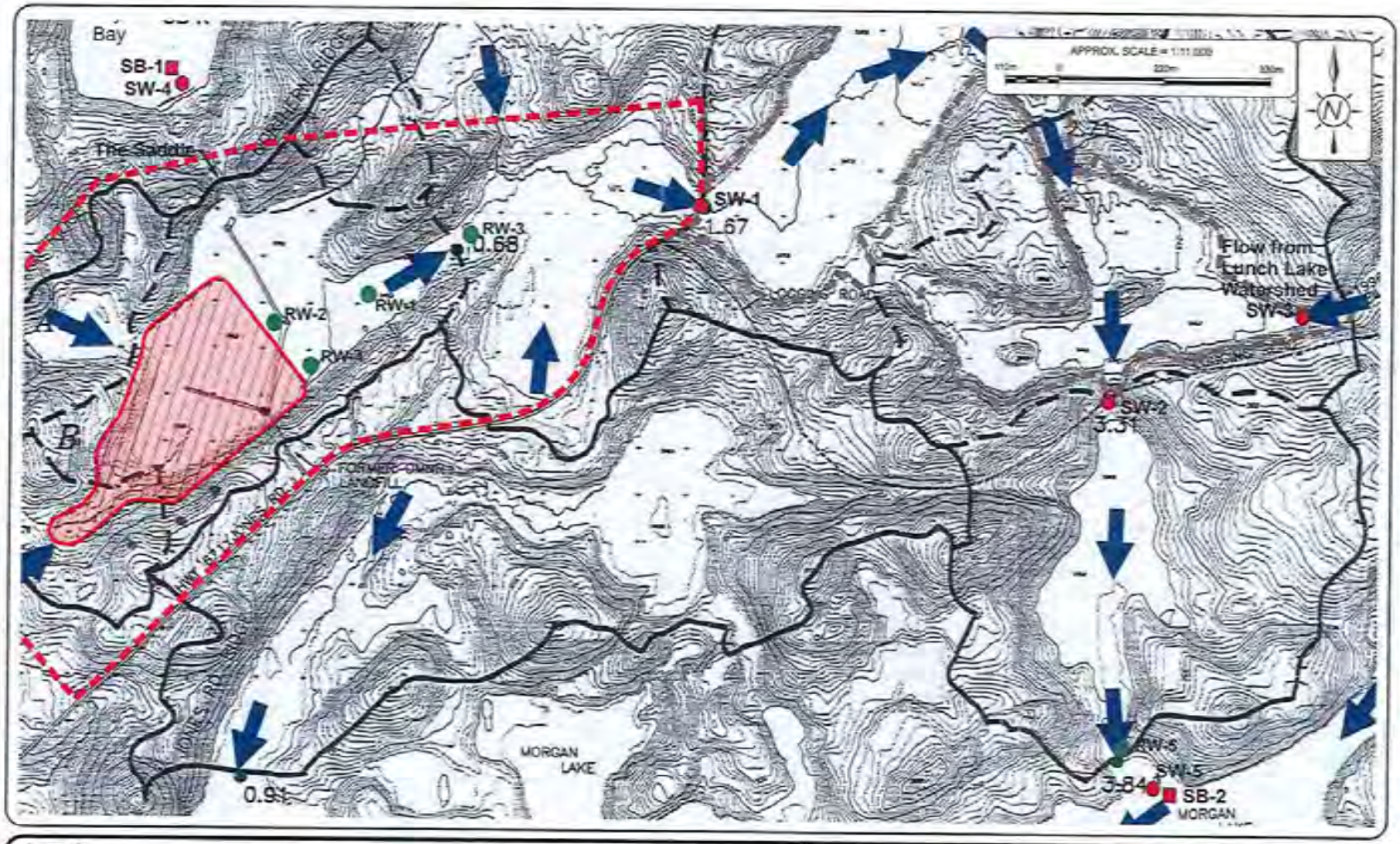
The City welcomes any feedback or comments relating to the above work plan, while any deviations will be detailed in an update letter to the MOECC District Office.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Attach:

cc: Mukesh Pokharel – City of Kenora



Legend:

- Approved Waste Footprint
- Approximate Property Boundary
- Contaminant Attenuation Zone
- Watershed Boundary
- Surface Water Sampling Location
- Sediment/Benthic Sampling Location
- Temporary Action Plan Surface Water Sampling Location
- Surface Water Flow

Base Drawing: Fenco MacLaren (1997), Figure S3.1

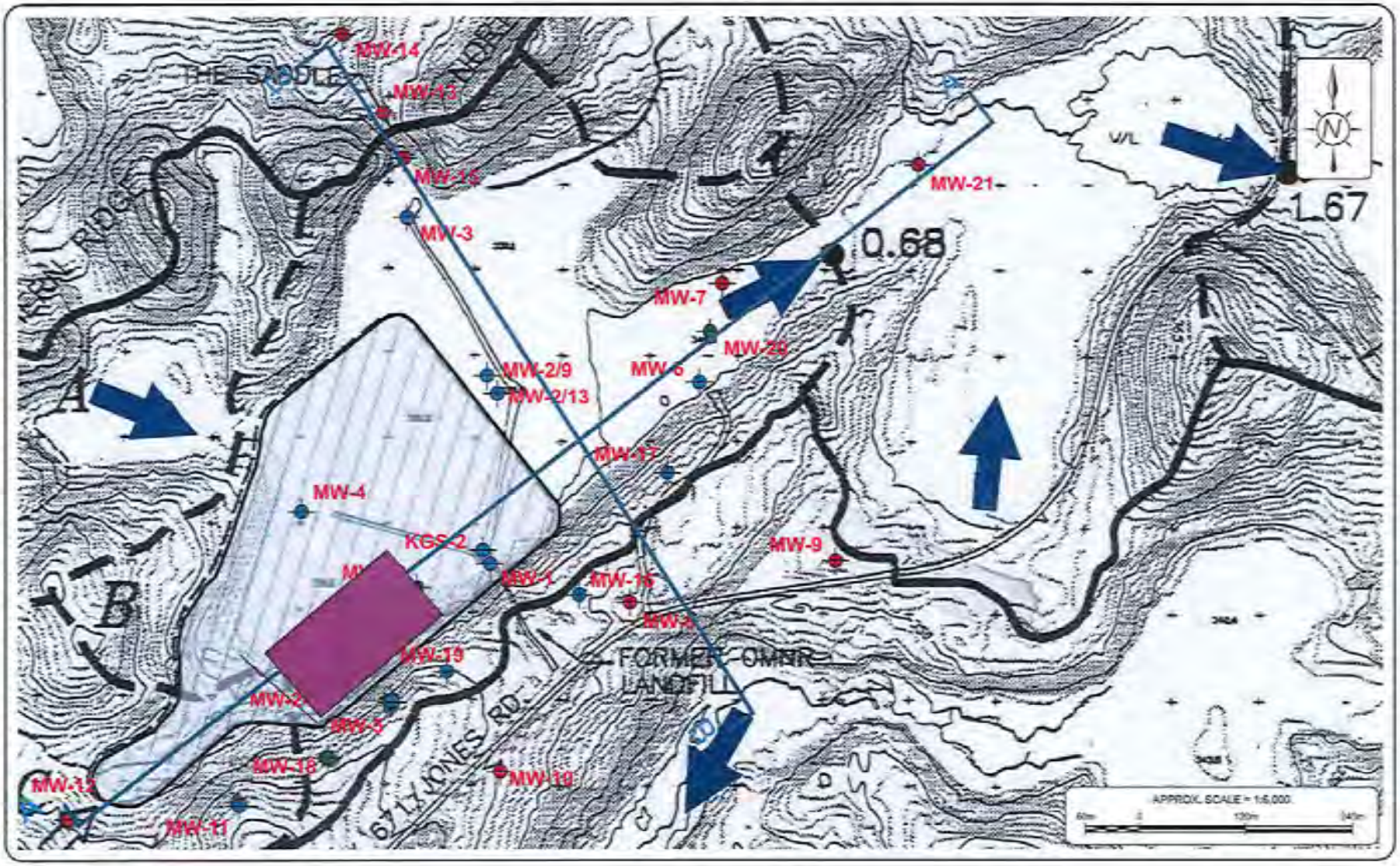
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Hydrologic Features

Date Issued:	February 2018
Created By:	EMB
Project No.	1-1020
File Name:	Figure 2 - Hydrologic FeaturesCDR

Jones Road Landfill Site
City of Kenora
MOE Certificate of Approval No. A612018

Figure No.
1



Legend:

- Approved Waste Footprint
- Ground Water Monitor (maintained)
- Ground Water Monitor (removed from program)
- Ground Water Monitor (decommissioned)
- Watershed Boundary
- Active Footprint Area

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING INC.

Ground Water Monitoring Network

Date Issued:	February 2018
Created By:	CMB
Project No.	17-4208
File Name:	Figure 4.CDR

Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No.
1

Station: SW-1

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Action**	QA/QC		0.8																
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/26/2004									0.50						2.16	0.053	82	1.0	5
8/19/2004		< 0.002	0.057	0.021	27.40	< 0.0001	< 0.005	0.001	0.54	< 0.0001	22.5	6.5	0.015	276	1.10	0.160	129	0.9	2
10/14/2004		< 0.002	0.062	0.028		< 0.0001	< 0.005	< 0.005	0.27					362	1.19	0.017	99	1.0	2
8/3/2005		0.002	0.065	0.029	25.00	< 0.0001	< 0.005	0.004	3.20		12	5.3	0.081		2.40	0.228	120	< 2	110
9/2/2005		0.0012	0.058	0.03		< 0.0001	< 0.005	0.0015	11	< 0.0001				304	1.70	0.114	81	5.0	26
10/21/2005		< 0.001	0.090	0.034		< 0.0001	< 0.005	< 0.001	2.30	< 0.0001				258	1.30	0.055	89	< 2	14
5/16/2006									0.35					98	1.40	0.009	78	< 2	< 1
8/29/2006		< 0.001	0.060	0.039		< 0.0001	< 0.005	0.002	17	< 0.0001				216	1.90	0.130	96	10.0	75
5/31/2011		< 0.2	0.040	0.040		< 0.005	< 0.01	< 0.02	8.2	< 0.0001				213	1.40	0.061	54	5.0	9
5/15/2007									0.43					183	2.00	0.043	92	<2	<1
8/15/2007		<0.2	0.170	0.070		<0.005	<0.01	<0.02	4.7	<0.0001				418	3.00	0.320	150	5.0	7
10/18/2007		<0.2	0.080	0.050		<0.005	<0.01	<0.02	1.7	<0.0001				246	3.00	0.120	140	3.0	5
5/21/2008									0.67						1.30	0.052	87	< 2	< 1
8/20/2008		<0.2	0.230	0.050		<0.005	<0.01	<0.02	1.8	<0.0001				270	3.30	0.530	280	6.0	14
10/24/2008		<0.2	0.130	0.030		<0.005	<0.01	<0.02	1.5	<0.0001				420	2.50	0.210	120	3.0	6
5/19/2009									0.29						1.30	0.096	81	2.0	< 1
8/18/2009		<0.2	0.120	0.050		<0.005	<0.01	<0.02	1.6	<0.0001				266	2.40	0.740	200	5.0	10
10/22/2009		<0.2	0.160	0.040		<0.005	<0.01	<0.02	1.2	<0.0001				335	1.90	0.130	100	< 2	5
5/18/2010									0.32						1.90	0.092	100	5.0	3
8/25/2010	*no sample*																		
10/21/2010		<0.2	0.130	0.040		<0.005	<0.01	<0.02	0.38	<0.0001				506	1.50	0.210	90	<2	1
5/31/2011									0.39						1.50	0.210	89	<2	4
8/24/2011		<0.2	0.330	0.040		<0.005	<0.01	<0.02	0.51	<0.0001				470	2.00	0.400	110	<2	3
10/25/2011		<0.2	0.130	0.030		<0.005	<0.01	<0.02	0.88	<0.0001				344	2.00	0.200	110	<2	2
5/18/2012									0.29						1.80	0.150	90	<2	3
8/30/2012		<0.2	0.250	0.070		<0.005	<0.01	<0.02	2.5	<0.0001				762	3.40	0.810	160	4.0	54
10/23/2012		<0.2	0.230	0.040		<0.005	<0.01	<0.02	0.26	<0.0001				696	1.80	0.370	120	<2	2
5/24/2013									0.24						2.80	0.004	110	<2	2
8/29/2013		<0.2	0.470	0.470		<0.005	<0.01	<0.02	7.3	<0.0001				780	4.70	0.830	150		56
10/17/2013		<0.2	0.390	0.070		<0.005	<0.01	<0.02	1.9	<0.0001				680	2.10	0.370	130	2.0	7
5/23/2014									0.4						2.40	0.150	96	<2	5
8/21/2014		<0.2	0.810	0.150		<0.005	<0.01	<0.02	6.8	<0.0001				1230	4.40	0.940	180	11.0	55
10/9/2014		<0.2	0.610	0.075		<0.005	<0.01	<0.02	1.9	<0.0001				788	2.30	0.290	110	<2	3
5/21/2015									0.5						1.60	0.170	100	<2	5
8/25/2015		<0.2	0.750	0.027		<0.005	<0.01	<0.02	0.57	<0.0001				762	1.60	0.600	140	<2	<1
10/20/2015		<0.2	0.820	0.053		<0.005	<0.01	<0.02	0.33	<0.001				1040	1.80	0.260	130	2.0	3
5/10/2016									0.48						4.15	0.161	104		19.3
9/8/2016		0.002	0.995	0.036	39.8	<0.00001	0.0002	0.001	0.46	<0.00001	155	23.9	0.021	676	2.58	0.480	151	<6	<4.0
11/1/2016		0.001	0.730	0.031		<0.00001	0.001	0.0004	0.246	<0.00001				414	1.58	0.171	105	<6	<4.0
11/18/2016			0.836																
11/18/2016	*Duplicate*		0.828																
5/17/2017			0.860						0.46						1.60	0.170	99	<3	<4
5/17/2017	*Duplicate*		0.882																
8/29/2017		0.001	0.990	0.038	41	<0.00002	<0.001	0.0002	0.47	0.0000035	130	24.0	0.039	602	2.00	0.043	130	NA	6
10/24/2017		0.001	0.820	0.030	35	<0.00002	<0.001	<0.0002	0.31	<0.000002	110	22.0	0.012	522	1.40	0.120	92	<3	<4.0

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Action**					187							0.96							
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/26/2004					8.5	< 0.2	< 0.2	40.4	7.08	44	1.29	0.00193		218	< 0.001	6	6.20	5.0	230
8/19/2004			< 0.0005	0.056	8.8	< 0.2	< 0.2	45.2	7.65	. 62	NA			246	0.001	6		10.0	
10/14/2004			< 0.0005	< 0.005	10.2	< 0.2	< 0.2	48.1	7.63	136	0.03	0.00016		420	< 0.001	5	6.80	5.0	440
8/3/2005			0.0022	0.036	5	< 0.3	< 0.2	11.1	7.58	75	0.09	0.00114		175	0.002	10	4.50	17.8	170
9/2/2005			< 0.0005	0.072	17	< 0.3	1.6	10.4	7.49	133	0.26	0.00197		294	< 0.001	19	6.00	13.7	270
10/21/2005			< 0.0005	0.092	10	< 0.01	< 0.1	11.0	7.78	115	0.08	0.00079		230	< 0.001	13	3.70	8.5	20
5/16/2006					8	< 0.01	< 0.1	14.0	7.70	85	< 0.05	<0.0005		221	< 0.001	10	7.30	17.2	
8/29/2006			< 0.0005	0.100	21	< 0.01	< 0.1	1.0	7.10	117	0.14	0.00057		291	0.001	11	6.71	17.4	
10/17/2006			< 0.02	0.250	30	< 0.01	< 0.1	30.0	7.60	113	0.46	0.00310		353	0.001	6	6.24	8.9	
5/15/2007					14	0.020	0.7	105.0	7.40	66	0.05	0.00034		417	<0.001	12	6.93	14.8	
8/15/2007			<0.05	0.200	21	<0.01	<0.1	33.0	8.00	306	0.58	0.01745		624	0.005	8	7.6	16.7	687
10/18/2007			<0.05	0.010	14	<0.01	<0.1	33.0	7.90	181	0.09	0.00141		458	0.004	6	7.21	11	
5/21/2008					10	<0.01	< 0.1	52.0	7.80	121	< 0.05	<0.0005		370	0.001	10	7.5	10.9	
8/20/2008			<0.05	<0.005	<1	<0.01	< 0.1	23.0	8.00	181	0.23	0.00901		402	<0.001	6	7.37	20.4	
10/24/2008			<0.05	<0.005	17	<0.01	< 0.1	< 2	8.20	280	0.05	0.00126		656	<0.001	9	7.06	8.4	309
5/19/2009					12	<0.01	< 0.1	48.0	7.00	99	< 0.05	<0.0005		322	<0.001	9	7.35	n/a	326
8/18/2009			<0.05	0.020	<1	<0.01	< 0.1	< 2	7.40	188	0.17	0.00133		438	0.005	4	7.52	16.9	480
10/22/2009			<0.05	0.030	20	<0.01	< 0.1	74.0	7.50	147	0.09	0.00043		514	<0.001	10	7.74	7.4	498
5/18/2010					19	<0.01	<0.1	35.0	8.10	159	0.16	0.00771		455	<0.001	8	7.72	20.2	430
8/25/2010	*no sample*															7	6.64	16	692
10/21/2010			<0.05	<0.01	28	<0.01	<0.1	85.0	8.01	254	<0.05	<0.0005		779	<0.001	9	7.94	5.1	784
5/31/2011					19	<0.01	<0.1	54.0	7.88	182	<0.05	<0.0005		552	<0.001	4	7.42	11.8	490
8/24/2011			<0.05	<0.01	27	<0.01	<0.1	27.0	8.02	262	<0.05	<0.0005		691	<0.001	6	8.14	18.1	699
10/25/2011			<0.0001	<0.01	24	<0.01	<0.1	13.0	7.71	185	0.22	0.00139		502	0.007	4	7	4.9	509
5/18/2012					26	<0.01	<0.1	31.0	7.76	170	<0.05	<0.0005		510	0.007	10	6.6	18	540
8/30/2012			<0.05	<0.01	61	<0.01	<0.1	13.0	8.18	400	0.3	0.01628		1000	<0.001	9	7.68	19.4	1259
10/23/2012			<0.05	<0.01	62	<0.01	<0.1	71.0	7.84	310	0.092	0.00083		960	<0.001	9	7.76	5.7	694
5/24/2013					31	0.025	0.31	9.0	7.94	220	0.63	0.01050		620	0.004	10	9.51	10.6	604
8/29/2013			<0.05	<0.01	68	<0.01	<0.1	<1	7.76	440	1.0	0.00843		1100	<0.001	6	7.37	18.8	1297
10/17/2013			<0.05	<0.01	60	0.011	<0.1	20.0	7.96	340	0.16	0.00110		940	0.011	6	7.65	7.7	801
5/23/2014					29	<0.01	0.24	30.0	7.87	210	1.5	0.01625		580	0.011	8	7.61	14.8	566
8/21/2014			<0.05	0.070	90	<0.05	<0.5	<1	7.94	570	0.32	0.01060		1400	<0.001	6	8.37	19.9	1290
10/9/2014			<0.05	0.020	71	<0.01	<0.10	20.0	7.87	380	0.33	0.00161		1000	0.017	4	7.54	6.6	886
5/21/2015					39	<0.01	<0.10	18.0	7.72	200	<0.05	<0.0005		600	<0.001	7	8.17	16.1	537
8/25/2015			<0.05	<0.01	43	<0.01	<0.10	<1	7.92	280	0.097	0.00020		740	<0.001	6	6.89	14.4	626
10/20/2015			<0.05	<0.01	100	<0.01	<0.10	45.0	8.09	590	0.098	0.00140		1600	<0.001	6	8.01	6.6	1146
5/10/2016					47	0.57*		18.4	7.99	330	2.4	0.12241		853	0.006	7	8.53	8	542
9/8/2016		48.5	<0.0002		60	<0.2	0.014	7.5	8.26	390	0.36	0.00000		976	0.005				
11/1/2016			<0.0002		44	0.004	<0.2	30.2	8.12	288	0.047	0.00023		758	0.002	7	7.56	6	317
11/18/2016					48						0.027	0.00029							
11/18/2016	*Duplicate*				48						<0.02	<0.0002							
5/17/2017					34	<0.010	0.094	16.0	8.00	254	<0.02	<0.0002		643	0.004	7	8.4	8.8	408
5/17/2017	*Duplicate*				35						<0.02	<0.0002				7	8.4	8.8	408
8/29/2017			<0.0002	<0.003	50	<0.010	<0.010	2.6	7.90	360	0.068	0.00472		937	0.003	7	8.43	15.2	582
10/24/2017			<0.0002	0.012	42	<0.010	0.019	17.0	8.09	300	<0.015	<0.0002		774	0.004	7	6.83	4.7	585

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Action Criteria

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

** - action level according to trigger mechanism

Station: SW-2

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO - Trigger - Units -		0.1 mg/L	0.2 0.2 mg/L	mg/L	mg/L	0.0001 mg/L	0.1 mg/L	0.005 mg/L	0.3 mg/L	0.0002 mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	0.03 mg/L	mg/L	mg/L	mg/L
5/26/2004									0.29						0.66	0.036	64	0.7	4
8/19/2004		< 0.002	0.010	0.014	8.60	< 0.0001	< 0.005	0.002	0.95	< 0.0001	5.9	3.4	0.042	138	0.98	0.024	105	0.9	1
10/14/2004		< 0.002	0.009	0.017		< 0.0001	< 0.005	< 0.0005	0.5					156	1.02	0.013	113	1.3	1
8/3/2005		0.001	0.016	0.020	16	< 0.0001	< 0.005	0.003	1.1		5.1	4.8	0.120		1.10	0.033	77	< 2	3
9/2/2005		< 0.001	0.019	0.019		< 0.0001	< 0.005	0.001	0.94	0.0001				194	1.10	0.035	64	< 2	8
10/21/2005		< 0.001	0.019	0.017		< 0.0001	< 0.005	0.001	0.71	< 0.0001				198	0.90	0.024	73	< 2	8
5/16/2006									0.25					50	1.50	0.006	61	< 2	1
8/29/2006		0.001	0.018	0.020		< 0.0001	0.012	0.001	1.7	< 0.0001				105	1.50	0.081	60	< 2	< 1
10/17/2006		< 0.2	< 0.02	< 0.02		< 0.005	< 0.1	< 0.02	0.19	< 0.0001				113	0.60	0.009	33	< 2	< 1
5/31/2007									0.29					69	1.50	0.017	72	<2	<1
8/15/2007		<0.2	0.05	0.03		<0.005	<0.01	<0.02	1.6	<0.0001				146	1.70	0.050	110	<2	3.0
10/18/2007		<0.2	0.05	0.02		<0.005	<0.01	<0.02	0.37	<0.0001				124	1.20	0.021	78	<2	<1
5/21/2008									0.41						1.00	0.010	63	<2	<10
8/20/2008		<0.2	0.05	0.05		<0.005	<0.01	<0.02	4.2	<0.0001				150	2.10	0.076	110	<2	40
10/24/2008		<0.2	0.04	<0.02		<0.005	<0.01	<0.02	0.33	0.0003				325	1.60	0.190	83	<2	<1
5/19/2009									0.17						0.80	0.020	71	<2	<1
8/18/2009		<0.2	0.05	0.03		<0.005	<0.01	<0.02	2.1	<0.0001				155	1.70	0.044	120	<2	2
10/22/2009		<0.2	0.03	<0.02		<0.005	<0.01	<0.02	0.36	<0.0001				140	1.10	0.014	72	<2	1
5/18/2010									0.58						1.40	0.019	75	<2	4
8/25/2010		<0.2	0.04	0.03		<0.005	<0.01	<0.02	1.8	<0.0001				200	1.70	0.073	97	<2	2
10/21/2010		<0.2	0.03	0.03		<0.005	<0.01	<0.02	0.36	<0.0001				192	0.70	0.016	64	<2	<1
5/31/2011									0.51						1.30	0.050	72	<2	3
8/24/2011		<0.2	0.05	0.03		<0.005	<0.01	<0.02	0.97	<0.0001				228	1.30	0.090	91	<2	228
10/25/2011		<0.2	0.03	0.02		<0.005	<0.01	<0.02	0.4	<0.0001				224	7.30	0.042	68	<2	2
5/18/2012									0.44						1.10	0.081	72	<2	2
8/30/2012		<0.2	0.05	0.03		<0.005	<0.01	<0.02	0.89	<0.0001				180	1.70	0.099	96	<2	11
10/23/2012		<0.2	0.03	<0.02		<0.005	<0.01	<0.02	0.37	<0.0001				184	1.30	0.011	78	<2	<1
5/24/2013									0.30						1.50	0.043	69	<2	<1
8/29/2013		<0.2	0.06	0.048		<0.005	<0.01	<0.02	1.5	<0.0001				334	1.90	0.130	110		6
10/17/2013		<0.2	0.05	0.028		<0.005	<0.01	<0.02	0.9	<0.0001				272	1.40	0.049	96	2	<1
5/23/2014									0.26						1.20	0.032	79	<2	<1
8/21/2014		<0.2	0.1	0.065		<0.005	<0.01	<0.02	3.8	<0.0001				382	2.20	0.310	120	2	10
10/9/2014		<0.2	0.09	0.038		<0.005	<0.01	<0.02	1.4	<0.0001				292	1.30	0.065	75	2	9
5/21/2015									0.45						1.10	0.042	68	<2	<1
8/25/2015		<0.2	0.14	0.035		<0.005	<0.01	<0.02	2.6	<0.0001				348	1.60	0.140	98	2	5
10/20/2015		<0.2	0.14	0.034		<0.005	<0.01	<0.02	2.3	<0.001				322	1.00	0.110	95	<2	4
5/10/2016									0.704						1.18	0.050	82		6
9/8/2016		0.0009	0.297	0.025	20.6	<0.00001	<0.001	0.0003	0.544	<0.00001	48.7	10.4	0.006	292	1.53	0.097	104	<6	<4.0
11/1/2016		0.0005	0.210	0.028		<0.00001	<0.001	0.0004	0.236	<0.00001				276	1.21	0.030	89	<6	<4.0
11/18/2016			0.202																
11/18/2016	Duplicate		0.217						0.38						1.20	0.053	72	<3	<4
5/17/2017			0.233																
5/17/2017	Duplicate		0.199																
8/29/2017		0.0008	0.360	0.035	22	<0.00002	<0.001	0.0002	2.1	0.000003	47	10.0	0.250	276	1.90	0.042	110	NA	<4
10/24/2017		0.0010	0.320	0.030	20	<0.00002	<0.001	0.0002	1	0.000002	52	9.8	0.066	274	1.40	0.050	94	8.0	<4

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO - Trigger - Units -		50 mg/L	0.003 mg/L	0.02 mg/L	125 mg/L	mg/L	mg/L	mg/L	6.5 - 8.5 n/a	* mg/L	mg/L	0.02 0.02 mg/L	mg/L	mg/L	0.001 mg/L	mg/L			
8/6/2003			< 0.0005	< 0.005	4.1	< 0.2	< 0.2	1.1	6.88	31	0.06	0.00018		90	< 0.001	8	6.60	20.0	70
9/25/2003					6.2	< 0.2	< 0.2	31.4	6.53	15	0.03	0.00002		141	< 0.001	14	5.60	8.5	110
10/28/2003			< 0.0005	< 0.005	8.4	< 0.2	< 0.2	38.7	6.62	12	< 0.03	<0.0003		168	< 0.001	19	6.10	2.0	160
5/26/2004					4.9	< 0.2	<0.2	20.9	6.81	18	0.04	0.00004		113	<0.001	8	5.80	8.0	120
8/19/2004		4.9	< 0.0005	< 0.005	5.0	< 0.2	< 0.2	6.8	7.24	30	NA			96	0.001	6		11.5	
10/14/2004			< 0.0005	< 0.005	6.1	< 0.2	< 0.2	13.6	7.15	38	< 0.03	<0.0003		146	<0.001	7	6.40	6.0	140
8/3/2005			0.0003	< 0.005	6.0	< 0.3	< 0.2	3.0	7.55	54	< 0.05	<0.0005		126	0.002	9	5.20	22.1	110
9/2/2005			< 0.0005	< 0.005	7.0	< 0.3	< 0.2	15.3	7.56	50	< 0.05	<0.0005		116	< 0.001	13	6.00	14.2	110
10/21/2005			< 0.0005	< 0.005	7.0	< 0.01	< 0.1	< 1	7.57	44	< 0.05	<0.0005		102	< 0.001	11	3.90	7.1	10
5/16/2006					7	< 0.01	< 0.1	2	7.40	37	< 0.05	<0.0005		109	< 0.001	9	6.20	16.4	
8/29/2006			< 0.0005	0.008	7	< 0.01	< 0.1	2	7.50	55	0.09	0.00098		134	< 0.001	6	6.90	18.3	
10/17/2006			< 0.05	0.020	14	< 0.01	< 0.1	5	7.80	48	< 0.05	<0.0005		154	< 0.001	12	7.42	7.5	
5/15/2007					7	<0.01	<0.1	30	7.00	26	<0.05	<0.0005		152	0.004	13	6.77	12.1	
8/15/2007			<0.05	<0.01	6	<0.01	<0.1	<1	7.90	88	0.11	0.00265		201	0.002	7	7.55	16.7	212
10/18/2007			<0.05	<0.01	9	<0.01	<0.1	28	7.70	49	<0.05	<0.0005		187	<0.001	5	7.04	11.4	
5/21/2008					6	<0.01	<0.1	19	7.40	43	<0.05	<0.0005		150	<0.001	7	7.53	8	
8/20/2008			<0.05	<0.01	11	<0.01	<0.1	<1	8.00	98	<0.05	<0.0005		223	<0.001	6	7.45	22.9	
10/24/2008			<0.05	<0.01	10	<0.01	<0.1	1	8.20	195	<0.05	<0.0005		516	<0.001	11	7.56	7.3	166
5/19/2009					6	<0.01	<0.1	<1	6.90	47	<0.05	<0.0005		161	<0.001	8	7.37	n/a	242
8/18/2009			<0.05	<0.01	<1	<0.01	<0.1	<1	7.40	102	<0.05	<0.0005		232	<0.001	9	7.74	18.1	244
10/22/2009			<0.05	<0.01	10	<0.01	<0.1	<1	7.40	84	<0.05	<0.0005		213	<0.001	11	7.74	4	196
5/18/2010					8	<0.01	<0.1	<1	7.40	67	0.05	0.00040		177	<0.001	8	7.63	17	171
8/25/2010			<0.05	<0.01	14	<0.01	<0.1	<1	7.70	123	<0.05	<0.0005		301	<0.001	5	7.30	18.6	
10/21/2010			<0.05	<0.01	14	<0.01	<0.1	<1	7.55	109	<0.05	<0.0005		597	<0.001	7	8.17	6.7	
5/31/2011					6	<0.01	<0.1	<1	7.59	74	<0.05	<0.0005		199	<0.001	7	7.18	11.4	199
8/24/2011			<0.05	<0.01	13	<0.01	<0.1	<1	7.63	122	<0.05	<0.0005		292	<0.001	6	8.19	18.1	306
10/25/2011			<0.05	<0.01	15	<0.01	<0.1	<1	7.93	111	<0.05	<0.0005		292	0.003	10	7.66	4.3	337
5/18/2012					13	<0.01	<0.1	<1	7.48	100	<0.05	<0.0005		260	0.005	8	6.29	18	540
8/30/2012			<0.05	<0.01	16	<0.01	<0.1	<1	7.74	130	0.058	0.00109		320	<0.001	7	7.50	18.3	435
10/23/2012			<0.05	<0.01	13	<0.01	<0.1	<1	7.37	72	0.076	0.00023		210	<0.001	9	7.71	5.3	216
5/24/2013					14	<0.01	<0.1	<1	7.66	88	0.073	0.00070		250	0.005	8	9.57	11.6	278
8/29/2013			<0.05	<0.01	26	<0.01	<0.1	<1	7.80	160	0.083	0.00179		420	<0.001	5	7.49	18.3	545
10/17/2013			<0.05	<0.01	23	<0.01	<0.1	<1	7.70	120	<0.05	<0.0005		340	0.006	7	7.70	5.5	314
5/23/2014					15	<0.01	<0.1	<1	7.46	96	<0.05	<0.0005		270	0.009	8	7.80	14.1	313
8/21/2014			<0.05	0.010	25	<0.05	<0.5	<1	7.71	160	0.096	0.00154		410	<0.001	7	8.35	17	468
10/9/2014			<0.05	<0.01	26	<0.01	<0.1	<1	7.64	140	0.098	0.00057		370	0.001	9	7.40	6.1	352
5/21/2015					13	<0.01	<0.1	<1	6.88	75	<0.05	<0.0005		200	<0.001	9	6.52	9.2	197
8/25/2015			<0.05	<0.01	21	<0.01	<0.1	<1	7.31	110	0.062	0.00031		310	<0.001	6	6.54	13.5	295
10/20/2015			<0.05	<0.01	28	<0.01	<0.10	<1	7.74	140	<0.05	<0.0005		400	<0.001	6	7.32	5.4	367
5/10/2016					18	<0.20*		<1	7.90	129	0.063	0.00099		330	0.005	9	8.88	11	297
9/8/2016		19.5	<0.0002		25	<0.20	0.005	5.1	7.96	155	0.086	0.00064		388	0.003				
11/1/2016			<0.0002		28	0.003	<0.2	<0.5	8.02	186	0.044	0.00060		467	0.002	9	7.25	5.7	290
11/18/2016					26						<0.02	<0.0002							
11/18/2016	Duplicate				27						<0.02	<0.0002							
5/17/2017					16.8	<0.033	0.051	4.3	8.05	138	0.081	0.01912		338	0.004	10	9.16	11.8	277
5/17/2017	Duplicate				16.9						0.041	0.00968				10	9.16	11.8	277
8/29/2017		19.0	<0.0002	<0.003	17	0.010	0.016	<0.5	7.50	160	0.36	0.00244		409	0.002	4	7.33	17.1	358
10/24/2017		21.0	<0.0002	0.025	20	<0.010	0.011	2.6	7.95	140	<0.015	<0.0002		357	0.004	11	7.58	5.8	226

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Trigger Criteria

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

Station: SW-3

Parameter -	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -	0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/26/2004								1.49						0.59	0.05	62	1.0	34
8/19/2004	< 0.002	< 0.002	0.065	5.90	< 0.0001		0.011	7.64	< 0.0001	2	3.5	0.115	170	0.70	0.17	115	0.9	32
8/3/2005	0.0012	< 0.01	0.016	11	< 0.0001	< 0.005	0.0025	1.1		5.1	4.8	0.12		1.4	0.14	86	< 2	21
9/2/2005	< 0.0001	0.011	0.017		< 0.0001	< 0.005	0.002	1.9	< 0.0001				92	1.9	0.18	73	9	10
10/21/2005	< 0.001	0.017	0.016		< 0.0001	< 0.005	< 0.001	0.55	< 0.0001				126	1.1	0.02	76	2	14
5/16/2006								12					22	1.6	0.14	91	< 2	110
5/15/2007								0.72					32	3	0.06	85	<2	8
8/15/2007	<0.2	<0.02	0.04		<0.005	<0.01	<0.02	12	<0.0001				62	18	2.10	320	4.0	1100
10/18/2007	<0.2	<0.02	0.03		<0.005	<0.01	<0.02	0.13	<0.0001				47	2.1	0.08	82	<2	1
5/21/2008								1.7						1	0.05	66	<2	<1
8/20/2008	<0.2	0.02	0.44		<0.005	0.05	0.06	7.7	<0.0001				110	40	3.00	1000	12	6400
5/31/2011	<0.2	<0.02	<0.03		<0.005	<0.01	<0.02	1.1	<0.0001				35	1.8	0.05	100	<2	<1
5/19/2009								0.76						1.1	0.03	78	3	4
8/18/2009	<0.2	<0.02	0.03		<0.005	<0.01	<0.02	1.5	<0.0001				60	1.5	0.07	91	2	16
10/22/2009	<0.2	<0.02	<0.03		<0.005	<0.01	<0.02	2.1	<0.0001				35	1.3	0.06	76	<2	3
5/18/2010								5.7						4.3	0.67	190	2	95
8/25/2010	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	9.1	<0.0001				46	1.7	0.097	110	3	21
10/21/2010	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	1.5	<0.0001				36	1.0	0.035	80	<2	43
5/31/2011								2.1						2.6	0.190	110	<2	5
8/24/2011	<0.2	<0.02	0.03		<0.005	<0.01	<0.02	12	<0.0001				80	3.0	0.360	120	7	25
10/25/2011	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.86	<0.0001				58	1.3	0.058	52	<2	15
5/18/2012								3.7						3.5	0.038	150	18	84
10/23/2012	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	1.5	<0.0001				122	1.5	0.032	84	<2	<1
5/24/2013								1.2						1.5	0.070	76	<2	4
10/17/2013	<0.2	<0.02	0.065		<0.005	<0.01	<0.02	7.3	<0.0001				132	4.4	0.340	220	3	190
5/23/2014								1.7						1.4	0.250	67	3	26
10/9/2014	<0.2	<0.02	0.025		<0.005	<0.01	<0.02	2.3	<0.0001				118	1.3	0.056	80	2	6
5/21/2015								1.6						1.2	0.200	110	<2	87
8/25/2015	<0.2	<0.02	0.021		<0.005	<0.01	<0.02	1.2	<0.0001				122	1.2	0.055	85	<2	<1
10/20/2015	<0.2	<0.02	0.058		<0.005	<0.01	<0.02	8	<0.0001				126	1.00	0.400	210	<2	160
5/10/2016								1.7						1.17	0.097	84		17
9/8/2016	0.0006	<0.05	0.014	4.37	<0.00001	0.0017	0.004	0.96	<0.00001	0.79	2.0	0.018	68	1.43	0.053	98	<6	74
11/1/2016	0.0003	<0.05	0.015		<0.00001	0.0011	0.003	0.45	<0.00001				24	1.66	0.149	113	<6	109
5/17/2017		<0.02						1.60						1.30	0.084	95	9.0	31.3
8/29/2017	0.0007	<0.02	0.013	7.5	<0.00002	<0.001	0.001	1.90	0.000004	0.72	3.2	0.069	66	1.50	0.018	97	NA	36.6
10/24/2017	0.0008	<0.02	0.014	5.3	<0.00002	0.0014	0.002	0.90	0.000007	0.52	2.4	0.024	94	1.20	0.080	88	12.0	47

Parameter -	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -		0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/26/2004				<0.5	< 0.2	< 0.2	2.8	6.18	7	0.03	0.00001		27	<0.001	11	5.50	4.5	30
8/19/2004	1.8	0.0026	0.047	5	< 0.2	< 0.2	1.5	6.65	13	NA			31	0.001	5		10.0	
8/3/2005	2.4	0.0007	0.022	2	< 0.3	< 0.2	4	7.10	40.6	< 0.05	<0.0005		86	0.002	6	4.40	19.4	90
9/2/2005		< 0.0005	0.0067	2	< 0.3	< 0.2	15.6	6.95	36.1	< 0.05	<0.0005		92	< 0.001	10	5.20	13.1	70
10/21/2005		< 0.0005	0.005	7	< 0.01	< 0.1	< 1	7.45	43	0.05	0.00021		103	< 0.001	12	4.00	7.3	10
5/16/2006				2	< 0.01	< 0.1		7.10	25	< 0.05	<0.0005		55	< 0.001	12	6.60	17.5	
5/31/2011				1	<0.01	<0.1	18	6.40	9	<0.05	<0.0005		85	<0.001	13	6.25	9.3	
8/15/2007		<0.05	0.02	<10	<0.01	<0.1	< 1	7.20	43	0.27	0.00114		90	0.003	6	6.79	14.7	65
10/18/2007		<0.05	0.01	2	0.01	<0.1	13	7.00	17	<0.05	<0.0005		75	<0.001	5	6.12	11	
5/21/2008				1	<0.01	<0.1	1	6.70	9	<0.05	<0.0005		38	<0.001	16	6.64	5.5	
8/20/2008		<0.05	0.19	<1	0.01	<0.1	< 1	7.30	83	0.41	0.00363		166	0.008	8	6.46	21.7	
10/24/2008		<0.05	<0.02	<1	<0.01	<0.1	< 1	6.90	17	<0.05	<0.0005		57	<0.001	9	6.76	6.7	50
5/19/2009				<1	<0.01	<0.1	< 1	6.60	9	<0.05	<0.0005		39	<0.001	10	6.91	n/a	58
8/18/2009		<0.05	<0.02	<1	<0.01	<0.1	< 1	6.70	43	<0.05	<0.0005		89	<0.001	5	7.08	16.6	76
10/22/2009		<0.05	<0.02	<1	<0.01	<0.1	< 1	6.50	23	<0.05	<0.0005		54	<0.001	7	7.68	3.2	48
5/18/2010				1	<0.01	<0.1	30	6.00	6	0.07	0.00002		43	<0.001	10	7.25	16.3	41
8/25/2010		<0.05	<0.01	2	<0.01	<0.1	<1	6.70	34	<0.05	<0.0005		75	0.004	13	6.30	16.5	
10/21/2010		<0.05	<0.01	1	<0.01	<0.1	<1	6.79	28	<0.05	<0.0005		59	<0.001	7	8.48	6.8	80
5/31/2011				1	<0.01	<0.1	<1	6.48	9	0.08	0.00006		35	<0.001	6	6.87	13	34
8/24/2011		<0.05	<0.01	2	<0.01	<0.1	9	6.61	40	0.05	0.00007		104	0.019	3	7.43	17.9	100
10/25/2011		<0.05	<0.01	<1	<0.01	<0.1	16	6.80	15	<0.05	<0.0005		84	0.002	10	6.94	2.8	97
5/18/2012				2	<0.01	<0.1	5	6.47	26	<0.05	<0.0005		84	0.006	11	6.50	24.7	99
10/23/2012		<0.05	<0.01	2	<0.01	<0.1	9	6.13	8.4	0.073	0.00001		59	<0.001	9	6.84	6.3	65
5/24/2013				1	<0.01	<0.1	1	6.65	8.9	0.072	0.00007		37	0.004	12	9.67	12.5	45
10/17/2013		<0.05	<0.01	2	<0.01	<0.1	<1	6.55	25	<0.05	<0.0005		62	0.007	6	7.08	5.2	51
5/23/2014				2	<0.01	<0.1	2	6.44	9	<0.05	<0.0005		35	0.006	11	7.52	20.6	61
10/9/2014		<0.05	0.01	1	<0.01	<0.1	<1	6.44	15	0.086	0.00004		59	0.008	5	7.45	7.7	61
5/21/2015				1	<0.01	<0.1	1	6.03	7.8	<0.05	<0.0005		37	<0.001	10	6.21	8.4	38
8/25/2015		<0.05	<0.01	1.6	<0.01	<0.1	1	6.08	6.6	<0.05	<0.0005		33	<0.001	6	6.86	13.5	36
10/20/2015		<0.05	0.020	1	<0.01	<0.10	<1	6.66	27	<0.05	<0.0005		66	<0.001	8	6.96	3.4	53
5/10/2016				2.2	<0.20**		1.6	6.43	7.53	<0.05	<0.0005		31	0.002	6	8.29	4.5	31
9/8/2016	1.53	<0.0002		3	0.020	<0.20	<0.5	6.58	10.7	0.053	0.00002		37	0.002				
11/1/2016		<0.0002		2.7	0.019	<0.2	<0.5	6.47	6.66	0.043	0.00002		38	0.001	9	7.18	6.5	38
5/17/2017				<0.5	<0.033	<0.044	1.2	6.58	8.76	0.018	0.00001		33	0.004	7	8.39	8.5	38
8/29/2017	1.9	<0.0002	0.005	0.53	<0.010	<0.010	<0.60	6.60	27	0.047	0.00005		65	0.003	4	6.29	13.9	92
10/24/2017	1.7	0.0003	0.024	0.65	<0.010	<0.010	0.7	6.66	11.4	<0.015	<0.0002		41	0.002	8	7.24	2.9	34

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

**Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

Station: SW-4

Parameter -	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -	0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/26/2004								0.04						0.18	0.009	12	0.8	4
8/19/2004	< 0.002	< 0.005	0.008	5.80	< 0.0001	< 0.005	0.001	0.31	<0.0001	0.8	1.3	0.010	32	0.28	0.072	24	0.9	6
10/14/2004	< 0.002	< 0.005	0.007		< 0.0001	< 0.005	0.0006	< 0.03					34	0.22	0.009	14	1.0	6
8/3/2005	< 0.001	< 0.010	0.0059	4.1	< 0.0001	< 0.005	0.0053	< 0.050		0.82	1.2	0.0085		0.40	0.025	12	< 2	1
9/2/2005	< 0.001	< 0.010	0.006		< 0.0001	< 0.005	< 0.0011	< 0.050	< 0.0001				64	0.40	0.009	8	< 2	4
10/21/2005	< 0.001	< 0.010	0.006		< 0.0001	< 0.005	< 0.001	0.058	< 0.0001				40	0.30	0.006	12	< 2	4
5/16/2006								0.091					73	0.50	0.007	11	< 2	3
8/29/2006	< 0.001	< 0.010	0.005		< 0.0001	< 0.005	< 0.001	< 0.050	< 0.0001				21	0.40	0.011	10	< 2	1
10/17/2006	< 0.2	< 0.02	< 0.02		< 0.005	< 0.01	< 0.02	0.06	< 0.0001				29	0.30	0.011	11	< 2	1
5/15/2007								<0.05					17	0.50	0.012	10	<2	<1
8/15/2007	<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	0.17	<0.0001				24	0.40	0.009	12	<2	<1
10/18/2007	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.13	<0.0001				40	0.50	0.015	13	<2	3
5/31/2011								< 0.05						0.40	0.006	16	<2	<1
8/20/2008	<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	<0.05	<0.0001				28	0.40	0.015	9	<2	<1
10/24/2008	<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	0.03	<0.0001				26	0.30	0.030	10	<2	1
5/19/2009								0.34						0.70	0.044	21	<2	10
8/18/2009	<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	<0.05	<0.0001				26	0.40	0.008	12	<2	<1
10/22/2009	<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	0.05	<0.0001				25	0.30	0.003	12	<2	6
5/18/2010								0.03						0.40	<0.002	13	<2	2
8/25/2010	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.04	<0.0001				24	0.40	0.004	13	<2	2
10/21/2010	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.05	<0.0001				22	0.40	0.005	<4	<2	3
5/31/2011								0.03						0.40	0.008	15	<2	2
8/24/2011	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.12	<0.0001				30	0.50	0.015	24	<2	12
10/25/2011	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.03	<0.0001				24	0.30	0.003	13	<2	<1
5/18/2012								<0.02						0.39	0.011	12	<2	<1
8/30/2012	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.04	<0.0001				28	0.38	0.018	13		7
10/23/2012	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	<0.02	<0.0001				40	0.34	<0.004	25	<2	15
5/24/2013								0.06						0.97	0.009	13	<2	4
8/29/2013	<0.2	<0.02	0.006		<0.005	<0.01	<0.02	<0.02	<0.0001				42	0.38	0.010	10	<2	5
10/17/2013	<0.2	<0.02	0.007		<0.005	<0.01	<0.02	0.14	<0.0001				48	0.59	0.023	31	<2	16
5/23/2014								0.06						0.40	<0.002	10	<2	2
8/21/2014	<0.2	<0.02	0.006		<0.005	<0.01	<0.02	0.03	<0.0001				34	0.34	0.008	12	<2	160
10/9/2014	<0.2	<0.02	0.011		<0.005	<0.01	<0.02	0.37	<0.0001				44	0.77	0.019	8.7	<2	21
5/21/2015								0.07						0.27	0.014	6.9	<2	3
8/25/2015	<0.2	<0.02	0.006		<0.005	<0.01	<0.02	0.04	<0.0001				46	0.22	0.013	13	<2	2
10/20/2015	<0.2	<0.02	0.006		<0.005	<0.01	<0.02	0.05	<0.001				16	0.18	0.011	4.2	<2	<1
5/10/2016								0.04						0.23	0.004	<10		<4
9/8/2016	0.0001	<0.05	0.006	3.83	<0.00001	<0.001	0.0007	0.08	<0.00001	0.067	1.2	0.002	24	0.29	0.005	28	<6	14
11/1/2016	0.0002	<0.05	0.007		<0.00001	<0.001	0.0005	0.08	<0.00001				26	0.30	0.012	22	<2	<4
5/17/2017								0.08						0.21	0.005	12	<3	<4
8/29/2017	<0.0002	<0.02	<0.010	3.7	<0.00002	<0.001	0.0008	<0.06	<0.000002	0.57	1.1	<0.004	<10	0.19	0.005	8.4	NA	<4
10/24/2017	0.0003	<0.02	<0.010	4.3	<0.00002	<0.001	0.0041	<0.06	<0.000002	0.69	1.3	<0.004	18	0.26	0.010	13	13.0	29.3

Parameter -	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -		0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/26/2004				<0.5	< 0.2	<0.2	3.1	7.25	20	< 0.03	<0.0003		37	< 0.001	6	5.70	11.0	40
8/19/2004	1.2	< 0.0005	0.021	< 0.5	< 0.2	< 0.2	3.1	7.26	16	NA			36	< 0.001	8		17.0	
10/14/2004		< 0.0005	< 0.005	0.7	< 0.2	< 0.2	2.9	7.18	14	< 0.03	<0.0003		39	< 0.001	9	6.60	10.0	30
5/31/2011	1.10	< 0.0002	< 0.005	< 1	< 0.3	< 0.2	10.0	7.44	13	< 0.05	<0.0005		35	< 0.001	9	7.20	23.7	30
9/2/2005		< 0.0005	< 0.005	2	< 0.3	1.700	10.8	7.41	13	< 0.05	<0.0005		36	< 0.001	16	4.90	23.7	20
10/21/2005		< 0.0005	< 0.005	< 1	< 0.01	< 0.1	3.0	7.36	14	< 0.05	<0.0005		34	< 0.001	12	4.10	7.8	20
5/16/2006				1	< 0.01	< 0.1	< 1	7.10	14	< 0.05	<0.0005		38	< 0.001	19	7.90	14.3	
8/29/2006		< 0.0005	< 0.005	1	< 0.01	< 0.1	3.0	7.40	14	< 0.05	<0.0005		39	< 0.001	11	7.76	19.5	
10/17/2006		< 0.05	< 0.01	1	< 0.01	< 0.1	3.0	7.40	15	< 0.05	<0.0005		40	< 0.001	16	7.98	8.2	
5/15/2007				<1	<0.01	<0.1	3.0	6.80	17	<0.05	<0.0005		41	<0.001	6	7.55	16	
8/15/2007		<0.05	<0.01	<1	<0.01	<0.1	3.0	7.30	13	<0.05	<0.0005		36	<0.001	13	8.32	17.8	44
10/18/2007		<0.05	<0.01	2	<0.01	<0.1	4.0	7.00	13	<0.05	<0.0005		41	<0.001	9	7.7	10.2	
5/21/2008				<1	<0.01	<0.1	6.0	7.00	9	0.07	0.00016		39	<0.001	13	7.43	12.6	
8/20/2008		<0.0005	<0.01	2	<0.01	<0.1	3.0	7.40	13	<0.05	<0.0005		41	<0.001	12	7.82	22.3	
10/24/2008		<0.0005		1	<0.01	<0.1	4.0	6.80	13	<0.05	<0.0005		40	<0.001	13	7.95	10.3	30
5/19/2009				6	<0.01	<0.1	5.0	6.30	10	<0.05	<0.0005		60	<0.001	11	8.84	n/a	54
8/18/2009		<0.0005	<0.01	1	<0.01	<0.1	3.0	6.40	15	<0.05	<0.0005		36	<0.001	9	7.91	20.8	38
10/22/2009		<0.0005	<0.01	<1	<0.01	<0.1	6.0	8.10	15	<0.05	<0.0005		46	<0.001	12	8.92	3.6	42
5/18/2010				<1	<0.01	<0.1	5.0	7.10	10	<0.05	<0.0005		36	<0.001	14	8.37	16.2	32
8/25/2010		<0.05	<0.01	<1	<0.01	<0.1	3.0	7.10	12	<0.05	<0.0005		37	<0.001	8	7.97	16.8	
10/21/2010		<0.05	<0.01	<1	<0.01	<0.1	3.0	7.09	13	<0.05	<0.0005		37	<0.001	11	8.55	8.3	65
5/31/2011				<1	0.050	<0.1	3.0	7.09	11	<0.05	<0.0005		37	<0.001	10	7.60	13.7	30
8/24/2011		<0.05	<0.01	3	<0.01	<0.1	3.0	7.59	12	<0.05	<0.0005		35	<0.001	9	8.23	21	36
10/25/2011		<0.05	<0.01	<1	<0.01	<0.1	3.0	7.37	13	<0.05	<0.0005		38	0.003	10	7.32	6.9	90
5/18/2012				<1	<0.01	<0.1	3.0	6.63	12	<0.05	<0.0005		38	0.002	9	6.04	20	43
8/30/2012		<0.05	<0.01	<1	<0.01	<0.1	3.0	6.37	11	<0.05	<0.0005		37	<0.001	8	8.13	20.1	75
10/23/2012		<0.05	<0.01	<1	<0.01	<0.1	3.0	6.76	12	<0.05	<0.0005		38	<0.001	10	7.57	7.9	36
5/24/2013				<1	<0.01	<0.1	3.0	7.19	12	0.077	0.00039		37	<0.001	12	8.12	17.3	36
8/29/2013		<0.05	<0.01	<1	<0.01	<0.1	3.0	7.16	13	<0.05	<0.0005		37	<0.001	8	7.92	23.5	65
10/17/2013		<0.05	<0.01	<1	<0.01	<0.1	3.0	6.83	12	<0.05	<0.0005		37	<0.001	11	8.30	9.9	38
5/23/2014				<1	<0.01	<0.1	3.0	6.46	11	<0.05	<0.0005		36	0.002	10	7.90	15.1	78
8/21/2014		<0.05	<0.01	<1	<0.05	<0.5	3.0	7.11	13	<0.05	<0.0005		37	<0.001	9	8.58	22	51
10/9/2014		<0.05	<0.01	<1	<0.01	<0.1	3.0	6.66	12	0.064	0.00005		37	0.002	11	8.69	8.9	33
5/21/2015				<1	<0.01	<0.1	3.0	6.14	<1	<0.05	<0.0005		37	<0.001	11	7.24	12.7	29
8/25/2015		<0.05	<0.01	<1	<0.01	<0.1	3.5	6.78	13	<0.05	<0.0005		37	<0.001	10	6.30	19.5	31
10/20/2015		<0.05	<0.01	<1	<0.01	<0.10	2.7	7.15	13	<0.05	<0.0005		38	<0.001	9	8.41	8.8	29
5/10/2016				1	0.039		2.9	7.20	10.5	<0.05	<0.0005		34	<0.001	11	8.18	11	34
9/8/2016	1.14	<0.0002		1.1	<0.002	<0.020	0.6	7.25	10.8	0.082	0.00012		36	0.002				
11/1/2016		<0.0002		1.4	<0.002	<0.2	2.1	7.26	12	0.016	0.00005		38	<0.001	12	7.69	8	31
5/17/2017				0.62	<0.033	<0.044	2.5	7.32	11.1	<0.015	<0.0005		34	0.004	10	8.85	12.2	31
8/29/2017	1.3	<0.0002	<0.003	0.59	<0.010	<0.010	2.6	7.20	12	0.043	0.00023		38	<0.002	9	9.18	17.8	38
10/24/2017	1.4	<0.0002	0.024	0.64	<0.010	<0.010	2.7	7.18	10.7	<0.015	<0.0002		35	0.002	10	8.13	7.7	28

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

Station: SW-5

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
8/19/2004		< 0.002	< 0.005	0.006	4.50	< 0.0001	< 0.005	0.001	0.17	< 0.0001				42	0.36	0.011	28	0.6	2
9/1/2005		< 0.001	< 0.010	0.008		< 0.0001	< 0.005	**0.024**	0.30	< 0.0001				58	0.40	0.019	22	< 2	6
8/29/2006		< 0.001	< 0.010	0.006		< 0.0001	0.006	0.002	0.071	< 0.0001				19	0.50	0.009	17	< 2	1
8/15/2007									0.17					37	0.60	0.016	28	< 2	< 1
8/20/2008		< 0.001	< 0.01	< 0.001		< 0.0001	< 0.005	< 0.001	0.09	< 0.0001				27	0.60	0.009	24	< 2	1
8/18/2009		< 0.001	< 0.01	< 0.001		< 0.0001	< 0.005	< 0.001	0.17	< 0.0001				25	0.60	0.012	17	< 2	2
8/25/2010	*Dry*																		
8/24/2011		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.27	<0.0001				26	0.50	<0.1	32	<2	<1
8/31/2012		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.1	<0.0001				38	0.42	0.017	23	<2	1
8/31/2012	*Duplicate*	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.1	<0.0001				56	0.63	0.022	25	<2	<1
8/29/2013		<0.2	<0.02	0.006		<0.005	<0.01	<0.02	0.05	<0.0001				42	0.43	0.009	22	<2	<1
8/21/2014		<0.2	<0.02	0.007		<0.005	<0.01	<0.02	0.13	<0.0001				52	0.40	0.008	22	<2	1
8/25/2015		<0.2	<0.02	0.005		<0.005	<0.01	<0.02	0.17	<0.0001				58	0.35	0.017	23	<2	<1
9/8/2016		0.0003	<0.05	0.007	3.12	<0.00001	<0.001	0.001	0.223	<0.00001	1.62	1.1	0.006	34	0.40	0.010	28	<6.0	<4
8/29/2017		0.0002	<0.02	<0.01	3	<0.00002	<0.001	0.0004	0.096	0.000002	0.86	1.0	<0.004	12	0.32	0.007	21	NA	<4

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
8/19/2004		2.9	< 0.0005	**0.021**	2.8	< 0.2	< 0.2	2.2	7.14	12.0	NA			41	< 0.001				
9/1/2005			< 0.0005	0.0066	4.0	< 0.3	1.60	10.4	6.97	8.0	< 0.05	<0.0005		38	< 0.001	13	5.10	21.7	30
8/29/2006			< 0.0005	0.013	5.0	< 0.01	< 0.1	1.0	7.80	14.0	< 0.05	<0.0005		44	< 0.001	13	7.20	22.5	
8/15/2007			< 0.0005	< 0.01	< 1	< 0.01	0.200	2.0	7.00	8.0	0.05	0.00021		41	< 0.001	9	7.30	20.6	36
8/20/2008			< 0.0005	< 0.01	5.0	< 0.01	< 0.1	2.0	7.20	8.0	< 0.05	<0.0005			< 0.001	10	7.18	26.8	
8/18/2009			< 0.0005	< 0.01	5.0	< 0.01	< 0.1	< 2.0	7.00	9.0	< 0.05	<0.0005		40	< 0.001	8	8.75	19.8	40
8/25/2010	*Dry*																		
8/24/2011			<0.05	<0.01	4.0	<0.01	<0.1	<1	6.98	10.0	<0.05	<0.0005		41	<0.001	9	7.42	23.2	48
8/31/2012			<0.05	<0.01	4.0	<0.01	<0.1	2.0	**6.38**	7.5	<0.05	<0.0005		42	<0.001	10	7.45	22.6	132
8/31/2012	*Duplicate*		<0.05	<0.01	4.0	<0.01	<0.1	1.0	**6.39**	8.3	<0.05	<0.0005		41	<0.001	10	7.45	22.6	132
8/29/2013			<0.05	<0.01	5.0	<0.01	<0.1	1.0	7.11	9.7	<0.05	<0.0005		46	<0.001	8	7.99	24.1	87
8/21/2014			<0.05	<0.01	5.0	<0.05	<0.5	2.0	6.72	7.3	<0.05	<0.0005		43	<0.001	9	8.85	23.3	62
8/25/2015			<0.05	<0.01	4.6	<0.05	<0.5	<1	**6.34**	10.0	<0.05	<0.0005		47	<0.001	8	6.68	20.7	43
9/8/2016		3.61	<0.05		5.6	<0.002	<0.02	<0.50	7.11	8.5	0.022	0.00002		45	**0.0017**				
8/29/2017		3.800	<0.0002	<0.003	5.0	<0.010	<0.010	1.5	6.9	8.5	0.038	0.00014		38	<0.002	9	6.64	22.1	52

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

* should not be decreased by more than 25% of the natural concentration

Additional Locations

Monitor	Parameter -	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
	PWQO -	0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
	Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RW-1	4/11/2017	0.015	**3.48**	0.125	189	0.00002	0.0093	0.0011	0.14	<0.00001	526	104	0.279	2560	59	**1.80**	340	<30	81.3
RW-2	4/11/2017	0.004	**1.36**	0.047	65	0.00001	0.0025	0.0011	0.17	<0.00001	175	48	0.225	932	16	**0.86**	150	24	55
RW-3	10/5/2017	0.001	**1.60**	0.044	48		0.0011	<0.0002	0.18	<0.000002	200	37	0.059	798	2.5	**0.47**	150	12	59

Monitor	Parameter -	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
	PWQO -		0.003	0.02					6.5 - 8.5	*		0.02			0.001				
	Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
RW-1	4/11/2017	182	<0.0002	0.0053	180	<0.22	<0.16	23.0	7.99	2070	70	**1.25**		4170	**0.016**				
RW-2	4/11/2017	66	<0.0002	0.0052	62	0.68	0.09	9.3	8.22	768	14	**0.42**		1650	**0.008**				
RW-3	10/5/2017	69	<0.0002	<0.003	69	0.039	0.410	10.0	8.31	517	0.13	0.005	39.0	1230					

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

* should not be decreased by more than 25% of the natural concentration

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
7/4	6/1/2001			0.020	0.337	10.7				**1.61**		3.9	3.9	
	8/1/2001		< 0.001	0.330	0.260	11.1	< 0.001	0.004	0.031	**2.45**	< 0.001	3.9	5.5	**0.168**
	5/7/2002			< 0.001	0.022	10.6				0.21			3.2	
	8/6/2002		0.002	0.008	0.138	17.6	< 0.001	0.013	0.087	**7.58**	< 0.001	7.2	6.0	**0.282**
	5/21/2003			< 0.01	0.023	11.7				0.10			3.3	
	8/6/2003		0.022	0.006	0.022	11.0	< 0.0001	< 0.005	< 0.0005	0.05	<0.00005	3.1	3.3	
	5/26/2004			<0.01	0.020	11.2				0.09			4.0	
	8/24/2004		< 0.002	0.008	0.022	11.7	< 0.0001	< 0.005	0.0017	0.16	0.0001	3.2	3.2	**0.198**
	8/3/2005			0.016	0.026	11.0				0.06			3.2	
	9/1/2005		< 0.001	< 0.01	0.017	11.0	< 0.0001	< 0.005	0.0043	< 0.05	< 0.0001	3.4	3.0	0.045
	5/16/2006			< 0.02	0.02	11.4				< 0.02			3.3	
	8/29/2006			< 0.02	0.02	11.0	< 0.0001	< 0.005	0.003	< 0.05	< 0.0001	3.3	3.2	
	5/15/2007			< 0.02	< 0.02	10.2				0.03			2.9	
	8/14/2007		< 0.001	< 0.01	0.2	12.0	< 0.0001	< 0.005	0.003	< 0.05	0.0001	3.6	3.5	**0.21**
	5/21/2008			< 0.01	< 0.02	11.1				< 0.05			3.0	
	8/19/2008		< 0.001	< 0.01	0.019	11.0	< 0.0001	< 0.005	0.003	< 0.05	< 0.0001	3.2	3.7	**0.2**
	5/19/2009			<0.02	<0.02	9.0				<0.05			2.5	
	8/18/2009		< 0.001	<0.02	0.02	11.0	< 0.0001	< 0.005	0.004	<0.05		3.2	3.0	**0.19**
	5/18/2010			<0.02	<0.02	10.7				0.03			3.0	
	8/24/2010		<0.001	<0.01	0.022	11.0	<0.0001	<0.005	<0.001	<0.01	<0.0001	3.4	3.2	**0.23**
	5/31/2011			<0.01	<0.01	11.4				<0.05			3.0	
	8/23/2011		<0.001	<0.01	0.018	11.0	<0.0001	<0.005	0.003	<0.1	<0.0001	3.0	3.2	**0.2**
	5/16/2012			<0.02	<0.02	11.9				<0.02			3.2	
	8/29/2012		<0.001	<0.01	0.02	11.0	<0.0001	<0.005	**2.8**	<0.2	<0.0001	3.2	3.3	**0.2**
	10/5/2017		0.0003	<0.02	0.017	9.9	<0.00002	<0.001	0.0034	0.075	<0.000002	2.9	2.9	**0.18**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5			5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
7/4	6/1/2001		4.8			2.4		< 0.10	7.5	7.46	45	< 0.10	2.2	116
	8/1/2001		8.1	< 0.001	0.180		< 0.10	< 0.10				0.10	2.8	
	5/7/2002		4.3			6.1		< 0.10	5.1	7.13	50	0.04	3.0	115
	8/6/2002		5.9	**0.017**	0.045	8.9	< 0.05	< 0.03	3.2	6.80	53	0.04	2.5	111.7
	5/21/2003		4.3			< 0.5		< 0.2	< 0.5	7.01	49	0.06	4.4	127
	8/6/2003		4.7	<0.0005	<0.005	0.6	< 0.2	< 0.2	8.1	7.91	108	0.06	2.8	227
	5/26/2004		4.4			<0.5		<0.2	5.6	6.93	49	<0.03	3.6	110
	8/24/2004		4.5	0.001	< 0.005	1.0	< 0.2	0.40	5.6	6.98	50	0.08	3.9	125
	8/3/2005		4.8			< 1		2.30	8.0	7.53	40	< 0.05	3.3	95
	9/1/2005		4.8	< 0.0005	0.005	< 1	< 0.3	0.50	7.0	7.45	53	< 0.05	3.2	107
	5/16/2006		4.3			2.0			6	7.3	55	< 0.01	3.7	113
	8/29/2006		4.2	< 0.0005	< 0.005	1.0	< 0.01	0.2	6	7.3	53	0.1	3.8	107
	5/15/2007		4.3			2.0		< 0.1	6	7	49	< 0.05	4.8	111
	8/14/2007		4.8	< 0.0005	< 0.005	< 1	< 0.01	0.1	6	7.1	52	< 0.05	3.6	110
	5/21/2008		3.9			< 1		< 0.1	5	7.7	50	< 0.05	3.1	109
	8/19/2008		4.7	< 0.0005	< 0.005	< 1	< 0.01	< 0.1	7	7.6	51	< 0.05	3.3	110
	5/19/2009		3.4			<1		<0.1	4	6.6	42	<0.05	2.8	94
	8/18/2009		4	< 0.0005	< 0.005	<1	< 0.01	<0.1	5	7	53	<0.05	3.6	112
	5/18/2010		4			1.0		<0.1	5	7.3	49	<0.05	3.3	109
	8/24/2010		4.7	<0.0005	<0.005	1	<0.01	<0.1	5	7.1	51	<0.05	3.8	116
	5/31/2011		3.9			2		<0.1	9	7.14	46	<0.05	2.9	101
	8/23/2011		4.4	<0.0005	0.006	1	<0.01	<0.1	7	6.74	48	<0.05	3.3	115
	5/16/2012		4.2			<1.0		<0.1	7	6.99	50	<0.05	3.6	110
	8/29/2012		4.6	<0.0005	<0.005	<1.0	<0.01	<0.1	5	6.86	53	<0.05	3.0	110
	10/5/2017		6.5	0.00046	<0.003	<0.5	<0.033	0.92	5.4	7.53	53.8	<0.015	3.3	110

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
7/4	6/1/2001		185			25	2				
	8/1/2001		218	0.46	0.07	36		< 1	< 0.001	7.2	50
	5/7/2002		**730**			195	< 1	13.47		7.0	70
	8/6/2002		146	0.07		< 20	< 1	4.55	< 0.001	7.1	100
	5/21/2003		180			14	< 0.5			7.4	90
	8/6/2003		132	0.18	< 0.05	9	< 0.5	3640	< 0.001	7.3	90
	5/26/2004		136			11				6.9	20
	8/24/2004		140	0.32	1.14	13			< 0.001	**6.2**	NA
	8/3/2005		410			22	< 3	2400		**3.3**	90
	9/1/2005		247	0.70	2.99	15			< 0.001	**4.4**	90
	5/16/2006		68			13	< 2	1100		7.0	
	8/29/2006		82	0.5	1.6	13	< 2		< 0.001	6.6	
	5/15/2007		72			5	< 2			6.9	
	8/14/2007		69	< 1	3.4	19	< 2		< 0.001	7.1	105
	5/21/2008		68			11	< 2	1500		7.5	
	8/19/2008		75	1.2	1.3	8	< 2		< 0.001	7.4	
	5/19/2009		60			16				7.5	100
	8/18/2009		72	1.6	2.2	34			< 0.001	7.6	152
	5/18/2010		74			13				7.2	85
	8/24/2010		74	1.6	0.79	19			<0.001	**11.0**	
	5/31/2011		66			18				**6.4**	118
	8/23/2011		100	0.6	0.50	11			<0.001	**6.3**	124
	5/16/2012		90			17				7.2	112
	8/29/2012		158	0.59	1.10	10			<0.001	6.9	156
	10/5/2017		160	0.31	0.54	17	<3	3890			

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
21/7	6/1/2001			0.062	0.297	25.7				0.27		2.80	7.2	
	8/1/2001		< 0.001	0.014	0.029	27.5	< 0.001	< 0.001	< 0.001	**0.45**	< 0.001	2.80	5.9	**0.071**
	8/6/2002		0.002	0.023	0.054	35.8	< 0.001	0.003	0.0150	**1.88**	< 0.001	4.02	9.1	**0.103**
	5/21/2003			0.020	0.043	28.9				0.03			6.5	
	8/6/2003		< 0.002	0.019	0.042	29.4	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.00005	3.10	7.0	
	5/26/2004			0.020	0.032	26.0				0.04			6.1	
	8/24/2004		< 0.002	0.021	0.035	30.1	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.0001	2.90	6.5	**0.056**
	8/3/2005			0.022	0.034	27.0				< 0.05			6.0	
	9/1/2005		< 0.001	0.022	0.034	33.0	< 0.0001	< 0.005	0.0016	< 0.05	< 0.0001	3.50	7.4	**0.069**
	5/16/2006			< 0.02	0.03	26.3				< 0.02			5.6	
	8/29/2006		< 0.001	0.017	0.034	30.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	3.20	6.8	
	5/15/2007			< 0.02	0.04	28.0				< 0.02			6.0	
	14/08/2007		0.001	0.018	0.037	33.0	< 0.0001	< 0.005	< 0.001	< 0.02	< 0.0001	3.70	7.3	
	5/21/2008			< 0.02	0.03	26.8				< 0.02			5.6	
	8/19/2008		< 0.001	0.021	0.034	29.0	< 0.0001	< 0.005	< 0.001	< 0.02	< 0.0001	3.20	7.4	**0.055**
	5/19/2009			<0.02	0.03	26.4				<0.02			5.6	
	8/18/2009		< 0.001	0.019	0.039	30.0	< 0.0001	< 0.005	0.001	<0.02		3.20	6.8	0.046
	5/18/2010			< 0.02	0.05	28.6				<0.02			6.1	
	8/24/2010	No Recovery												
	5/31/2011			<0.02	0.04	29.2				<0.02			6.4	
	8/23/2011		<0.001	0.015	0.041	31.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	3.30	7.2	0.042
	5/16/2012			<0.02	0.04	31.2				<0.02			6.6	
	8/29/2012		<0.001	0.022	0.039	31.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	3.30	7.3	0.028
	10/5/2017		0.00058	0.021	0.045	30.0	<0.00002	<0.001	0.00039	<0.06	<0.000002	3.40	6.6	0.040

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5			5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
21/7	6/1/2001		10.3			2.7		< 0.10	8.3	8.05	110	< 0.10	4.5	230
	8/1/2001		7.8	< 0.001	0.0050		< 0.10	< 0.10		7.89	100	< 0.10	2.2	210
	8/6/2002		7.7	0.0020	0.0290	< 0.5	< 0.05	< 0.03	3.4	8.12	118	0.08	1.6	220
	5/21/2003		6.5			28.9		< 0.2	7.6	7.90	106	< 0.03	2.3	227
	8/6/2003		7.2	< 0.0005	< 0.005	1.0	< 0.2	< 0.2	8.1	7.91	108	0.06	2.8	227
	5/26/2004		5.5			0.5		0.20	6.6	7.95	93	0.03	2.4	187
	8/24/2004		6.4	0.0006	0.0050	0.6	< 0.2	< 0.2	6.9	8.00	111	0.07	2.1	223
	8/3/2005		5.8			< 1		< 0.2	9.0	8.19	110	0.11	3.1	208
	9/1/2005		6.9	< 0.0005	0.0058	< 1	< 0.3	< 0.2	6.0	8.03	120	0.07	2.5	217
	5/16/2006		6.1			1		< 0.1	6.0	8.20	121	< 0.05	1.9	230
	8/29/2006		6.4	< 0.0005	< 0.005	6	< 0.01	< 0.1	7.0	8.10	123	0.09	2.4	223
	5/15/2007		6.3			1		< 0.1	7.0	8.00	113	< 0.05	2.4	229
	8/14/2007		7			2	< 0.01	< 0.1	7.0	8.00	118	0.08	2.4	217
	5/21/2008		5.8			4		< 0.1	6.0	8.00	113	< 0.05	1.9	228
	8/19/2008		6.8	< 0.0005	< 0.005	2	< 0.01	< 0.1	6.0	8.20	115	< 0.05	2.6	230
	5/19/2009		5.9			1		<0.1	5.0	7.10	83	0.06	2.3	206
	8/18/2009		6.2	< 0.0005	< 0.005	1	0.02	<0.1	7.0	7.80	119	0.14	2.7	230
	5/18/2010		6.1			2		<0.1	9.0	8.10	111	0.16	2.1	234
	8/24/2010	No Recovery												
	5/31/2011		5.8			1		<0.1	5.0	8.02	103	0.09	2.4	211
	8/23/2011		6.3	<0.0005	<0.005	2	<0.01	<0.1	7.0	8.02	114	<0.05	2.4	231
	5/16/2012		6.1			<1		<0.1	6.0	7.84	110	<0.05	2.5	230
	8/29/2012		6.3	<0.0005	<0.005	1	<0.01	<0.1	6.0	7.76	120	<0.05	3.5	230
	10/5/2017		6.5	<0.0002	<0.003	0.56	<0.033	1.8	7.1	8.08	98.9	0.06	1.8	204

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
21/7	6/1/2001		149			< 20	< 1				
	8/1/2001		230	0.26	0.01	22		15.00	< 0.001		
	8/6/2002		180	< 0.05		56	1	6.52	< 0.001	8.3	180
	5/21/2003		192			9	< 0.5			7.9	170
	8/6/2003		160	0.19	< 0.05	11	< 0.5	8030		7.7	160
	5/26/2004		156			9				6.9	40
	8/24/2004		142	0.20	3.54	12			< 0.001	6.7	NA
	8/3/2005		350			64	< 3	410		3.9	170
	9/1/2005		220	0.80	7.50	36			< 0.001	6.1	200
	5/16/2006		154			< 4	< 2	8000		8.2	
	8/29/2006		147	0.300	2.5	6	< 2		< 0.001	8.23	
	5/15/2007		158			18	< 2			8.35	
	8/14/2007		151	0.700	4	17	< 2		< 0.001	8.11	221
	5/21/2008		148			7	< 2	4600		8.39	
	8/19/2008		160	1.400	1.3	13	< 2		< 0.001	8.39	
	5/19/2009		140			28				7.91	230
	8/18/2009		155	4.000	12	76				8.19	222
	5/18/2010		162			85					
	8/24/2010	No Recovery									
	5/31/2011		124			20				6.8	246
	8/23/2011		156	0.600	0.54	<4			<0.001	**6.25**	245
	5/16/2012		122			19				7.53	229
	8/29/2012		160	0.820	0.37	<8.0			<0.001	**7.76**	260
	10/5/2017		312	0.41	6.90	39	<3	28500			

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

January 9, 2018 AEC 18-020

Ministry of Environment, Conservation & Parks
Northern Region
Kenora Area Office
808 Robertson Street
Kenora, ON
P9N 1X9

Attention: Cathy Debney – Senior Environmental Officer

Re: **Jones Road Landfill Site –- 2018 Trigger Mechanism Exceedance Monitoring Summary**

Dear Cathy:

The purpose of this correspondence is to provide the Ministry of Environment, Conservation & Parks (MECP) District Office an update on the monitoring completed as part of the 2017 Trigger Mechanism Exceedances for boron in the surface water at the Jones Road landfill Site. The plan which was first outlined in a June 2017 letter notification letter proposed a phased approach which included collection of additional samples from both surface and ground water locations in 2017 to assess the mechanism in which the elevated boron concentrations were migrating downstream within the established Contaminant Attenuation Zone (CAZ). Subsequent revisions and recommendations to the program were made in the 2017 Trigger Mechanism Exceedance Monitoring Summary submitted April, 2018. The summary of the work completed in 2018 is summarized in the following sections.

Continued (2018) Surface Water Monitoring of Additional Locations

Surface water monitoring was continued in 2018 at additional surface water locations in the forested wetland area between the waste mound and SW-1. A total of three locations were targeted at various distances from the waste mound. As illustrated in the appended figures, RW-1 is located adjacent the MW-20, RW-2 is located adjacent to MW-2/13 and RW-3 was located between MW-20 and MW-21. It is noted that these locations were

targeted by City staff based on sufficient depth to facilitate a representative sample. There are no defined flow channels in this area and surface water migration is assumed to braided based on local subtle topographic variation.

The results, which have been appended along with updated surface water summary tables for the existing monitoring locations indicates boron concentrations were elevated at all three locations with similar concentrations to those observed in 2017.

As can be observed, the data is somewhat similar to last year with boron concentrations at all locations above 1.0 mg/L, while RW-2 indicated the most elevated values during the June12, 2018 sampling event (6.2 mg/L). This is not surprising given this location is closest to the waste mound. Other leachate indicator parameters were also observed to be more elevated at this location, including ammonia (14-79 mg/) and chloride (190-200mg/L); however, concentrations were noted to be reduced with distance from the waste mound (0.13-1.3 mg/L – ammonia & 98-110 mg/L at RW-3).

The surface water quality data collected in 2018 confirms the presence of leachate within the surface water is consistent between the waste mound and SW-1 with respect to boron concentrations, while other parameters are indicating a greater amount of attenuation in the same downstream area. This continues to illustrate along with the previous ground water data collected from MW7-4 in 2017 that the primary pathway for migration of these impacts are via overland flow. This is supported by the fact the underlying soils have limited permeability with a dominance of silt and clay.

Beyond the additional proximal surface water monitoring locations added in 2017/18, the water quality collected from routine monitoring location SW-1 has shown to be relatively consistent for the past three years, albeit elevated above the historical average concentrations for boron, while an increasing trend remains at SW-2. Given the onset of the boron elevations began at SW-1 in 2012 (appended graph), while they were not observed at SW-2 until 2016, there is likely a time lag with respect to the migration of the boron plume within the surface water such that the increasing trends at SW-2 may continue for the next few years. This time lag is also reflective in the operational mitigation strategies that have been employed by the City with the decreasing of the active working area, shifting the active area further back from the downgradient toe in a new cell area and increasing the amount of cover material at the downgradient end of the waste mound. Continued monitoring in 2019 of the regular surface water monitoring network will help to continue to assess the effectiveness with these operational changes, however, the leachate / boron contributions to the wetland feature would appear to be related to toe seeps or shallow ground water discharge in the wetland area immediately

north of the waste mound rather than from direct surface runoff from the active waste area.

Boron Compliance / Trigger Criteria Assessment

In addition to the additional surface water monitoring completed at the Site, a review of the evaluation criteria was completed. In this instance, the trigger limit for boron was based on the Provincial Water Quality Objectives (PWQO), which is routinely utilized as a reference in compliance evaluation of surface water at landfill sites in Ontario. However, given the distinct elevations in boron relative to other leachate indicator parameters at this Site as well as a number of other active landfill sites in various parts of the Province that Azimuth is involved with, the MECP Standards Branch was contacted to discuss the supporting information with respect to this parameter given its interim designation. It was communicated that given the limited toxicology dataset that was utilized during development of the PWQO criteria that the Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME, 2003) value would be more appropriate to use as it utilized a more robust toxicological dataset and was developed by the MECP. The CWQG is based on impacts to Bluegill (*Lepomus macrochirus*) and rainbow trout (*Oncorhynchus mykiss*), which are reported in Rainy River District. The CWQG value for boron for long term exposure is 1.5 mg/L and includes conservative factors to be protective of aquatic species. If this value is utilized in the surface water evaluation at the Site, SW-2 is in compliance , as the maximum concentration observed at this location to date is 0.42 mg/L, which is <30% of the CWQG criteria. Based on this alternative criteria, it is recommended that the trigger concentration for boron at SW-2 be revised from 0.2 mg/L to 1.5 mg/L to reflect the more appropriate compliance criteria, while the action level for SW-1 should be adjusted from 0.8 mg/L to 3 mg/L, which provides a more representative threshold given the elevated boron concentrations relative to all remaining leachate indicator parameters.

It is noted that an additional surface water location (RW-5) was proposed to be collected at the outlet of the wetland tributary at Morgan Lake. However, given the results discussed previously and the fact that a water quality sampling location is already in this general area (SW-5), which has not indicated any observable boron influence, the location was not formally established in 2018 and is not proposed to be targeted as part of the monitoring program in 2019. In the event that subsequent increases in boron concentrations at SW-1 are noted, then this location could be potentially targeted to better assess boron contributions to Morgan Lake, however, the current monitoring program is determined to be appropriate.

Boron Source Assessment

As indicated in the work plan for 2018, an assessment to potentially identify the specific source of boron within the waste stream was completed. It is understood that boron is potentially contained in a number of construction and demolition (C & D) wastes as both a fire retardant (wallboard) and preservative (treated wood), but the amounts and leaching potential for these materials is not well understood. As such, some common C & D wastes were assessed in 2018 for leachable boron content. The City isolated these wastes (pressure treated wood, wallboard and particle board) in separate Rubbermaid containers on site such that they were exposed to local conditions and that these containers collected the leached rainfall from these materials between spring melt and midsummer. Subsequent water samples were collected and analyzed for boron. The results, which are summarized in the following table indicate that the primary source is treated wood products, which is helpful from an operations perspective. In the event the boron concentrations continue to increase, these materials could be isolated from the remaining waste stream such that they are covered to reduce leaching or situated in an area where runoff can be more readily contained such that it is not allowed to discharge into the adjacent wetland area. Despite these potential operational changes, no formal recommendations are being made at this time as the data collected thus far the surface water locations would indicate that conditions have stabilized, while the proposed revisions to the compliance criteria would indicate that the current boron concentrations are not unacceptable at this time.

Table 1: Boron Source Concentrations

Material Source	Concentration (mg/L)
Particle Board	0.53
Wall Board / Dry Wall	0.85
Pressure Treated Wood	9.1

Further to the above noted source materials, the landfill capping material was also analyzed to assess potential boron contributions. The boron concentrations was noted to be 0.88 µg/g, whereas the background concentration as per O.Reg. 153/04 (Table 1) is 36 µg/g, indicating that the cover material represents an insignificant source relative to the treated wood noted above.

Aquatic Assessment (Update)

As discussed in the original action plan, it was proposed that an update to the historic aquatic assessment (Fenco MacLaren, 1997) could be completed with an updated field assessment of the water course / wetland feature that is present between the landfill and SW-2. However, given the abovementioned assessment, including proposed revisions to

the compliance criteria, completion of this assessment is no longer considered critical to the overall evaluation. If increased boron concentration trends begin to be noted at SW-1 and the proposed action / trigger concentrations are exceeded then it would be recommended that this assessment be undertaken. As the proposed compliance criteria relates to the CWQG, which has specific rationale for its threshold, including targeted aquatic species, the aquatic assessment would have a more direct relationship with this criteria.

2019 Trigger Exceedance Monitoring

Given the results collected during 2017 and 2018, there is a more refined understanding of the boron impacts at the Site and that they are the result of surface water flow from the northern end waste area into the adjacent wetland area, likely through toe seeps or shallow ground water discharge in the area. The additional proximal surface water locations have confirmed that leachate indicator parameter concentrations are more elevated adjacent to the waste mound, although significant attenuation occurs between the waste and SW-1. The boron concentrations are noted to remain more elevated through the watershed, which is likely a function solubility and lack of chemical reactivity within the natural environment relative to other more prominent indicator parameters such as ammonia or BOD.

As a result of these parameter specific (boron) elevations in the downstream section of the Site and the fact that a more appropriate compliance criteria for boron is being proposed, it is recommended that the surface water monitoring program be curtailed back to the historic program identified in the ECA and subsequent amendments, with seasonal sampling at SW-1, SW-2, SW-3, SW-4 and SW-5. However, given the recent results, it is also recommended that one of the additional trigger monitoring locations (RW-2) be added to the program with the same frequency and analytical parameters as SW-1 and SW-2 such that a better understanding of the leachate quality can be established and tracked over the operational lifespan of the Site. This will allow for earlier detection of shifting leachate contributions to the watershed such that potential operational changes can be made to mitigate any more significant leachate impacts to the wetland.

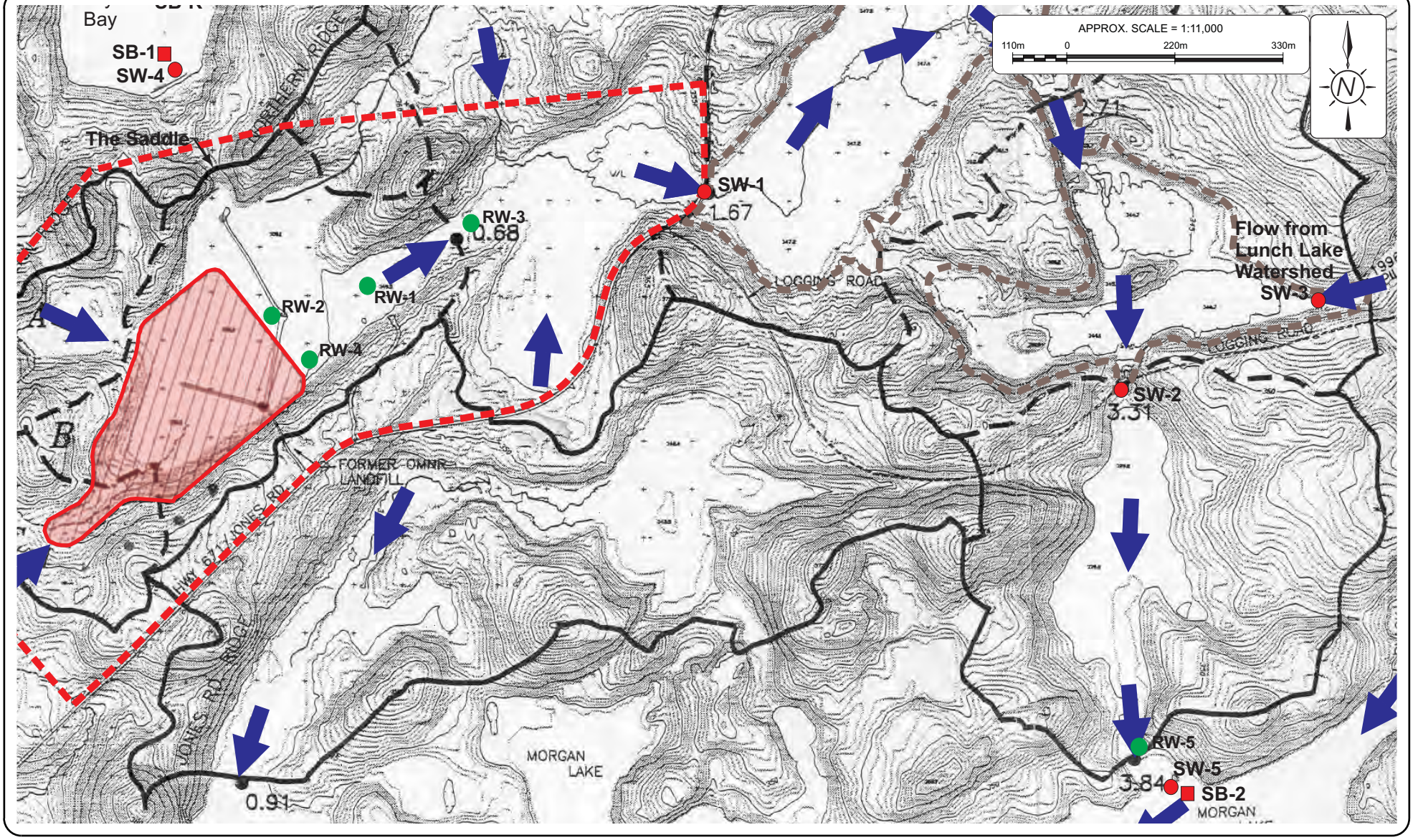
The City welcomes any feedback or comments relating to the above trigger exceedance summary.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Colin Ross, B.Sc., P.Geo.
Senior Hydrogeologist

Attach:

cc: Mukesh Pokharel – City of Kenora



Legend:

- Approved Waste Footprint
- Approximate Property Boundary
- Contaminant Attenuation Zone
- Watershed Boundary
- Surface Water Sampling Location
- Sediment/Benthic Sampling Location
- Temporary Action Plan Surface Water Sampling Location
- Surface Water Flow

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

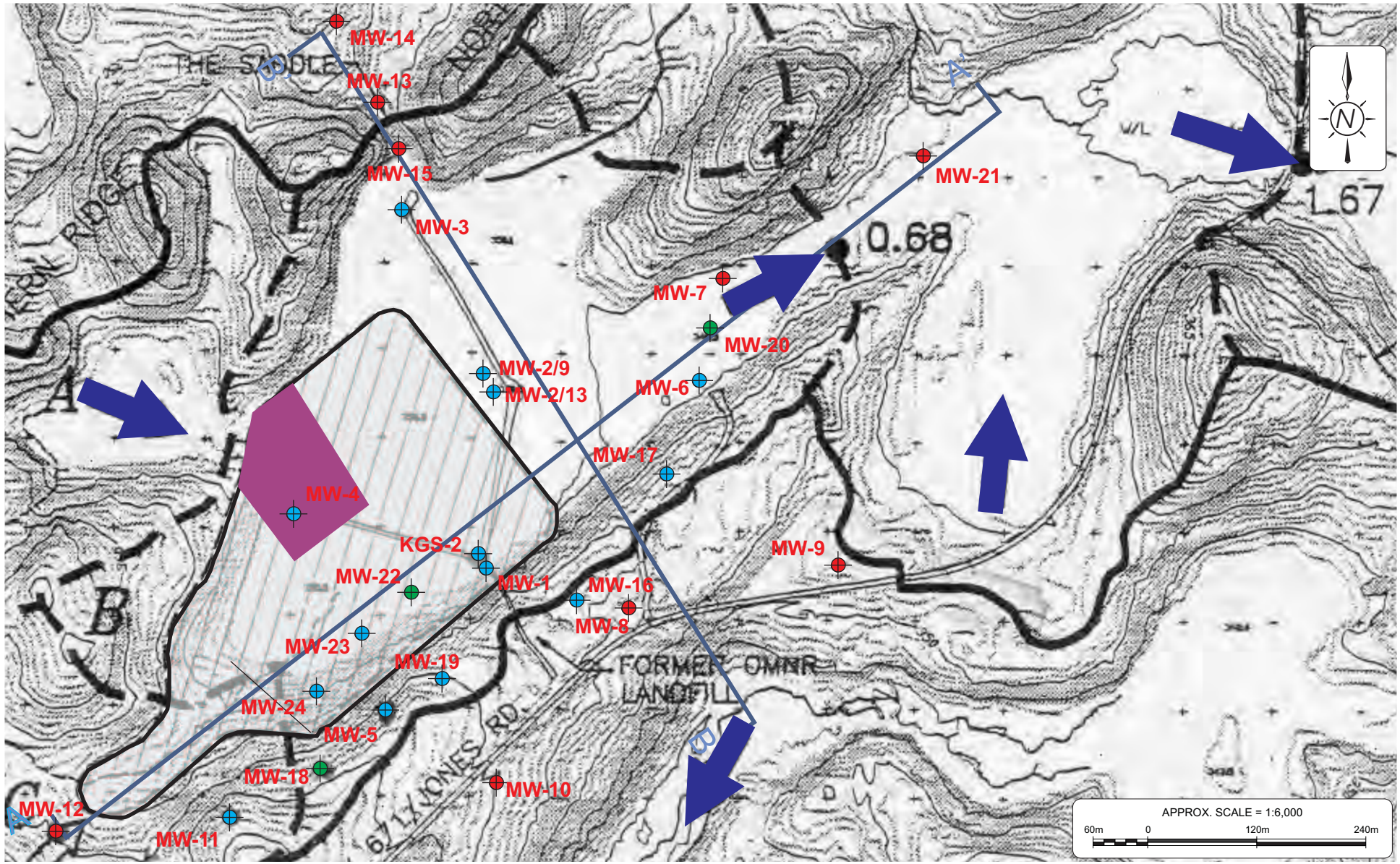
Hydrologic Features

Date Issued:	February 2018
Created By:	CMR
Project No.	17-020
File Name:	Figure 2 - Hydrologic Features.CDR

Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **1**



Legend:

- Approved Waste Footprint
- Ground Water Monitor (maintained)
- Ground Water Monitor (removed from program)
- Ground Water Monitor (decommissioned)
- Watershed Boundary
- Active Footprint Area

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

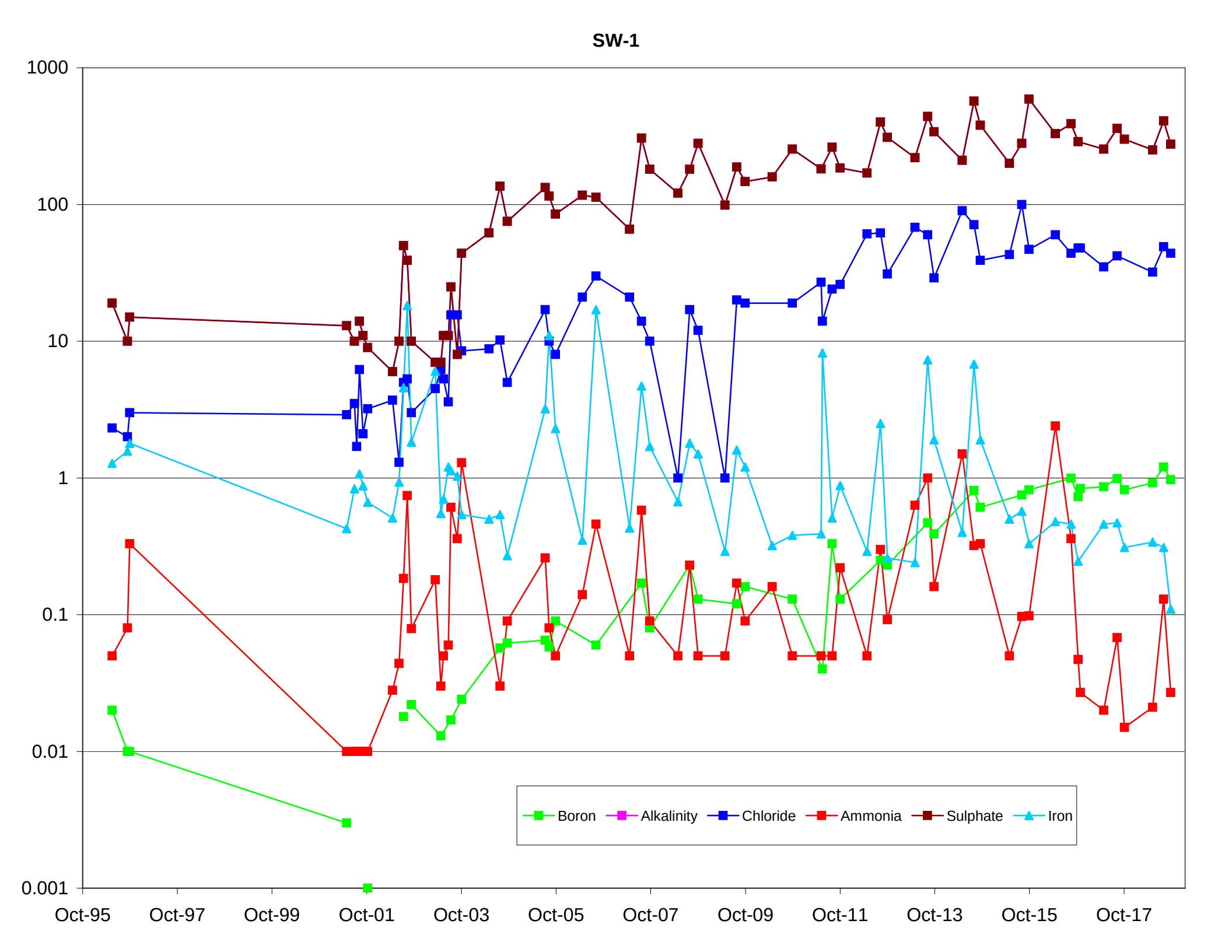
Ground Water Monitoring Network

Date Issued:	Jan 2019
Created By:	CMR
Project No.	18-020
File Name:	Figure 4 .CDR

Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **1**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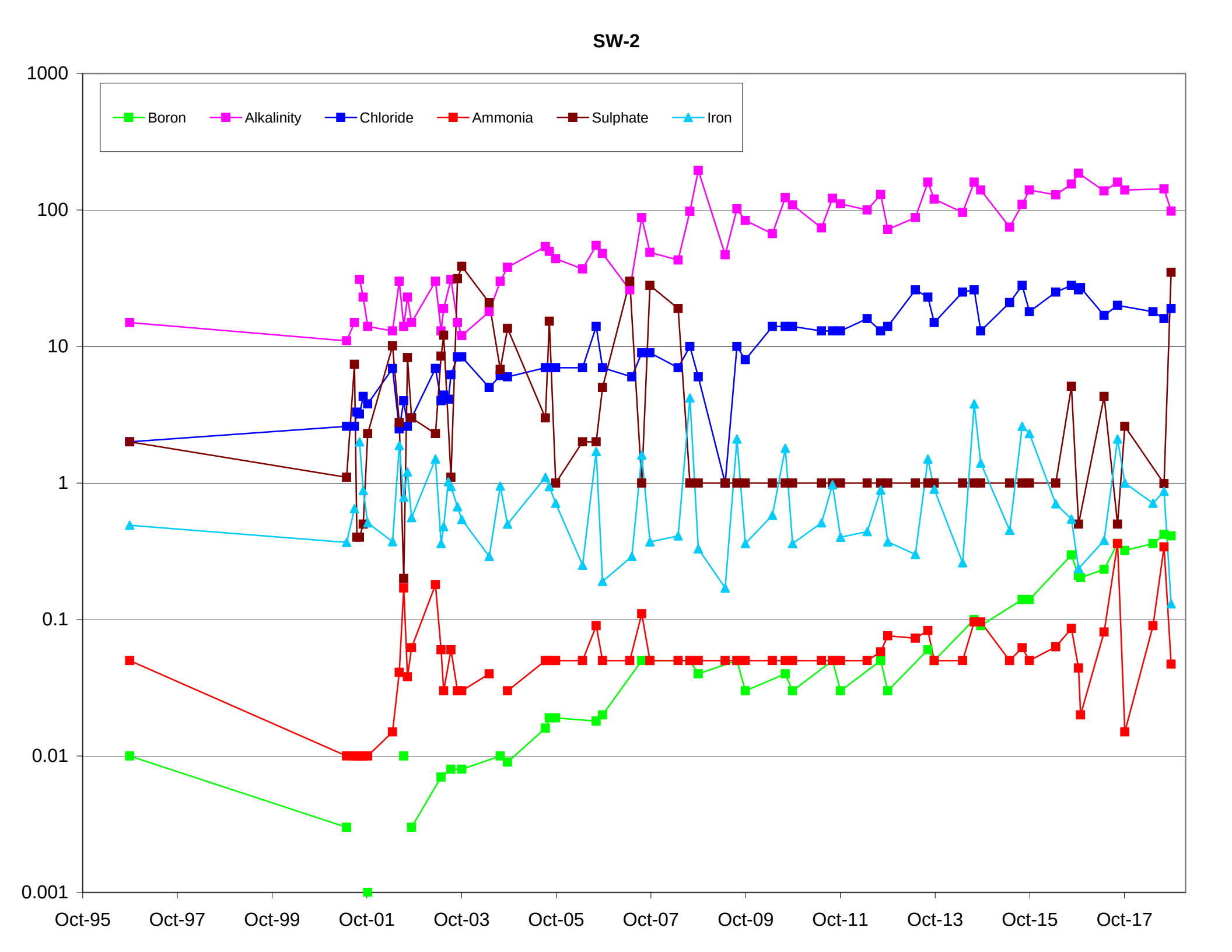
1000
100
10
1
0.1
0.01
0.001
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron


SW-2
Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron
1000
100
10
1
0.1
0.01
0.001
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17

APPENDIX C

Annual Waste Quantities

MATERIALS	2021	2022	2023
Total Cumulative	**334,175.00**	**367,491.64**	**404,636.13**
Total Year	**32,605.71**	**33,316.64**	**37,144.49**
Garbage (Domestic & Commercial)	7,095.16	6,657.40	6,521.23
Construction and Demolition	9,726.36	9,844.23	10,552.63
Brush and Yard Waste	362.17	323.44	324.41
Approved Contaminated Waste	337.72	396.87	6,696.87
Controlled Substance (Asbestos)	11.25	62.89	36.67
Industrial Ash	2,986.22	2,702.40	2,759.54
Hog Fuel	9,334.78	10,586.07	7,703.24
Biosolids (Sewer Sludge)	2,558.70	2,636.82	2,445.73
Compost	193.35	106.52	104.17
Glass Bottles	82.12	98.31	87.42

APPENDIX D

Ground Water Quality Data

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1/17	2010-05-18					29						3	6	
	2010-08-25	Limited Sample												0.044
	2011-05-31	no sample												
	2011-08-23		<0.001	<0.01	0.023	32	<0.0001	<0.005	<0.001	<0.1		4	7	0.034
	2012-05-16			0.11	0.04	96				**9.3**			17	
	2012-08-29		<0.001	0.69	0.03	130	<0.0001	<0.005	<0.001	**42**	<0.0001	8	27	**4.1**
	2013-05-22			0.4	0.0	162				**68**			33	
	2013-08-27		<0.2	0.6	0.025	187	<0.005	<0.01	<0.02	**74**	<0.0001	10	40	**2.74**
	2014-05-20			1	0.11	290				**58**			58	
	2014-08-19		<0.001	0.11	0.042	55	<0.001	<0.005	<0.001	**14**	<0.0001	6	12	**0.61**
	2015-05-20			0.37	0.069	110				**31**			25	
	2015-08-18	no sample												
	2016-05-10	no sample												
	2016-08-31		<0.0001	0.05	0.0228	40	<0.00001	<0.001	<0.0002	<0.005	<0.00001	3	9	**0.0718**
	2017-05-16		0.00183	<0.050	0.0308	38	<0.00001	0.0016	0.00351	**4.68**	<0.00001	3	9	**0.0997**
	2017-08-29		0.0019	<0.020	0.03	38	<0.00002	<0.001	<0.0002	**0.38**	<0.000001	3	8	0.032
	2018-05-28		<0.0002	0.074	0.064	98	<0.00002	<0.001	<0.0002	<0.06	<0.000002	7	22	**0.44**
	2018-08-22		0.00051	0.041	0.053	66	<0.00002	<0.001	0.0002	<0.06	<0.000002	6	15	**0.21**
	2019-05-29		0.0027	1.3	0.52	230	<0.00002	0.0048	0.00053	**150**	<0.000002	69	62	**3.7**
	2019-08-28		0.00072	1.22	0.134	188	<0.000005	0.00144	<0.0002	**0.972**	<0.000005	86	64	**2.27**
	2020-05-27		0.0004	0.016	0.0428	40	<0.000005	<0.0005		**1.96**	<0.000005	5	9	**0.171**
	2020-08-19		0.0015	<0.01	0.0289	31	<0.000005	<0.0001	<0.0002	0.011	<0.000005	4	8	**0.0515**
	2021-06-10		0.00044	0.523	0.106	195	<0.000005	0.00076	<0.0002	0.034	<0.000005	46	59	**2.27**
	2021-08-11		0.0002	0.075	0.104	70	<0.000005	0.00017	0.00031	<0.01	<0.000005	7	25	0.018
	2022-05-25		0.0012	1.6	0.341	234	<0.000005	<0.0005	<0.0002	**29.9**	<0.000005	124	74	**1.37**
	2022-08-10		0.0003	0.029	0.048	35	<0.000005	<0.0005	<0.0002	0.044	<0.000005	9	8	**0.293**
	2023-06-07		<0.00100	0.222	0.117	218	<0.00005	<0.00500	<0.00200	**1.88**	<0.000005	16	59	**1.06**
	2023-08-23		0.00126	1.42	0.113	302	<0.00001	0.001	<0.00040	**5.6**	<0.0000050	57	84	**3.54**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
1/17	2010-05-18		4			11			38	7.90	56	0.06	1.3	242
	2010-08-25		10	<0.0005	0.016	9	<0.1	<0.1	36	7.40	99		3.1	344
	2011-05-31	no sample												
	2011-08-23		3	<0.0005	<0.005	14	<0.1	<0.1	46	7.78	56	<0.05	1.8	263
	2012-05-16		10			6		<0.1	37	7.12	280	0.95	**9.2**	600
	2012-08-29		20	<0.0005	0.0066	19	0.067	<0.1	88	6.79	380	1.5	**26**	910
	2013-05-22		24			36		<0.1	20	7.29	500	3.4	**42**	1100
	2013-08-27		41	<0.05	<0.01	66	<0.01	<0.1	<1	7.07	**640**	3.3	**80**	1400
	2014-05-20		84			110		<0.1	<1	6.92	**1100**	15	**77**	2000
	2014-08-19		10	<0.0005	<0.005	18	<0.01	<0.1	32	7.36	170	1.3	**5.2**	450
	2015-05-20		26			36		<0.1	95	6.99	310	4.9	**17**	890
	2015-08-18	no sample												
	2016-05-10	no sample												
	2016-08-31		3	<0.0002		7	<0.02	<0.02	64	7.96	65.9	0.12	1.6	293
	2017-05-16		4	0.0011		8	<0.033	<0.044	64	7.83	65.8	0.04	1.8	296
	2017-08-29		3	<0.0002	<0.003	7	<0.010	<0.010	61	8.03	66.7	0.03	1.2	281
	2018-05-28		12	<0.0002	<0.003	16	<0.010	<0.010	61	8.03	259	0.45	**6.0**	622
	2018-08-22		9	<0.0002	<0.003	10	<0.010	<0.010	41	7.93	178	0.31	4.9	440
	2019-05-29		74	<0.0002	<0.003	110	0.057	0.022	7	6.85	**960**	17	**31.0**	2000
	2019-08-28		85	<0.00005	<0.001	72	<0.020	<0.04	4	6.76	**844**	22	**48.2**	1770
	2020-05-27		4	<0.00005	<0.001	5	<0.01	<0.02	35	8.12	98	0.36	3.2	261
	2020-08-19		3	<0.00005	<0.001	4	<0.01	<0.02	40	3.5	83	0.02	2.1	244
	2021-06-10		57	<0.00005	<0.001	82	<0.02	<0.04	1	6.99	**939**	9.70	**31.3**	1720
	2021-08-11		17	<0.00005	<0.001	26	<0.01	<0.02	14	7.72	390	0.04	**9.0**	782
	2022-05-25		110	<0.00005	<0.001	89	<0.02	<0.04	<6.0	7.09			**44.4**	
	2022-08-10		5	<0.00005	<0.001	3	<0.02	<0.04	27	7.45	190	3.73	4.6	246
	2023-06-07		46	<0.0005	<0.0100	66	<0.05	<0.1	6	7.64	**641**	0.55	**26.8**	1300
	2023-08-23		106	<0.00010	<0.0020	126	<0.2	<0.4	<6.0	6.87	**1230**	11.60	**37.5**	2520

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
1/17	2010-05-18		116			21				7.90	
	2010-08-25		166							7.40	
	2011-05-31	no sample									
	2011-08-23		214	0.5	0.07	11	<2		0.001	**6.47**	276
	2012-05-16		364			69				6.80	818
	2012-08-29		**800**	3.9	0.14	150			0.016	6.72	1354
	2013-05-22		**824**			220				6.73	1203
	2013-08-27		**1140**	5.7	0.19	280	69	240	0.27	7.04	1642
	2014-05-20		**1290**			300				6.93	1114
	2014-08-19		264	1.5	0.037	35	13		0.012	6.88	2630
	2015-05-20		**634**			64	3	120		7.11	849
	2015-08-18	no sample									
	2016-05-10	no sample									
	2016-08-31		180	0.152	0.0266	10	<6.0	51	<0.0010		
	2017-05-16		174	0.13	0.011	6.2	<3	37	0.0043	8.24	226
	2017-08-29		138	0.054	0.0063	7.2	<3	8.5	<0.002	6.82	250
	2018-05-28		402	0.8	<0.003	24	<10	41.5	<0.002	6.52	341
	2018-08-22		268	0.39	<0.003	18	<6	17	<0.002	7.68	334
	2019-05-29		**1200**	19	0.009	160	17	370	0.0048	6.87	650
	2019-08-28		**1000**	23.3	<0.015	155	7.1	244	0.0102	7.68	546
	2020-05-27		149	<15	0.0351	460	27.8	243	0.0765	7.88	179
	2020-08-19		171	0.064	0.0048	<20	<2	3.5	<0.001	8.38	228
	2021-06-10		**924**	11.5	0.0188	126	<10	248	0.0021	7.12	670
	2021-08-11		462	1.86	1.55	72	<2	1600	0.0039		
	2022-05-25		**1190**				303	10400	0.0049	6.84	1080
	2022-08-10		161	11	53.1	216	218	30300	0.0131	7.84	313
	2023-06-07		**666**	1.53	0.942	53	25	6910	0.0215	7.25	518
	2023-08-23		**1610**	16.6	1.95	397	47	14400	<0.0050	6.68	2770

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2/9	2010-05-18			<0.02	0.07	26.6				<0.001			6.4	
	2010-08-25		0.001	0.021	0.091	26.0	< 0.0001	<0.005	<0.001	<0.001	<0.0001	6.3	6.3	0.016
	2011-05-31			0.02	0.06	28.5				<0.05			6.6	
	2011-08-23		<0.001	0.014	0.074	28.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	5.7	6.9	0.026
	2012-05-16			<0.02	0.08	28.5				<0.02			6.7	
	2012-08-29		<0.001	0.023	0.081	28.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	6.0	7.2	0.022
	2013-05-22			0.02	0.078	28.9				0.03			7.0	
	2013-08-27		<0.2	0.03	0.082	28.3	<0.005	<0.01	<0.02	<0.02	<0.0001	6.0	6.9	0.03
	2014-05-20			0.02	0.081	29.0				<0.02			7.2	
	2014-08-19		<0.001	0.02	0.078	27.0	<0.001	<0.005	<0.001	<0.1	<0.0001	5.8	6.8	0.019
	2015-05-20			0.02	0.075	29.0				0.04			7.0	
	2015-08-18		0.0011	0.014	0.085	28.0	<0.0001	<0.005	<0.001	<0.1		5.9	7.0	0.023
	2016-05-10	could not access												
	2016-08-31		0.0097	<0.050	0.0735	25.0	<0.00001	<0.001	0.00036	<0.05	<0.00001	5.8	6.6	0.0053
	2017-05-16		0.0010	<0.050	0.0308	41.2	0.000089	0.0124	0.0149	**6.99**	<0.00001	7.7	14.3	**0.211**
	2017-08-29		<0.0002	0.021	0.065	26.0	<0.00002	<0.001	0.00093	<0.060	<0.000002	5.8	6.6	0.025
	2018-05-28		0.0005	0.026	0.077	30.0	<0.00002	<0.001	0.0041	<0.060	<0.000002	6.6	7.6	0.034
	2018-08-22		0.0003	0.024	0.073	29.0	<0.00002	<0.001	0.00086	<0.060	<0.000002	6.4	7.3	0.032
	2019-05-29		0.0012	0.021	0.12	32.0	0.000049	0.013	0.013	**6.8**	0.0000023	7.4	9.8	**0.14**
	2019-08-28		0.0002	0.021	0.057	26.0	<0.000005	<0.0001	0.00022	<0.01	<0.000005	6.2	6.9	0.025
	2020-05-27		0.0010	0.02	0.0839	26.6	<0.000005	<0.0005		<0.01	<0.000005	6.2	6.7	0.00824
	2020-08-19		0.0002	0.023	0.064	26.2	<0.000005	<0.0001	0.00022	<0.01	<0.000005	6.6	7.4	0.0219
	2021-06-10		0.0004	0.018	0.0683	26.2	<0.000005	<0.0001	0.0006	<0.01	<0.000005	5.8	7.0	0.0235
	2021-08-11		0.0002	0.021	0.0651	27.4	<0.000005	<0.0001	0.0002	<0.01	<0.000005	6.1	7.1	0.0274
	2022-05-25		0.0005	0.021	0.069	27.7	0.0000072	<0.0005	0.00053	<0.01	<0.000005	6.2	7.0	0.0144
	2022-08-10		0.0005	0.014	0.0645	24.2	0.0000123	<0.0005	0.00046	<0.01	<0.000005	6.0	6.7	0.00115
	2023-06-07		0.0004	0.02	0.0639	27.3	0.0000062	<0.0005	0.00061	<0.010	<0.000005	6.6	7.9	0.0193
	2023-08-23		0.0004	0.021	0.0657	26.4	<0.000005	<0.0005	0.00029	<0.010	<0.000005	6.4	7.5	0.0251

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
2/9	2010-05-18		7.2			1			11	8.10	103	0.05	0.8	225
	2010-08-25		7.3	<0.0005	<0.005	<1	0.01	<0.1	12	8.20	107	<0.05	0.8	228
	2011-05-31		6.7			<1			11	8.24	103	0.15	0.9	224
	2011-08-23		7	<0.0005	<0.005	<1	<0.01	<0.1	10	8.14	106	0.1	1.2	223
	2012-05-16		7			<1		<0.1	9	7.94	110	<0.05	0.95	230
	2012-08-29		7.2	<0.0005	<0.005	<1	0.034	<0.1	8	7.78	110	0.11	1.8	230
	2013-05-22		7.8			1		<0.1	10	8.10	110	0.19	1.1	230
	2013-08-27		7.2	<0.05	<0.01	1	0.018	<0.1	8	8.14	110	0.19	1.5	230
	2014-05-20		8.1			3		<0.1	15	7.84	110	0.22	1.1	220
	2014-08-19		7.2	<0.0005	<0.005	2	<0.01	<0.1	15	8.07	100	0.21	3	230
	2015-05-20		7.4			<1		<0.1	9	7.47	110	0.23	1.4	230
	2015-08-18		6.9	<0.0005	<0.005	<1	0.035	<0.1	7.9	7.99	120	0.14	0.93	230
	2016-05-10	could not access												
	2016-08-31		7.34	<0.0002	<0.005	3	0.005	<0.020	15	8.17	103	0.14	0.7	225
	2017-05-16		7.85	**0.0158**		<0.5	<0.033	0.055	12	8.23	105	0.09	0.7	219
	2017-08-29		7.4	<0.0002	<0.003	<0.5	<0.01	<0.01	13	8.21	101	0.10	<1	221
	2018-05-28		8.2	<0.0002	<0.003	<0.5	0.013	0.035	12	8.3	104	0.06	<0.5	223
	2018-08-22		7.8	<0.0002	<0.003	<0.5	<0.010	<0.010	11	8.25	105	0.22	2.1	221
	2019-05-29		8	0.01	0.022	1	0.055	0.15	11	8.2	100	0.16	1.0	230
	2019-08-28		7.13	<0.00005	<0.001	0.5	<0.010	<0.020	10.3	8.22	109	0.13	1.4	222
	2020-05-27		7.22	<0.00005	<0.001	0.3	<0.01	0.022	12.5	8.04	117	0.09	1.5	8.04
	2020-08-19		8.1	0.00009	<0.001	0.4	<0.01	<0.02	12	8.12	110	0.07	1.0	221
	2021-06-10		7.55	0.000073	<0.001	0.7	<0.01	<0.02	8	8	141	0.20	2.0	238
	2021-08-11		7.26	0.000071	<0.001	1.1	<0.01	<0.02	7.36	8.02	133	0.12	1.5	253
	2022-05-25		7.53	0.000067	<0.001	0.3	<0.01	<0.02	10.5	8	**1120**	0.09	1.9	
	2022-08-10		7.04	0.000171	<0.001	0.3	<0.01	<0.02	11.8	8.3	107	0.1	2.0	222
	2023-06-07		7.56	0.000054	<0.001	0.9	<0.01	0.044	11.6	8.09	125	0.1	2.6	236
	2023-08-23		7.28	0.000067	<0.001	1.4	<0.01	<0.020	9.61	8.16	139	0.1	1.9	255

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
2/9	2010-05-18		156							8.10	
	2010-08-25		144	0.5	0.46	5			<0.001	8.20	
	2011-05-31		146			<4				8.11	226
	2011-08-23		160	<1	1.2	<4			<0.001	**5.98**	230
	2012-05-16		130			7.2				8.10	230
	2012-08-29		170	0.28	0.38	<8			<0.001	8.05	297
	2013-05-22		168			4.8				8.00	270
	2013-08-27		162	0.64	6.1	5.5	<2	12000	<0.001	8.21	236
	2014-05-20		192			15				6.59	220
	2014-08-19		186	3.4	6.7	23	<2		0.0011	**8.63**	253
	2015-05-20		182			9.3	<2	2300		**5.80**	210
	2015-08-18		228	0.21	0.7	<4	<2			7.18	203
	2016-05-10	could not access									
	2016-08-31		122	0.146	3.56	69	<6.0	2900	0.0026		
	2017-05-16		146	0.27	1.4	38	<3	2300	0.0039	7.88	216
	2017-08-29		166	0.28	1.4	34	<3	3040	<0.002	7.02	203
	2018-05-28		168	0.31	2.3	30	<6	4650	<0.002	7.17	186
	2018-08-22		410	1	8	94	<6	6150	<0.002	7.32	173
	2019-05-29		170	0.2	0.16	12	2.6	9000	<0.0015	7.38	135
	2019-08-28		199	0.24	0.274	<20	<2	4130	0.0031	8.46	166
	2020-05-27		222	0.16	0.402	17	<2	9480	<0.001	8.48	174
	2020-08-19		165	0.073	0.484	24	<3.3	307	<0.001	6.7	272
	2021-06-10		269	0.4	0.361	40	<2	6090	0.0016	7.6	182
	2021-08-11		192	0.381	0.382	28	<2	5610	0.0033		
	2022-05-25		190	0.287	0.384	20	<5.0	2120	0.0059	8.41	237
	2022-08-10		182	0.465	0.353	35.0	<3.3	385	0.0076	8.35	233
	2023-06-07		182	<0.100	0.6	38	<3.0	3670	0.0143	8.37	248
	2023-08-23		207	0.184	0.358	24	<3.0	8500	<0.0010	8.24	257

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2/13	2010-05-18			<0.02	0.02	23.3				<0.1			7.0	
	2010-08-25		< 0.001	0.022	0.025	24.0	<0.0001	<0.005	<0.001	<0.1		6.0	7.2	0.015
	2011-05-31			0.03	0.01	29.0				<0.05			7.9	
	2011-08-23		<0.001	0.018	0.021	24.0	<0.0001	<0.005	<0.001	<0.1			6.9	
	2012-05-16			<0.02	0.03	26.6				<0.02			7.4	
	2012-08-29		<0.001	0.027	0.024	24.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	6.0	7.7	0.0061
	2013-05-22			0.02	0.026	26.7				<0.02			7.6	
	2013-08-27		<0.2	0.03	0.023	25.9	<0.005	<0.01	<0.02	<0.02	<0.0001	6.0	7.4	0.01
	2014-05-20			0.03	0.031	27.0				<0.02			8.1	
	2014-08-19		<0.001	0.024	0.025	24.0	<0.001	<0.005	<0.001	<0.1	<0.0001	5.8	7.3	0.023
	2015-05-20			0.02	0.028	26.0				<0.1			7.6	
	2015-08-18		<0.001	0.016	0.025	24.0	<0.0001	<0.005	<0.001	<0.1		6.0	7.6	0.018
	2016-05-10	could not access												
	2016-08-31		0.00027	<0.050	0.024	26	<0.00001	<0.001	0.00178	<0.005	<0.00001	6.9	7.9	<0.001
	2017-05-16		0.00069	<0.050	0.084	37	0.00008	0.00049	0.0128	**3.08**	<0.00001	7.0	11.2	0.0125
	2017-08-29		0.00027	0.023	0.030	25	<0.00002	<0.001	0.00048	<0.06	<0.000002	6.4	7.3	**0.13**
	2018-05-28		0.00026	0.026	0.030	28	<0.00002	<0.001	0.0023	<0.06	<0.000002	7.1	8.4	**0.084**
	2018-08-22		0.00039	<0.02	0.031	26	<0.00002	<0.001	0.00027	<0.06	<0.000002	7.1	8.1	**0.3**
	2019-05-29		0.0008	0.025	0.054	29	0.00005	0.0036	0.0093	**2.3**	<0.000002	7.3	8.9	**0.069**
	2019-08-28		0.00038	0.021	0.023	23	0.00001	<0.0001	0.0009	<0.01	<0.000005	6.7	7.5	<0.0001
	2020-05-27		0.0005	0.024	0.020	21	<0.000005	<0.0005		<0.01	<0.000005	6.7	7.4	<0.0005
	2020-08-19		0.00034	0.019	0.022	22	<0.000005	<0.0001	<0.0002	<0.01	<0.000005	7.0	7.7	**0.0501**
	2021-06-10		0.00063	0.02	0.020	22	0.000005	<0.0001	0.00093	<0.01	<0.000005	6.6	7.6	<0.0001
	2021-08-11		0.00036	0.023	0.023	23	0.00001	<0.0001	0.0037	<0.01	<0.000005	6.6	7.4	0.0315
	2022-05-25		0.00057	0.025	0.022	22	0.00001	<0.0005	0.00062	<0.01	<0.000005	6.8	7.6	0.00124
	2022-08-10		0.0005	0.015	0.022	21	0.00001	<0.0005	0.00062	<0.01	<0.000005	6.6	7.3	<0.0001
	2023-06-07		0.00047	0.022	0.021	25	0.00002	<0.0005	0.00058	<0.010	<0.000005	7.2	8.7	0.00436
	2023-06-07	Duplicate	0.00042	0.025	0.019	24	0.00001	<0.0005	0.00136	<0.010	<0.000005	8.1	8.1	0.0457
	2023-08-23		0.00046	0.022	0.017	22	0.00001	<0.0005	0.00069	<0.010	<0.000005	6.7	7.3	0.00868

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
2/13	2010-05-18		8.8			<1			12	8.10	104	<0.05	0.7	228
	2010-08-25		7.3	<0.0005	<0.005	1.0	<0.01	0.05	12	8.20	103	<0.05	1.3	175
	2011-05-31		9.5			<1			11	8.10	114	0.37	5.9	253
	2011-08-23		7.9	<0.0005	<0.005	<1	<0.01	<0.1	12	8.14	102	0.21	1.1	221
	2012-05-16		9.4			<1		0.11	11	7.91	110	0.17	2.4	240
	2012-08-29		8.9	<0.0005	<0.005	<1	<0.01	<0.1	12	7.78	100	<0.05	0.58	230
	2013-05-22		9.8			<1		<0.1	12	8.15	100	0.17	0.93	230
	2013-08-27		9.0	<0.05	<0.01	<1	<0.01	0.11	13	8.07	100	0.058	0.81	230
	2014-05-20		13.0			1.0		<0.1	13	8.01	110	0.1	0.69	230
	2014-08-19		9.1	<0.0005	<0.005	<1	<0.01	<0.1	13	8.09	110	0.081	0.77	240
	2015-05-20		9.8			<1		<0.1	14	7.59	110	0.056	0.96	240
	2015-08-18		9.0	<0.0005	0.0059	1.2	0.015	<0.1	14	8.00	110	0.07	1.10	230
	2016-05-10	could not access												
	2016-08-31		9.51	<0.0002	<0.005	0.6	0.006	0.08	13	8.18	111	0.25	0.81	236
	2017-05-16		8.97	**0.0279**		<0.5	<0.033	0.42	12	8.18	107	0.12	<0.5	225
	2017-08-29		8.8	0.0002	<0.003	<0.5	<0.01	0.041	13	8.2	103	0.12	<1	226
	2018-05-28		11	<0.0002	<0.003	0.6	0.019	0.099	13	8.31	110	0.08	<0.5	235
	2018-08-22		11	<0.0002	<0.003	1.2	<0.010	<0.010	12	7.96	106	0.22	0.87	233
	2019-05-29		14	0.01	0.048	1.4	0.03	0.53	13	8	110	0.09	<0.50	240
	2019-08-28		12.1	<0.00005	0.0036	0.6	<0.010	0.086	10.5	8.19	566	<0.02	1.15	232
	2020-05-27		19.6	<0.00005	0.0021	0.5	<0.02	0.54	10.9	8.37	132	0.35	1.21	255
	2020-08-19		13.4	<0.00005	0.0013	0.5	0.012	0.097	10.7	8.14	120	0.24	1.32	235
	2021-06-10		20.3	0.00005	0.0013	0.5	<0.010	0.11	11.5	8.21	131	0.01	0.91	250
	2021-08-11		13.1	0.000089	0.0046	0.5	<0.01	0.108	12.1	8.1	117	0.07	1.28	236
	2022-05-25		20.9	0.000058	0.0011	0.8	<0.01	0.117	10.4	8.07	132	0.17	0.79	
	2022-08-10		12.2	0.000147	<0.001	0.4	<0.01	0.139	12.1	8.28	114	0.01	1.21	234
	2023-06-07		9.91	0.000179	0.0014	0.4	<0.010	0.068	12.9	8.12	116	0.05	1.20	230
	2023-06-07	Duplicate	11.7	0.000076	0.0035	0.6	<0.010	0.061	11.6	8.12	111	0.08	0.79	228
	2023-08-23		13.9	0.0001	<0.001	0.5	<0.010	0.036	12.6	8.25	114	0.14	1.05	231

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
2/13	2010-05-18		140							8.12	199
	2010-08-25		144	0.3	0.19	5			<0.001	**11.37**	
	2011-05-31		160			16				7.64	265
	2011-08-23		160	0.6	0.24	<4			0.001	**5.60**	238
	2012-05-16		112			11				7.69	266
	2012-08-29		122	0.22	0.27	4.5			<0.001	8.05	297
	2013-05-22		152			5.2				7.91	270
	2013-08-27		210	0.36	0.36	<4	<2	180	<0.001	8.08	237
	2014-05-20		166			<4				6.85	228
	2014-08-19		150	0.37	0.64	<4	<2		<0.001	**8.65**	256
	2015-05-20		144			19	<2	440		**5.93**	229
	2015-08-18		168	0.17	0.29	<4	<2			6.60	217
	2016-05-10	could not access									
	2016-08-31		126	0.294	0.75	60	<6.0	417	0.0032		
	2017-05-16		130	0.17	1.2	12	<3	493	0.0036	7.53	196
	2017-08-29		124	0.49	4.5	9	11	658	<0.002	7.24	186
	2018-05-28		140	1.6	5.2	100	15	449	<0.002	7.29	199
	2018-08-22		136	0.25	0.18	11	<6	549	<0.002	6.82	185
	2019-05-29		130	0.14	0.27	7	2.5	280	0.0023	7.61	159
	2019-08-28		159	0.23	0.126	<20	<2	206	0.0037	**8.78**	193
	2020-05-27		143	0.48	0.252	14	<2	310	<0.001	**8.7**	193
	2020-08-19		153	0.28	0.249	<20	<2.5	84.3	<0.001	**6.14**	200
	2021-06-10		150	0.14	0.291	19	<2	522	0.0035		
	2021-08-11		109	0.295	0.101	25	<2	235	0.0098		
	2022-05-25		152	0.316	0.197	<10	<2	112	0.0062	**8.58**	222
	2022-08-10		147	0.068	0.25	16	<3	379	0.0102	8.36	283
	2023-06-07		154	<0.1	0.544	31	<2	353	0.0049	8.39	245
	2023-06-07	Duplicate	144	0.226	0.933	26	<2	940	0.0115	8.39	245
	2023-08-23		132	0.293	0.181	16	<2	1500	<0.001	**8.72**	255

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
3/8	2010-05-18				0.020	25.0				0.02			3.1	
	2010-08-25				0.02	24.0	<0.0001	<0.005	0.001			2.5	3.1	0.021
	2011-05-31			<0.02	0.03	28.8				<0.05			3.3	
	2011-08-23		<0.001	<0.01	0.021	25.0	<0.0001	<0.005	<0.001	<0.10	<0.0001	2.4	3.3	0.015
	2012-05-16			<0.02	0.02	27.6				<0.02			3.3	
	2012-08-29		0.021	<0.01	0.021	26.0	<0.0002	<0.005	<0.001	<0.10	<0.0001	2.6	3.5	<0.002
	2013-05-22			<0.01	0.02	25.5				<0.10			3.1	
	2013-08-27		<0.2	<0.02	0.022	26.9	<0.005	<0.01	<0.02	<0.02	<0.0001	4.0	3.4	<0.01
	2014-05-20			<0.02	0.022	29.0				<0.02			3.7	
	2014-08-19		<0.001	<0.01	0.021	25.0	<0.001	<0.005	0.0014	<0.1	<0.0001	2.4	3.2	0.0065
	2015-05-20			<0.02	0.024	27.0				<0.1			3.4	
	2015-08-18		<0.001	<0.02	0.021	26.0	<0.0001	<0.005	0.0013	<0.1		2.5	3.5	<0.002
	2016-05-10		<0.001	<0.05	0.069	27.7	<0.0001	0.006	0.0145	**3.85**	<0.0001	3.2	4.4	**0.0734**
	2016-08-30	could not access												
	2017-05-16		0.00046	<0.05	0.0573	26.4	0.00003	0.0044	0.0113	**2.23**	<0.00001	2.8	4.1	**0.0545**
	2017-08-29		0.00023	<0.02	0.021	25.0	<0.00002	<0.001	0.0013	<0.06	<0.000002	2.4	3.2	0.0074
	2018-05-28		0.00023	<0.02	0.022	29.0	<0.00002	<0.001	0.0019	<0.06	<0.000002	2.7	3.7	<0.004
	2018-08-22		0.00032	<0.02	0.025	28.0	<0.00002	<0.001	0.0028	<0.06	<0.000002	2.9	3.6	0.016
	2019-05-29		0.0024	<0.02	0.12	33.0	0.00014	0.021	0.032	**11**	<0.000002	3.7	5.6	**0.14**
	2019-08-28		0.00033	<0.01	0.0219	25.5	0.0000055	0.0002	0.00223	<0.01	<0.000005	2.8	3.5	<0.0001
	2020-05-27		0.00036	<0.01	0.0198	22.6	<0.000005	<0.0005		<0.01	<0.000005	2.2	3.0	<0.0005
	2020-08-19		0.0004	<0.01	0.0186	23.0	<0.000005	0.00021	0.00055	0.021	<0.000005	2.5	3.4	0.00241
	2020-08-19	*Duplicate*	0.00041	<0.2	0.0183	23.4	<0.000005	0.00024	0.00098	0.021	<0.000005	2.5	3.5	0.00147
	2021-06-10		0.00037	0.010	0.0179	21.6	<0.000005	<0.0001	0.00089	0.023	<0.000005	2.2	3.0	0.00018
	2021-08-11		0.00047	<0.01	0.0173	24.2	<0.000005	0.0001	0.00096	0.017	<0.000005	2.4	3.3	0.00123
	2022-05-25		0.00039	<0.01	0.0193	23.5	<0.000005	<0.0005	0.00097	0.029	<0.000005	2.2	3.2	<0.0005
	2022-08-10		0.00044	<0.01	0.019	22.3	<0.000005	<0.0005	0.00126	0.022	<0.000005	2.5	3.2	<0.00001
	2023-06-07		0.00056	<0.010	0.0163	23.5	<0.000005	<0.0005	0.00086	0.023	<0.000005	2.3	3.3	0.00092
	2023-08-23		0.00048	0.017	0.0191	22.1	<0.000005	<0.0005	0.00084	0.023	<0.000005	2.4	3.5	0.00129

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Tigger					126					284			
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
3/8	2010-05-18		3.3			2		0.7	18	7.90	64	0.05	3.6	176
	2010-08-25		3.3	<0.0005	<0.005	2	<0.01	1.2	18	8.00	62	<0.05	3.7	175
	2011-05-31		3.4			1		0.6	16	7.64	64	<0.05	3.6	176
	2011-08-23		3.4	<0.0005	<0.005	2	<0.01	0.8	17	7.83	67	<0.05	3.6	177
	2012-05-16		3.5			1		0.46	16	7.59	72	<0.05	3.8	180
	2012-08-29		3.6	<0.0005	<0.005	2	<0.01	0.63	17	7.42	73	<0.05	3.4	180
	2013-05-22		4.1			1		0.28	15	7.94	66	<0.05	3.5	170
	2013-08-27		3.6	<0.05	<0.01	<1	<0.01	0.66	15	7.96	68	<0.05	3.4	180
	2014-05-20		3.8			2		0.52	18	7.60	69	<0.05	3	180
	2014-08-19		3.4	<0.0005	<0.005	2	0.013	0.69	17	7.85	68	<0.05	3.5	180
	2015-05-20		3.6			<1		0.33	16	7.01	78	<0.05	3.2	180
	2015-08-18		3.6	<0.0005	<0.005	1.2	<0.01	0.47	16	7.78	72	<0.05	3.3	180
	2016-05-10		3.83	0.008	0.02	1.5	0.006	0.47	13	7.85	63	0.06	3.45	156
	2016-08-30	could not access												
	2017-05-16		3.97	0.00584		1.2	<0.033	2.4	14	8.00	73	0.02	3.9	176
	2017-08-29		3.6	<0.0002	<0.003	1.1	<0.010	0.66	16	7.99	68	0.022	2.5	174
	2018-05-28		3.7	<0.0002	<0.003	0.7	<0.010	0.48	14	8.12	87	<0.015	1.9	173
	2018-08-22		4	<0.0002	<0.003	0.8	0.011	0.59	12	7.95	71	0.017	2.2	171
	2019-05-29		4.5	**0.016**	0.045	1.6	0.012	1.9	12	7.84	72	0.081	2.9	170
	2019-08-28		3.67	<0.00005	0.0044	0.6	<0.010	0.47	12	8.03	89	<0.02	3.6	170
	2020-05-27		2.96	<0.00005	<0.001	0.6	<0.01	0.46	12	8.08	77	0.01	4.3	168
	2020-08-19		3.27	0.000067	<0.001	0.9	<0.01	0.55	11	7.93	73	<0.0075	2.8	165
	2020-08-19	*Duplicate*	3.23	<0.00005	<0.001	0.6	<0.01	0.64	12	7.93	73	0.0122	3.1	166
	2021-06-10		3.08	<0.00005	<0.001	0.5	<0.01	0.41	10	7.83	72	<0.005	4.1	162
	2021-08-11		5.43	<0.00005	<0.001	0.5	<0.01	0.47	11	7.92	78	0.023	3.1	172
	2022-05-25		3.32	0.000054	<0.001	0.5	<0.01	0.57	9	7.87	72	0.017	2.7	
	2022-08-10		3.62	<0.00005	<0.001	0.8	<0.01	0.64	11	8.05	71	0.0091	3.8	161
	2023-06-07		4.93	<0.00005	<0.001	1.9	<0.01	0.61	16	8.81	106	0.018	3.3	225
	2023-08-23		3.26	<0.00005	<0.001	0.6	<0.01	0.48	11	8.08	73	<0.005	**5.3**	166

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Trigger		324								
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
3/8	2010-05-18		120			40				6.97	173
	2010-08-25		110	1.10	0.54	23			< 0.001	**11.19**	
	2011-05-31		108			11				7.63	185
	2011-08-23		177	1.00	1.30	11			<0.001	**5.71**	187
	2012-05-16					27				7.29	192
	2012-08-29		126	0.71	0.66	<8.0			<0.001	7.76	238
	2013-05-22		162			15				8.05	216
	2013-08-27		140	0.73	1.40	7.1	<2	2000	<0.001	7.38	202
	2014-05-20		134			15				8.26	437
	2014-08-19		136	0.86	0.99	10	<2		<0.001	**8.55**	247
	2015-05-20		108			33	<2	630		**6.24**	163
	2015-08-18		148	0.20	0.98	12	<2			8.03	166
	2016-05-10		116	0.36	0.89	66	<3	3870	0.0032	6.62	58
	2016-08-30	could not access									
	2017-05-16		108	0.57	0.47	17	<3	866	0.0034	7.32	135
	2017-08-29		118	0.37	0.47	40	<3	1060	<0.002	**6.25**	125
	2018-05-28		140	0.32	0.64	47	<6	1990	<0.002	**6.23**	149
	2018-08-22		174	0.36	0.31	42	<6	2280	<0.002	6.52	146
	2019-05-29		140	0.80	0.83	93	7.4	1500	0.0017	7.39	102
	2019-08-28		140	0.34	0.11	<20	<2	364	0.0035	7.52	122
	2020-05-27		126	0.18	0.76	61	<2	486	<0.001	6.61	102
	2020-08-19		142	0.15	0.48	61	<2.5	152	<0.001	7.49	132
	2020-08-19	*Duplicate*	135	0.24	0.13	36	<2.5	1140	<0.001	7.49	132
	2021-06-10		109	0.28	0.20	46	<2	709	0.0023	7.47	126
	2021-08-11		147	0.33	0.36	38	<2	2380	0.0141		
	2022-05-25		125	0.34	0.17	31	<2	1010	0.0072	8.23	188
	2022-08-10		121	0.54	0.44	52	<3	436	0.0108	7.86	174
	2023-06-07		200	<0.1	0.37	53	<3.0	1090	0.0046	**9.55**	242
	2023-08-23		132	0.22	0.33	33	<2.0	558	<0.001	8.07	177

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4/6	2010-05-18	*No Recovery*												
	2010-08-24	*No Recovery*												
	2011-05-31	*No Recovery*												
	2011-08-23	*No Recovery*												
	2012-05-16	*Out of Service*												
	2013-05-22	*Out of Service*												
	2013-08-27	*	<0.2	0.030	0.030	34.0	<0.005	<0.01	<0.02	<0.02	0.00025	3.0	6.0	**0.080**
	2014-05-20			0.020	0.035	38.0				0.02			6.6	
	2014-08-19		0.001	<0.01	0.035	30.0	<0.001	<0.005	<0.001	<0.1	0.00013	2.5	5.5	0.033
	2015-05-20			<0.01	0.030	31.0				<0.1			5.6	
	2015-08-18		0.014	<0.01	0.028	30.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	2.5	5.6	0.018
	2016-05-10		0.003	<0.05	0.079	37.2	0.0002	0.012	0.0233	**5.59**	<0.0001	4.4	9.6	**0.091**
	2016-08-31		0.002	<0.05	0.036	31.1	<0.00001	<0.001	0.00052	0.005	<0.00001	2.6	5.5	0.007
	2017-05-16		0.003	<0.05	0.109	39.6	0.000298	0.0163	0.0198	**6.65**	<0.00001	4.2	10.9	**0.137**
	2017-08-29		0.001	<0.02	0.031	30.0	<0.00002	<0.001	<0.0002	<0.06	<0.000002	2.5	5.3	0.015
	2018-05-28		0.002	<0.02	0.031	35.0	<0.00002	<0.001	0.0013	<0.06	<0.000002	2.8	6.5	0.022
	2018-08-22		0.001	<0.02	0.024	32.0	<0.00002	<0.001	0.00032	<0.06	<0.000002	2.8	6.1	0.009
	2019-05-29		0.002	<0.02	0.057	34.0	0.000099	0.014	0.013	**4.5**	<0.000002	3.5	7.9	**0.066**
	2019-08-28		0.001	0.011	0.026	29.1	<0.000005	<0.0001	0.00033	<0.01	<0.000005	2.9	5.9	0.012
	2020-05-27	*not sampled*												
	2020-08-19	*not sampled*												
	2021-06-10	*not sampled*												
	2021-08-11	*not sampled*												
	2022-05-25	*Inaccessible*												
	2022-08-10		0.003	0.013	0.068	42.4	0.000044	<0.00001	0.00013	<0.01	<0.000005	4.2	7.7	0.028
	2022-08-10	*Duplicate*	0.003	0.010	0.068	41.5	0.0000378	<0.0005	0.00083	<0.01	<0.000005	4.1	7.9	0.024
	2023-06-07		0.002	<0.1	0.092	55.6	<0.00005	<0.00500	<0.00200	<0.1	<0.000005	5.1	9.8	**0.056**
	2023-08-23		0.002	0.025	0.093	54.5	<0.00001	<0.001	<0.00040	<0.02	<0.000005	5.6	11.1	**0.054**
	2023-08-23	*Duplicate*	0.002	<0.02	0.071	49.5	<0.00001	<0.001	<0.00040	<0.02	<0.000005	4.4	10.1	**0.063**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
4/6	2010-05-18	*No Recovery*												
	2010-08-24	*No Recovery*												
	2011-05-31	*No Recovery*												
	2011-08-23	*No Recovery*												
	2012-05-16	*Out of Service*												
	2013-05-22	*Out of Service*												
	2013-08-27	*	4.4	<0.05	<0.01	<1	<0.01	<0.1	9	8.09	110	0.14	2.2	220
	2014-05-20		4.8			2		<0.1	5	7.76	130	0.17	2.4	250
	2014-08-19		4	<0.0005	<0.005	<1	<0.01	<0.1	8	7.95	100	0.09	1.6	220
	2015-05-20		4.4			<1		<0.1	7	7.12	110	<0.05	1.6	210
	2015-08-18		4.2	<0.0005	<0.005	1.7	<0.01	<0.1	8.9	7.83	99	<0.05	1.5	200
	2016-05-10		4.8	0.009	0.06	1.2	<0.02	0.03	7.2	7.89	101	0.03	0.6	203
	2016-08-31		4.23	<0.0002		<0.50	<0.002	<0.020	7.3	8.10	116	0.07	1.8	210
	2017-05-16		4.56	**0.0163**		0.6	<0.033	<0.044	6.1	7.77	102	0.05	1.3	210
	2017-08-29		4.2	<0.0002	<0.003	<0.50	<0.010	0.014	7.4	8.01	96.7	0.07	<13	204
	2018-05-28		4.6	<0.0002	<0.003	<0.50	<0.010	<0.010	4.5	7.82	56.9	<0.015	<0.50	201
	2018-08-22		4.7	<0.0002	<0.002	<0.50	<0.033	<0.044	5.7	8.03	99.2	0.03	1.9	202
	2019-05-29		4.6	0.0049	0.025	1.3	<0.0099	<0.013	5.1	7.70	100	<0.015	1.2	210
	2019-08-28		4.44	<0.00005	<0.001	0.5	<0.010	<0.020	5.53	7.90	109	0.02	1.9	211
	2020-05-27	*not sampled*												
	2020-08-19	*not sampled*												
	2021-06-10	*not sampled*												
	2021-08-11	*not sampled*												
	2022-05-25	*Inaccessible*												
	2022-08-10		6.19	0.000051	0.0018	1.54	<0.01	<0.02	1.84	7.89	192	0.28	3.35	307
	2022-08-10	*Duplicate*	6.2	<0.00005	0.0017	1.9	<0.01	<0.02	1.81	7.79	250	0.27	**292.0**	310
	2023-06-07		6.87	<0.0005	<0.01	3.7	<0.01	<0.02	3.39	8.00	266	0.28	2.2	379
	2023-08-23		7.42	<0.0001	<0.002	2.1	<0.01	<0.02	6.75	7.93	242	0.41	**21.6**	395
	2023-08-23	*Duplicate*	6.89	<0.0001	<0.002	2.23	<0.01	<0.02	6.88	7.91	224	0.29	**8.99**	354

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
4/6	2010-05-18	*No Recovery*									
	2010-08-24	*No Recovery*									
	2011-05-31	*No Recovery*									
	2011-08-23	*No Recovery*									
	2012-05-16	*Out of Service*									
	2013-05-22	*Out of Service*									
	2013-08-27	*	180	9.5	5.2	340	<2	6300	<0.001	7.73	317
	2014-05-20		162			74				7.69	229
	2014-08-19		144	7.7	2.5	210	<2		<0.001	8.07	294
	2015-05-20		174			83	<2	1400		**6.29**	195
	2015-08-18		154	0.1	0.97	25	<2		0.97	6.79	192
	2016-05-20		84	0.8	0.39	63	<3	874	0.001	7.17	179
	2016-08-31		150	0.9	1.28	267	<6.0	1900	<0.0010		
	2017-05-16		146	2.0	0.71	74	<3	660	0.004	**8.79**	214
	2017-08-29		136	4.2	1.1	120	4	1530	<0.002	6.75	203
	2018-05-28		176	1.6	0.69	91	<6	884	0.0023	7.32	203
	2018-08-22		148	0.2	0.13	26	<6	280	<0.002	8.46	146
	2019-05-29		140	0.4	0.15	20	2.2	160	<0.0015	8.30	176
	2019-08-28		155	1.5	0.374	<20	<2	278	0.0066	**8.98**	169
	2020-05-27	*not sampled*									
	2020-08-19	*not sampled*									
	2021-06-10	*not sampled*									
	2021-08-11	*not sampled*									
	2022-05-25	*Inaccessible*									
	2022-08-10		216	4.9	3.8	15	<7.5	6960	0.0036	7.70	316
	2022-08-10	*Duplicate*	210	2.8	3.53	<10	<15	4760	0.0132	7.70	316
	2023-06-07		234	0.2	0.376	42	<3.0	6740	0.0035	7.52	398
	2023-08-23		252	28.6	16.7	44	5.8	1700	0.0023	7.35	409
	2023-08-23	*Duplicate*	221	3.8	2.64	49	7.4	2880	<0.001	7.35	409

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria * - first sample from newly constructed replacement well

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/17	2010-05-18				0.023	22.7				<0.02			4.3	
	2010-08-24		<0.001	<0.01	0.023	23.0	<0.0001	<0.005	0.005	<0.1	<0.0001	1.2	4.8	<0.002
	2011-05-31			<0.01	<0.01	24.9				<0.05			4.4	
	2011-08-23		<0.001	<0.01	0.009	22.0	<0.0001	<0.005	0.007	<0.1	<0.0001	1.3	4.5	<0.002
	2012-05-16	*Dry*												
	2012-08-29	*Dry*												
	2013-05-22	*Dry*												
	2013-08-27	*Dry*												
	2014-05-20	*Dry*												
	2014-08-19		<0.001	<0.01	0.010	25.0	<0.001	<0.005	0.0038	<0.1	<0.0001	1.1	5.2	<0.002
	2015-05-20	*Dry*												
	2015-08-18		<0.001	<0.01	0.012	23.0	<0.0001	<0.005	<0.0061	<0.1	<0.0001	1.5	4.8	0.0023
	2016-05-10		<0.001	0.050	0.053	32.8	<0.0001	0.005	0.168	**5.49**	<0.0001	2.5	8.0	**0.177**
	2016-08-31		0.00016	0.050	0.014	27.4	<0.00001	0.0012	0.0028	<0.0050	<0.00010	1.2	5.5	<0.0010
	2017-05-16	*Dry*												
	2017-08-29	*Dry*												
	2018-05-28		<0.0002	<0.02	0.012	25.0	<0.00002	<0.001	0.0058	<0.06	<0.000002	1.6	4.8	<0.004
	2018-08-22		<0.0002	<0.02	0.013	24.0	<0.0002	<0.001	0.0051	<0.06	<0.000002	1.6	4.8	<0.004
	2019-05-29	*Dry*												
	2019-08-28		<0.0001	<0.01	0.015	23.6	0.000008	0.00076	0.00599	<0.010	<0.000005	1.7	5.3	0.00159
	2020-05-27		0.00014	<0.01	0.014	27.1	0.0000062	0.00094		<0.010	<0.000005	1.4	5.4	0.00161
	2020-08-19		0.00016	<0.01	0.011	24.3	<0.000005	0.00099	0.00312	0.014	<0.000005	1.3	5.4	0.00035
	2021-06-10	*Dry*												
	2021-08-11		0.00013	<0.01	0.013	24.0	<0.000005	0.00087	0.00332	<0.01	<0.000005	1.6	4.9	0.00204
	2022-05-25		0.00011	<0.01	0.015	23.0	0.0000105	0.00082	0.00417	<0.01	<0.000005	1.5	4.5	0.00157
	2022-08-10		0.00017	<0.01	0.011	22.9	<0.000005	0.00086	0.00284	<0.01	<0.000005	1.3	4.9	<0.0001
	2023-06-07		0.00014	<0.010	0.013	25.8	0.0000065	0.00091	0.0032	<0.010	<0.000005	1.6	5.8	0.0012
	2023-08-23		0.00017	<0.010	0.012	22.6	<0.000005	0.00091	0.0025	<0.010	<0.000005	1.6	5.4	0.00032

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
5/17	2010-05-18		3.8			1		<0.1	2	8.00	81	<0.05	1.3	164
	2010-08-24		3.4	<0.0005	<0.005	1	<0.01	0.2	2	8.10	85	<0.05	1.4	167
	2011-05-31		3.7			<1		<0.1	1	8.05	79	<0.05	1.5	161
	2011-08-23		3.6	<0.0005	<0.005	1	<0.01	<0.1	2	7.99	81	<0.05	1.4	162
	2012-05-16	*Dry*												
	2012-08-29	*Dry*												
	2013-05-22	*Dry*												
	2013-08-27	*Dry*												
	2014-05-20	*Dry*												
	2014-08-19		3.2	<0.0005	<0.005	<1	<0.01	0.33	2	8.05	90	<0.05	1.1	180
	2015-05-20	*Dry*												
	2015-08-18		4.2	<0.005	0.021	1.2	<0.01	0.47	2.4	7.82	83	<0.05	1.3	170
	2016-05-10		4.6	0.0273	0.035	0.8	0.01	0.29	2.8	8.06	95	0.012	2.2	186
	2016-08-31		3.54	<0.0002		<0.50	0.168	0.168	2.2	8.09	92	<0.005	1.6	185
	2017-05-16	*Dry*												
	2017-08-29	*Dry*												
	2018-05-28		4.3	<0.0002	0.012	1.8	<0.01	1.1	<10	7.96	72	<0.015	0.6	159
	2018-08-22		4.3	<0.0002	0.058	2.3	<0.010	1	2.9	8.08	76	<0.015	1.2	164
	2019-05-29	*Dry*												
	2019-08-28		4.5	<0.00005	0.102	0.9	<0.010	1.8	2.59	8.04	106	<0.02	1.7	181
	2020-05-27		4.1	<0.00005	0.0894	0.5	<0.010	1.75	2.74	8.22	98	0.017	3.1	192
	2020-08-19		3.6	0.000063	0.0041	0.6	<0.01	1.01	2.07	8.08	94	0.0091	2.5	180
	2021-06-10	*Dry*												
	2021-08-11		4.6	0.000072	0.0021	1.1	<0.01	0.481	2.28	7.89	92.2	<0.005	3.1	178
	2022-05-25		4.5	0.0055	0.0596	1.7	<0.01	0.597	2.4	7.96	82.8	<0.0050	2.4	
	2022-08-10		3.5	<0.00005	0.0025	0.8	<0.01	0.295	1.9	8.23	90.5	0.0121	2.7	174
	2023-06-07		4.6	<0.00005	0.0055	0.6	<0.01	0.301	2.17	8.02	94.4	0.0344	1.5	183
	2023-08-23		4.4	<0.00005	0.004	0.6	<0.01	0.219	2.34	8.14	90.3	<0.005	2.4	175

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
5/17	2010-05-18		114			11				7.59	145
	2010-08-24		106	0.7	1.50	8			<0.001	**11.16**	
	2011-05-31		98			12				7.58	161
	2011-08-23		100	<1	1.50	<4			<0.001	6.76	170
	2012-05-16	*Dry*									
	2012-08-29	*Dry*									
	2013-05-22	*Dry*									
	2013-08-27	*Dry*									
	2014-05-20	*Dry*									
	2014-08-19		126	0.44	0.37	9	<2		<0.001	7.73	216
	2015-05-20	*Dry*									
	2015-08-18		134	<0.1	0.25	<4	<2		<0.001	7.08	161
	2016-05-10		98	0.147	0.50	29	<3	791	0.002	7.11	156
	2016-08-31		144	0.155	0.26	17	<6	585	0.0022		
	2017-05-16	*Dry*									
	2017-08-29	*Dry*									
	2018-05-28		146	0.21	2.70	31	<6	1190	<0.002	6.98	186
	2018-08-22		120	0.14	0.49	20	<6	562	<0.002	8.19	146
	2019-05-29	*Dry*									
	2019-08-28		141	0.36	0.39	<20	<2	589	0.0062	8.65	142
	2020-05-27		134	0.31	0.26	17	<2	327	0.0013	7.45	152
	2020-08-19		143	0.197	1.70	87	<2.5	1260	0.0029	7.69	152
	2021-06-10	*Dry*									
	2021-08-11		142	0.269	1.03	36	<2	752	0.0035		
	2022-05-25		118	0.194	0.27	17	<2.0	288	0.0031	7.72	170
	2022-08-10		130	0.186	0.39	26	3.2	290	0.0074	8.38	187
	2023-06-07		126	0.127	0.28	22	<2.0	260	0.005	7.97	197
	2023-08-23		127	0.052	0.12	16	<2.0	253	<0.001	7.86	185

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
6/5	2010-05-18			<0.02	<0.02	14.7				<0.02			3.0	
	2010-08-24		<0.001	<0.02	0.012	15.0	<0.0001	<0.005	<0.001	<0.01	<0.0001	1.8	3.1	0.003
	2011-05-31			<0.02	<0.02	17.3				<0.05			3.3	
	2011-08-23		<0.001	<0.02	0.013	16.0	<0.0001	<0.005	<0.001	<0.10	<0.0001	1.7	3.1	0.003
	2012-05-16			<0.02	<0.02	17.0				<0.02			3.3	
	2012-08-29		<0.001	<0.01	0.017	18.0	<0.0001	<0.005	<0.001	<0.10	<0.0001	2.1	3.8	<0.002
	2013-05-22			<0.01	0.016	19.9				<0.10			3.9	
	2013-08-27		<0.2	<0.02	0.015	17.7	<0.005	<0.01	<0.02	<0.02	<0.0001	2.0	3.4	<0.01
	2014-05-20			<0.02	0.017	19.0				<0.02			3.7	
	2014-08-19		<0.001	<0.01	0.013	15.0	<0.001	<0.005	<0.001	<0.02	<0.0001	1.7	3.1	0.0023
	2015-05-20			<0.01	0.015	17.0				<0.02			5.5	
	2015-08-18		<0.001	<0.01	0.015	15.0	<0.0001	<0.005	<0.001	<0.02	<0.0001	1.7	3.3	0.0085
	2016-05-10		0.001	0.050	0.045	17.2	0.0001	0.005	0.0101	**2.23**	0.0001	2.3	4.5	0.050
	2016-08-31		0.00041	<0.050	0.014	16.1	<0.00001	<0.001	0.00056	0.0069	<0.00001	1.8	3.3	<0.001
	2017-05-16		**0.0618**	<0.050	0.062	19.4	0.00004	0.0059	0.0129	**2.97**	<0.00001	2.1	5.1	**0.0566**
	2017-08-29		0.0004	<0.02	0.015	17.0	<0.00002	<0.001	0.00058	0.087	<0.000002	1.8	3.4	0.0064
	2018-05-28		0.0003	<0.02	0.016	19.0	<0.00002	<0.001	0.0012	<0.06	<0.000002	1.9	3.9	0.01
	2018-08-22		<0.0002	<0.02	0.018	19.0	<0.00002	<0.001	0.00041	<0.06	<0.000002	2.0	3.7	0.036
	2019-05-29		0.0015	<0.02	0.091	21.0	0.00005	0.013	0.018	**6.6**	0.0000029	2.9	5.4	**0.082**
	2019-08-28		0.00045	<0.010	0.015	16.7	<0.000005	0.00059	0.00063	<0.010	<0.000005	2.1	3.8	0.00143
	2020-05-27		0.00043	<0.01	0.016	17.1	<0.000005	<0.0005		<0.01	<0.000005	1.7	3.6	<0.0005
	2020-08-19		0.00048	<0.01	0.152	16.8	<0.000005	0.00066	0.00035	0.012	<0.000005	1.9	3.8	0.00042
	2021-06-10		0.00044	<0.01	0.015	16.5	<0.000005	0.00059	0.0005	0.013	<0.000005	1.8	3.6	0.00017
	2021-08-11		0.00045	<0.01	0.017	16.8	<0.000005	0.00058	0.0003	<0.01	<0.000005	2.0	3.6	0.00274
	2022-05-25	*Inaccessible*												
	2022-08-10	*Inaccessible*												
	2023-06-07	*Inaccessible*												
	2023-08-23	*Inaccessible*												

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
6/5	2010-05-18		2.6			<1		0.1	6.0	7.90	51	<0.05	1.7	116
	2010-08-24		2.7	< 0.0005	< 0.005	<1	<0.01	0.1	6.0	8.00	52	0.09	1.7	118
	2011-05-31		2.6			<1		<0.1	5.0	7.81	54	0.05	1.7	119
	2011-08-23		2.7	<0.0005	<0.005	<1	<0.01	<0.1	9.0	7.59	52	<0.05	1.7	123
	2012-05-16		2.7			<1		0.2	6.0	7.62	56	<0.05	1.9	130
	2012-08-29		3.1	<0.0005	<0.005	<1	0.038	0.2	6.0	7.10	65	0.28	2.5	140
	2013-05-22		3.5			<1		0.2	8.0	7.94	63	0.14	1.8	150
	2013-08-27		3.0	<0.05	<0.01	<1	0.014	0.23	6.0	7.88	58	0.08	1.8	140
	2014-05-20		3.0			<1		0.16	7.0	7.51	59	<0.05	1.5	130
	2014-08-19		2.7	<0.0005	<0.005	<1	<0.01	0.17	6.0	7.82	55	<0.05	1.6	120
	2015-05-20		2.8			<1		0.18	7.0	6.91	72	<0.05	1.6	120
	2015-08-18		3.5	<0.005	<0.005	<1	<0.01	0.2	7.2	7.62	56	<0.05	1.5	130
	2016-05-10		3.2	<0.005	0.018	0.05	0.011	0.3	5.3	7.80	52	0.043	1.9	118
	2016-08-31		3.3	<0.00002		<0.50	0.003	0.31	4.7	7.99	56	0.02	1.8	127
	2017-05-16		3.1	0.00616		<0.50	<0.033	1.70	5.1	8.01	58	0.035	1.2	125
	2017-08-29		2.9	<0.0002	<0.003	<0.50	<0.01	0.36	6.6	8.01	57	0.015	1.2	126
	2018-05-28		3.1	<0.0002	<0.003	<0.50	<0.01	0.39	6.2	8.06	57	<0.015	0.6	127
	2018-08-22		3.3	<0.0002	<0.003	<0.50	<0.01	0.37	4.8	8.12	59	0.02	1.4	126
	2019-05-29		3.6	0.0083	0.019	1.6	<2	1.8	6.3	7.92	55	<0.015	1.4	130
	2019-08-28		2.9	<0.00005	<0.001	0.3	<0.010	0.38	5.5	8.20	64	0.024	1.8	126
	2020-05-27		2.8	<0.00005	<0.001	0.3	<0.01	0.47	5.0	8.01	62	0.014	2.4	126
	2020-08-19		2.9	<0.00005	<0.001	0.3	<0.01	0.43	5.0	7.85	62	0.0235	2.0	128
	2021-06-10		2.9	<0.00005	<0.001	0.4	<0.01	0.43	5.2	7.90	66	0.0104	2.5	135
	2021-08-11		3.1	<0.00005	<0.001	0.4	<0.01	0.47	5.7	7.88	63	<0.005	1.9	132
	2022-05-25	*Inaccessible*												
	2022-08-10	*Inaccessible*												
	2023-06-07	*Inaccessible*												
	2023-08-23	*Inaccessible*												

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
6/5	2010-05-18		74			<4				7.54	94
	2010-08-24		76	0.7	0.480	11			<0.001	**11.30**	
	2011-05-31		70			5				6.80	132
	2011-08-23		92	<1	0.400	5			<0.001	**6.27**	185
	2012-05-16		78			10				7.38	172
	2012-08-29		96	0.62	0.540	18			0.0054	7.58	214
	2013-05-22		92			21				7.88	166
	2013-08-27		122	0.51	0.400	9.1	<2	180	<0.001	7.68	159
	2014-05-20		108			10				6.77	129
	2014-08-19		90	0.25	0.250	<4	<2		<0.001	7.55	144
	2015-05-20		62			4.1	<2	490		**6.33**	120
	2015-08-18		102	0.1	0.290	<4	<2		<0.001	6.81	124
	2016-05-10		56	0.31	0.255	22	<3	336	<0.001	7.45	99
	2016-08-31		80	0.279	0.316	15	<6	822	<0.001		
	2017-05-16		76	0.24	0.600	7.2	6	671	0.0044	**8.55**	105
	2017-08-29		84	0.23	0.520	19	6	678	<0.002	7.16	126
	2018-05-28		104	0.28	0.790	25	<6	655	0.0028	7.41	105
	2018-08-22		98	0.17	0.600	14	<6	872	<0.002	7.38	112
	2019-05-29		86	0.27	0.310	11	<2	640	<0.0015	**8.72**	102
	2019-08-28		110	0.22	0.821	<20	<2	636	<0.01	**8.75**	112
	2020-05-27		95	0.17	0.480	22	2.5	676	0.0012	8.22	105
	2020-08-19		101	0.148	0.590	29	<2	511	<0.001	7.19	122
	2021-06-10		100	0.28	0.723	31	<2	449	0.02	**9.01**	126
	2021-08-11		92	0.185	0.173	29	<2	647	0.0032		
	2022-05-25	*Inaccessible*									
	2022-08-10	*Inaccessible*									
	2023-06-07	*Inaccessible*									
	2023-08-23	*Inaccessible*									

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
11/4	2010-05-18			<0.02	0.02	8.7				0.06			2.5	
	2010-08-24			0.18	0.850	7.6				0.03			2.3	
	2011-05-31			<0.02	<0.02	8.3				<0.05			2.5	
	2011-08-23			<0.02	<0.02	9.0				<0.02			2.5	
	2012-05-16	*Dry*												
	2012-08-29			<0.02	<0.02	9.3				0.03			2.6	
	2013-05-22	*Dry*												
	2013-08-27	*Dry*												
	2014-05-20			<0.02	0.021	8.8				0.02			2.5	
	2014-08-19		<0.001	<0.01	0.018	6.9	<0.001	<0.005	0.0014	<0.1	<0.0001	1.1	2.0	0.0024
	2015-05-20	*Dry*												
	2015-08-18		<0.001	<0.01	0.018	5.9	<0.0001	<0.005	0.0023	<0.1	<0.0001	1.2	1.9	0.0021
	2016-05-10		0.001	0.050	1.25	50.8	0.0002	0.05	0.197	**29.9**	0.0001	10.2	16.0	**0.857**
	2016-08-31		<0.0001	<0.050	0.0179	7.1	<0.00001	<0.001	0.00168	0.029	<0.00001	1.11	2.0	0.0026
	2017-05-16	*Dry*												
	2017-08-29	*Dry*												
	2018-05-28	*Dry*												
	2018-08-22	*Dry*												
	2019-05-29	*Dry*												
	2019-08-28	*Dry*												
	2020-05-27		0.00024	<0.01	0.0216	10.0	0.000103	0.00073		<0.01	<0.000005	1.31	3.0	0.00418
	2020-08-19		0.00015	<0.01	0.0195	9.3	<0.000005	0.00077	0.00079	0.01	<0.000005	1.44	3.1	0.00147
	2021-06-10	*Dry*												
	2021-08-11	*Dry*												
	2022-05-25		0.00017	<0.01	0.021	11.0	<0.000005	0.00071	0.00108	<0.010	<0.000005	1.57	3.3	0.00305
	2022-08-10		0.00023	<0.01	0.0173	6.6	<0.000005	0.00052	0.00189	0.044	<0.000005	1.24	2.0	0.0024
	2023-06-07		0.00028	<0.01	0.0111	5.9	<0.000005	<0.0005	0.00209	0.013	<0.000005	0.931	1.7	0.00158
	2023-08-23	*limited sample*	<0.0005	<0.05	0.0182	8.8	<0.000025	<0.0025	0.0017	<0.050	<0.000005	1.87	2.8	0.0207

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
11/4	2010-05-18		6			<1		<0.1	4	7.00	43	0.12	3.7	96
	2010-08-24		11.3			<1		0.1	4	6.80	43	<0.05	4.2	92
	2011-05-31		5.6			<1		<0.1	3	6.99	41	0.1	3.9	92
	2011-08-23		6.1			<1		<0.1	4	6.73	42	<0.05	3.9	92
	2012-05-16	*Dry*												
	2012-08-29		5.8			9		0.14	4	6.92	47	NA	4.6	100
	2013-05-22	*Dry*												
	2013-08-27	*Dry*												
	2014-05-20		6.3			<1		<0.1	4	6.74	38	<0.05	4.0	84
	2014-08-19		5.3	<0.0005	<0.005	9	<0.01	<0.1	4	6.79	35	0.066	4.0	83
	2015-05-20	*Dry*												
	2015-08-18		5.6	<0.0005	<0.005	<1	<0.01	<0.1	4	6.54	34	0.058	**5.7**	76
	2016-05-10		9.86	**0.057**	0.188	20	0.003	0.085	60.1	7.27	35	0.033	**5.4**	88.3
	2016-08-31		5.52	<0.0002		0.7	0.086	0.073	4.1	7.62	34	0.0084	5.0	83.6
	2017-05-16	*Dry*												
	2017-08-29	*Dry*												
	2018-05-28	*Dry*												
	2018-08-22	*Dry*												
	2019-05-29	*Dry*												
	2019-08-28	*Dry*												
	2020-05-27		5.56	<0.00005	<0.001	0.7	<0.01	0.112	4.37	6.85	50	0.029	4.5	98.6
	2020-08-19		5.72	<0.00005	<0.001	0.7	<0.01	0.083	3.69	**6.38**	47	0.0176	4.1	99.8
	2021-06-10	*Dry*												
	2021-08-11	*Dry*												
	2022-05-25		6.3	<0.00005	<0.001	1.2	<0.01	0.175	3.33	6.76	54	0.029	3.7	
	2022-08-10		5.3	0.00006	<0.001	1.3	<0.01	0.194	3.46	6.56	37	0.0098	**7.5**	79.6
	2023-06-07		5.07	<0.00005	<0.001	3.1	<0.01	0.132	2.52	6.62	31	0.0124	**10.6**	75.3
	2023-08-23	*limited sample*	6.25	<0.00025	<0.005	1.9	<0.01	0.092	3.58			0.0373	**17.4**	

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
11/4	2010-05-18		64			83				7.52	91
	2010-08-24		58			26				**11.15**	
	2011-05-31		54			9				**6.26**	100
	2011-08-23		74			11				6.51	93
	2012-05-16	*Dry*									
	2012-08-29		NA			NA				**6.30**	136
	2013-05-22	*Dry*									
	2013-08-27	*Dry*								6.99	112
	2014-05-20		**1270**			21				7.56	78
	2014-08-19		**562**	<1	25	11	<2		<0.001	7.24	105
	2015-05-20	*Dry*									
	2015-08-18		**1750**	0.24	12	4.7	<2		<0.001	7.10	80
	2016-05-10		56	0.505	14.5	113	<6	N/A	0.001	6.54	72
	2016-08-31		518	1.09	11.1	186	<6	-	<0.0010		
	2017-05-16	*Dry*									
	2017-08-29	*Dry*									
	2018-05-28	*Dry*									
	2018-08-22	*Dry*									
	2019-05-29	*Dry*									
	2019-08-28	*Dry*									
	2020-05-27		303	0.18	4.82	93	<5	106000	<0.001	7.25	95
	2020-08-19		**643**	0.829	11.2	22	<3.3	29400	<0.001	7.72	118
	2021-06-10	*Dry*									
	2021-08-11	*Dry*									
	2022-05-25		**616**	<1	23.6	22	5.3	2760	0.0061	**6.44**	116
	2022-08-10		371	<1	26.4	38	<10	12800	0.0038	6.54	82
	2023-06-07		368	0.13	6.78	29	<3.0	5760	0.0043	6.80	80
	2023-08-23	*limited sample*		0.698	0.668	68			0.0039	7.48	111

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
16/15	2010-05-18	*No Recovery*												
	2010-08-24	*No Recovery*												
	2011-05-31			<0.02	<0.02	17.5				<0.02			3.0	
	2011-08-23		<0.001	<0.02	0.050	15.0	<0.0001	<0.005	<0.0001	<0.1	<0.0001	1.10	2.9	<0.002
	2012-05-16			<0.02	<0.02	15.0				<0.02			2.8	
	2012-05-16	*Duplicate*		<0.02	<0.02	15.1				<0.02			2.8	
	2012-08-29		<0.001	<0.02	0.052	14.0	<0.0001	<0.005	<0.0001	<0.1	<0.0001	1.00	3.0	<0.002
	2013-05-22			<0.02	0.005	15.7				<0.02			3.0	
	2013-08-27		<0.2	<0.02	0.005	15.7	<0.005	<0.01	<0.02	<0.02	<0.0001	1.00	3.1	<0.01
	2014-05-20			<0.02	0.008	17.0				<0.02			3.4	
	2014-08-19		<0.001	<0.01	0.008	17.0	<0.001	<0.005	0.0011	<0.1	<0.0001	1.10	3.1	0.006
	2015-05-20			<0.01	0.006	17.0				<0.02			3.2	
	2015-08-18		<0.001	<0.01	0.006	16.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	1.10	3.3	<0.002
	2016-05-10		<0.001	0.050	0.050	23.6	0.0001	<0.005	0.009	**2.4**	<0.0001	2.13	5.4	**0.051**
	2016-08-31		0.00021	<0.05	0.006	15.9	<0.00001	<0.001	0.00069	<0.0050	<0.00001	1.09	3.2	<0.001
	2017-05-16		0.00027	<0.05	0.024	25.1	0.000032	0.0024	0.00491	**1.0**	<0.00001	1.36	4.1	0.0251
	2017-08-29		<0.0002	<0.02	<0.01	17.0	<0.00002	<0.001	0.0005	<0.06	<0.000002	1.10	3.0	<0.004
	2018-05-28		<0.0002	<0.02	<0.01	17.0	<0.00002	<0.001	0.0004	<0.06	<0.000002	1.20	3.4	<0.004
	2018-08-22		<0.0002	<0.02	<0.01	17.0	<0.00002	<0.001	0.00072	<0.06	<0.000002	1.20	3.3	0.0051
	2019-05-29		0.00039	<0.02	0.018	17.0	0.000022	0.0023	0.0037	**0.74**	<0.000002	1.30	3.4	0.014
	2019-08-28		0.00018	<0.01	0.006	15.6	<0.000005	0.00049	0.00083	<0.01	<0.000005	1.25	3.4	0.00046
	2020-05-27		0.00022	<0.01	0.007	17.6	<0.000005	<0.0005		<0.01	<0.000005	1.09	3.3	<0.0005
	2020-08-19		0.0002	<0.01	0.007	17.3	<0.000005	0.00049	<0.0002	<0.01	<0.000005	1.21	3.6	0.0002
	2021-06-10		0.0002	<0.01	0.006	16.8	<0.000005	0.0004	0.00025	<0.01	<0.000005	1.17	3.4	<0.0001
	2021-08-11		0.00023	<0.01	0.007	17.8	<0.000005	0.00046	0.00042	<0.01	<0.000005	1.25	3.7	<0.0001
	2022-05-25		0.00022	<0.01	0.007	19.7	<0.000005	0.0005	0.00035	<0.01	<0.000005	1.19	3.8	<0.0005
	2022-08-10		0.00021	<0.01	0.011	21.6	0.0000102	<0.0005	0.00059	<0.01	<0.000005	1.67	4.6	<0.0001
	2023-06-07		0.00022	<0.01	0.008	22.3	<0.000005	0.00053	0.00049	<0.01	<0.000005	1.38	4.7	0.00011
	2023-08-23		0.00021	<0.01	0.008	19.6	<0.000005	0.00051	0.00028	<0.01	<0.000005	1.32	4.6	<0.00010

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
16/15	2010-05-18	*No Recovery*												
	2010-08-24	*No Recovery*												
	2011-05-31		2.9			1		0.3	3.0	7.85	53	<0.05	1.8	118
	2011-08-23		2.9	<0.0005	<0.005	<1	<0.01	0.2	3.0	7.85	51	<0.05	1.4	110
	2012-05-16		2.8			<1		0.14	3.0	7.72	52	<0.05	1.4	110
	2012-05-16	*Duplicate*	2.8			<1		0.16	3.0	7.63	52	<0.05	1.3	110
	2012-08-29		3.0	<0.0005	<0.005	<1	<0.01	0.21	3.0	7.71	55	<0.05	1.7	110
	2013-05-22		3.8			<1		0.22	3.0	8.06	53	0.08	1.4	110
	2013-08-27		3.2	<0.05	<0.01	<1	<0.01	0.29	3.0	8.20	54	<0.05	1.3	110
	2014-05-20		3.5			<1		0.34	3.0	7.77	56	<0.05	1.3	120
	2014-08-19		2.9	<0.0005	<0.005	<1	<0.01	0.46	4.0	7.81	55	<0.05	1.2	120
	2015-05-20		3.2			<1		0.27	4.0	7.09	61	<0.05	1.4	120
	2015-08-18		3.0	<0.0005	<0.005	<1	<0.01	0.38	4.5	8.10	58	<0.05	1.2	120
	2016-05-10		3.6	0.0033	0.016	0.6	0.007	0.342	5.0	7.91	63	0.013	1.74	120
	2016-08-31		3.1	<0.0002		<0.5	<0.002	0.322	4.5	8.03	55	<0.005	1.16	122
	2017-05-16		3.3	0.00168		<0.5	<0.033	0.90	3.9	8.18	56	<0.015	0.78	118
	2017-08-29		3.1	<0.0002	0.0046	<0.5	0.07	0.27	4.2	8.10	62	0.016	0.75	115
	2018-05-28		3.3	<0.0002	<0.003	<0.5	<0.01	0.14	3.3	8.21	55	<0.015	<0.5	114
	2018-08-22		3.3	<0.0002	<0.003	<0.5	<0.01	0.11	2.5	8.21	55	<0.015	1.2	114
	2019-05-29		3.1	0.00091	<0.003	1.1	<0.0099	0.51	2.7	8.10	55	0.019	1.1	120
	2019-08-28		3.1	<0.00005	<0.001	0.3	<0.010	0.116	2.3	8.28	61	0.06	1.4	119
	2020-05-27		3.0	<0.00005	<0.001	0.3	<0.01	0.191	4.0	8.13	66	<0.01	2.3	130
	2020-08-19		3.2	<0.00005	<0.001	0.3	<0.05	<0.01	4.0	8.07	64	<0.005	1.7	126
	2021-06-10		3.3	<0.00005	<0.001	0.3	<0.01	0.146	3.0	7.91	64	<0.005	2.1	127
	2021-08-11		3.4	<0.00005	<0.001	0.4	<0.01	0.186	3.7	8.05	66	0.39	1.6	131
	2022-05-25		3.4	<0.00005	<0.001	0.6	<0.01	0.218	3.3	7.94	71	<0.005	1.5	
	2022-08-10		3.9	<0.00005	0.0064	0.9	<0.01	0.384	8.9	8.22	76	<0.005	1.6	166
	2023-06-07		3.8	<0.00005	<0.001	0.6	<0.01	0.266	7.8	7.99	74	<0.005	1.6	158
	2023-08-23		3.7	<0.00005	<0.001	0.5	<0.01	0.234	7.9	8.24	72	<0.005	1.6	156

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
16/15	2010-05-18	*No Recovery*									
	2010-08-24	*No Recovery*									
	2011-05-31		70			9				6.98	125
	2011-08-23		84	<1	0.49	<4			<0.001	6.88	122
	2012-05-16		64			8.6					
	2012-05-16	*Duplicate*	84			13				8.15	145
	2012-08-29		76	3.4	0.25	4.4			<0.001	8.29	159
	2013-05-22		84			10				8.43	122
	2013-08-27		152	0.11	0.37	4.6	<2	290	0.002	8.41	122
	2014-05-20		100			<4				**8.6**	102
	2014-08-19		54	0.14	0.33	7.3	<2		<0.001	**8.62**	149
	2015-05-20		86			4.1	<2	340		**6.2**	120
	2015-08-18		102	<0.1	0.14	<4	<2		<0.001	7.22	116
	2016-05-10		68	0.118	0.44	25	<3	289	<0.001	8.2	107
	2016-08-31		98	0.057	0.29	36	<6	172	<0.001		
	2017-05-16		96	0.066	0.16	40	<3	248	0.004	**8.59**	109
	2017-08-29		82	0.083	0.24	16	15	198	<0.002	7.59	106
	2018-05-28		76	<0.05	0.16	8	<3	260	0.0023	7.82	112
	2018-08-22		74	<0.05	0.13	10	<6	563	<0.002	**8.51**	99
	2019-05-29		92	0.22	0.15	9.9	<2	200	0.0025	8.46	95
	2019-08-28		94	<0.15	0.09	<20	<2	113	0.0023	**9.92**	105
	2020-05-27		92	<0.15	0.09	<10	<2	157	<0.001	8.42	105
	2020-08-19		77	<0.05	0.06	<20	<2	87	<0.001	8.2	115
	2021-06-10		88	0.13	0.10	18	<2	118	0.0029	8.41	111
	2021-08-11		92	0.17	0.04	14	<2	99.5	0.0057		
	2022-05-25		91	<0.05	0.08	<10	<2	80.4	0.0125	8.35	149
	2022-08-10		115	0.079	0.15	17	<2	180	0.0123	8.46	180
	2023-06-07		115	<0.05	0.07	14	<2	123	0.0159	8.18	169
	2023-08-23		114	<0.05	0.05	<10	<2	89.6	<0.001	8.13	166

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
17/15	2010-08-24	*No Recovery*												
	2011-05-31			<0.02	0.040	26.3				<0.02			5.8	
	2011-08-23			<0.02	0.030	24.5				<0.02			5.5	
	2012-05-16			<0.02	0.030	26.3				<0.02			5.7	
	2012-08-29			<0.02	0.030	22.4				<0.02			4.8	
	2013-05-22			<0.02	0.024	22.4				<0.02			4.8	
	2013-08-27		<0.2	<0.02	0.030	23.8	<0.005	<0.01	<0.02	<0.02	<0.0001	2	5.2	<0.01
	2014-05-20			<0.02	0.027	23.0				<0.02			5.0	
	2014-08-19		0.001	<0.01	0.033	24.0	<0.001	<0.005	0.0012	<0.1	<0.0001	1.8	5.6	ND
	2015-05-20			<0.01	0.037	27.0				<0.02			6.0	
	2015-08-18		0.0013	<0.01	0.035	25.0	<0.0001	<0.005	0.0012	<0.1	<0.0001	2.1	6.1	<0.002
	2016-05-10		0.0014	0.050	0.382	26.6	0.0003	<0.005	0.0039	0.23	<0.0001	2.4	6.8	0.007
	2016-08-31		0.0011	<0.050	0.038	28.2	0.00003	<0.001	0.00119	<0.005	<0.00001	2.2	6.5	<0.001
	2017-05-16		0.0111	<0.050	0.040	25.6	0.000094	0.0012	0.00504	0.29	<0.00001	2.1	6.5	0.0082
	2017-08-29		0.00074	<0.02	0.036	26.0	0.000037	<0.001	0.0014	0.09	<0.000002	2.2	5.9	<0.004
	2018-05-28		0.001	<0.02	0.035	28.0	<0.00002	<0.001	0.0015	<0.06	<0.000002	2.3	6.5	<0.004
	2018-08-22		0.00095	<0.02	0.035	26.0	<0.00002	<0.001	0.00044	<0.06	<0.000002	2.2	6.0	<0.004
	2019-05-29		0.0012	<0.02	0.037	23.0	0.000003	0.0022	0.0048	**0.49**	<0.000002	1.8	5.4	0.0095
	2019-08-28		0.00099	<0.01	0.028	21.4	<0.000005	0.00047	0.00203	<0.01	<0.000005	2.0	5.1	<0.0001
	2020-05-27		0.00106	<0.01	0.031	23.0	0.0000138	<0.0005		<0.01	<0.000005	1.9	5.2	<0.0005
	2020-08-19		0.00105	<0.01	0.034	24.2	<0.000005	0.00037	0.0007	<0.01	<0.000005	2.2	6.1	0.00079
	2021-06-10		0.0011	<0.01	0.031	22.9	<0.00005	0.00036	0.0011	<0.01	<0.000005	2.0	5.4	<0.0001
	2021-08-11		0.00104	<0.01	0.031	22.9	0.000005	0.000949	0.0012	<0.01	<0.000005	2.1	5.2	0.00013
	2022-05-25		0.00147	<0.01	0.025	21.4	0.000006	<0.0005	0.00115	<0.01	<0.000005	1.8	4.7	<0.0005
	2022-05-25	*Duplicate*	0.00142	<0.01	0.026	20.6	0.00001	0.00071	0.00108	<0.01	<0.000005	1.9	4.7	<0.0005
	2022-08-10		0.0011	<0.01	0.029	20.6	0.0000113	<0.0005	0.0009	<0.01	<0.000005	2.0	4.9	<0.0001
	2023-06-07		0.00103	<0.01	0.030	25.0	0.000008	<0.00050	0.00152	<0.01	<0.000005	2.1	6.2	0.00061
	2023-08-23		0.00116	<0.01	0.032	22.5	<0.000005	<0.00050	0.0014	<0.01	<0.000005	2.0	6.0	0.0001

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
17/15	2010-08-24	*No Recovery*												
	2011-05-31		3.3			<1		0.1	11.0	7.98	83	<0.05	2.4	191
	2011-08-23		3.1			<1		0.1	11.0	7.76	83	<0.05	2.3	188
	2012-05-16		3.3			<1		<0.1	10.0	7.74	84	<0.05	2.7	190
	2012-08-29		3			<1		0.15	7.0	7.53	78	<0.05	3.3	170
	2013-05-22		3.9			<1		0.11	5.0	8.06	73	0.07	2.7	150
	2013-08-27		3.5	<0.05	<0.01	<1	<0.01	<0.1	7.0	8.11	80	<0.05	3.0	170
	2014-05-20		3.7			<1		0.1	5.0	7.76	74	<0.05	2.3	150
	2014-08-19		3	<0.0005	<0.005	<1	<0.01	<0.1	13.0	7.97	86	<0.05	2.1	200
	2015-05-20		3.6			<1		<0.1	12.0	7.20	85	<0.05	2.3	190
	2015-08-18		3.3	<0.0005	<0.005	<1	<0.01	<0.1	14.0	8.02	87	<0.05	2.5	190
	2016-05-10		3.9	0.005	0.007	1.0	<0.01	0.1	10.4	7.88	81	<0.05	2.3	187
	2016-08-31		3.5	<0.0002		<0.50	0.004	0.065	14.0	8.16	90	0.018	2.6	205
	2017-05-16		3.6	0.00093		<0.50	<0.010	0.14	12.0	8.03	87	<0.015	1.6	191
	2017-08-29		3.4	<0.0002	0.0037	0.6	<0.010	0.088	11.0	8.03	83	0.016	1.9	188
	2018-05-28		3.8	<0.0002	0.0042	<0.50	<0.010	0.11	9.9	8.25	91	<0.015	1.4	200
	2018-08-22		3.7	<0.0002	<0.003	<0.50	<0.10	0.086	8.7	8.14	89	<0.015	2.1	196
	2019-05-29		3.5	0.00064	<0.003	1.0	<0.0099	0.45	7.2	7.93	78	0.026	2.0	170
	2019-08-28		3.3	<0.00005	0.0026	0.3	<0.010	0.06	6.8	8.00	82	<0.02	2.8	171
	2020-05-27		3.3	<0.00005	0.0036	0.3	<0.01	0.069	7.2	8.01	88	<0.01	3.2	176
	2020-08-19		3.4	<0.00005	0.0015	0.4	<0.05	<0.01	9.7	7.80	91	<0.005	3.3	185
	2021-06-10		3.5	<0.00005	<0.001	0.3	<0.01	0.13	6.7	7.87	88	<0.005	2.7	179
	2021-08-11		3.6	<0.00005	0.0021	0.3	<0.01	0.09	6.8	7.89	86	0.34	2.7	176
	2022-05-25		3.3	<0.00005	0.0011	0.4	<0.01	0.098	3.4	7.96	77	0.0078	2.6	
	2022-05-25	*Duplicate*	3.3	<0.00005	0.0021	0.2	<0.01	0.09	4.8	8.02	85	<0.005	2.5	
	2022-08-10		3.3	<0.00005	0.001	0.3	<0.01	0.094	6.7	8.19	81	<0.005	2.8	169
	2023-06-07		3.7	<0.00005	0.0021	0.3	<0.01	0.083	7.9	8.02	88	0.0218	2.5	183
	2023-08-23		3.4	<0.00005	0.0013	0.3	<0.01	0.088	8.1	8.16	87	<0.005	3.4	181

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
17/15	2010-08-24	*No Recovery*									
	2011-05-31		138			17				6.79	223
	2011-08-23		128			8				**6.44**	197
	2012-05-16		110			16				7.96	233
	2012-08-29		104			15				7.99	240
	2013-05-22		92			7.9				8.1	163
	2013-08-27		130	0.2	0.064	4.7	<2	110	<0.001	7.72	183
	2014-05-20		110			10				8.15	132
	2014-08-19		110	0.15	0.054	8.2	<2		<0.001	7.71	189
	2015-05-20		118			6.3	<2	65		**5.81**	180
	2015-08-18		128	<0.1	0.044	4.1	<2		<0.001	8.48	165
	2016-05-10		76	0.11	0.040	<10	<3	67.8	0.001	7.4	149
	2015-08-31		126	0.069	0.132	22	<6.0	140	<0.001		
	2017-05-16		80	0.095	0.048	17	<3	81.8	0.0037	8.24	152
	2017-08-29		84	0.1	0.026	14	18	30.3	<0.002	7.38	169
	2018-05-28		126	0.065	0.033	<3	<3	57.8	0.0022	7.29	172
	2018-08-22		178	0.064	0.029	10		273	<0.002	7.37	149
	2019-05-29		53	0.11	0.019	11	11	53	<0.0015	**8.49**	130
	2019-08-28		109	<0.15	0.046	<20	<2	38.7	0.0041	**8.91**	142
	2020-05-27		128	0.2	0.028	13	<2	42.8	<0.001	8.09	132
	2020-08-19		291	<0.05	0.023	<20	<2	118	<0.001	8.28	156
	2021-06-10		108	0.13	0.028	13	<2	30.6	0.017	**8.67**	173
	2021-08-11		117	0.132	0.028	16	<2	30.5	0.0037		
	2022-05-25		92	0.052	0.027	<10	<2	71	0.0069	7.93	158
	2022-05-25	*Duplicate*	109	0.084	0.035	13	<2	63.3	0.0103	7.93	158
	2022-08-10		115	0.088	0.041	25	<2	118	0.005	7.81	173
	2023-06-07		133	0.217	0.082	14	<2	104	0.0032	7.81	197
	2023-08-23		113	<0.05	0.047	12	<2	80.6	<0.001	7.94	194

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
19/16	2010-05-18			<0.02	<0.02	39.5				<0.02			8.7	
	2010-08-24			<0.02	<0.02	37.5				<0.02			8.8	
	2011-05-31			<0.02	<0.02	39.8				<0.02			9.0	
	2011-08-23			<0.02	<0.02	39.6				<0.02			8.9	
	2012-05-16			<0.02	<0.02	41.5				<0.02			9.0	
	2012-08-29			<0.02	<0.02	41.7				<0.02			9.1	
	2013-05-22			<0.02	0.014	45.3				<0.02			10.2	
	2013-08-27		<0.2	<0.02	0.017	45.8	<0.005	<0.01	<0.02	<0.02	<0.0001	2.00	10.4	<0.01
	2014-05-20			<0.02	0.018	49.0				<0.02			11.0	
	2014-08-19		<0.001	<0.01	0.016	43.0	<0.001	<0.005	<0.001	<0.1	<0.0001	2.20	10.0	<0.01
	2015-05-20			<0.01	0.018	45.0				<0.02			10.0	
	2015-08-18		<0.001	<0.01	0.016	41.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	2.10	9.9	<0.002
	2016-05-10		0.001	0.050	0.042	49.6	0.0002	<0.005	0.006	**1.55**	<0.0001	2.99	12.0	0.031
	2016-08-31		0.00073	<0.05	0.0157	41.9	<0.00001	0.0019	0.00038	<0.005	<0.00001	2.02	9.3	<0.001
	2017-05-16		0.00081	<0.05	0.0358	24.9	0.017	0.0034	0.00487	**1.04**	<0.00001	2.37	10.9	0.025
	2017-08-29		0.00044	<0.02	0.016	41.0	<0.00002	<0.001	0.00031	<0.060	<0.000002	4.30	9.3	<0.004
	2018-05-28		0.00057	<0.02	0.015	44.0	<0.00002	0.0013	0.001	<0.06	<0.000002	2.30	10.0	<0.004
	2018-08-22		0.00073	0.110	0.056	47.0	<0.00002	0.0013	0.00038	<0.06	<0.00002	2.50	11.0	<0.004
	2019-05-29		0.0012	<0.02	0.049	43.0	0.000023	0.0052	0.006	**1.9**	<0.000002	2.80	10.0	0.034
	2019-08-28		0.00074	<0.01	0.0173	42.3	0.000062	0.00169	0.00079	<0.01	<0.000005	2.53	10.6	0.0003
	2020-05-27		0.00082	<0.01	0.016	39.3	<0.000005	<0.0005		<0.01	<0.000005	2.17	9.4	0.0005
	2020-08-19		0.00073	<0.01	0.0154	38.5	<0.000005	0.00176	<0.0002	<0.01	<0.000005	2.26	9.6	0.0006
	2021-06-10		0.00077	<0.01	0.0157	37.8	<0.000005	0.00158	0.00033	<0.01	<0.000005	2.25	9.2	<0.0001
	2021-08-11		0.00079	<0.01	0.0166	40.8	<0.000005	0.00168	0.00033	<0.01	<0.000005	2.32	9.6	<0.0001
	2022-05-25		0.00087	<0.01	0.0174	44.5	<0.000005	0.00186	0.0004	<0.01	<0.000005	2.25	10.3	<0.0005
	2022-08-10		0.00074	<0.01	0.0167	39.3	0.0000102	0.00188	0.0006	<0.01	<0.000005	2.41	9.4	<0.0001
	2023-06-07		0.00082	<0.01	0.015	41.0	0.0000053	0.00183	0.00051	<0.01	<0.000005	2.23	10.4	0.0002
	2023-08-23		0.00083	<0.01	0.0159	40.1	<0.000005	0.00165	0.00035	<0.01	<0.000005	2.26	10.4	<0.0001

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
19/16	2010-05-18		4.3			2		0.1	5	8.20	137	<0.05	1.7	273
	2010-08-24		4.2			1		0.1	5	8.10	135	<0.05	1.8	275
	2011-05-31		4			1		0.1	4	8.11	138	<0.05	1.9	278
	2011-08-23		4.1			1		0.1	4	7.99	142	<0.05	1.6	279
	2012-05-16		4.3			<1		0.12	4	8.04	140	<0.05	1.9	280
	2012-08-29		4.1			<1		0.15	5	8.02	150	<0.05	2.9	290
	2013-05-22		5.3			<1		0.12	5	8.22	150	0.06	1.7	300
	2013-08-27		4.8	<0.05	<0.01	<1	<0.01	<0.1	5	8.28	160	0.05	1.6	310
	2014-05-20		5.1			2		<0.1	5	8.17	160	<0.05	1.5	300
	2014-08-19		4.4	<0.0005	<0.005	1	<0.01	0.1	5	8.15	160	<0.05	2.3	310
	2015-05-20		4.7			1		<0.1	6	7.75	160	<0.05	1.7	160
	2015-08-18		4.3	<0.0005	<0.005	1.2	<0.01	<0.1	6.7	8.12	150	<0.05	1.4	300
	2016-05-10		5.1	0.002	0.01	1.2	0.005	0.14	5.79	8.12	149	0.03	2.3	291
	2016-08-11		4.1	<0.0002		<0.50	<0.002	0.127	5.5	8.29	139	0.0069	1.8	281
	2017-05-16		4.6	0.0203		1	<0.010	0.24	7.8	8.16	141	<0.015	0.9	278
	2017-08-29		4.3	<0.0002	<0.003	0.8	<0.010	0.22	7.8	8.25	140	0.015	<1.0	287
	2018-05-28		4.6	<0.0002	<0.003	0.7	<0.01	0.19	6.1	8.35	152	<0.015	<0.50	290
	2018-08-22		5.7	<0.0002	<0.003	1.5	0.2	0.2	5.8	8.20	144	0.15	1.5	285
	2019-05-29		4.8	0.0025	0.0092	1.6	0.18	0.78	5.7	8.13	140	0.034	1.5	290
	2019-08-28		4.7	<0.00005	0.0026	0.6	<0.010	0.158	4.58	8.19	158	<0.02	2.0	292
	2020-05-27		4.2	<0.00005	<0.001	0.5	<0.01	0.143	4.95	8.31	280	0.016	2.6	280
	2020-08-19		4.3	<0.00005	<0.001	0.6	<0.01	0.131	4.9	8.12	151	<0.0075	2.1	276
	2021-06-10		4.4	<0.00005	<0.001	0.7	<0.01	0.147	4.66	8.15	151	<0.005	2.4	276
	2021-08-11		4.5	<0.00005	<0.001	0.7	<0.01	0.147	5.52	8.11	158	0.74	1.9	289
	2022-05-25		4.7	<0.00005	<0.001	1.0	<0.01	0.113	3.95	8.24	218	<0.005	1.8	
	2022-08-10		4.4	<0.00005	0.0023	1.3	<0.01	0.101	7.63	8.35	151	<0.005	2.4	292
	2023-06-07		4.5	<0.00005	0.0012	0.7	<0.01	0.095	4.16	8.22	205	0.0129	1.8	278
	2023-08-23		4.4	<0.00005	<0.001	0.6	<0.01	0.114	4.39	8.39	158	<0.005	2.2	291

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
19/16	2010-05-18		186			6				8.07	274
	2010-08-24		180			8				**11.42**	
	2011-05-31		172			7				6.83	302
	2011-08-23		190			<4				7.05	304
	2012-05-16		142			10				7.95	320
	2012-08-29		156			8				7.92	374
	2013-05-22		180			4.3				7.86	317
	2013-08-27		310	0.110	0.32	<4	<2	290	<0.001	7.80	337
	2014-05-20		186			6.3				8.08	253
	2014-08-19		176	0.380	0.19	<4	<2		<0.001	8.33	300
	2015-05-20		160			<4	<2	390		7.60	279
	2015-08-18		198	0.120	0.16	<4	<2		<0.001	6.86	272
	2016-05-10		124	0.110	0.29	17	<3	276	0.004	7.71	216
	2016-08-31		166	0.054	0.216	44	<6	222	<0.0010		
	2017-05-16		142	0.093	<0.015	27	<3	221	0.0033	8.32	237
	2017-08-29		158	0.071	0.42	10	6	422	<0.002	6.93	216
	2018-05-28		160	0.120	0.2	11	<3	617	0.0042	7.46	237
	2018-08-22		166	0.190	0.12	14	<6	177	<0.002	8.36	223
	2019-05-29		180	0.180	0.17	13	<2	200	<0.0015	8.30	196
	2019-08-28		184	0.170	0.108	<20	<2	177	0.0068	**8.84**	209
	2020-05-27		190	0.220	0.139	22	<2	198	<0.001	8.19	186
	2020-08-19		180	0.052	0.048	<20	<2	116	<0.001	8.19	213
	2021-06-10		162	0.110	0.08	17	<2	183	0.0059	8.39	220
	2021-08-11		189	0.061	0.071	23	<2	223	<0.01		
	2022-05-25		171	<0.05	0.121	12	<2	88.4	0.0083	8.08	307
	2022-08-10		177	0.425	0.082	25	<2	174	0.0055	8.05	306
	2023-06-07		175	0.059	0.121	33	<2	254	0.0125	8.01	300
	2023-08-23		269	<0.05	0.148	20	<2	197	<0.001	7.99	311

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
23/3	2010-05-18			< 0.02	< 0.02	24				< 0.02			5.5	
	2010-08-24			< 0.02	< 0.02	22				< 0.02			5.4	
	2011-05-31			<0.02	<0.02	29				<0.02			6.3	
	2011-08-23			<0.02	<0.02	25				<0.02			5.5	
	2012-05-16			<0.02	<0.02	27				<0.02			5.8	
	2012-08-29			<0.02	<0.02	25				<0.02			5.5	
	2013-05-22			<0.02	0.016	28				<0.02			6.3	
	2013-08-27		<0.2	<0.02	0.014	27	<0.005	<0.01	<0.02	<0.02	<0.0001	2	6.3	<0.01
	2014-05-20			1.90	0.54	190				**34**			81.0	
	2014-08-19		0.0014	0.13	0.045	39	<0.001	<0.005	<0.001	<0.1	<0.0001	14	11.0	**0.2**
	2015-05-20			0.12	0.046	40				<0.02			13.0	
	2015-08-18		0.0120	0.09	0.042	34	<0.0001	<0.005	<0.001	<0.1	0.00058	8.8	9.1	**0.2**
	2016-05-10		0.0120	1.28	0.367	132	0.0004	0.027	0.0383	**56.5**	<0.0001	76	52.2	**1.3**
	2016-08-31		0.0008	0.37	0.0653	48	0.00002	<0.001	0.00197	0.01	<0.00001	23	14.1	**0.1**
	2017-05-16		0.0643	0.17	0.00643	47	0.00026	0.0123	0.0357	**14.9**	<0.00001	14	16.7	**0.2**
	2017-08-29		0.0008	0.55	0.097	68	<0.00002	<0.001	0.0005	0.1	<0.000002	32	24.0	**0.3**
	2018-05-28		0.0011	1.10	0.18	190	<0.00002	<0.001	<0.0002	**5.0**	<0.000002	72	66.0	**1.4**
	2018-08-22		0.0009	0.21	0.069	56	<0.00002	<0.001	<0.0002	<0.06	<0.000002	15	16.0	**0.2**
	2019-05-29		0.0024	1.50	0.22	130	0.00011	0.014	0.018	**42.0**	0.000034	90	48.0	**1.7**
	2019-08-28		0.0008	1.06	0.16	111	0.0000089	0.00037	0.00164	0.02	<0.000005	88	47.4	**0.5**
	2020-05-27		0.0006	0.48	0.0809	74	0.00000083	<0.0005		0.03	<0.000005	13	21.6	**0.3**
	2020-08-19		0.0038	0.68	0.117	112	0.0000051	0.00086	<0.0002	**0.62**	<0.000005	59	27.3	**0.7**
	2021-06-10		0.0011	1.63	0.228	231	0.00000163	0.00067	0.002	0.07	<0.000005	174	76.9	**1.4**
	2021-08-11		0.0007	0.33	0.664	68	<0.000005	0.00014	0.00021	0.02	0.0000085	33	19.2	**0.2**
	2021-08-11	*Duplicate*	0.0007	0.65	0.153	111	<0.000005	0.00026	0.00022	**0.4**	<0.000005	73	35.3	**0.3**
	2022-05-25	*Inaccessible*												
	2022-08-10	*Inaccessible*												
	2023-06-07		0.0013	1.40	0.095	147	<0.00005	<0.00500	<0.00200	0.3	<0.000005	118	50.2	**1.0**
	2023-08-23		0.0014	0.32	0.0706	56	<0.00001	<0.001	0.00042	0.04	<0.000005	35	17.6	**0.3**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
23/3	2010-05-18		3.5			2		0.1	8	8.10	85	0.5	1.3	184
	2010-08-24		3.3			1		0.2	8	8.10	86	0.3	2.1	186
	2011-05-31		3.5			1		0.1	9	8.06	87	0.43	1.4	189
	2011-08-23		3.4			2		0.1.	9	7.70	89	<0.05	1.5	189
	2012-05-16		3.7			1		<0.1	8	7.93	95	<0.05	1.4	200
	2012-08-29		3.4			<1		0.12	8	7.36	90	0.14	2.2	190
	2013-05-22		4.7			2		<0.1	11	8.04	93	0.22	2.0	200
	2013-08-27		4	<0.05	<0.01	2	<0.01	<0.1	6	7.89	93	<0.05	1.8	200
	2014-05-20		72			110		<0.1	300	7.30	**750**	11	**97.0**	2200
	2014-08-19		7.4	<0.0005	<0.005	9	<0.01	<0.1	25	7.78	150	0.54	4.6	360
	2015-05-20		8.9			10		<0.1	22	7.35	150	0.47	4.5	268
	2015-08-18		6.5	<0.0005	<0.005	5.1	<0.01	<0.1	27	7.53	120	0.77	4.2	290
	2016-05-10		31.9	**0.02**	0.188	27	<0.002	<0.2	15.3	7.67	**577**	5.4	**15.2**	1150
	2016-08-31		10	<0.00002		6.7	0.006	0.042	22	8.15	194	1.2	**8.1**	439
	2017-05-16		8.53	**0.0115**		4.3	<0.010	0.068	14	7.66	203	0.7	3.7	422
	2017-08-29		14	<0.0002	<0.003	8.6	0.015	0.048	35	7.88	280	3.1	<13	626
	2018-05-28		29	<0.0002	<0.003	26	0.011	0.017	18	7.62	**681**	5.7	**14.0**	1260
	2018-08-22		8.4	<0.0002	<0.003	4	0.019	0.059	12	7.74	205	0.85	4.7	422
	2019-05-29		25	0.0043	0.037	13	0.011	0.055	28	7.41	500	6.8	**11.0**	1100
	2019-08-28		25.3	<0.00005	0.0015	8.3	0.011	0.065	28	7.44	399	7.35	**18.4**	792
	2020-05-27		13.3	<0.00005	0.0102	5.8	<0.01	<0.02	11	7.78	317	3.4	**13.6**	585
	2020-08-19		15.9	<0.00005	0.0026	7.3	<0.01	<0.02	5	7.24	409	4.38	**35.0**	726
	2021-06-10		55.7	<0.00005	0.0071	26.7	<0.05	<0.1	48	7.75	**872**	23.3	**34.0**	1570
	2021-08-11		12.9	<0.00005	0.001	8.3	<0.01	<0.02	14	7.73	322	3.33	**7.7**	633
	2021-08-11	*Duplicate*	25	<0.00005	<0.001	8.6	<0.01	<0.02	15	7.37	339	7.26	**8.5**	662
	2022-05-25	*Inaccessible*												
	2022-08-10	*Inaccessible*												
	2023-06-07		44.8	<0.0005	<0.01	23.7	<0.05	<0.100	7	7.70	**600**	19.3	**37.8**	955
	2023-08-23		12.8	<0.0001	<0.002	11.8	<0.01	<0.020	5	7.51	310	4.68	**17.4**	602

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
23/3	2010-05-18		122			1800				7.92	170
	2010-08-24		120			310				8.07	
	2011-05-31		118			740				7.01	209
	2011-08-23		136			25				**6.44**	204
	2012-05-16		110			45				7.82	223
	2012-08-29		142			100				7.73	250
	2013-05-22		216			220				7.92	226
	2013-08-27		182	2.2	1.8	52	<2	2700	<0.001	7.41	246
	2014-05-20		**1560**			380				6.99	1130
	2014-08-19		222	1.2	0.69	34	<2		0.0052	7.32	331
	2015-05-20		268			29	<2	740		**6.10**	522
	2015-08-18		200	1	2.5	69	<2		0.095	**6.22**	375
	2016-05-10		**624**	7.53	1.86	189	23	2660	0.0208	6.89	549
	2016-08-31		222	4.77	2.38	221	<6	1580	0.0016		
	2017-05-16		264	2	1.1	56	10	2250	0.004	7.68	263
	2017-08-29		344	4.9	2.1	46	62	3960	<0.001	**6.38**	485
	2018-05-28		**732**	7.2	1	92	31	9230	0.011	**4.92**	489
	2018-08-22		280	2	2.7	120	21	3060	0.0048	7.67	297
	2019-05-29		**690**	13	2.4	270	12	5700	0.012	6.96	516
	2019-08-28		497	10	1.85	60	8.2	1370	0.011	8.10	479
	2020-05-27		360	4.87	0.438	71	16.2	4000	<0.001	7.32	310
	2020-08-19		**507**	8.11	0.824	209	8.7	7180	0.0032	7.73	401
	2021-06-10		**2090**	27	1.87	234	34	2090	0.004	7.58	818
	2021-08-11		410	0.777	13.9	71	12.8	410	0.0041		
	2021-08-11	*Duplicate*	419	6.25	14.5	109	12.8	419	<0.01		
	2022-05-25	*Inaccessible*									
	2022-08-10	*Inaccessible*									
	2023-06-07		489	13.9	1.35	142	7.8	1720	0.0083	7.14	1241
	2023-08-23		316	12.8	5.32	326	55.3	4700	0.006	7.13	573

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
24/5	2010-05-18			<0.02	0.03	16.1				<0.02			6.7	
	2010-08-24			<0.02	0.03	16.0				<0.02			6.6	
	2011-05-31			<0.02	0.03	15.7				0.03			6.4	
	2011-08-23			<0.02	0.02	16.0				<0.02			6.4	
	2012-05-16			<0.02	0.03	16.4				<0.02			6.7	
	2012-08-29			<0.02	0.03	17.0				0.02			6.5	
	2013-05-22			<0.02	0.03	17.2				0.06			7.1	
	2013-08-27	*Tubing Damaged*												
	2014-05-20	*Tubing Damaged*												
	2014-08-19		<0.001	<0.01	0.026	15.0	<0.001	<0.005	0.0041	<0.1	<0.0001	2.3	6.5	**0.24**
	2015-05-20			<0.01	0.026	15.0				<0.02			6.7	
	2015-08-18		<0.001	<0.01	0.026	15.0	<0.0001	<0.005	0.0046	<0.1	<0.0001	2.1	7.0	**0.24**
	2016-05-10		0.002	0.075	0.08	21.7	0.0001	0.006	0.021	**9.7**	<0.0001	5.2	8.9	**0.41**
	2016-08-31		0.00043	0.092	0.0435	18.4	0.000046	<0.001	0.00639	0.0223	<0.00001	5.6	7.7	**0.17**
	2017-05-16		0.0012	<0.05	0.0562	16.5	0.000072	0.0039	0.0202	**3.18**	<0.00001	3.73	7.6	**0.35**
	2017-08-29		0.00059	0.075	0.039	18.0	<0.00002	<0.001	0.0064	0.081	<0.000002	6.5	7.0	**0.30**
	2018-05-28		<0.0002	0.058	0.038	19.0	0.0001	<0.001	0.025	<0.06	<0.000002	4.8	7.6	**0.23**
	2018-08-22		0.00044	0.110	0.056	22.0	<0.00002	<0.001	0.0012	<0.06	<0.00002	9.5	7.9	**0.36**
	2019-05-29		0.0021	0.220	0.13	30.0	0.00021	0.015	0.31	**10**	0.000004	15	12.0	**0.76**
	2019-05-29	*Duplicate*	0.0039	0.140	0.19	29.0	0.00011	0.037	0.05	**24**	0.0000081	14	15.0	**0.75**
	2019-08-28		0.00058	0.243	0.0903	24.4	0.000144	0.00032	0.0916	0.037	<0.000005	21.4	7.2	**0.17**
	2020-05-27		0.00053	0.054	0.0353	16.3	0.00008	<0.0005		0.103	<0.000005	6.23	6.1	**0.07**
	2020-08-19		0.00107	0.445	0.0639	35.8	0.000127	0.00065	0.0921	0.275	<0.000005	25	14.8	**0.43**
	2021-06-10		0.00034	0.131	0.043	17.8	0.000132	0.00013	0.21	0.033	<0.000005	6.62	7.5	**0.16**
	2021-08-11		0.00033	0.050	0.0329	17.2	0.0000231	0.00021	0.00709	0.024	<0.000005	4.61	7.3	**0.32**
	2022-05-25	*Inaccessible*												
	2022-08-10	*Inaccessible*												
	2023-06-07		0.00109	0.312	0.0494	49.4	<0.0000500	<0.00500	0.00486	0.261	<0.000005	14.7	15.4	**0.80**
	2023-08-23		0.00152	0.196	0.0581	39.2	0.0000074	0.00064	0.00373	**0.43**	<0.000005	12.1	16.1	**0.86**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
24/5	2010-05-18		5.8			1		< 0.01	5	7.60	78	0.07	4.0	164
	2010-08-24		5.9			<1		0.4	5	7.50	78	<0.05	4.4	106
	2011-05-31		5.3			1		<0.1	7	7.44	73	<0.05	0.5	156
	2011-08-23		5.7			<1		<0.1	5	7.25	78	<0.05	4.1	166
	2012-05-16		6.1			<1		<0.1	6	7.21	77	<0.05	4.9	
	2012-08-29		5.8			<1		<0.1	5	6.96	80	0.16	**5.8**	170
	2013-05-22		6.9			7		<0.1	5	7.56	75	0.10	4.3	160
	2013-08-27	*Tubing Damaged*												
	2014-05-20	*Tubing Damaged*												
	2014-08-19		6.1	<0.0005	<0.005	<1	<0.01	<0.1	5	7.33	75	0.065	**6.2**	160
	2015-05-20		7.1			<1		<0.1	5	6.64	90	<0.05	4.4	160
	2015-08-18		6.8	<0.0005	0.0052	<1	<0.01	<0.1	5.6	7.16	75	<0.05	4.1	160
	2016-05-10		13.7	0.006	0.004	2.7	<0.01	0.1	10.6	7.53	92	0.15	5.0	214
	2016-08-31		12.8	<0.0002		1.8	<0.002	0.03	11	7.91	98.9	0.22	**6.9**	223
	2017-05-16		8.78	0.00403		1.1	<0.010	0.021	5.3	7.36	83.7	0.048	4.5	177
	2017-08-29		37.0	<0.0002	0.011	2.4	<0.010	0.35	8.6	7.56	128	0.21	**5.8**	282
	2018-05-28		14.0	<0.0002	0.048	1.2	<0.010	0.039	4.8	7.30	94.8	0.03	4.1	195
	2018-08-22		19.0	<0.0002	<0.003	1.8	<0.010	<0.010	3.3	7.39	133	0.14	**4.9**	273
	2019-05-29		16.0	**0.052**	0.3	11	<0.0099	0.018	8.7	7.35	130	0.86	**11.0**	290
	2019-05-29	*Duplicate*	15.0	**0.012**	0.072	9.8	0.011	0.024	8.7	7.23	120	0.63	**9.8**	260
	2019-08-28		15.0	0.000938	0.441	2.2	<0.010	<0.020	3	7.04	120	0.166	**13.1**	236
	2020-05-27		50.7	0.0011	0.223	2.0	<0.01	<0.02	7.4	7.58	184	1.25	**8.3**	341
	2020-08-19		32.5	0.00314	0.271	3.8	<0.01	0.026	10.7	7.10	200	0.764	**19.9**	386
	2021-06-10		20.9	0.000251	0.211	1.3	<0.10	0.035	6.11	7.48	180	0.064	**9.7**	218
	2021-08-11		12.4	<0.00005	0.138	1.1	<0.01	<0.02	4.38	7.22	98.4	0.094	**6.6**	197
	2022-05-25	*Inaccessible*												
	2022-08-10	*Inaccessible*												
	2023-06-07		63	<0.00005	0.0391	9.6	0.037	9.43	81.7	7.94	388	0.992	**20.1**	730
	2023-08-23		35.8	0.000113	0.0197	3.8	<0.010	0.037	6.17	7.95	255	0.487	**20.6**	441

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
24/5	2010-05-18		112			17				7.45	103
	2010-08-24		106			15				**11.08**	
	2011-05-31		102			9				6.90	196
	2011-08-23		138			5				**6.45**	172
	2012-05-16		232			22				7.51	155
	2012-08-29		184			11				7.19	229
	2013-05-22		162			10				7.59	132
	2013-08-27	*Tubing Damaged*								7.26	226
	2014-05-20	*Tubing Damaged*									
	2014-08-19		288	3.4	1.6	7.5	< 2		< 0.001	7.33	160
	2015-05-20		236			6.7	<2	980		6.05	145
	2015-08-18		228	0.15	0.64	8.1	<2		<0.001	7.0	155
	2016-05-10		146	0.77	0.48	45	<6	1180	0.0026	7.3	183
	2016-08-31		178	0.731	1.4	108	<6	1410	<0.001		
	2017-05-16		144	0.3	0.39	24	<3	928	0.0041	7.7	166
	2017-08-29		204	0.59	0.59	47	9	798	<0.002	**6.1**	270
	2018-05-28		176	0.47	0.9	38	<6	1010	<0.002	6.9	213
	2018-08-22		234	0.53	1.1	63	<6	1310	0.0035	7.7	223
	2019-05-29		220	2.7	0.27	63	4.3	910	0.0025	7.5	263
	2019-05-29	*Duplicate*	190	2.1	1	59	5.2	1100	0.0091	7.5	263
	2019-08-28		216	1.6	0.497	42	<2	917	0.0071	8.1	479
	2020-05-27		231	1.42	0.305	51	2.5	845	0.0065	7.8	246
	2020-08-19		311	2.83	0.469	101	4.9	866	<0.001	7.6	310
	2021-06-10		180	1.12	0.58	70	<3.3	540	0.0035	8.4	246
	2021-08-11		183	0.81	0.81	47	<2	688	0.0022		
	2022-05-25	*Inaccessible*									
	2022-08-10	*Inaccessible*									
	2023-06-07		490	3.07	0.428	95	3.8	629	0.0094	7.2	760
	2023-08-23		292	1.87	0.605	78	4.9	643	0.0015	7.1	460

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KGS-2	2010-05-18			< 0.02	0.030	39.0				< 0.02			8.5	
	2010-08-24			< 0.02	0.040	35.3				< 0.02			8.2	
	2011-05-31			<0.02	0.050	45.4				<0.05			8.8	
	2011-08-23			<0.02	0.040	41.0				<0.03			8.2	
	2012-05-16			<0.02	0.060	60.5				<0.02			12.6	
	2013-05-22			<0.02	0.051	51.8				<0.02			10.9	
	2013-08-27		<0.2	<0.02	0.039	46.9	<0.005	<0.01	<0.02	<0.02	<0.0001	4	10.0	**0.34**
	2014-05-20			<0.02	0.037	46.0				<0.02			9.7	
	2014-08-19		<0.001	<0.01	0.037	44.0	<0.001	<0.005	<0.001	<0.1	<0.0001	4.2	9.7	**0.24**
	2015-05-20			<0.01	0.043	54.0				<0.02			11.0	
	2015-08-18		<0.001	<0.02	0.042	53.0	<0.001	<0.005	<0.001	<0.1	<0.0001	4.5	1.2	**0.28**
	2016-05-10		0.001	0.050	0.128	53.8	<0.001	0.015	0.024	**14.8**	<0.0001	7.1	15.0	**0.63**
	2016-08-31		<0.001	0.050	0.049	69.3	<0.00005	<0.001	0.00044	<0.005	<0.00005	5.1	14.3	**0.11**
	2017-05-16		0.00102	<0.050	0.188	36.6	0.00013	0.0138	0.025	**13.6**	<0.00001	6.5	13.8	**0.60**
	2017-08-29		<0.0002	<0.02	0.036	36.0	<0.00002	<0.001	0.00028	<0.06	<0.000002	4.0	7.4	**0.07**
	2018-05-28		<0.0002	<0.02	0.031	37.0	<0.00002	<0.001	0.0023	<0.06	<0.000002	4.3	8.1	**0.07**
	2018-08-22		<0.0002	<0.02	0.033	36.0	<0.00002	<0.001	0.0007	<0.06	<0.000002	4.3	7.6	**0.09**
	2019-05-29		0.0022	<0.02	0.150	41.0	0.00010	0.027	0.029	**18**	<0.000002	6.4	11.0	**0.60**
	2019-08-28		0.00019	<0.01	0.030	34.6	0.00001	<0.0001	0.00053	<0.01	<0.000005	4.4	8.1	0.02
	2020-05-27		0.0048	0.151	0.243	207	<0.0005	<0.0005		0.02	<0.000005	9.9	54.3	**0.21**
	2020-08-19		0.00046	0.284	0.302	251	0.00001	0.00075	0.00035	0.041	0.000086	11.2	67.0	**0.35**
	2021-06-10		0.00023	0.093	0.127	117	0.00017	0.00016	0.00131	<0.01	<0.000005	7.5	29.7	**0.18**
	2021-08-11	*No Sample*												
	2022-05-25		0.00075	0.390	0.311	295	0.00004	0.00062	0.00226	0.023	<0.000005	11.3	70.6	**1.15**
	2022-08-10		0.00109	1.500	0.603	362	0.00005	0.0015	0.0076	0.068	<0.000005	16.3	113.0	**0.40**
	2023-06-07		<0.001	1.140	0.462	339	<0.00005	<0.005	0.00236	<0.1	<0.000005	16.0	96.7	**0.56**
	2023-08-23		0.00091	0.750	0.536	298	<0.00001	<0.001	0.00052	0.037	<0.000005	17.7	89.0	**0.90**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
KGS-2	2010-05-18		3.8			9		< 0.01	52.0	8.00	82	0.14	1.7	303
	2010-08-24		9.6			7		< 0.01	40.0	8.00	85	< 0.05	2.2	291
	2011-05-31		3.9			5			34.0	7.97	108	0.12	2.0	306
	2011-08-23		4.2			9		<0.01	43.0	7.92	93	<0.05	2.2	288
	2012-05-16		5.4			11		<0.01	67.0	7.49	130	0.09	3.5	420
	2013-05-22		5.6			11		<0.10	67.0	8.03	97	0.26	2.4	370
	2013-08-27		4.5	<0.05	<0.01	10	<0.01	<0.10	67.0	7.89	83	<0.05	2.9	340
	2014-05-20		4.7			7		<0.1	46.0	7.76	100	0.07	2.4	310
	2014-08-19		4.1	<0.0005	<0.005	7	<0.01	<0.1	53.0	8.02	94	0.12	2.0	320
	2015-05-20		4.7			13		<0.1	89.0	7.17	88	<0.05	2.2	390
	2015-08-18		4.7	<0.0005	<0.005	14	<0.01	<0.1	97.0	7.86	83	0.11	2.8	390
	2016-05-10		4.8	0.02	0.044	7	<0.002	<0.020	50.8	8.03	101	0.05	2.3	306
	2016-08-31		4.7	<0.0002		8	<0.00002	<0.00002	25.0	8.35	204	0.04	3.0	445
	2017-05-16		4.5	**0.0243**		3	<0.033	0.1	25.0	8.21	104	0.07	2.5	259
	2017-08-29		3.6	<0.0002	<0.003	2	<0.010	0.017	22.0	8.31	100	0.04	1.3	251
	2018-05-28		3.9	<0.0002	<0.003	1	<0.010	0.027	21.0	8.17	104	0.02	<0.50	229
	2018-08-22		3.8	<0.0002	<0.003	2	<0.033	<0.044	20.0	7.97	97	0.06	2.9	230
	2019-05-29		4.4	0.014	0.041	2	<0.0099	0.023	22.0	8.09	99	<0.015	1.2	240
	2019-08-28		3.9	<0.00005	<0.001	1	<0.010	<0.020	19.6	7.92	113	0.03	3.3	257
	2020-05-27		34.6	0.000055	0.002	39	<0.02	<0.04	13.4	7.98	**536**	0.04	**21.0**	1020
	2020-08-19		46	0.000086	0.002	80	<0.05	<0.10	5.8	7.04	**1070**	0.06	**24.0**	1980
	2021-06-10		20.3	<0.00005	<0.001	31	<0.01	<0.02	12.5	7.94	434	0.05	**9.8**	830
	2021-08-11	*No Sample*												
	2022-05-25		34.8	0.000118	0.0027	48	<0.05	<0.1	8.2	7.67	**1670**	0.10	**22.3**	
	2022-08-10		119	0.0002	0.003	140	<0.2	<0.4	<6	7.20	**1460**	0.19	**59.3**	2540
	2023-06-07		75.4	<0.000500	<0.01	112	<0.2	<0.4	<6	7.41	**1140**	0.42	**40.6**	2130
	2023-08-23		68	0.000203	<0.002	106	<0.2	<0.4	<6	7.25	**1120**	0.35	**34.7**	2080

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
KGS-2	2010-05-18		204			10				7.79	404
	2010-08-24		184			16				8.00	
	2011-05-31		192			15				6.99	364
	2011-08-23		20			<4				**6.32**	301
	2012-05-16		262			32				7.33	491
	2013-05-22		306			48				7.36	448
	2013-08-27		256	0.49	0.75	<4	<2	1400	<0.001	7.66	413
	2014-05-20		292			10				7.69	284
	2014-08-19		234	2.60	1.2	11	<2		<0.001	7.21	337
	2015-05-20		266			13	<2	570		8.22	348
	2015-08-18		286	0.27	1.7	20	<2		<0.001	6.85	359
	2016-05-10		154	0.39	0.742	41	<3	1150	0.0023	7.50	240
	2016-08-31		264	0.31	0.97	62	<6.0		0.001		
	2017-05-16		160	0.62	1.1	25	<3	2060	0.0027	8.40	214
	2017-08-29		190	0.39	1.8	59	<3	4570	<0.002	6.60	240
	2018-05-28		198	0.50	1.1	35	<6	1700	0.0033	7.17	183
	2018-08-22		174	0.39	1.8	94	<6	1200	<0.002	8.07	219
	2019-05-29		160	0.45	0.23	45	<2	1700	0.0023	8.08	196
	2019-08-28		195	0.22	0.356	<20	<2	2220	<0.01	8.35	193
	2020-05-27		**599**	0.88	0.995	93	2.4	256	<0.001	7.30	313
	2020-08-19		**1240**	1.03	1.36	149	2.7	1950	<0.001	7.83	553
	2021-06-10		448	1.20	1.6	85	<3.3	969	0.0022	8.31	519
	2021-08-11	*No Sample*									
	2022-05-25		**715**	1.94	1.17	126	5.5	4620	0.0038	7.22	1080
	2022-08-10		**1760**	2.70	4.38	243	7.8	199	0.0039	**6.47**	2800
	2023-06-07		**1460**	1.15	0.798	172	<3.0	1350	0.0022	6.87	2261
	2023-08-23		**1280**	2.69	2.8	186	8.5	4510	0.0014	6.81	2094

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

APPENDIX E

Ground Water Levels

Historical Water Level Monitoring Data

Monitor	Target Zone	Ground Surface Elevation	Trigger Elevation (masl)	Background	Ground Water Elevations								
				Fenco (10/96)	01-May-02	01-Jun-02	01-Jul-02	01-Aug-02	01-Sep-02	01-Oct-02	01-May-03	01-May-04	01-Aug-04
1/17	Till	351.44		350.87	350.66			350.23			350.74	350.74	NA
2/9	Till	351.07		350.08	350.32	350.26	350.17	350.16	350.32	349.62	349.62	350.62	350.36
2/13	Bedrock	350.85		350.06	350.10			349.93			350.18	350.35	350.15
3/8	Till	351.51		350.44	349.86	350.17	350.06	350.06	350.36	350.30	350.34	350.51	350.21
4/6	Till	351.48		350.36	350.13			349.93			349.79	350.18	350.08
5/17	Till / Bedrock	370.13	361.75	355.57	353.08	352.82	352.63	N/A	352.43	352.58	353.59	353.83	357.10
6/5	Till	351.09		349.90	349.77			349.55			349.71	349.97	349.87
11/4	Till	366.45	366.45		361.36	361.34	361.41	N/A	361.34	362.11	361.95	363.85	363.19
13/6	Till	355.02			348.62	348.90	348.90	348.81	349.09	349.58		350.37	350.26
13/14	??	354.72			349.27	350.00	349.15	348.72	349.62	349.87		351.22	350.63
14/6	Till	348.91			346.07	346.50	346.48	346.33	346.91	347.66		348.19	347.92
14/21	??	348.68			345.18	345.50	345.45	345.30	345.92	346.53		347.18	346.91
15/5	Till	352.17			350.50	349.80	350.37	350.38	349.80	350.88		351.42	350.73
15/17	??	352.08			350.58	350.60	350.47	350.47	350.85	350.83		351.99	350.80
16/15	??	362.25	362.25		350.37	350.07	349.95	349.94		350.27	350.51	350.55	351.04
17/15	??	359.99			350.37			350.14			350.72	350.99	351.79
19/6	Till	364.15	364.15		357.60	357.54	364.15	N/A			357.54	357.45	dry
23/3	Peat	351.19			350.33			350.12			350.46	350.39	351.00
24/5	Till	352.01			350.56			350.80			350.89	351.01	350.91
KGS-2	??	351.38		350.37	349.93			349.66			350.08	350.08	350.08

Note: **?? denotes unknown target zone**

Historical Water Level Monitoring Data

Monitor	Target Zone	Ground Surface Elevation	Trigger Elevation (masl)	Background	Ground Water Elevations								
				Fenco (10/96)	01-Aug-05	01-Sep-05	01-Oct-05	01-May-06	01-Aug-06	01-May-07	01-Aug-07	01-May-08	01-Aug-08
1/17	Till	351.44		350.87	NA	NA	NA	350.66	350.04	350.38	351.44	348.09	no access
2/9	Till	351.07		350.08	350.23	350.32	349.62	349.95	349.77	349.82	349.85	349.64	349.79
2/13	Bedrock	350.85		350.06	350.13	350.13	350.14	350.10	349.93	350.06	350.02	350.30	350.07
3/8	Till	351.51		350.44	350.19	350.13	350.16	350.17	349.80	350.12	350.26	350.28	350.11
4/6	Till	351.48		350.36	350.06	350.00	350.39	350.05	349.73	350.13	350.16	349.58	350.23
5/17	Till / Bedrock	370.13	361.75	355.57	357.77	357.18	356.10	dry	dry	Dry	354.91	353.68	354.88
6/5	Till	351.09		349.90	349.79	349.75	349.79	349.73	349.02	349.65	349.75	349.84	349.55
11/4	Till	366.45	366.45		363.41	363.01	362.05	dry	dry	Dry	362.75	361.89	362.82
13/6	Till	355.02			350.22	349.90	349.52	349.41	348.67	348.56	350.50	349.10	350.10
13/14	??	354.72			350.78	350.27	350.22	350.07	348.39	349.09	350.35	348.06	350.16
14/6	Till	348.91			347.81	347.57	347.41	347.31	346.32	345.05	347.32	347.11	347.27
14/21	??	348.68			346.72	346.32	346.37	346.33	345.33	344.20	346.30	347.08	346.26
15/5	Till	352.17			350.69	350.51	350.52	350.57	350.12	349.45	350.87	350.75	350.58
15/17	??	352.08			358.59	358.57	359.53	350.66	350.26	350.56	350.82	350.78	350.67
16/15	??	362.25	362.25		352.05	352.13	351.56	350.50	350.19	349.60	350.63	350.69	350.91
17/15	??	359.99			352.47	352.09	351.53	350.58	350.23	349.72	351.40	350.59	350.99
19/6	Till	364.15	364.15		dry	353.02	dry	dry	dry	Dry	Dry	Dry	Dry
23/3	Peat	351.19			350.27	350.25	350.30	350.22	349.85	350.17	350.32	349.83	350.32
24/5	Till	352.01			350.79	350.79	351.01	350.79	350.53	350.52	350.75	350.09	350.89
KGS-2	??	351.38		350.37	350.20	350.20	349.34	349.98	349.79	349.84	no access	349.39	no access

Note: **?? denotes unknown target zone**

Historical Water Level Monitoring Data

Monitor	Target Zone	Ground Surface Elevation	Trigger Elevation (masl)	Background	Ground Water Elevations								
				Fenco (10/96)	01-May-09	01-Aug-09	10-May-10	10-Aug-10	09-Jun-11	23-Aug-11	16-May-12	29-Aug-12	21-May-13
1/17	Till	351.44		350.87	no access	349.99	349.47	350.00	349.50	351.44	349.02	349.22	349.02
2/9	Till	351.07		350.08	349.86	349.84	349.74	349.74	349.72	349.67	349.57	349.57	349.57
2/13	Bedrock	350.85		350.06	350.12	350.15	350.08	350.18	350.16	350.07	350.07	350.06	350.07
3/8	Till	351.51		350.44	350.38	350.31	350.22	350.26	350.25	350.13	350.09	350.08	350.09
4/6	Till	351.48		350.36	350.85	350.58	350.52	350.54	350.52	N/A	N/A	N/A	NA
5/17	Till / Bedrock	370.13	361.75	355.57	353.28	356.27	353.65	356.05	353.58	354.68	352.43	352.73	352.43
6/5	Till	351.09		349.90	349.87	349.84	349.74	349.84	349.80	349.48	349.62	349.30	349.62
11/4	Till	366.45	366.45		362.61	363.45	362.22	363.57	362.53	362.58	361.24	361.59	361.24
13/6	Till	355.02			349.77	350.62	349.48	350.57	349.63	349.62	348.73	349.33	348.73
13/14	??	354.72			350.02	350.77	350.22	350.76	350.26	349.63	348.96	349.28	348.96
14/6	Till	348.91			347.50	348.08	347.41	347.91	347.61	346.98	346.11	346.46	346.11
14/21	??	348.68			346.55	347.03	346.43	347.86	347.56	346.00	345.16	345.49	345.16
15/5	Till	352.17			351.07	350.97	350.71	350.88	350.73	350.56	350.62	350.53	350.62
15/17	??	352.08			350.95	350.92	350.73	350.90	350.75	350.66	350.53	350.59	350.53
16/15	??	362.25	362.25		350.46	351.41	350.62	356.58	350.70	350.93	349.71	350.41	349.71
17/15	??	359.99			350.62	351.64	350.59	351.84	350.83	351.05	350.04	350.29	350.04
19/6	Till	364.15	364.15		Dry	Dry	dry	357.56	dry	dry	dry	dry	350.31
23/3	Peat	351.19			350.44	350.63	349.79	350.48	350.57	350.50	350.46	350.45	350.46
24/5	Till	352.01			341.74	351.04	350.61	351.01	351.01	350.79	350.69	350.84	350.69
KGS-2	??	351.38		350.37	351.38	no access	348.45	349.08	349.97	348.95	348.74	348.83	348.74

Note: **?? denotes unknown target zone**

Historical Water Level Monitoring Data

Monitor	Target Zone	Ground Surface Elevation	Trigger Elevation (masl)	Background	Ground Water Elevations								
				Fenco (10/96)	26-Aug-13	20-May-14	19-Aug-14	19-May-15	25-Aug-15	10-May-16	30-Aug-16	15-May-17	29-Aug-17
1/17	Till	351.44		350.87	349.22	348.00	348.19	347.66	347.76	inaccessible		350.27	348.49
2/9	Till	351.07		350.08	349.57	349.77	349.60	349.58	349.57			349.67	349.65
2/13	Bedrock	350.85		350.06	350.06	350.34	350.17	350.17	350.16			350.30	350.25
3/8	Till	351.51		350.44	350.08	350.45	350.19	350.22	350.16	350.30	350.23	350.28	350.26
4/6	Till	351.48		350.36	350.08	349.90	348.94	348.98	348.98	349.43	349.41	349.37	349.34
5/17	Till / Bedrock	370.13	361.75	355.57	352.73	352.44	355.79	352.83	353.07	355.06	358.76	354.91	355.94
6/5	Till	351.09		349.90	349.30	349.93	349.67	349.75	349.54	349.86	350.08	349.89	349.81
11/4	Till	366.45	366.45		361.59	361.95	362.93	dry	361.75	363.38	363.50	362.90	362.87
13/6	Till	355.02			349.33	349.57	350.07	348.58	349.34	350.03	349.96	349.82	349.82
13/14	??	354.72			349.28	349.88	350.11	348.93	349.61	350.11	349.97	349.89	349.79
14/6	Till	348.91			346.46	346.99	347.12	345.94	346.76	347.87	347.75	347.88	347.38
14/21	??	348.68			345.49	346.10	346.07	345.04	345.73	346.80	346.73	346.84	346.38
15/5	Till	352.17			350.53	351.34	350.68	350.59	350.59	350.91	350.68	350.78	350.72
15/17	??	352.08			350.59	351.11	349.75	350.69	350.69	350.08	350.77	350.89	350.84
16/15	??	362.25	362.25		350.41	350.35	350.95	350.27	350.42	351.05	353.17	351.24	351.49
17/15	??	359.99			350.29	350.47	351.52	350.17	350.17	350.91	352.62	351.14	351.35
19/6	Till	364.15	364.15		350.75	350.57	351.84	350.52	350.73	351.55	353.88	351.95	352.24
23/3	Peat	351.19			350.45	350.14	349.28	349.06	349.23	349.68	349.95	349.74	349.77
24/5	Till	352.01			350.84	350.40	349.65	349.41	349.66	350.11	350.23	349.99	350.07
KGS-2	??	351.38		350.37	348.83	347.91	347.56	347.38	347.44	347.77	348.00	348.78	347.79

Note: **?? denotes unknown target zone**

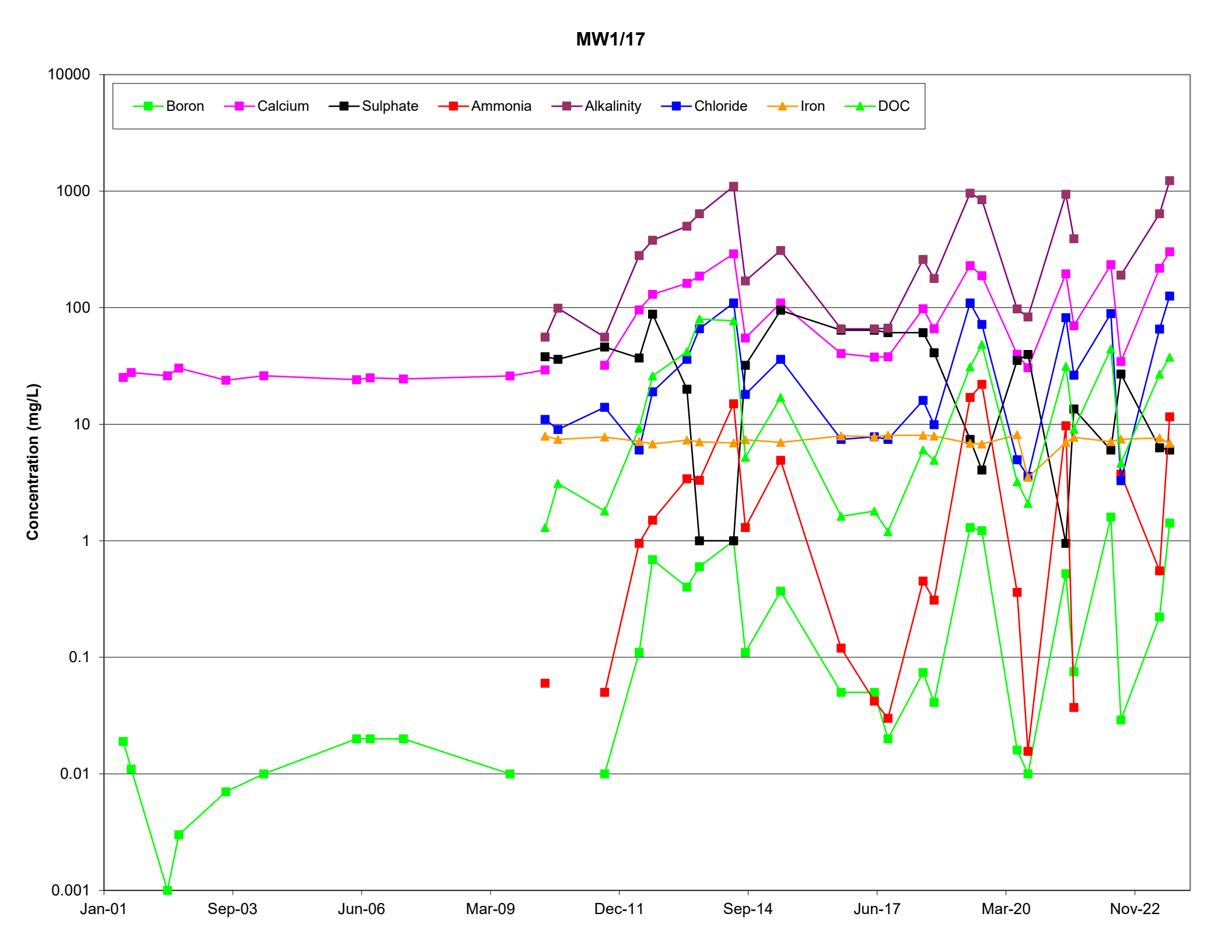
Historical Water Level Monitoring Data

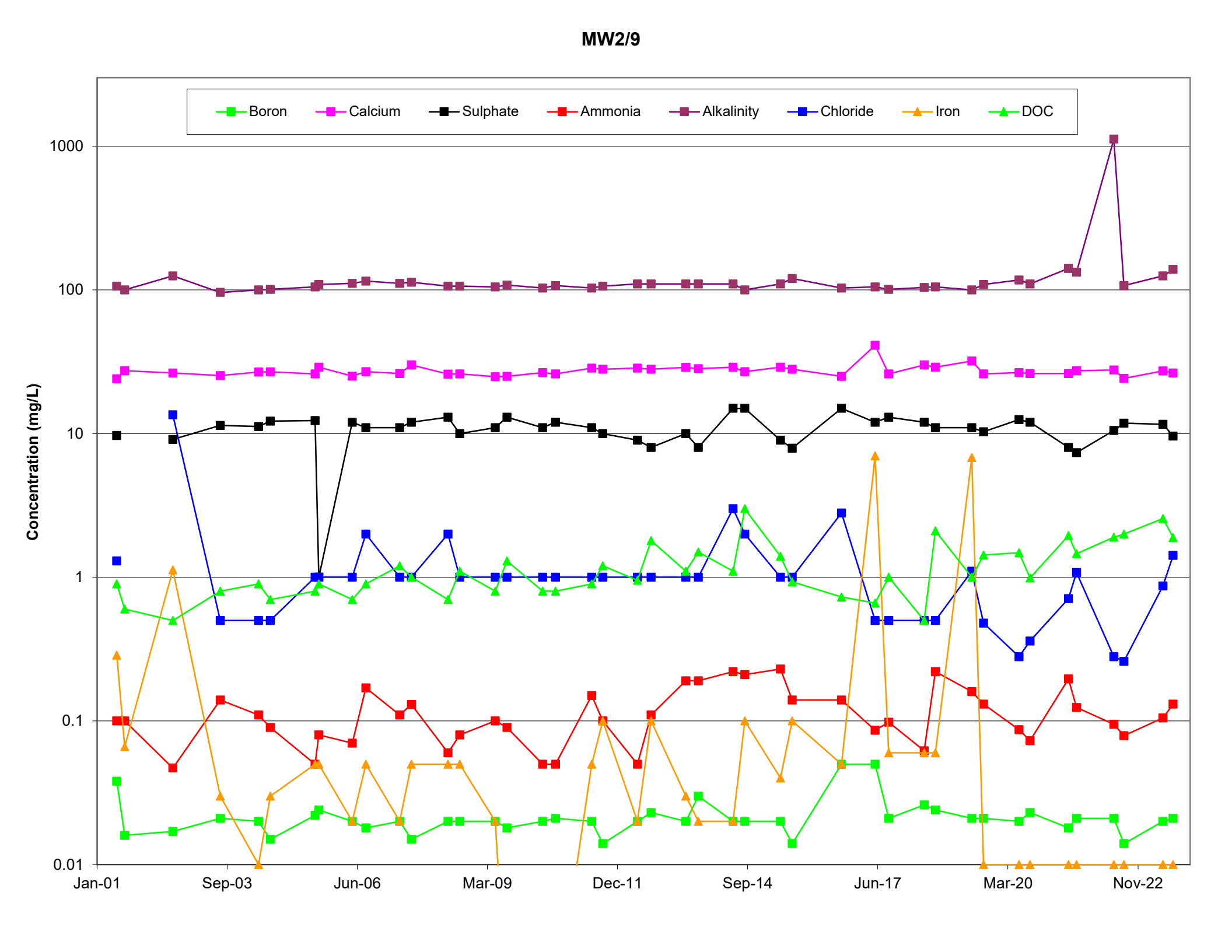
Monitor	Target Zone	Ground Surface Elevation	Trigger Elevation (masl)	Background	Ground Water Elevations											Maximum (masl)	Minimum	Fluctuation
				Fenco (10/96)	28-May-18	21-Aug-18	29-May-19	27-Aug-19	26-May-20	18-Aug-20	08-Jun-21	24-May-22	10-Aug-22	06-Jun-23	22-Aug-23			
1/17	Till	351.44		350.87	350.27	no access	348.09	347.89	348.29	348.25	347.76	348.57	348.88	348.09	347.82	351.44	347.66	**3.78**
2/9	Till	351.07		350.08	349.67	349.52	349.64	349.52	349.50	349.48	349.40	349.55	349.53	349.44	349.33	350.62	349.48	**1.14**
2/13	Bedrock	350.85		350.06	350.30	350.20	350.30	350.22	350.32	350.29	350.21	350.40	350.39	350.29	350.17	350.35	349.93	**0.42**
3/8	Till	351.51		350.44	350.28	350.13	350.28	350.24	350.28	350.26	350.23	350.57	350.41	350.27	350.09	350.51	349.80	**0.71**
4/6	Till	351.48		350.36	349.37	349.05	349.58	349.41	Damaged			N/A	346.83	346.51	346.23	350.85	348.94	**1.91**
5/17	Till / Bedrock	370.13	361.75	355.57	354.91	353.93	353.68	353.71	354.87	353.71	352.73	353.39	357.17	353.75	353.64	358.76	352.43	**6.33**
6/5	Till	351.09		349.90	349.89	349.44	349.84	349.71	349.71	349.71	349.64	N/A	N/A	N/A	N/A	350.08	349.02	**1.06**
11/4	Till	366.45	366.45		362.90	361.85	361.89	361.73	362.30	361.73		360.60	363.33	361.82	361.34	363.85	361.24	**2.61**
13/6	Till	355.02			349.82	349.12	349.10	349.22	348.92	349.22	348.59	350.26	350.35	348.91	348.54	350.62	348.56	**2.06**
13/14	??	354.72			349.89	349.12	348.06	349.15	349.12	349.15	348.72	350.42	350.30	349.05	348.51	351.22	348.06	**3.16**
14/6	Till	348.91			347.88	346.66	347.11	346.68	346.56	346.68	346.18	348.16	347.91	346.80	346.13	348.19	345.05	**3.14**
14/21	??	348.68			346.84	345.61	347.08	345.66	346.23	345.66	345.25	348.06	346.84	345.78	345.17	347.86	344.20	**3.66**
15/5	Till	352.17			350.78	350.75	350.75	350.62	350.72	350.62	350.62	351.77	351.13	350.72	350.51	351.42	349.45	**1.97**
15/17	??	352.08			350.89	350.43	350.78	350.69	350.84	350.69	350.76	351.36	351.09	350.84	350.64	359.53	349.75	**9.78**
16/15	??	362.25	362.25		351.24	350.60	350.69	350.56	350.93	350.56	350.15	351.15	351.39	350.83	350.42	356.58	349.60	**6.98**
17/15	??	359.99			351.14	350.49	350.59	350.17	350.71	350.17	350.06	350.46	351.91	350.50	350.31	352.62	349.72	**2.90**
19/6	Till	364.15	364.15		351.95	dry	351.34	350.94	350.56	350.94	350.59	351.21	352.69	351.19	350.93	364.15	350.31	**13.84**
23/3	Peat	351.19			349.74	349.41	349.83	349.69	350.14	349.69	349.72	N/A	N/A	350.18	349.83	351.00	349.06	**1.94**
24/5	Till	352.01			349.99	349.64	350.09	349.86	350.31	349.86	349.47	N/A	N/A	350.29	349.95	351.04	341.74	**9.30**
KGS-2	??	351.38		350.37	348.78	347.48	349.39	347.59	347.85	347.59	347.56	348.30	348.13	347.77	347.57	351.38	347.38	**4.00**

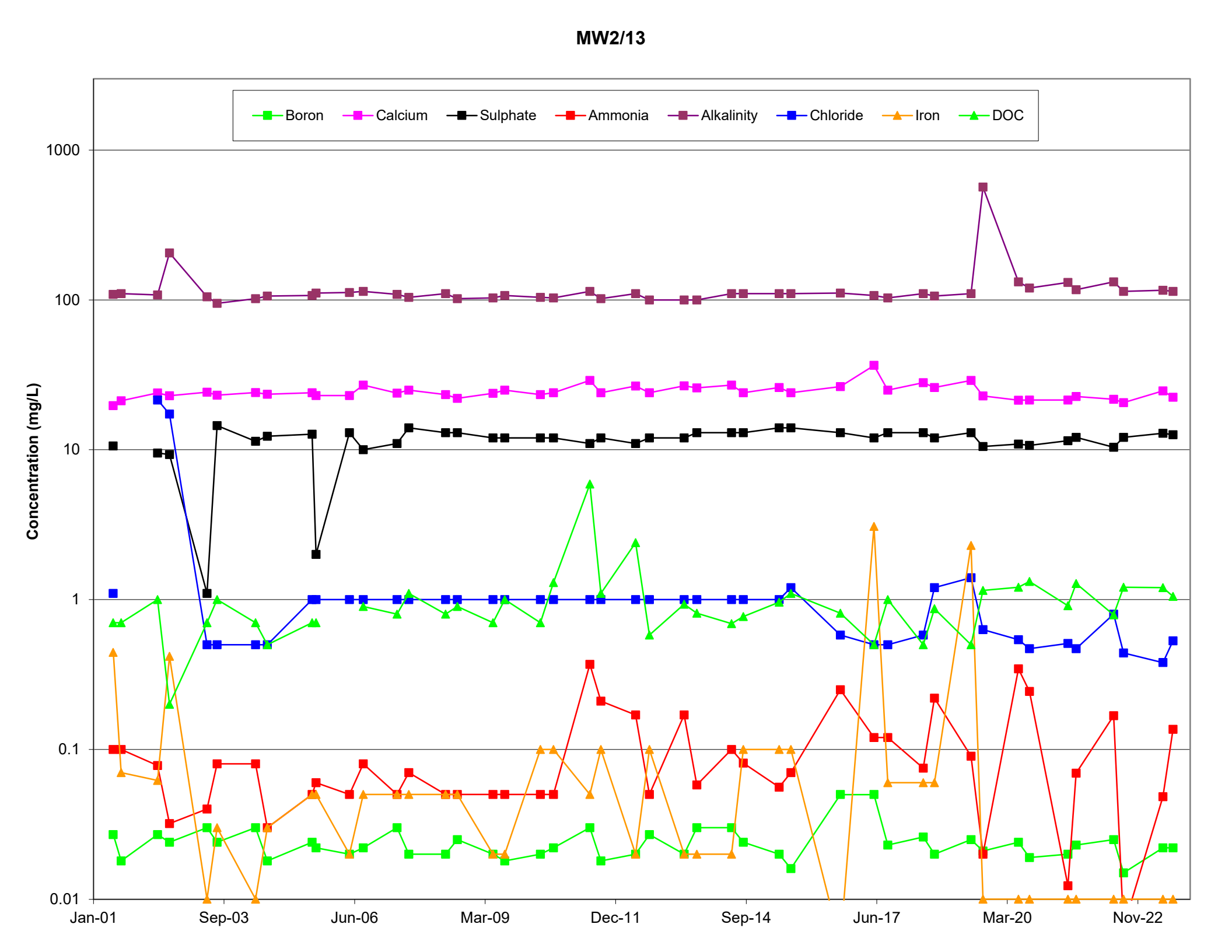
Note: **?? denotes unknown target zone**

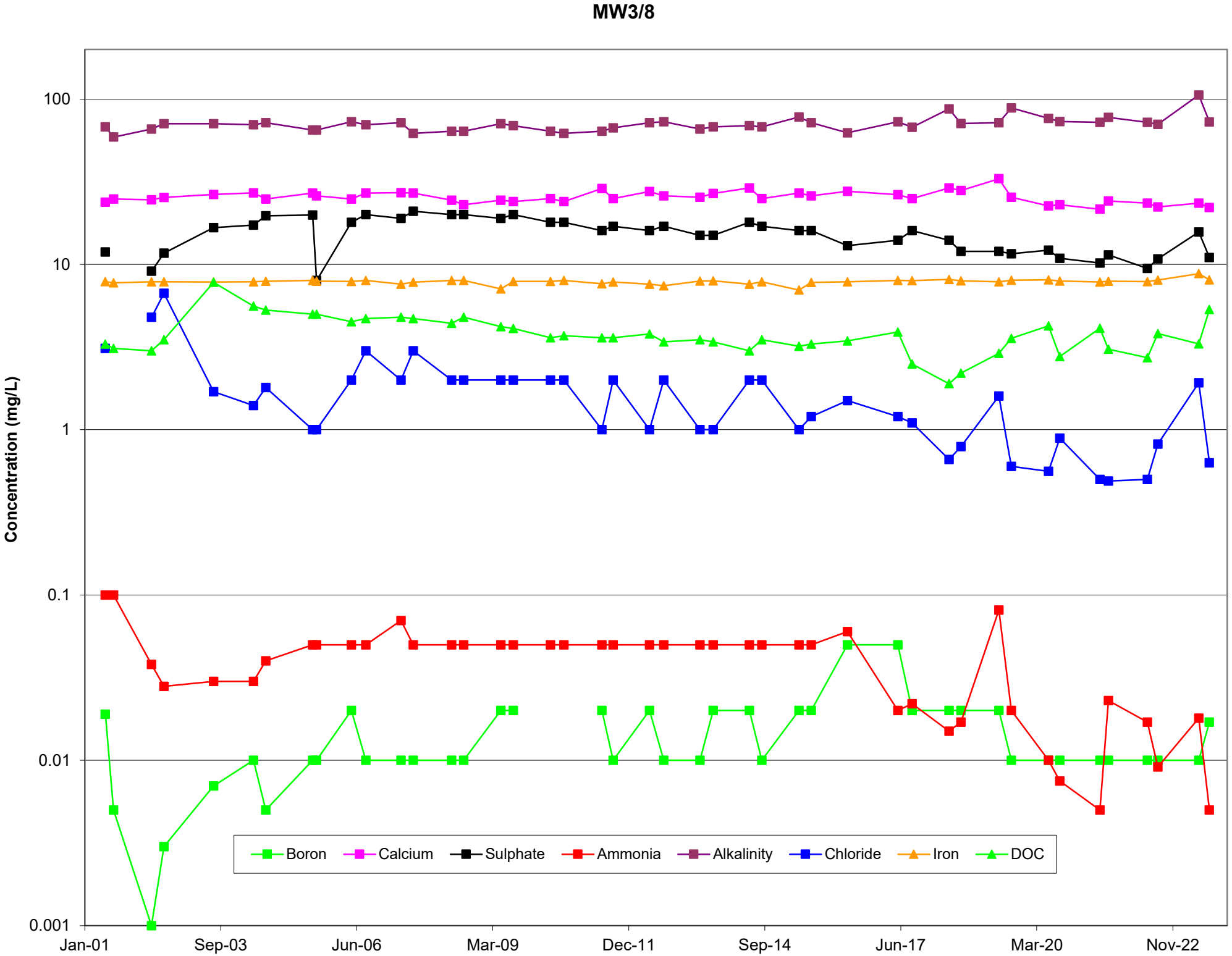
APPENDIX F

Ground Water Chemistry Over Time

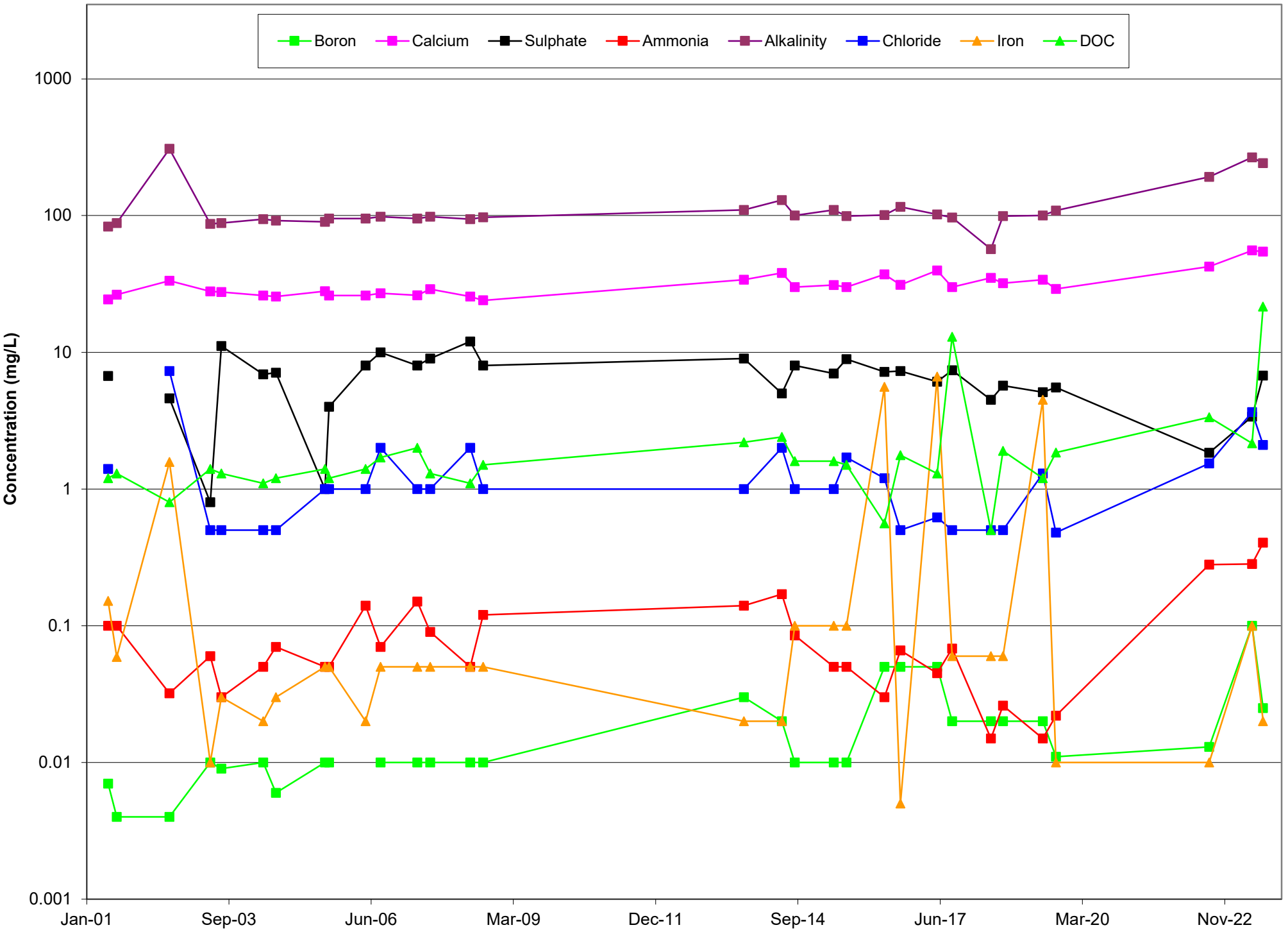

MW1/17
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
10000
1000
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

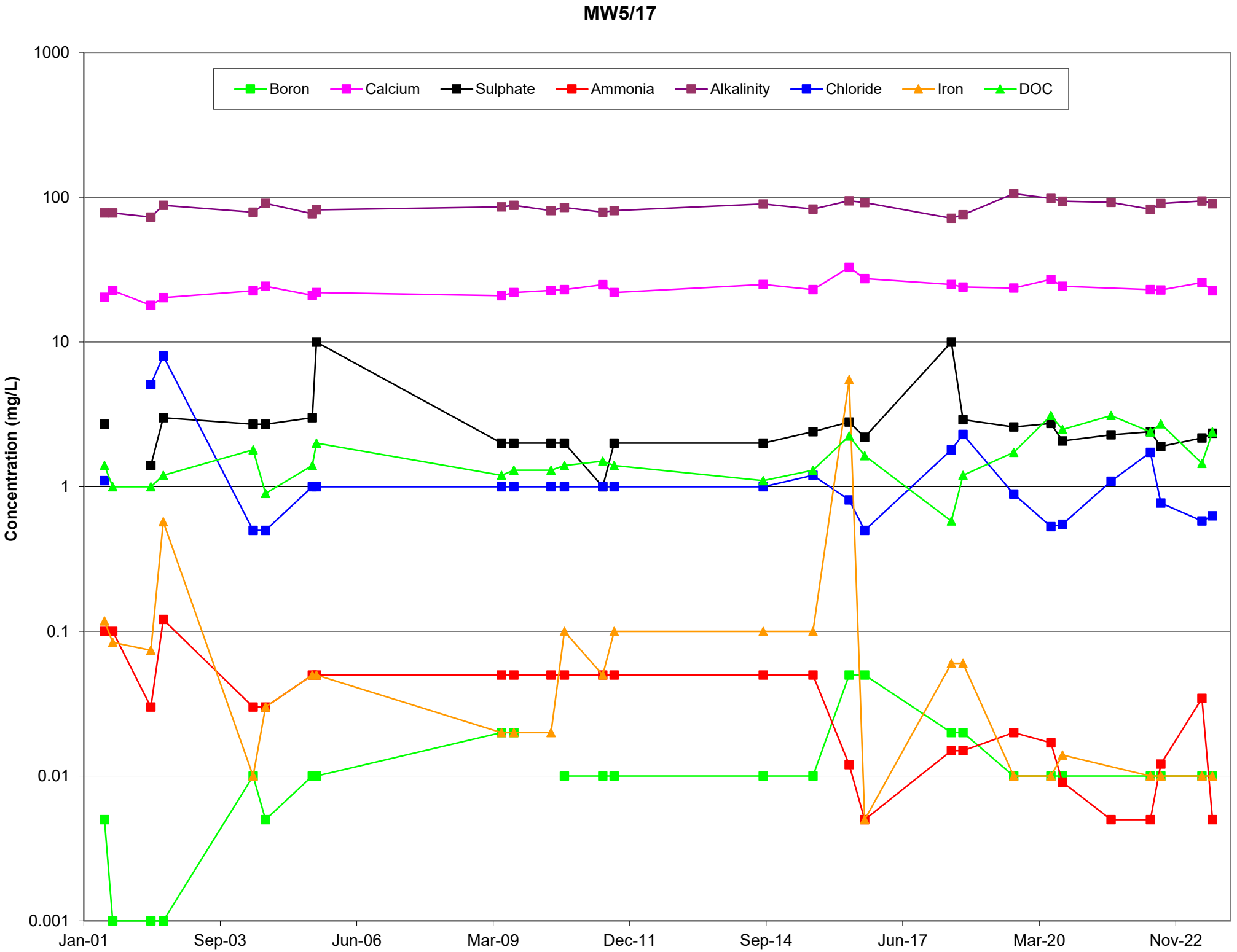

MW2/9
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
1000
100
10
1
0.1
0.01
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

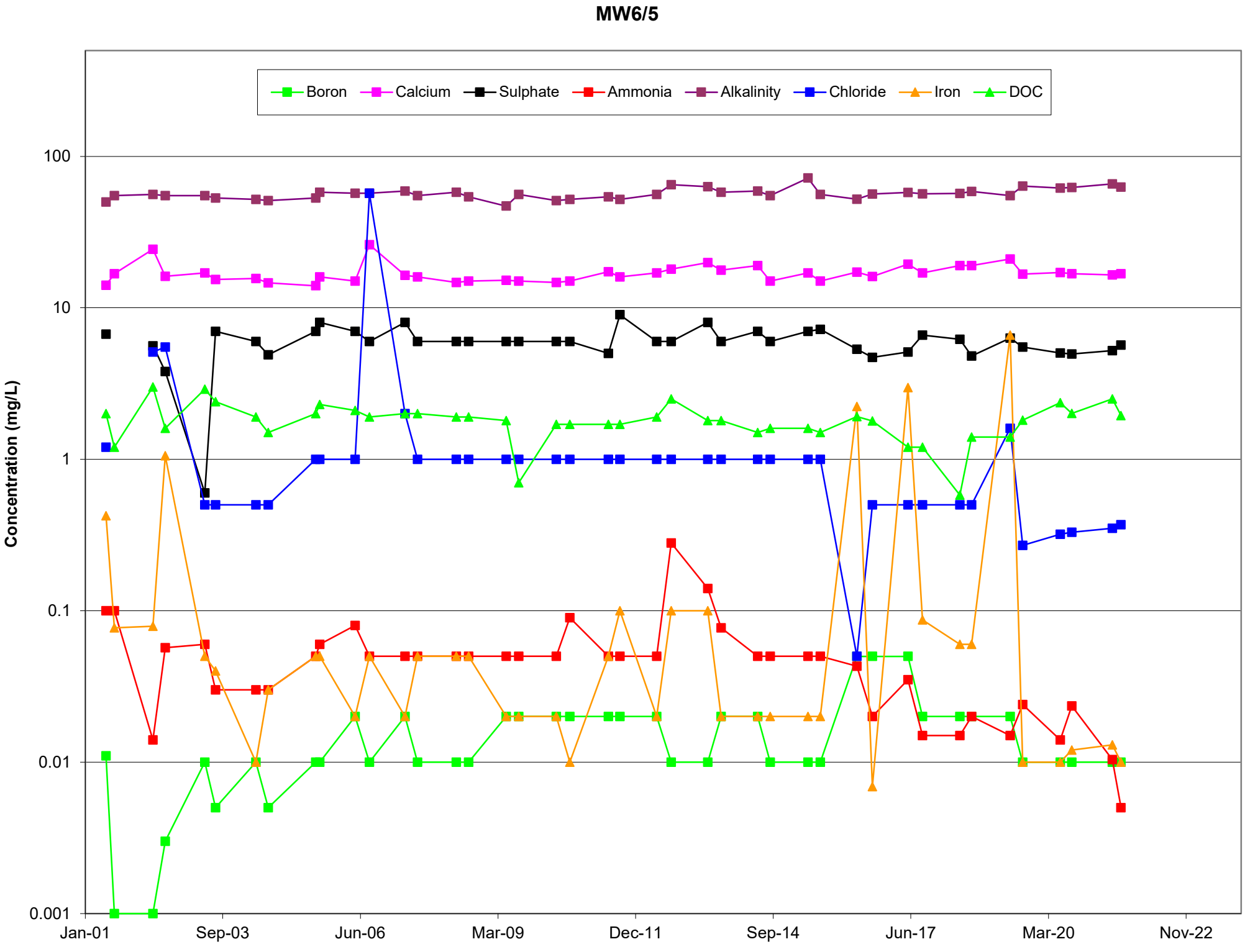

MW2/13
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
1000
100
10
1
0.1
0.01
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22


MW3/8
Concentration (mg/L)
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC

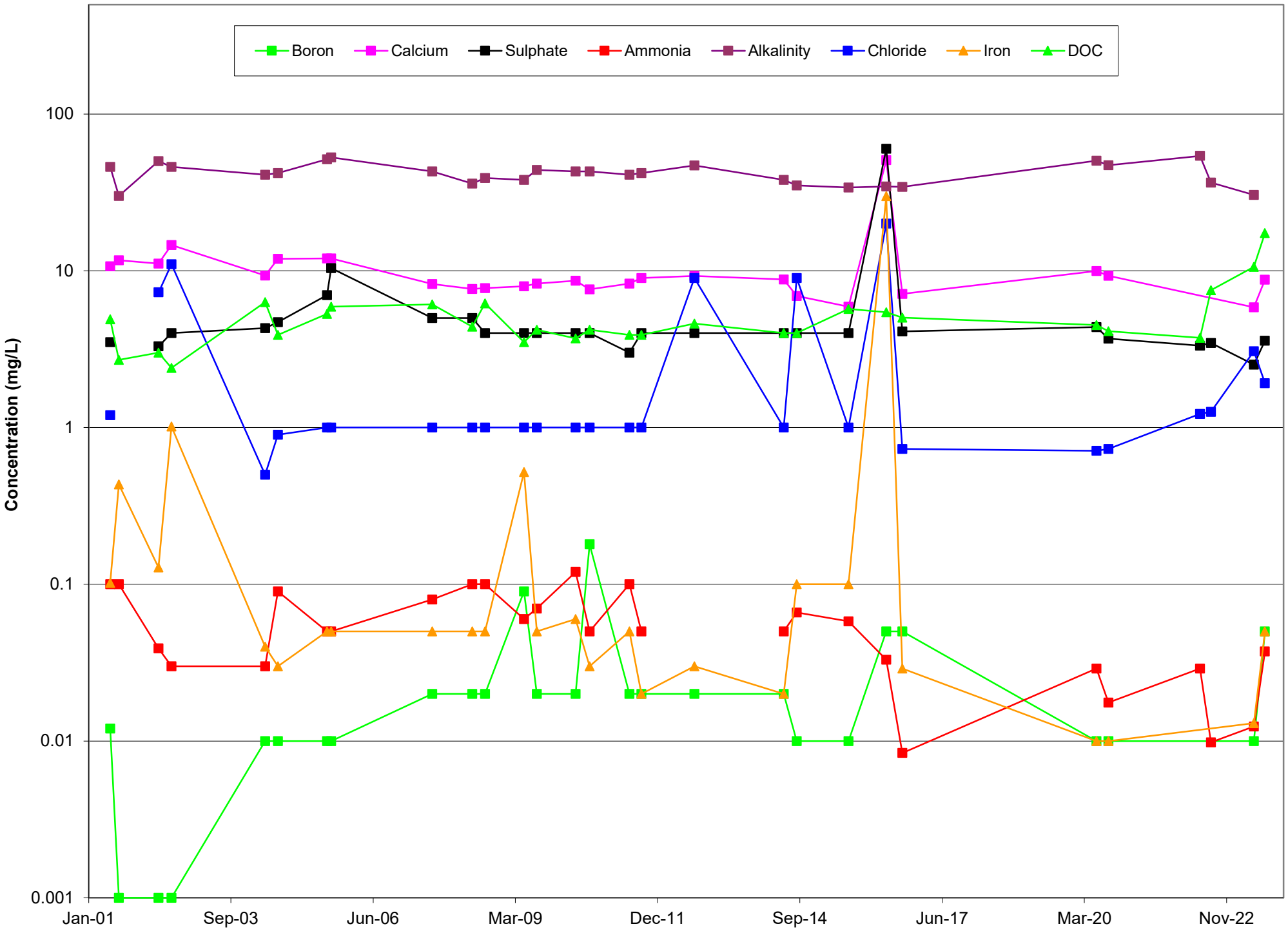
MW4/6


Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

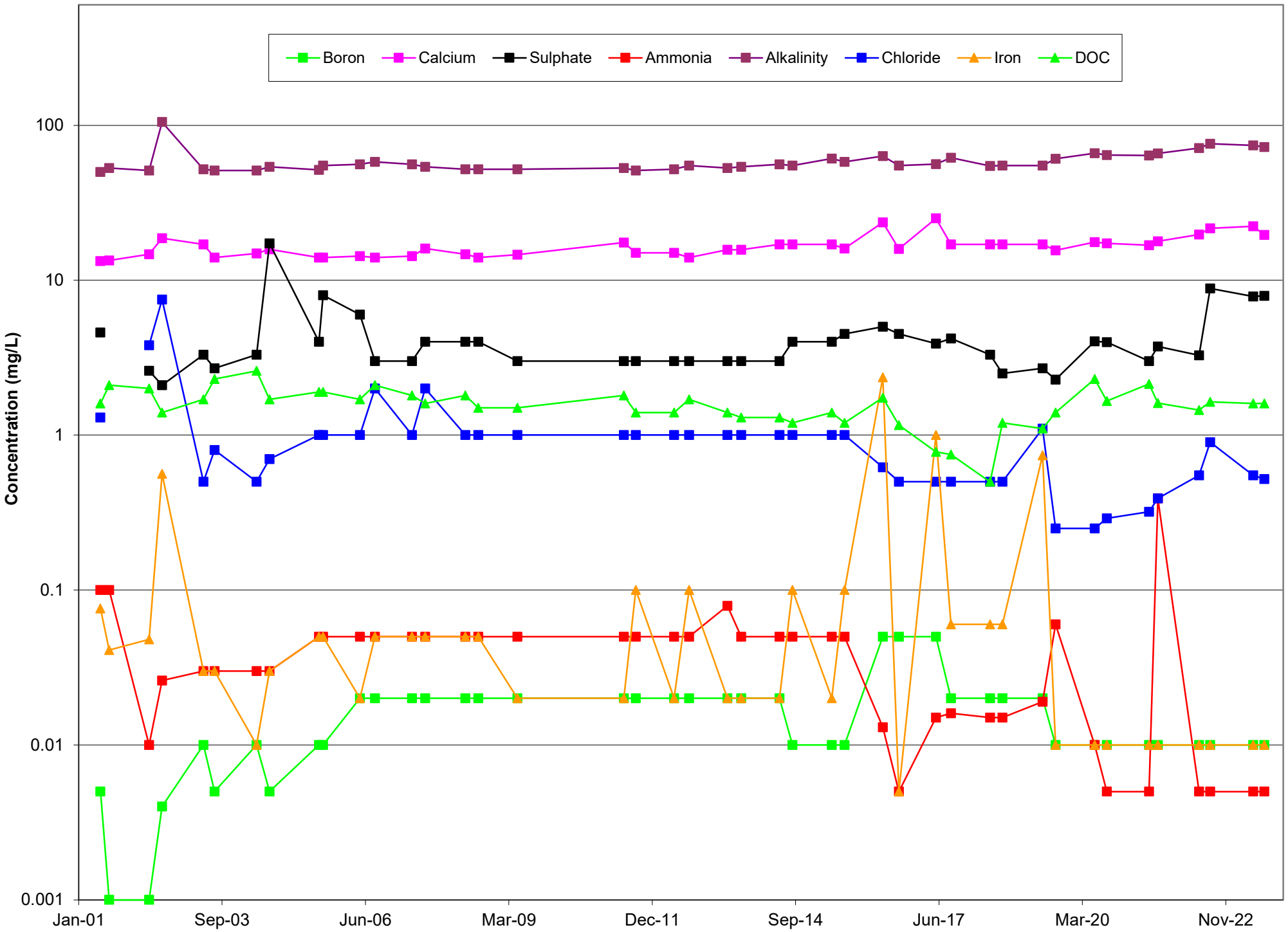

MW5/17
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

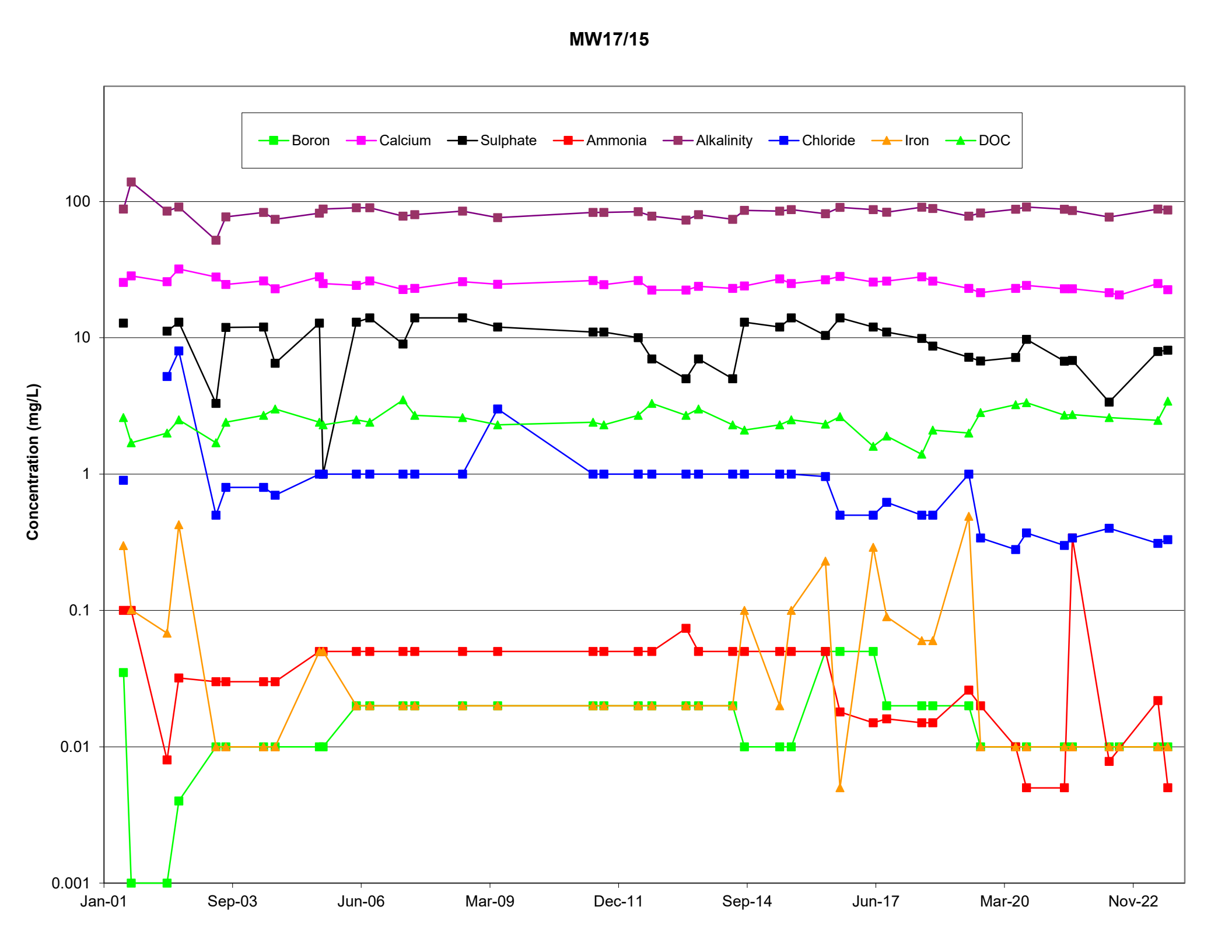

MW6/5
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

MW11/4

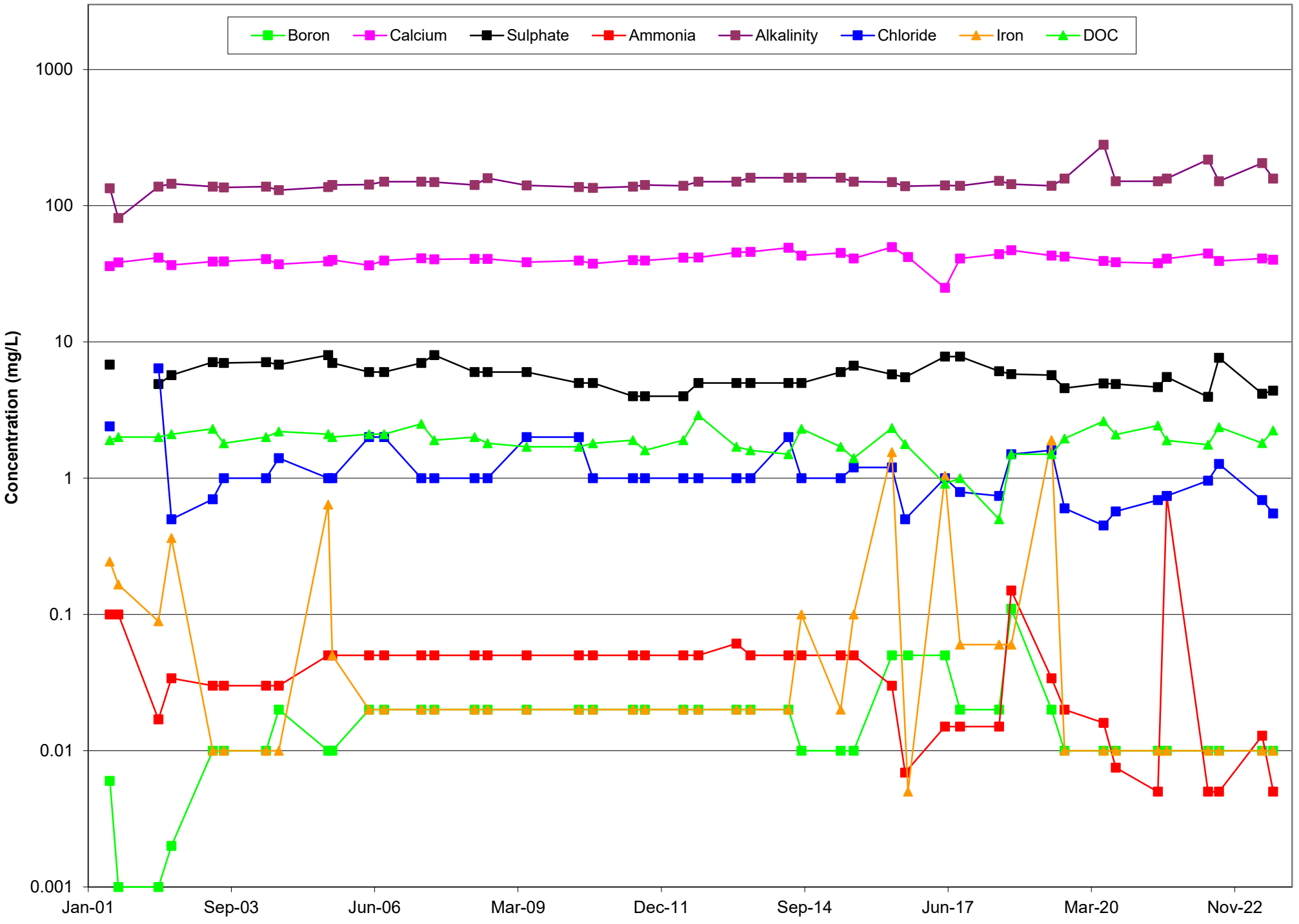

Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

MW16/15

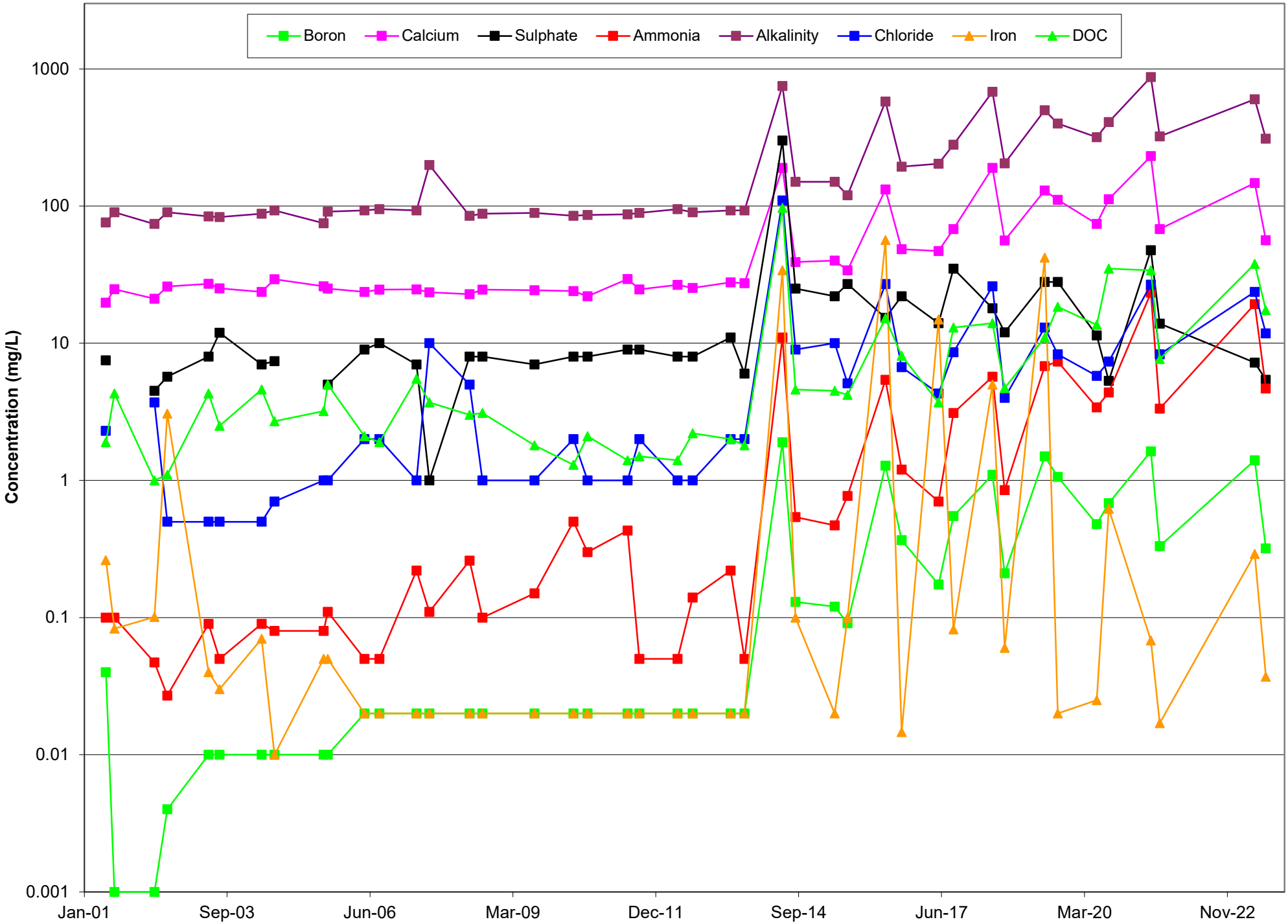

Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22


MW17/15
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

MW19/16


Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

MW23/3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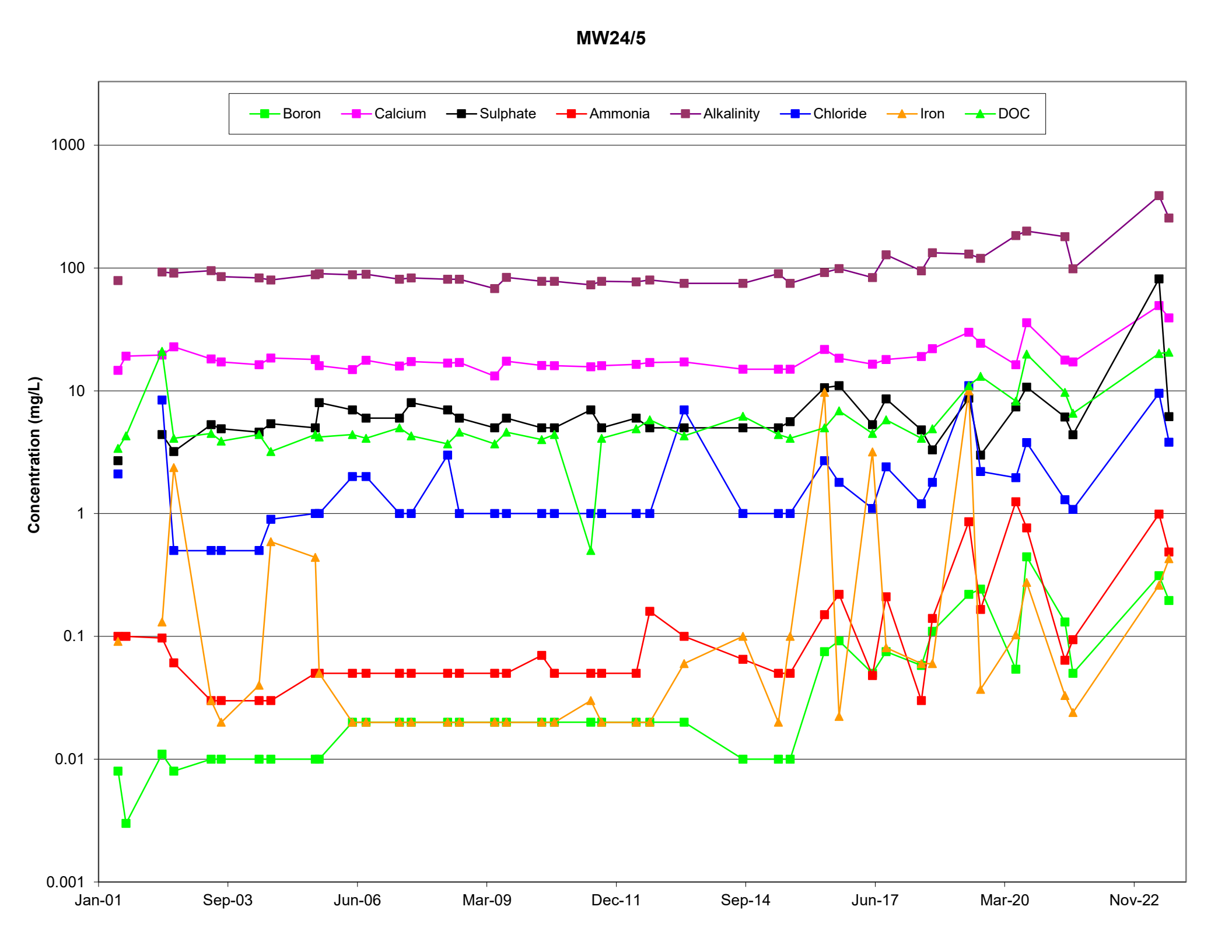
Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
1000
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22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Sulphate
Ammonia
Alkalinity
Chloride
Iron
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Concentration (mg/L)
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100
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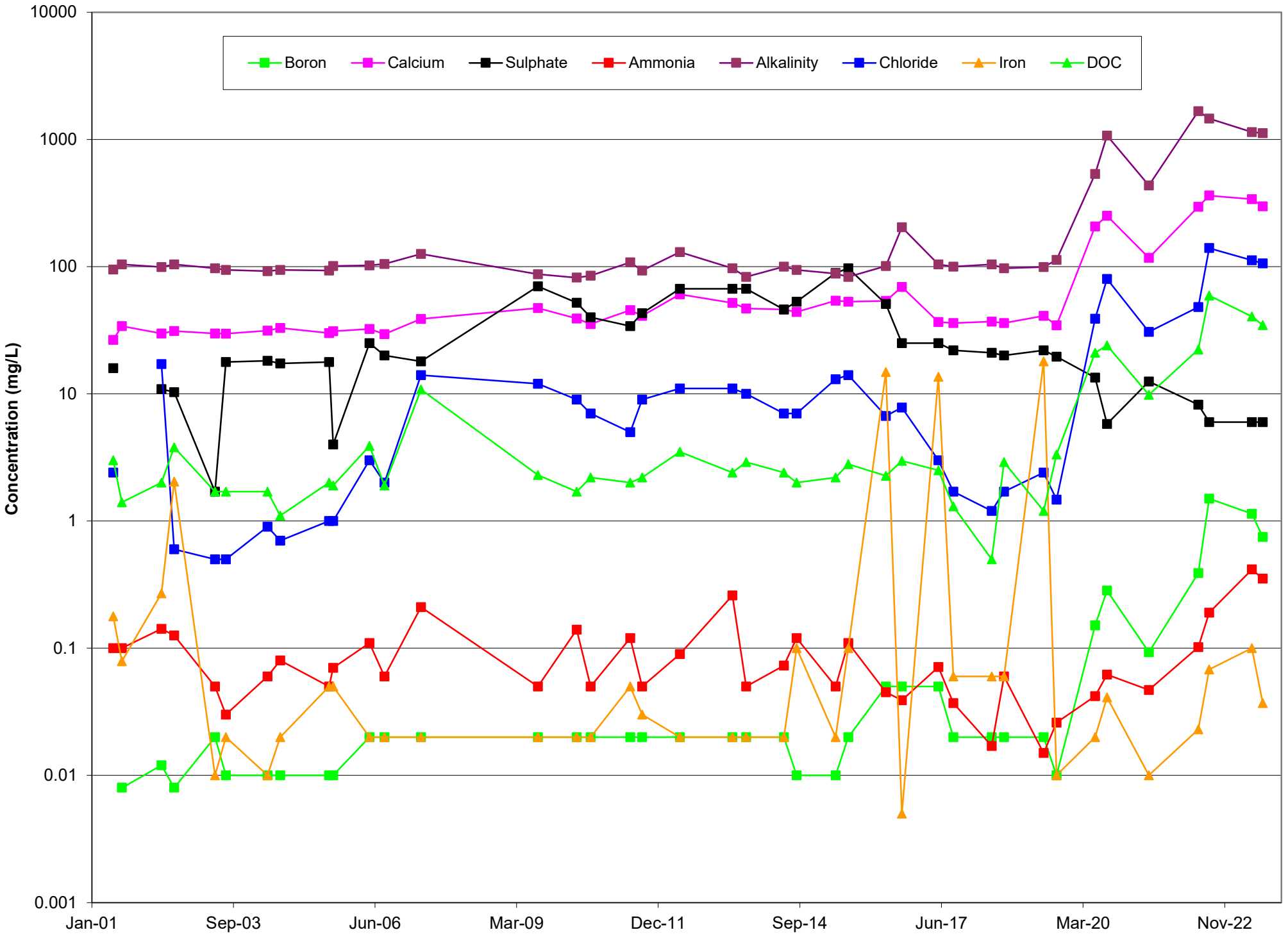
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22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Calcium
Sulphate
Ammonia
Alkalinity
Chloride
Iron
DOC
Concentration (mg/L)
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1000
100
10
1
0.1
0.01
0.001
Jan-01
Sep-03
Jun-06
Mar-09
Dec-11
Sep-14
Jun-17
Mar-20
Nov-22

APPENDIX G

Detected Volatile Organic Compounds

Summary Table of Detected Volatile Organic Compounds

Monitor	Date	Toluene (mg/L) *0.024 (ODWQS, 2006)*	1,4 dichloro-benzene (mg/L) *0.001 (ODWQS, 2006)*
4/18	August, 2001	-	0.001
1/17	August, 2002	0.001	-
2/9	August, 2002	0.0006	-
3/8	August, 2002	0.0026	-
4/6	August, 2002	0.0013	-
4/18	August, 2002	0.003	-
5/17	August, 2002	0.0005	-
6/5	August, 2002	0.0021	-
20/4	August, 2004	0.0002	-
4/6-II	August, 2008	0.0004	-
SW-2	August, 2010	0.001	-
SW-2	August, 2018	0.0018	

All results for all other required sampling parameters were below laboratory detection limits.

In 2006, VOC samples were collected at monitors: 1/17, 2/9, 2/13, 3/8, 4/6, 4/18, 6/14, 7/4,16/15, 20/4, 21/7 and SW-2

In 2007, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 4/6, 4/18, 5/17, 6/5, 6/5 II, 6/14, 7/4,16/15, 20/4, 21/7 and SW-2

In 2008, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 4/6, 4/6-II, 4/18, 5/17, 6/5, 6/14, 7/4, 16/15, 20/4, 21/7 and SW-2

In 2009, VOC samples were collected at monitors: 1/17, 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4, 20/4, 21/7 and SW-2

In 2010, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4 and SW-2

In 2011, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4, 16/15, 21/7 and SW-2

In 2012, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4, 16/15, 21/7 and SW-2

In 2013, VOC samples were collected at Monitor: 2/9 and SW-2

In 2014, VOC samples were collected at Monitor: 2/9 and SW-2

In 2015, VOC samples not collected

In 2016, VOC samples were collected at Monitor: 2/9

In 2017, VOC samples were collected at Monitor: 2/9 and SW-2

In 2018, VOC samples were collected at Monitor: 2/9 and SW-2

In 2019, VOC samples were collected at Monitor 2/9, SW-2

In 2020, VOC samples were collected at Monitor 2/9, SW-2

In 2021, VOC samples were collected at Monitor 2/9

In 2022, VOC samples were collected at Monitor: 2/9

In 2023, VOC samples were collected at Monitor: 2/9

APPENDIX H

Surface Water Quality Data

Station: SW-1

Parameter -		As	B	Ba	Cd	Cr	Cu	Fe	Hg	TDS	TKN	Total P	COD	BOD	TSS	Cl-
PWQO -		0.1	0.2		0.0001	0.0089	0.005	0.3	0.0002			0.03				
Action**	QA/QC		3.0													158
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2011-06-09		< 0.2	0.04	0.040	< 0.005	< 0.01	< 0.02	**8.2**	< 0.0001	213	1.40	**0.061**	54	5.0	9	14
2011-08-24		<0.2	**0.33**	0.040	<0.005	<0.01	<0.02	**0.51**	<0.0001	470	2.00	**0.400**	110	<2	3	24
2011-10-25		<0.2	0.13	0.030	<0.005	<0.01	<0.02	**0.88**	<0.0001	344	2.00	**0.200**	110	<2	2	26
2012-05-18								0.29			1.80	**0.150**	90	<2	3	61
2012-08-30		<0.2	**0.25**	0.070	<0.005	<0.01	<0.02	**2.5**	<0.0001	752	3.40	**0.810**	160	4.0	54	62
2012-10-23		<0.2	**0.23**	0.040	<0.005	<0.01	<0.02	0.26	<0.0001	696	1.80	**0.370**	120	<2	2	31
2013-05-24								0.24			2.80	0.004	110	<2	2	68
2013-08-29		<0.2	**0.47**	0.470	<0.005	<0.01	<0.02	**7.3**	<0.0001	780	4.70	**0.830**	150		56	60
2013-10-17		<0.2	**0.39**	0.070	<0.005	<0.01	<0.02	**1.9**	<0.0001	680	2.10	**0.370**	130	2.0	7	29
2014-05-23								**0.4**			2.40	**0.150**	96	<2	5	90
2014-08-21		<0.2	**0.81**	0.150	<0.005	<0.01	<0.02	**6.8**	<0.0001	1230	4.40	**0.940**	180	11.0	55	71
2014-10-09		<0.2	**0.61**	0.075	<0.005	<0.01	<0.02	**1.9**	<0.0001	788	2.30	**0.290**	110	<2	3	39
2015-05-21								**0.5**			1.60	**0.170**	100	<2	5	43
2015-10-20		<0.2	**0.82**	0.053	<0.005	<0.01	<0.02	**0.33**	<0.001	1040	1.80	**0.260**	130	2.0	3	47
2016-05-10								**0.48**			4.15	**0.161**	104		19.3	60
2016-09-08		0.002	**1.00**	0.036	<0.00001	0.0002	0.001	**0.46**	<0.00001	676	2.58	**0.480**	151	<6	<4.0	44
2016-11-01		0.001	**0.73**	0.031	<0.00001	0.001	0.0004	0.246	<0.00001	414	1.58	**0.171**	105	<6	<4.0	48
2016-11-18			**0.84**													48
2016-11-18	*Duplicate*		**0.83**													34
2017-05-17			**0.86**					**0.46**			1.60	**0.170**	99	<3	<4	35
2017-05-17	*Duplicate*		**0.88**													50
2017-08-29		0.001	**0.99**	0.038	<0.00002	<0.001	0.0002	**0.47**	0.0000035	602	2.00	**0.043**	130	NA	6	42
2017-10-24		0.001	**0.82**	0.030	<0.00002	<0.001	<0.0002	**0.31**	<0.000002	522	1.40	**0.120**	92	<3	<4.0	
2018-05-29			**0.92**					**0.34**			1.50	**0.210**	110	<6	<4	32
2018-08-22		0.001	**1.20**	0.053	<0.00002	0.001	0.0008	**0.31**	0.0000028	662	2.50	**0.580**	150	12.0	125	49
2018-08-22	*Duplicate*	0.001	**1.20**	0.047	<0.00002	<0.0001	0.0015	**0.34**	0.0000023	650	2.40	**0.490**	140	25.0	60	49
2018-10-16		0.002	**0.97**	0.022	<0.00002	0.001	0.0005	0.11	0.0000033	524	1.70	**0.150**	120	4.0	10	44
2019-05-29		0.001	**0.84**	0.022	<0.00002	0.002	0.0010	0.24			1.40	**0.077**	92	<2	1.3	38
2019-08-28		0.002	**1.15**	0.030	0.000009	0.002	0.0010	**0.589**	<0.000005	553	2.67	**0.279**	162	<2	3.1	40
2019-10-29		0.001	**0.60**	0.023	0.000008	0.002	0.0013	**0.345**	<0.000005	404	1.66	**0.099**	96	3.6	3.6	29
2020-05-27			**0.53**					**0.499**		474	3.26	**0.111**	111	<2	6.9	32
2020-08-18		0.001	**0.75**	0.033	<0.000005	0.002	0.0006	**0.83**	<0.000005	454	2.11	**0.183**	133	<3.3	3.8	25
2020-10-06		0.001	**0.93**	0.032	0.000006	0.002	0.0006	**0.479**	<0.000005	546	2.03	**0.087**	125	<2	3.3	40
2021-06-10								**0.532**			1.97	**0.106**	134	<2	5.6	47
2021-08-11		0.001	**1.09**	0.033	0.000009	0.002	0.0010	**0.904**	<0.000005	569	2.63	**0.292**	150	7.6	37.1	50
2021-10-20		0.001	**0.92**	0.033	<0.000025	0.002	<0.0025	**0.701**	<0.000005	558	2.66	**0.243**	165	<2	14.3	55
2022-05-26			**0.69**					**0.385**			1.89	**0.127**	110	2.0	<3	21
2022-08-10		0.002	**0.71**	0.542	<0.000025	<0.0025	<0.0025	**2.64**	0.0000086	608	3.61	**0.700**	216	10.9	7.5	29
2022-10-19		0.001	**0.68**	0.029	<0.000005	0.002	<0.0005	**0.404**	<0.000005	551	1.98	**0.052**	120	<2	<3	60
2023-06-06			**0.85**					**1.46**			2.07	**0.223**	144	3.9	8.8	56
2023-08-22		0.001	**0.89**	0.070	<0.000025	0.003	<0.0025	**4.39**	<0.000005	706	5.36	**0.290**	246	10.1	691	73
2023-10-11		0.001	**1.07**	0.042	0.000005	0.002	<0.0005		<0.000005	645	2.66	**0.178**	166	2.1	<3	72

Parameter -		Pb	Zn	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -		0.003	0.02				6.5 - 8.5	*		0.02		0.001				
Action**										0.8						
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
2011-08-24		<0.05	<0.01	<0.01	<0.1	27.0	8.02	262	<0.05	<0.0005	691	<0.001	6	8.14	18.1	699
2011-10-25		<0.0001	<0.01	<0.01	<0.1	13.0	7.71	185	0.22	0.00139	502	**0.007**	4	7	4.9	509
2012-05-18				<0.01	<0.1	31.0	7.76	170	<0.05	<0.0005	510	**0.007**	10	6.6	18	540
2012-08-30		<0.05	<0.01	<0.01	<0.1	13.0	8.18	400	0.3	0.01628	1000	<0.001	9	7.68	19.4	1259
2012-10-23		<0.05	<0.01	<0.01	<0.1	71.0	7.84	310	0.092	0.00083	960	<0.001	9	7.76	5.7	694
2013-05-24				0.025	0.31	9.0	7.94	220	0.63	0.01050	620	**0.004**	10	9.51	10.6	604
2013-08-29		<0.05	<0.01	<0.01	<0.1	<1	7.76	440	1.0	0.00843	1100	<0.001	6	7.37	18.8	1297
2013-10-17		<0.05	<0.01	0.011	<0.1	20.0	7.96	340	0.16	0.00110	940	**0.011**	6	7.65	7.7	801
2014-05-23				<0.01	0.24	30.0	7.87	210	1.5	0.01625	580	**0.011**	8	7.61	14.8	566
2014-08-21		<0.05	**0.070**	<0.05	<0.5	<1	7.94	570	0.32	0.01060	1400	<0.001	6	8.37	19.9	1290
2014-10-09		<0.05	0.020	<0.01	<0.10	20.0	7.87	380	0.33	0.00161	1000	**0.017**	4	7.54	6.6	886
2015-05-21				<0.01	<0.10	18.0	7.72	200	<0.05	<0.0005	600	<0.001	7	8.17	16.1	537
2015-08-25		<0.05	<0.01	<0.01	<0.10	<1	7.92	280	0.097	0.00020	740	<0.001	6	6.89	14.4	626
2015-10-20		<0.05	<0.01	<0.01	<0.10	45.0	8.09	590	0.098	0.00140	1600	<0.001	6	8.01	6.6	1146
2016-05-10				0.57*		18.4	7.99	330	2.4	**0.03663**	853	**0.008**	7	8.53	8	542
2016-09-08		<0.0002		<0.2	0.014	7.5	8.26	390	0.36	0.00000	976	**0.005**				
2016-11-01		<0.0002		0.004	<0.2	30.2	8.12	288	0.047	0.00023	758	**0.002**	7	7.56	6	317
2016-11-18									0.027	0.00029						
2016-11-18	*Duplicate*								<0.02	<0.0002						
2017-05-17				<0.010	0.094	16.0	8.00	254	<0.02	<0.0002	643	**0.004**	7	8.4	8.8	408
2017-05-17	*Duplicate*								<0.02	<0.0002			7	8.4	8.8	408
2017-08-29		<0.0002	<0.003	<0.010	<0.010	2.6	7.90	360	0.068	0.00472	937	**0.003**	7	8.43	15.2	582
2017-10-24		<0.0002	0.012	<0.010	0.019	17.0	8.09	300	<0.015	<0.0002	774	**0.004**	7	6.83	4.7	585
2018-05-29				<0.033	<0.010	6.0	8.24	251	0.021	0.00017	612	**0.006**	9	7.27	21.7	441
2018-08-22		<0.0002	<0.003	<0.010	<0.02	2.0	8.04	408	0.13	0.00122	960	**0.021**	3	7.47	17.2	529
2018-08-22	*Duplicate*	<0.0002	<0.003	<0.010	<0.02	1.6	8.02	410	0.15	0.00141	955	**0.023**	3	7.47	17.2	529
2018-10-16		0.000	<0.003	<0.16	0.590	27.0	7.86	276	0.027	0.00006	748	**0.003**	9	7.38	2	324
2019-05-29		<0.0002	<0.003	<0.010	0.040	4.5	7.68	230	<0.15	<0.0002	600	**0.004**	7	8.03	10.5	357
2019-08-28		0.00026	<0.003	0.010	0.029	5.3	7.89	335	0.041	0.00158	700	**0.003**	9	8.23	13.1	371
2019-10-29		0.00012	<0.003	<0.010	1.040	8.3	7.92	264	<0.02	<0.0002	612	**0.003**	11	8.63	0.5	243
2020-05-27				0.011	0.149	0.5	8.18	297	1.41	**0.03980**	680	<0.001	8	8.05	14.3	330
2020-08-18		0.00022	<0.003	<0.010	<0.02	2.7	7.95	241	0.173	0.00137	541	<0.001	9	7.29	20.5	425
2020-10-06		0.00012	0.005	<0.010	<0.02	1.5	7.69	356	0.103	0.00083	758	<0.001		7.78	5.9	327
2021-06-10				<0.010	<0.02	0.8	8.02	277	0.030	0.00112	674	**0.002**	5	8.11	16.2	461
2021-08-11		0.00031	<0.003	<0.02	<0.04	4.5	8.04	284	0.090	0.00000	731	<0.01				
2021-10-20		0.00030	<0.015	<0.02	<0.04	1.6	8.14	350	0.093	0.00129	856	<0.01	4	8.01	6.3	411
2022-05-26				<0.010	0.14	2.3	8.19	284	0.353	0.00282	455	**0.002**	3	7.55	12.6	503
2022-08-10		<0.00025	<0.0125	<0.02	<0.04	<0.6	8.01	292	0.306	0.00117	650	**0.030**	5	7.00	19.6	670
2022-10-19		0.00006	<0.003	<0.02	0.24	2.4	8.20	309	0.047	0.00020	787	**0.003**	2	7.56	4.2	807
2023-06-06				<0.01	<0.02	1.0	8.08	302	0.116	0.00114	744	**0.006**	14	7.28	23.8	790
2023-08-22		0.00048	<0.015	<0.1	<0.2	3.1	7.61	418	0.071	0.00029	987	**0.006**	15	7.07	18.5	1040

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Action Criteria

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

** - action level according to trigger mechanism

Station: SW-2

Parameter -		As	B	Ba	Cd	Cr	Cu	Fe	Hg	TDS	TKN	Total P	COD	BOD	TSS	Cl-
PWQO -		0.1	0.2		0.0001	0.0089	0.005	0.3	0.0002			0.03				
Trigger -			1.5													187
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2012-05-18								**0.44**			1.10	**0.081**	72	<2	2	16
2012-08-30		<0.2	0.05	0.03	<0.005	<0.01	<0.02	**0.89**	<0.0001	180	1.70	**0.099**	96	<2	11	13
2012-10-23		<0.2	0.03	<0.02	<0.005	<0.01	<0.02	**0.37**	<0.0001	184	1.30	0.011	78	<2	<1	14
2013-05-24								0.30			1.50	**0.043**	69	<2	<1	26
2013-08-29		<0.2	0.06	0.048	<0.005	<0.01	<0.02	**1.5**	<0.0001	334	1.90	**0.130**	110		6	23
2013-10-17		<0.2	0.05	0.028	<0.005	<0.01	<0.02	**0.9**	<0.0001	272	1.40	**0.049**	96	2	<1	15
2014-05-23								0.26			1.20	**0.032**	79	<2	<1	25
2014-08-21		<0.2	0.1	0.065	<0.005	<0.01	<0.02	**3.8**	<0.0001	382	2.20	**0.310**	120	2	10	26
2014-10-09		<0.2	0.09	0.038	<0.005	<0.01	<0.02	**1.4**	<0.0001	292	1.30	**0.065**	75	2	9	13
2015-05-21								**0.45**			1.10	**0.042**	68	<2	<1	21
2015-08-25		<0.2	0.14	0.035	<0.005	<0.01	<0.02	**2.6**	<0.0001	348	1.60	**0.140**	98	2	5	28
2015-10-20		<0.2	0.14	0.034	<0.005	<0.01	<0.02	**2.3**	<0.001	322	1.00	**0.110**	95	<2	4	18
2016-05-10								**0.704**			1.18	**0.050**	82		6	25
2016-09-08		0.0009	**0.297**	0.025	<0.00001	<0.001	0.0003	**0.544**	<0.00001	292	1.53	**0.097**	104	<6	<4.0	28
2016-11-01		0.0005	**0.210**	0.028	<0.00001	<0.001	0.0004	0.236	<0.00001	276	1.21	**0.030**	89	<6	<4.0	26
2016-11-18			**0.202**													27
2016-11-18	*Duplicate*		**0.217**													16.8
2017-05-17			**0.233**					**0.38**			1.20	**0.053**	72	<3	<4	16.9
2017-05-17	*Duplicate*		0.199													17
2017-08-29		0.0008	**0.360**	0.035	<0.00002	<0.001	0.0002	**2.1**	0.000003	276	1.90	**0.042**	110	NA	<4	20
2017-10-24		0.0010	**0.320**	0.030	<0.00002	<0.001	0.0002	**1**	0.000002	274	1.40	**0.050**	94	8.0	<4	
2018-05-29			**0.360**					**0.71**			1.40	**0.100**	97	<6	<4	18
2018-08-22		0.0010	**0.420**	0.035	<0.00002	<0.001	0.0012	**0.87**	0.000003	292	2.80	**0.320**	130	9.0	72	16
2018-10-16		0.0007	**0.410**	0.019	<0.00002	<0.001	0.0005	0.13	0.000003	262	1.50	**0.048**	91	4.0	<4	19
2019-05-29		0.0009	**0.370**	0.021	<0.00002	0.0018	0.0014	**0.71**			1.50	**0.060**	80	2.1	4.9	22
2019-08-28		0.0010	**0.379**	0.029	<0.000005	0.0008	<0.0005	**1.77**	<0.000005	276	1.75	**0.166**	123	2.7	3.1	16.3
2019-10-29		0.0007	**0.342**	0.017	0.0000053	0.001	<0.001	**0.572**	<0.000005	221	0.94	**0.033**	90	<2	2.4	14.8
2020-05-27			**0.331**					**0.53**		284	1.60	**0.060**	80	3.1	4.8	25
2020-08-18		0.001	**0.349**	0.026	<0.000005	0.001	<0.0005	**0.932**	<0.000005	289	1.86	**0.118**	103	2.4	<3	14
2020-10-06		0.001	**0.370**	0.022	<0.000005	0.001	<0.0005	**0.838**	<0.000005	246	1.80	<0.075	100	<2	<3	14
2021-06-10								**1**			1.55	**0.085**	91	<2	5.2	20
2021-08-11		0.001	**0.320**	0.026	0.000005	0.001	<0.0005	**1.5**	<0.000005	298	2.20	**0.195**	100	<2	<3	20
2021-10-20		0.001	**0.291**	0.029	<0.000005	0.001	<0.0005	**1.65**	<0.000005	259	1.76	**0.096**	89	2.2	11.9	20
2022-05-26			**0.434**					**0.519**			1.40	**0.052**	94	<2.0	<3.0	14
2022-08-10		0.002	**0.388**	0.036	<0.000025	<0.0025	<0.0025	**1.49**	<0.000005	380	2.62	**0.172**	157	2.1	3.7	17
2022-10-19		0.006	**0.274**	0.025	<0.000005	0.001	<0.00005	**0.412**	<0.000005	323	1.37	0.029	110	<2	<3	24
2023-06-06			**0.350**					**0.889**			2.02	**0.112**	117	117.0	<2	18
2023-08-22		0.001	**0.329**	0.031	<0.000005	0.001	<0.0005	**1.12**	<0.00005	310	1.67	**0.122**	110	<2	3.1	19
2023-10-11		0.001	**0.370**	0.025	<0.000005	0.001	0.0008	**0.597**	<0.0000050	259	1.52	0.047	97	<2.0	<3.0	23

Parameter -		Pb	Zn	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -		0.003	0.02				6.5 - 8.5	*		0.02		0.001				
Trigger -										0.02						
2011-10-25		<0.05	<0.01	<0.01	<0.1	<1	7.93	111	<0.05	<0.0005	292	**0.003**	10	7.66	4.3	337
2012-05-18				<0.01	<0.1	<1	7.48	100	<0.05	<0.0005	260	**0.005**	8	6.29	18	540
2012-08-30		<0.05	<0.01	<0.01	<0.1	<1	7.74	130	0.058	0.00109	320	<0.001	7	7.50	18.3	435
2012-10-23		<0.05	<0.01	<0.01	<0.1	<1	7.37	72	0.076	0.00023	210	<0.001	9	7.71	5.3	216
2013-05-24				<0.01	<0.1	<1	7.66	88	0.073	0.00070	250	**0.005**	8	9.57	11.6	278
2013-08-29		<0.05	<0.01	<0.01	<0.1	<1	7.80	160	0.083	0.00179	420	<0.001	5	7.49	18.3	545
2013-10-17		<0.05	<0.01	<0.01	<0.1	<1	7.70	120	<0.05	<0.0005	340	**0.006**	7	7.70	5.5	314
2014-05-23				<0.01	<0.1	<1	7.46	96	<0.05	<0.0005	270	**0.009**	8	7.80	14.1	313
2014-08-21		<0.05	0.010	<0.05	<0.5	<1	7.71	160	0.096	0.00154	410	<0.001	7	8.35	17	468
2014-10-09		<0.05	<0.01	<0.01	<0.1	<1	7.64	140	0.096	0.00057	370	0.001	9	7.40	6.1	352
2015-05-21				<0.01	<0.1	<1	6.88	75	<0.05	<0.0005	200	<0.001	9	6.52	9.2	197
2015-08-25		<0.05	<0.01	<0.01	<0.1	<1	7.31	110	0.062	0.00031	310	<0.001	6	6.54	13.5	295
2015-10-20		<0.05	<0.01	<0.01	<0.10	<1	7.74	140	<0.05	<0.0005	400	<0.001	6	7.32	5.4	367
2016-05-10				<0.20*		<1	7.90	129	0.063	0.00099	330	**0.005**	9	8.88	11	297
2016-09-08		<0.0002		<0.20	0.005	5.1	7.96	155	0.086	0.00064	388	**0.003**				
2016-11-01		<0.0002		0.003	<0.2	<0.5	8.02	186	0.044	0.00060	467	**0.002**	9	7.25	5.7	290
2016-11-18									<0.02	<0.0002						
2016-11-18	*Duplicate*								<0.02	<0.0002						
2017-05-17				<0.033	0.051	4.3	8.05	138	0.081	0.00190	338	**0.004**	10	**9.16**	11.8	277
2017-05-17	*Duplicate*								0.041	0.00096			10	**9.16**	11.8	277
2017-08-29		<0.0002	<0.003	0.010	0.016	<0.5	7.50	160	0.36	0.00244	409	**0.002**	4	7.33	17.1	358
2017-10-24		<0.0002	0.025	<0.010	0.011	2.6	7.95	140	<0.015	<0.0002	357	**0.004**	11	7.58	5.8	226
2018-05-29									0.09	0.00193	331	**0.008**	7	7.56	25.9	344
2018-08-22		<0.0002	<0.003	<0.010	<0.02	1.0	7.69	143	0.34	0.00346	361	**0.021**	4	7.55	15.8	307
2018-10-16		0.00021	<0.003	<0.16	<0.44	35.0	7.69	98.3	0.047	0.00024	350	**0.004**	10	7.72	2.2	206
2019-05-29		0.00020	<0.0003	<0.01	0.029	2.4	7.71	110	0.92	0.01399	320	**0.005**	8	8.32	16.3	273
2019-08-28		0.00007	<0.003	<0.01	<0.02	0.6	7.54	143	0.164	0.00154	320	**0.002**	9	8.86	15	253
2019-10-29		0.00009	<0.003	<0.01	0.02	3.0	7.92	123	0.039	0.00032	283	**0.002**	9	8.96	2.4	166
2020-05-27				0.014	0.06	1.5	8.23	185	0.171	0.01138	427	<0.001	7	8.55	20.8	293
2020-08-18		0.00008	<0.003	<0.01	0.12	0.4	7.81	149	0.315	0.00763	328	**0.0011**	6	6.3	19.6	307
2020-10-06		<0.00005	<0.003	<0.01	0.14	0.36	7.62	154	0.231	0.00153	315	<0.001	4	7.45	8.1	199
2021-06-10				<0.10	0.14	1.08	7.95	131	0.148	0.00541	322	**0.002**	5	8.35	21	314
2021-08-11		0.00006	<0.003	<0.01	0.08	0.78	7.73	142	0.515	0.00227	343	<0.001				
2021-10-20		0.00010	<0.003	<0.01	0.04	0.76	7.82	136	0.316	0.00315	337	<0.010	6	8.65	7.5	250
2022-05-26				<0.010	<0.020	1.93	8.01				292		3	7.63	13.6	315
2022-08-10		<0.00025	<0.015	<0.01	<0.02	<0.3	8.05	179	0.216	0.00753	402	**0.009**	4	7.35	17.2	423
2022-10-19		0.00006	<0.003	<0.01	0.03	0.86	8.03	175	0.025	0.00017	414	**0.003**	5	7.81	3.3	440
2023-06-06				<0.01	<0.01	0.87	7.94	139	0.067	0.00065	324	**0.005**	4	7.32	22.3	348
2023-08-22		0.00011	<0.003	<0.01	0.05	0.34	7.78	188	0.131	0.00102	388	0.001	5	7.31	19.6	415
2023-10-11		0.00012	<0.003	<0.010	<0.020	2.52	7.94	135	0.022	0.00006	359	0.006	6	7.5	7.6	361

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Trigger Criteria

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

Station: SW-3

Parameter -		As	B	Ba	Cd	Cr	Cu	Fe	Hg	TDS	TKN	Total P	COD	BOD	TSS	Cl-
PWQO -		0.1	0.2		0.0001	0.0089	0.005	0.3	0.0002			0.03				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2012-05-18								**3.7**			3.5	**0.038**	150	18	84	2
2012-08-30	*Dry*															
2012-10-23		<0.2	<0.02	<0.02	<0.005	<0.01	<0.02	**1.5**	<0.0001	122	1.5	**0.032**	84	<2	<1	2
2013-05-24								**1.2**			1.5	**0.070**	76	<2	4	1
2013-08-29	*Dry*															
2013-10-17		<0.2	<0.02	0.065	<0.005	<0.01	<0.02	**7.3**	<0.0001	132	4.4	**0.340**	220	3	190	2
2014-05-23								**1.7**			1.4	**0.250**	67	3	26	2
2014-08-21	*Dry*															
2014-10-09		<0.2	<0.02	0.025	<0.005	<0.01	<0.02	**2.3**	<0.0001	118	1.3	**0.056**	80	2	6	1
2015-05-21								**1.6**			1.2	**0.200**	110	<2	87	1
2015-08-25		<0.2	<0.02	0.021	<0.005	<0.01	<0.02	**1.2**	<0.0001	122	1.2	**0.055**	85	<2	<1	1.6
2015-10-20		<0.2	<0.02	0.058	<0.005	<0.01	<0.02	**8**	<0.0001	126	1.00	**0.400**	210	<2	180	1
2016-05-10								**1.7**			1.17	**0.097**	84		17	2.2
2016-09-08		0.0006	<0.05	0.014	<0.00001	0.0017	0.004	**0.96**	<0.00001	68	1.43	**0.083**	98	<6	74	3
2016-11-01		0.0003	<0.05	0.015	<0.00001	0.0011	0.003	**0.45**	<0.00001	24	1.68	**0.149**	113	<6	109	2.7
2017-05-17			<0.02					**1.60**			1.30	**0.084**	95	9.0	31.3	<0.5
2017-08-29		0.0007	<0.02	0.013	<0.00002	<0.001	0.001	**1.90**	0.000004	66	1.50	0.018	97	NA	38.5	0.53
2017-10-24		0.0008	<0.02	0.014	<0.00002	0.0014	0.002	**0.90**	0.000007	94	1.20	**0.080**	88	12.0	47	0.65
2018-05-29								**0.58**			1.50	**0.079**	100	<6	12.5	<0.5
2018-08-22	*Dry*															
2018-10-16		0.0006	<0.02	0.014	0.00003	0.0018	0.003	**0.31**	0.000004	116	0.83	0.029	75	3.0	<4	<0.5
2019-05-29		0.0007	0.022	0.018	<0.00002	0.0035	0.004	**1.10**			1.30	**0.042**	80	4.1	4.1	1.8
2019-08-28		0.0011	0.017	0.029	0.00002	0.0018	0.003	**3.89**	<0.000005	122	2.25	**0.083**	110	12.8	83	0.31
2019-10-29		0.0032	<0.01	0.160	0.00012	0.0332	**0.025**	**20.10**	0.000040	103	5.30	**0.845**	206	17.4	743	1.4
2020-05-27			<0.01					**1.9**		80	1.09	**0.042**	74	3.1	9.2	0.56
2020-08-18		0.0013	**0.240**	0.036	<0.000005	0.001	0.0006	**1.79**	<0.000005	236	2.00	**0.074**	126	4.6	58.6	11
2020-10-06		0.0014	0.113	0.023	0.000021	0.002	0.0019	**3.11**	<0.000005	134	4.45	**0.280**	142	5.9	39.3	5
2021-06-10								**1.51**			2.05	**0.099**	122	4.5	34.4	15
2021-08-11		0.0007	0.012	0.008	0.000007	0.000	0.0006	**0.709**	<0.000005	63	0.96	0.021	60	<2	3.1	0.5
2021-10-20		0.0007	<0.01	0.010	0.000015	0.001	0.0009	**0.98**	<0.000005	74	1.02	0.026	75	<2	<3	0.4
2022-05-26								**0.742**			0.61	0.018	36	<2	<3	0.2
2022-08-10		0.0007	<0.01	0.008	0.000062	0.001	0.0094	**0.74**	<0.000005	56	1.43	0.021	64	<2	<3	0.5
2022-10-19		0.0005	<0.01	0.006	<0.000005	0.001	0.0008	**0.811**	<0.000005	55	0.71	0.021	63	<2	<3	0.4
2023-06-06			<0.01					**1.27**			0.84	**0.042**	64	2.0	<3	0.3
2023-08-22		0.0007	0.035	0.006	<0.000005	0.001	0.0006	**1.52**	<0.000005	56	0.77	**0.031**	67	<2	<3	<0.1
2023-10-11		0.0007	<0.010	0.009	0.000009	0.001	0.0009	**1.14**	<0.000005	54	0.92	0.029	66	<2.0	<3	0.4

Parameter -		Pb	Zn	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -		0.003	0.02				6.5 - 8.5	*		0.02		0.001				
2011-10-25		<0.05	<0.01	<0.01	<0.1	18	6.80	15	<0.05	<0.0005	84	**0.002**	10	6.94	2.8	97
2012-05-18				<0.01	<0.1	5	6.47	26	<0.05	<0.0005	84	**0.006**	11	6.50	24.7	99
2012-08-30	*Dry*															
2012-10-23		<0.05	<0.01	<0.01	<0.1	9	**6.13**	8.4	0.073	0.00001	59	<0.001	9	6.84	6.3	65
2013-05-24				<0.01	<0.1	1	6.65	8.9	0.072	0.00007	37	**0.004**	12	9.67	12.5	45
2013-08-29	*Dry*															
2013-10-17		<0.05	<0.01	<0.01	<0.1	<1	6.55	25	<0.05	<0.0005	62	**0.007**	6	7.06	5.2	51
2014-05-23				<0.01	<0.1	2	**6.44**	9	<0.05	<0.0005	35	**0.006**	11	7.52	20.6	61
2014-08-21	*Dry*															
2014-10-09		<0.05	0.01	<0.01	<0.1	<1	**6.44**	15	0.086	0.00004	59	**0.008**	5	7.45	7.7	61
2015-05-21				<0.01	<0.1	1	**6.03**	7.8	<0.05	<0.0005	37	<0.001	10	6.21	8.4	38
2015-08-25		<0.05	<0.01	<0.01	<0.1	1	**6.08**	6.6	<0.05	<0.0005	33	<0.001	6	6.86	13.5	36
2015-10-20		<0.05	0.020	<0.01	<0.10	<1	6.66	27	<0.05	<0.0005	66	<0.001	8	6.96	3.4	53
2016-05-10				<0.20**		1.6	**6.43**	7.53	<0.05	<0.0005	31	**0.002**	6	8.29	4.5	31
2016-09-08		<0.0002		0.020	<0.20	<0.5	6.58	10.7	0.053	0.00002	37	**0.002**				
2016-11-01		<0.0002		0.019	<0.2	<0.5	**6.47**	6.66	0.043	0.00002	38	**0.001**	9	7.18	6.5	38
2017-05-17				<0.033	<0.044	1.2	6.58	8.76	0.018	0.00001	33	**0.004**	7	8.39	8.5	38
2017-08-29		<0.0002	0.005	<0.010	<0.010	<0.50	6.60	27	0.047	0.00005	65	**0.003**	4	6.29	13.9	92
2017-10-24		0.0003	**0.024**	<0.010	<0.010	0.7	6.66	11.4	<0.015	<0.0002	41	**0.002**	8	7.24	2.9	34
2018-05-29				<0.033	<0.044	1.0	6.60	9.82	0.028	0.00007	37	**0.009**	8	7.19	26.5	61
2018-08-22	*Dry*															
2018-10-16		0.0006	0.007	<0.022	0.120	6.8	6.25	5.63	<0.015	<0.0002	42	**0.002**	10	8.04	3	34
2019-05-29		0.0005	0.005	<0.010	<0.010	<1	5.99	8.2	<0.15	<0.0002	36	**0.003**	9	7.97	13.4	28
2019-08-28				<0.010	<0.020	2.6	6.26	19.8	0.021	0.00001	44	**0.003**	6	8.26	13.1	45
2019-10-29		**0.0078**	**0.091**	<0.010	0.021	1.0	5.84	11.8	0.141	0.00001	40	**0.009**	6	8.73	0.4	17
2020-05-27				<0.010	<0.020	2.01	6.33	5.1	0.036	0.00004	27	<0.001	9	8.74	24.5	45
2020-08-18		0.00017	0.005	<0.010	<0.020	<0.30	7.23	105	0.022	0.00015	242	**0.002**	6	6.75	20.2	247
2020-10-06		0.00045	0.016	<0.010	<0.020	<0.30	6.89	69.6	0.052	0.00026	140	<0.001	4	7.63	4.5	112
2021-06-10				<0.010	<0.020	0.360	7.53	99.3	0.027	0.00316	262	**0.005**	4	8.46	22.1	277
2021-08-11		0.00009	<0.003	<0.010	<0.020	0.360	6.75	14.6	0.029	0.00000	40	**0.005**	4			
2021-10-20		0.00017	0.004	<0.010	<0.010	0.316	6.50	10.1	0.031	0.00077	37	**0.002**	3	8.25	6.8	34
2022-05-26				<0.010	0.032	0.920	6.69	8	0.019	0.00024	26	**0.002**	3	7.67	14.6	34
2022-08-10		0.00013	<0.003	<0.010	<0.02	0.600	6.73	8	0.023	0.00005	27	**0.019**	4	6.66	21.4	38
2022-10-19		0.00013	<0.003	<0.010	0.027	0.710	6.67	10.4	0.025	0.00004	30	**0.005**	3	7.13	3.9	42
2023-06-06				<0.010	<0.020	0.970	6.66	10.3	0.028	0.00005	31	**0.016**	5	6.48	24.3	46
2023-08-22		0.00018	<0.003	<0.01	0.007	<0.3	6.80	14.6	0.007	0.00003	34	<0.001	7	7.0	21.4	42
2023-08-22		0.00018	<0.003	<0.01	0.007	<0.3	6.80	14.6	0.007	0.00003	34	<0.001	7	7.0	21.4	42
2023-10-11		0.00014	0.003	<0.010	<0.020	0.740	6.61	11.2	0.031	0.00008	36	**0.003**	3	6.6	8.5	38

Notes: **Bold** denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

**Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

Station: SW-4

Parameter -	As	B	Ba	Cd	Cr	Cu	Fe	Hg	TDS	TKN	Total P	COD	BOD	TSS	Cl-
PWQO -	0.1	0.2		0.0001	0.0089	0.005	0.3	0.0002			0.03				
Units -	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2012-05-18							<0.02			0.39	0.011	12	<2	<1	<1
2012-08-30	<0.2	<0.02	<0.02	<0.005	<0.01	<0.02	0.04	<0.0001	28	0.38	0.018	13		7	<1
2012-10-23	<0.2	<0.02	<0.02	<0.005	<0.01	<0.02	<0.02	<0.0001	40	0.34	<0.004	25	<2	15	<1
2013-05-24							0.06			0.97	0.009	13	<2	4	<1
2013-08-29	<0.2	<0.02	0.006	<0.005	<0.01	<0.02	<0.02	<0.0001	42	0.38	0.010	10	<2	5	<1
2013-10-17	<0.2	<0.02	0.007	<0.005	<0.01	<0.02	0.14	<0.0001	48	0.59	0.023	31	<2	16	<1
2014-05-23							0.06			0.40	<0.002	10	<2	2	<1
2014-08-21	<0.2	<0.02	0.006	<0.005	<0.01	<0.02	0.03	<0.0001	34	0.34	0.008	12	<2	160	<1
2014-10-09	<0.2	<0.02	0.011	<0.005	<0.01	<0.02	**0.37**	<0.0001	44	0.77	0.019	8.7	<2	21	<1
2015-05-21							0.07			0.27	0.014	6.9	<2	3	<1
2015-08-25	<0.2	<0.02	0.006	<0.005	<0.01	<0.02	0.04	<0.0001	46	0.22	0.013	13	<2	2	<1
2015-10-20	<0.2	<0.02	0.006	<0.005	<0.01	<0.02	0.05	<0.001	16	0.18	0.011	4.2	<2	<1	<1
2016-05-10							0.04			0.23	0.004	<10		<4	1
2016-09-08	0.0001	<0.05	0.006	<0.00001	<0.001	0.0007	0.08	<0.00001	24	0.29	0.005	28	<6	14	1
2016-11-01	0.0002	<0.05	0.007	<0.00001	<0.001	0.0005	0.08	<0.00001	26	0.30	0.012	22	<2	<4	1
2017-05-17							0.08			0.21	0.005	12	<3	<4	1
2017-08-29	<0.0002	<0.02	<0.010	<0.00002	<0.001	0.0008	<0.06	<0.000002	<10	0.19	0.005	8.4	NA	<4	1
2017-10-24	0.0003	<0.02	<0.010	<0.00002	<0.001	0.0041	<0.06	<0.000002	18	0.26	0.010	13	13.0	29.3	1
2018-05-29							<0.06			0.18	0.008	24	<6	12.5	1
2018-08-22	0.0010	<0.02	<0.010	<0.02	<0.001	0.0003	<0.06	<0.000002	12	0.22	0.006	9.1	<6	11	1
2018-10-16	<0.0002	<0.02	<0.010	<0.02	<0.001	0.0004	<0.06	<0.000002	24	0.74	**0.040**	53	3.0	54	1
2019-05-29	<0.0002	<0.02	<0.010	<0.00002	0.001	0.0006	<0.06			0.20	0.024	8.9	<2	<1	1
2019-08-28	0.0002	<0.01	0.006	<0.000005	0.0004	0.0007	0.06	<0.000005	33	0.35	0.009	20	<2	22.8	1
2019-10-29	0.0002	<0.01	0.006	<0.000005	<0.0005	<0.001	0.06	<0.000005	27	<0.15	0.007	<20	2.3	<2	1
2020-05-27							0.033		35	0.24	0.004	15	<2	35	1
2020-08-18	0.003	<0.01	0.005	<0.000005	0.0002	<0.0005	0.037	<0.000005	24	0.35	0.007	<20	<2	<3	1
2020-10-06	0.000	<0.02	0.006	<0.000005	0.0002	<0.0005	0.046	<0.000005	11.1	0.30	0.006	<20	<2	11	1
2021-06-10							0.111			0.37	0.020	22	<2	75	1
2021-08-11	0.0002	<0.01	0.007	0.000008	0.0002	0.0016	0.073	<0.000005	28	0.49	0.007	20	<2	<3	1
2021-10-20	0.0003	<0.01	0.007	0.000014	0.0002	0.0010	0.086	<0.000005	30	0.34	0.009	16	<2	4.7	1
2022-05-26							0.059			0.32	0.011	17	<2	3.2	1
2022-08-10	0.0003	<0.01	0.006	0.000094	<0.0005	0.0019	0.136	<0.000005	26	0.56	0.011	25	<2	5.3	1
2022-10-19	0.0002	<0.01	0.006	<0.000005	<0.0005	0.0005	0.039	<0.000005	25	0.20	0.004	22	<2	<3	1
2023-06-06		<0.01					0.042			0.38	0.006	16	<2	<3	1
2023-08-22	0.0023	0.015	0.002	<0.000005	<0.0005	0.0006	0.026	<0.000005	23	0.33	0.008	22	<2	<3	1
2023-10-11	0.0002	<0.010	0.006	0.000010	<0.0005	0.0023	0.045	<0.000005	23	0.27	0.011	10	<2.0	3	1

Parameter -	Pb	Zn	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -	0.003	0.02				6.5 - 8.5	*		0.02		0.001				
Units -	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
2012-05-18			<0.01	<0.1	3.0	6.63	12	<0.05	<0.0005	38	**0.002**	9	6.04	20	43
2012-08-30	<0.05	<0.01	<0.01	<0.1	3.0	6.37	11	<0.05	<0.0005	37	<0.001	8	8.13	20.1	75
2012-10-23	<0.05	<0.01	<0.01	<0.1	3.0	6.76	12	<0.05	<0.0005	38	<0.001	10	7.57	7.9	38
2013-05-24			<0.01	<0.1	3.0	7.19	12	0.077	0.00039	37	<0.001	12	8.12	17.3	38
2013-08-29	<0.05	<0.01	<0.01	<0.1	3.0	7.16	13	<0.05	<0.0005	37	<0.001	8	7.92	23.5	65
2013-10-17	<0.05	<0.01	<0.01	<0.1	3.0	6.83	12	<0.05	<0.0005	37	<0.001	11	8.30	9.9	38
2014-05-23			<0.01	<0.1	3.0	**6.46**	11	<0.05	<0.0005	36	**0.002**	10	7.90	15.1	78
2014-08-21	<0.05	<0.01	<0.05	<0.5	3.0	7.11	13	<0.05	<0.0005	37	<0.001	9	8.58	22	51
2014-10-09	<0.05	<0.01	<0.01	<0.1	3.0	6.66	12	0.064	0.00005	37	**0.002**	11	8.69	8.9	33
2015-05-21			<0.01	<0.1	3.0	**6.14**	<1	<0.05	<0.0005	37	<0.001	11	7.24	12.7	29
2015-08-25	<0.05	<0.01	<0.01	<0.1	3.5	6.78	13	<0.05	<0.0005	37	<0.001	10	6.30	19.5	31
2015-10-20	<0.05	<0.01	<0.01	<0.10	2.7	7.15	13	<0.05	<0.0005	38	<0.001	9	8.41	8.8	29
2016-05-10			0.039		2.9	7.20	11	<0.05	<0.0005	34	<0.001	11	8.18	11	34
2016-09-08	<0.0002		<0.002	<0.020	0.6	7.25	11	0.082	0.00012	36	**0.002**				
2016-11-01	<0.0002		<0.002	<0.2	2.1	7.26	12	0.016	0.00005	38	<0.001	12	7.69	8	31
2017-05-17			<0.033	<0.044	2.5	7.32	11	<0.015	<0.0005	34	**0.004**	10	8.85	12.2	31
2017-08-29	<0.0002	<0.003	<0.010	<0.010	2.6	7.20	12	0.043	0.00023	38	<0.002	9	9.18	17.8	38
2017-10-24	<0.0002	**0.024**	<0.010	<0.010	2.7	7.18	11	<0.015	<0.0002	35	**0.002**	10	8.13	7.7	28
2018-05-29			<0.033	<0.044	2.6	7.40	12	<0.015	<0.0002	36	**0.002**	9	**5.72**	22.5	58
2018-08-22	<0.0002	<0.003	<0.033	<0.010	<0.02	7.34	11	<0.015	<0.0002	36	**0.002**	9	13.83	19	52
2018-10-16	<0.000002	<0.003	<0.033	<0.089	2.7	7.11	11	<0.015	<0.0002	35	<0.002	12	14	3.4	36
2019-05-29	<0.0002	<0.003	<0.010	<0.010	2.6	6.88	10	<0.015	<0.0002	34	<0.0015	9	13.49	3.6	36
2019-08-28	<0.00005	**0.037**	<0.010	<0.020	2.8	7.26	12	0.036	0.03597	36	**0.003**	9	12.65	15.6	41
2019-10-29	<0.00005	<0.003	<0.010	0.023	2.7	7.13	13	<0.02	<0.0002	36	**0.0017**	11	8.2	3.9	25
2020-05-27			<0.010	<0.02	2.6	7.32	14	0.016	0.00008	38	**0.0035**	9	7.13	19.4	41
2020-08-18	<0.00005	<0.003	<0.010	<0.02	2.4	7.23	14	0.0089	0.00890	36	<0.001	9	13.23	23.4	380
2020-10-06	<0.00005	0.008	<0.010	<0.02	2.4	7.29	15	0.0053	0.00510	37	<0.001	9	11.12	10.6	41
2021-06-10			<0.010	<0.02	0.1	7.15	14	<0.005	<0.0002	41	**0.003**	8	10.18	22.5	58
2021-08-11	0.0002	0.005	<0.010	<0.02	3.0	7.14	13	<0.005	<0.0002	37	**0.007**				
2021-10-20	0.0001	0.005	<0.010	<0.02	2.4	6.96	13	0.0160	0.00031	36	**0.002**	8	8.06	9	32
2022-05-26			<0.010	0.066	2.5	7.17	13	<0.005	<0.0002	37	**0.003**	9	8.64	10.3	55
2022-08-10	0.0001	<0.003	<0.010	<0.02	2.5	7.30	12	0.0064	0.00007	35	**0.010**	7	7.5	19.1	38
2022-10-19	<0.00005	<0.003	<0.010	<0.02	2.6	6.99	12	0.0087	0.00023	35	**0.001**	7	8.27	6.9	59
2023-06-06			<0.010	<0.02	2.8	7.24	13	0.0075	0.00074	39	**0.015**	6	8.33	23.6	70
2023-08-22	<0.00005	0.003	<0.01	<0.02	2.7	7.28	13	<0.005	<0.0002	35	<0.001	2	7.3	19	47
2023-10-11	0.0001	0.006	<0.010	<0.020	2.5	7.22	14	<0.005	0.00049	37	**0.002**	2	7.4	11.1	50

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

*Nitrate plus Nitrite

* should not be decreased by more than 25% of the natural concentration

Station: SW-5

Parameter -		As	B	Ba	Cd	Cr	Cu	Fe	Hg	TDS	TKN	Total P	COD	BOD	TSS	Cl-
PWQO -		0.1	0.2		0.0001	0.0089	0.005	0.3	0.0002			0.03				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2012-08-31		<0.2	<0.02	<0.02	<0.005	<0.01	<0.02	0.1	<0.0001	38	0.42	0.017	23	<2	1	4
2013-08-29		<0.2	<0.02	0.006	<0.005	<0.01	<0.02	0.05	<0.0001	42	0.43	0.009	22	<2	<1	5
2014-08-21		<0.2	<0.02	0.007	<0.005	<0.01	<0.02	0.13	<0.0001	52	0.40	0.008	22	<2	1	5
2015-08-25		<0.2	<0.02	0.005	<0.005	<0.01	<0.02	0.17	<0.0001	58	0.35	0.017	23	<2	<1	5
2016-09-08		0.0003	<0.05	0.007	<0.00001	<0.001	0.001	0.223	<0.00001	34	0.40	0.010	28	<6.0	<4	6
2017-08-29		0.0002	<0.02	<0.01	<0.00002	<0.001	0.0004	0.096	0.000002	12	0.32	0.007	21	NA	<4	5
2018-08-22		0.0004	<0.02	<0.01	<0.00002	<0.001	0.0008	0.1	<0.000002	34	0.53	0.016	22	<6	<4	4
2019-08-28	*not sampled*															
2020-08-18		0.0004	<0.01	0.005	<0.000005	0.0003	<0.0005	0.143	<0.000005	32	0.41	0.013	26	<2	<3	4
2021-08-11		0.0004	<0.01	0.004	0.000016	0.0002	<0.0005	0.099	<0.000005	42	0.44	0.033	27	<2	<3	5
2022-08-10		0.0004	<0.01	0.007	0.000006	<0.0005	0.0007	0.178	<0.000005	33	0.33	0.011	20	<2	<3	4
2023-08-22		0.0004	<0.01	0.006	<0.000005	0.0006	0.0008	0.127	<0.000005	44	0.39	0.014	28	<2	<3	4

Parameter -		Pb	Zn	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -		0.003	0.02				6.5 - 8.5	*		0.02		0.001				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
2012-08-31		<0.05	<0.01	<0.01	<0.1	2.0	**6.38**	7.5	<0.05	<0.0005	42	<0.001	10	7.45	22.6	132
2013-08-29		<0.05	<0.01	<0.01	<0.1	1.0	7.11	9.7	<0.05	<0.0005	46	<0.001	8	7.99	24.1	87
2014-08-21		<0.05	<0.01	<0.05	<0.5	2.0	6.72	7.3	<0.05	<0.0005	43	<0.001	9	8.85	23.3	62
2015-08-25		<0.05	<0.01	<0.05	<0.5	<1	**6.34**	10.0	<0.05	<0.0005	47	<0.001	8	6.68	20.7	43
2016-09-08		<0.05		<0.002	<0.02	<0.50	7.11	8.5	0.022	0.00002	45	**0.0017**				
2017-08-29		<0.0002	<0.003	<0.010	<0.010	1.5	6.9	8.5	0.038	0.00014	38	<0.002	9	6.64	22.1	52
2018-08-22		<0.0002	0.004	<0.010	<0.02	1.4	7.05	10.7	0.018	0.00008	47	**0.007**	8	8.47	20.6	75
2019-08-28	*not sampled*															
2020-08-18		<0.00005	<0.005	<0.010	<0.02	1.4	7.03	9.7	0.0064	0.00004	42	<0.001	9	8.51	24.6	55
2021-08-11		0.0001	<0.003	<0.010	<0.02	1.8	6.99	10.2	<0.005	<0.0005	47	<0.001				
2022-08-10		<0.00005	<0.003	<0.010	<0.02	1.4	7	7.6	<0.005	<0.0005	39	**0.0097**	6	7.53	22.8	46
2023-08-22		0.0001	<0.01	<0.01	<0.02	1.5	7.23	10.0	0.005	<0.0005	42	0.0020	6	7.60	20.7	42

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

* should not be decreased by more than 25% of the natural concentration

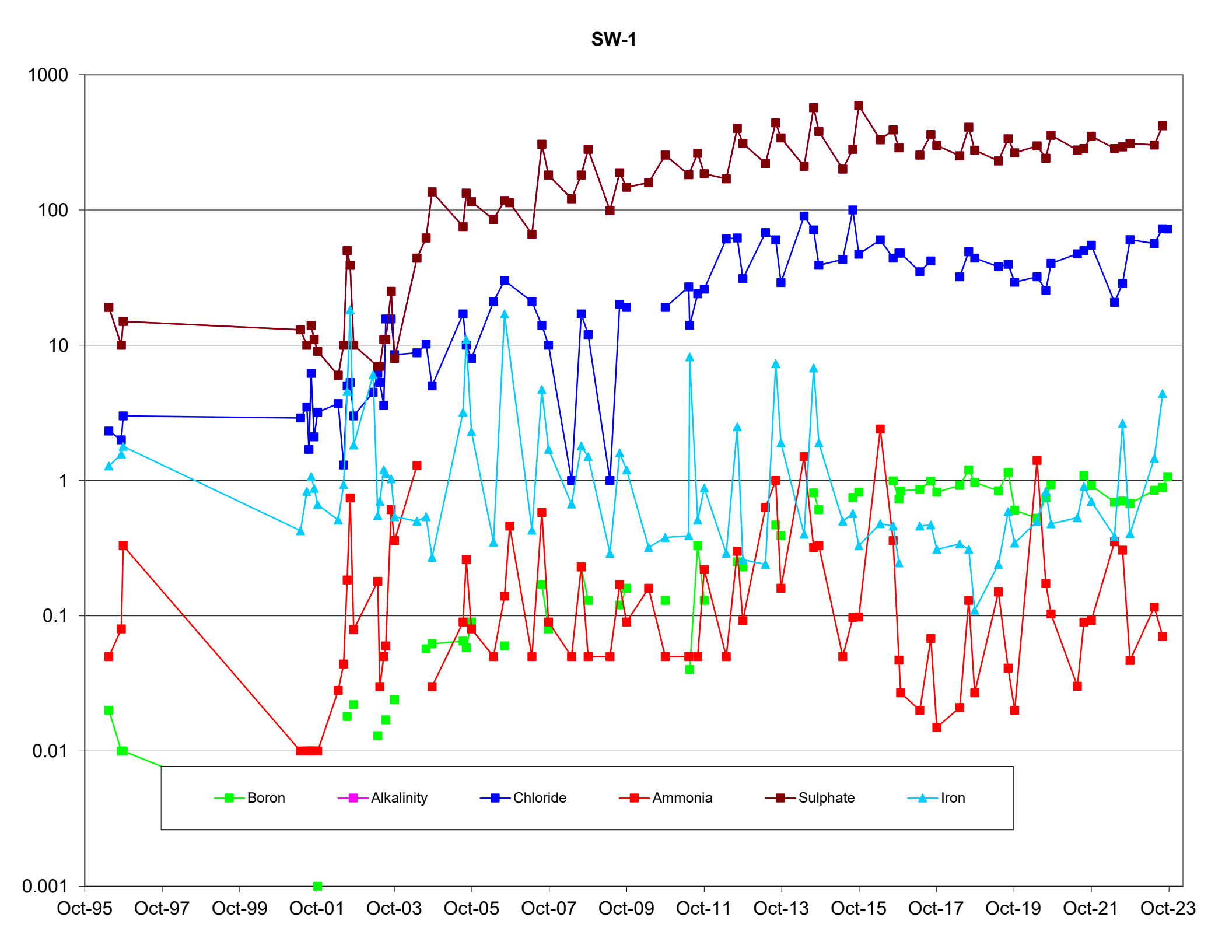
Additional Locations

Monitor	Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
	PWQO -		0.1	0.2			0.0001	0.0089	0.005	0.3	0.0002						0.03			
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RW-1	2017-04-11		0.015	**3.48**	0.125	189	0.00002	0.0093	0.0011	0.14	<0.00001	526	104	0.279	2560	59	**1.80**	340	<30	81.3
	2018-06-12			**1.70**						0.25							**2.40**	190	51	
	2020-08-18		0.005	**3.50**	0.201		<0.000025	0.0060	<0.0025	**1.14**	<0.0000005				1670	17.7	**1.45**	243	33	843
RW-2	2017-04-11		0.004	**1.36**	0.047	65	0.00001	0.0025	0.0011	0.17	<0.00001	175	48	0.225	932	16	**0.86**	150	24	55
	2018-06-12			**6.20**						<0.06							**1.40**	440	21	
	2018-06-12	*DUP*		**5.80**						0.098							**1.40**	390	24	
	2018-10-16		0.005	**3.60**	0.092	120	<0.000002	0.0081	0.0012	0.2	<0.000002	450	76	0.230	2500	41.0	**0.55**	260	55	6
	2019-05-29		0.053	**5.30**	0.130	160	0.000023	0.0110	0.0017	**0.61**		560	92	0.430		60.0	**0.93**	310	15	17
	2019-08-28		0.007	**5.61**	0.107		0.000011	0.0109	0.0009	**0.345**	<0.000005				2530	53.2	**1.15**	370	12	148
	2019-10-29		0.023	**5.86**	0.126		<0.00005	0.0243	<0.010	**0.44**	<0.000005				2710	73.7	**2.15**	383	13	30
	2020-05-27									0.24					2150	80.4	**1.65**	377	33	18
	2020-08-18		0.009	**6.40**	0.151		0.000035	0.0120	<0.0025	**0.622**	0.0000055				3030	75.1	**1.88**			112
	2021-06-10									**0.33**						69.5	**1.77**	483	22	54
	2021-08-12		0.010	**6.58**	0.095		<0.0001	0.0090	<0.01	**0.34**	<0.000005					41.0	**1.13**	445	14	17
	2022-05-26									0.26						78.1	**1.48**	332	12	15
	2022-08-10		0.006	**6.30**	0.124	136	<0.00005	0.0003	<0.005	**0.324**	<0.000005	614	126	0.200	2730	41.4	**0.48**	374	23	19
	2023-06-06									**0.582**						53.7	**1.20**	384	60	390
	2023-08-22		0.005	**4.88**	0.151		<0.0001	**0.0103**	<0.01	**0.576**	<0.000005				2520	43.3	**1.13**	451	25	515
RW-3	2017-10-05		0.001	**1.60**	0.044	48		0.0011	<0.0002	0.18	<0.000002	200	37	0.059	798	2.5	**0.47**	150	12	59
	2018-06-12			**2.90**						0.14							**0.75**	220	38	
	2018-10-16		0.003	**2.40**	0.049	54	<0.000002	0.0022	0.0003	0.16	<0.000002	270	45	0.610	1180	9.0	**1.20**	590	51	1200
	2020-08-18		0.005	0.20	0.290		0.000016	0.0059	0.001	**0.625**	<0.000005				1730	12.3	**1.01**	258	57	455
RW-4	2020-08-18		0.005	**0.84**	0.205		0.000421	0.0074	**0.016**	**5.47**	0.0000156				729	3.8	**1.66**	115	7	327
RW-5	2019-10-29		0.001	**0.27**	0.017		<0.000005	0.0010	<0.001	**0.63**	<0.000005				190	0.9	**0.03**	83	<2	<2
	2020-08-18		<0.0005	<0.05	0.007		<0.000025	<0.0005	<0.0025	0.257	<0.000005				47	0.7	0.02	36	<2	<3
	2021-08-11		0.001	**0.22**	0.019		**0.00016**	0.0006	0.001	**0.615**	<0.000005				216	2.0	**0.06**	82	<2	5
	2022-08-10		0.001	<0.05	0.010	5.22	<0.000025	<0.0025	<0.0025	**0.343**	<0.000005	6.15	2	0.027	70	0.5	0.02	59	<2	<3
	2023-08-22		0.001	0.18	0.017	2.85	<0.000005	0.0010	0.001	**0.393**	<0.000005	23.7	6	0.021	167	1.2	<0.05	61	<2	<3

Monitor	Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
	PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
RW-1	2017-04-11		182	<0.0002	0.0053	180	<0.22	<0.16	23.0	7.99	2070	70	**1.25**		4170	**0.016**				
	2018-06-12					67	<0.033	<0.089	2.8	8.06	475	<0.015	<0.015		1100	**0.006**	9	14.00	15.8	619
	2020-08-18			0.00113	0.018	131	<0.01	<0.02	14.1	7.96	1090	4	**1.25**		2280	**0.002**	6	6.83	19.2	798
RW-2	2017-04-11		66	<0.0002	0.0052	62	0.68	0.09	9.3	8.22	768	14	**0.42**		1650	**0.008**				
	2018-06-12					200	0.079	0.54	28.0	8.02	1910	79	**2.50**		3980	**0.049**	8	8.97	16.8	1019
	2018-06-12	*DUP*				200	0.14	0.46	25.0	7.96	1850	65	**1.80**		3950	**0.050**	8	8.97	16.8	1019
	2018-10-16		150	0.00032	0.0068	190	0.14	2.60	55.0	8.01	1780	42	**0.379**		3820	**0.016**	9	11.50	0.9	430
	2019-05-29		180	0.00025	0.0069	160	0.011	<0.010	<1	7.77	1600	52	**0.455**		3800	**0.014**	5	7.09	7.3	602
	2019-08-28			0.00007	0.0046	188	0.099	0.01	12.6	7.81	1750	40	**0.558**		2710	**0.020**	9	7.97	12.0	672
	2019-10-29			<0.0005	<0.03	210	<0.2	<0.4	10.3	7.94	2140	73	**0.555**		4170	**0.006**	9	7.60	0.8	421
	2020-05-27					185	<0.2	<0.4	6.1	8.08	1900	65	**2.10**		3710	**0.008**	9	7.70	15.3	545
	2020-08-18			0.00190	0.017	237	<0.20	1.93	11.5	7.92	2190	55	**1.76**		4350		9	6.07	20.2	961
	2021-06-10									8.26	1850	58	**3.37**		3690	<0.010	14	8.54	18.0	1060
	2021-08-12			<0.001	<0.06	231	<0.01	0.15	39.0	8.28	1760	26	**0.40**		3740	<0.010				
	2022-05-26					165				8.37	1700	53	**2.86**		3520	**0.005**	6	7.68	13.4	3814
	2022-08-10		216	<0.0005	<0.03	168	<0.20	0.63	6.5	8.13	1910	30	**1.06**		3810	**0.012**	1	7.72	15.1	3855
	2023-06-06									8.51	1680	50	**0.76**		3470	**0.005**	14	7.65	18.3	3881
	2023-08-22			<0.001	<0.06	212	<0.5	<1	<15	8.06	1680	3.3	**0.03**		3500	**<0.005**	15	7.51	17.4	3468
RW-3	2017-10-05		69	<0.0002	<0.003	69	0.039	0.41	10.0	8.31	517	0.13	0.0022	39.0	1230					
	2018-06-12					98	0.280	2.40	21.0	8.40	762	1.3	**0.122**		1730	**0.012**	10	7.88	20.5	585
	2018-10-16		95	<0.0002	0.006	110	0.066	0.92	51.0	7.71	693	0.22	0.0010		1790	**0.014**	9	7.16	1.3	431
	2020-08-18			0.0004	0.012	117	<0.01	<0.02	19.2	8.09	1060	1.86	**0.0811**		2310	**0.002**	6	6.95	19.1	761
RW-4	2020-08-18			**0.0089**	**0.116**	22	0.052	0.07	71.1	8.06	494	1.22	**0.0448**		1010	**0.002**	5	11.13	17.6	451
RW-5	2019-10-29			0.0001	<0.003	11	<0.01	0.03	2.3	7.47	107	0.065	0.0002		246	**0.002**	9	12.19	1.9	198
	2020-08-18			0.0003	<0.015	5	<0.01	<0.02	1.2	7.18	17	0.013	0.0001		60	**0.0014**	7	9.82	23.8	80
	2021-08-11			0.0009	0.007	14	<0.01	<0.02	0.5	7.59	97	0.0162	0.0001		243	**0.0034**				
	2022-08-10		5	<0.00025	<0.015	5	<0.01	<0.02	1.1	7.44	26	<0.005	<0.0001		72	**0.0056**	4	7.77	20.4	96
	2023-08-22		14	0.0002	0.006	12	<0.01	>0.02	0.8	7.98	90	0.0099	0.0003		222	**0.0011**	5	7.38	19.2	256

APPENDIX I

Surface Water Quality Over Time


SW-1
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10
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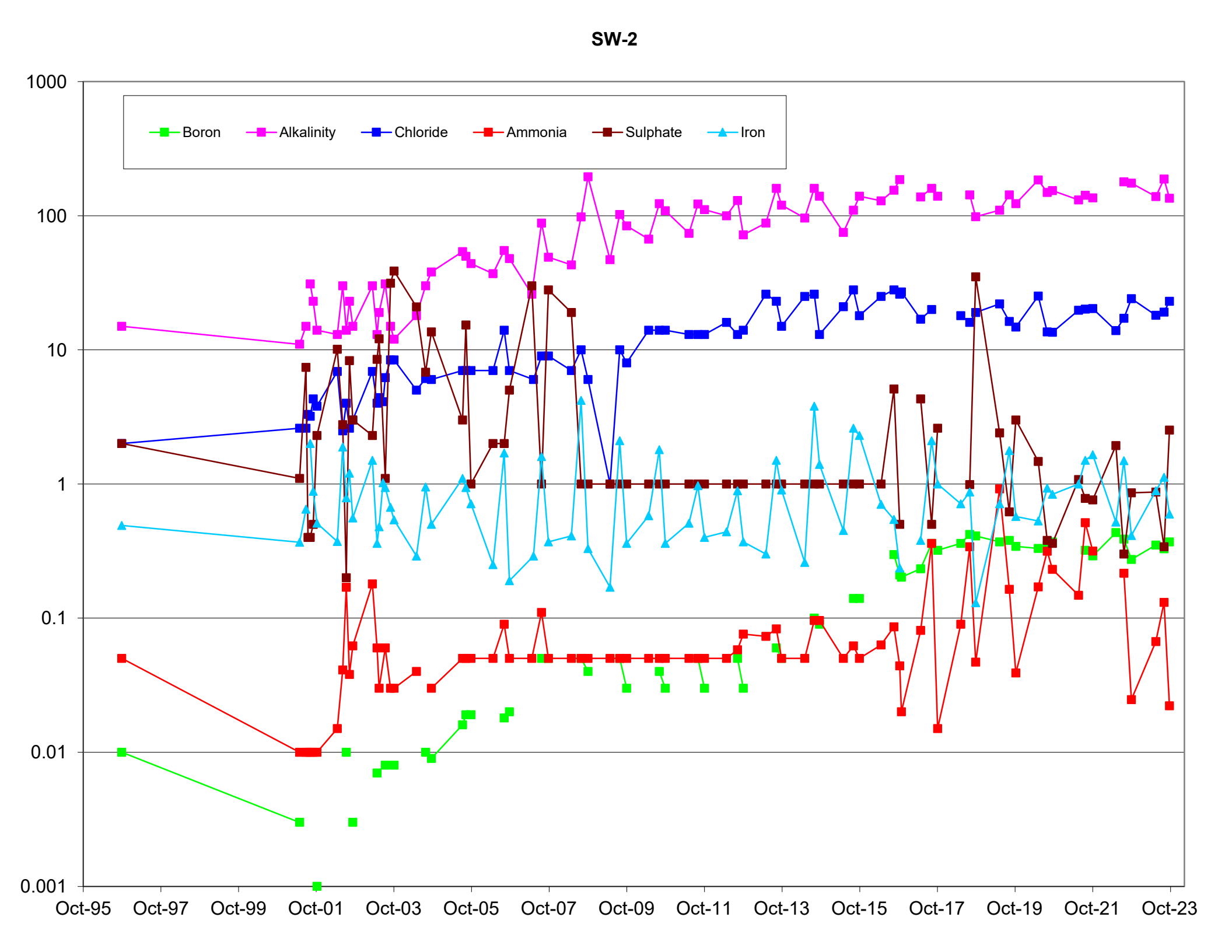
0.01
0.001
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
Oct-23
Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron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Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron
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10
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0.01
0.001
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Oct-97
Oct-99
Oct-01
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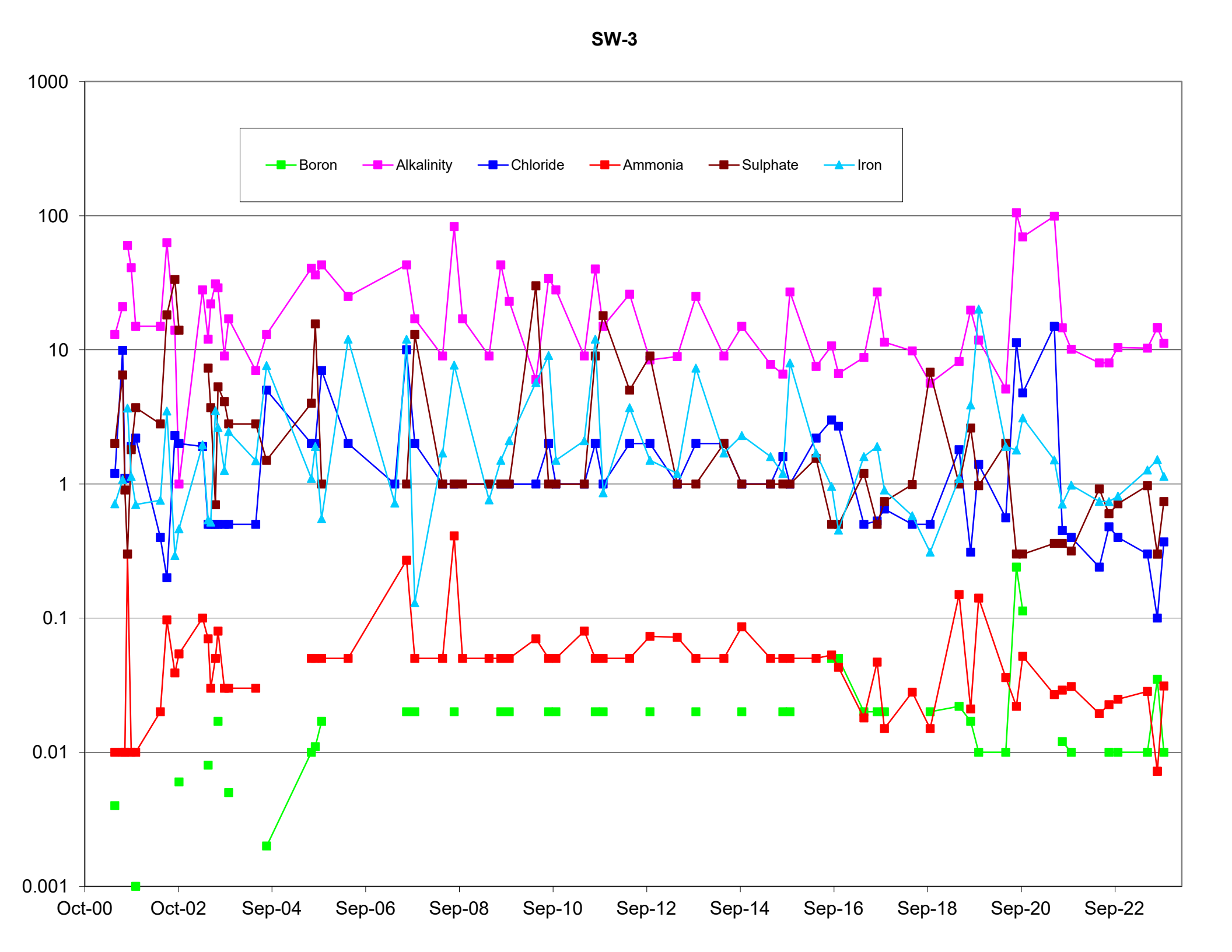
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21
Oct-23


SW-3
Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron
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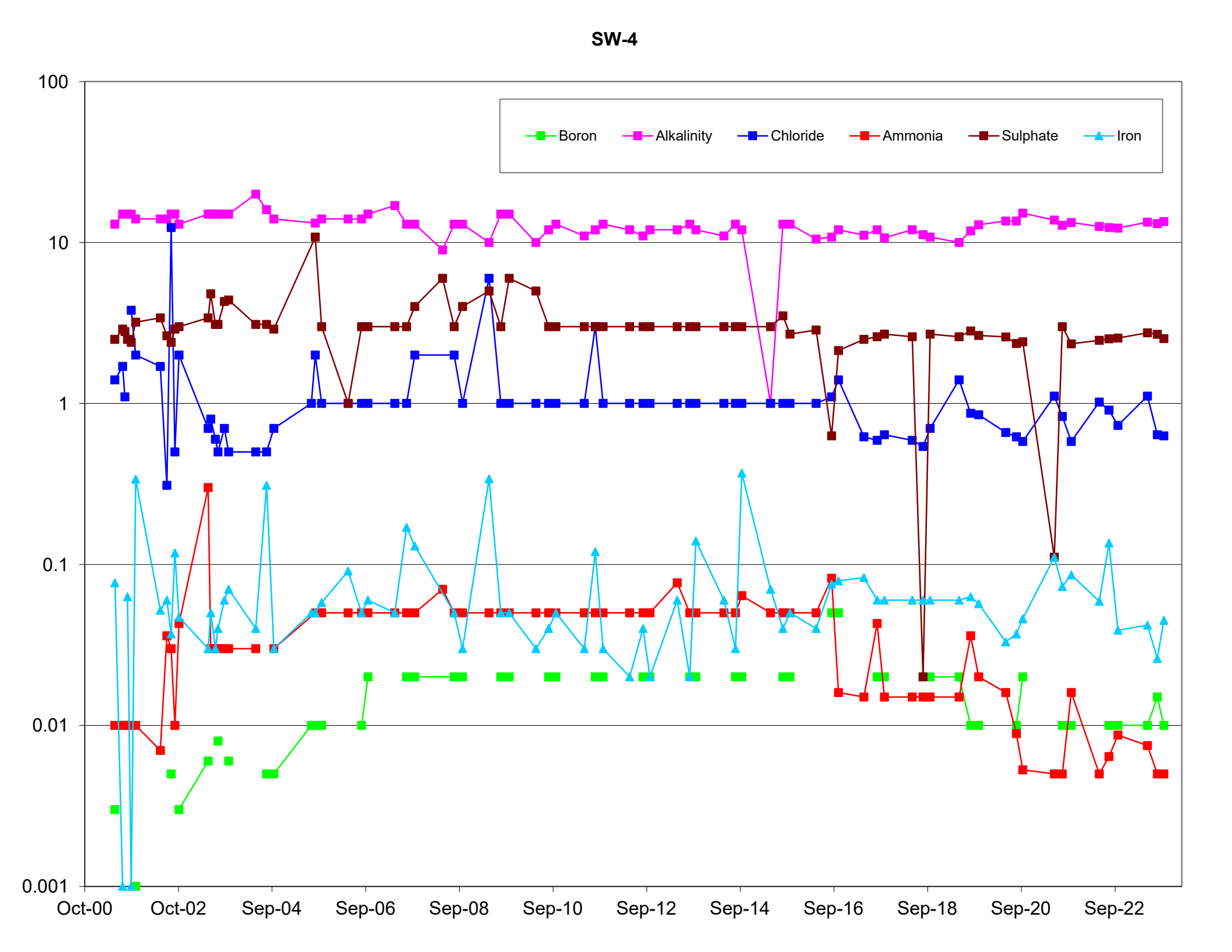
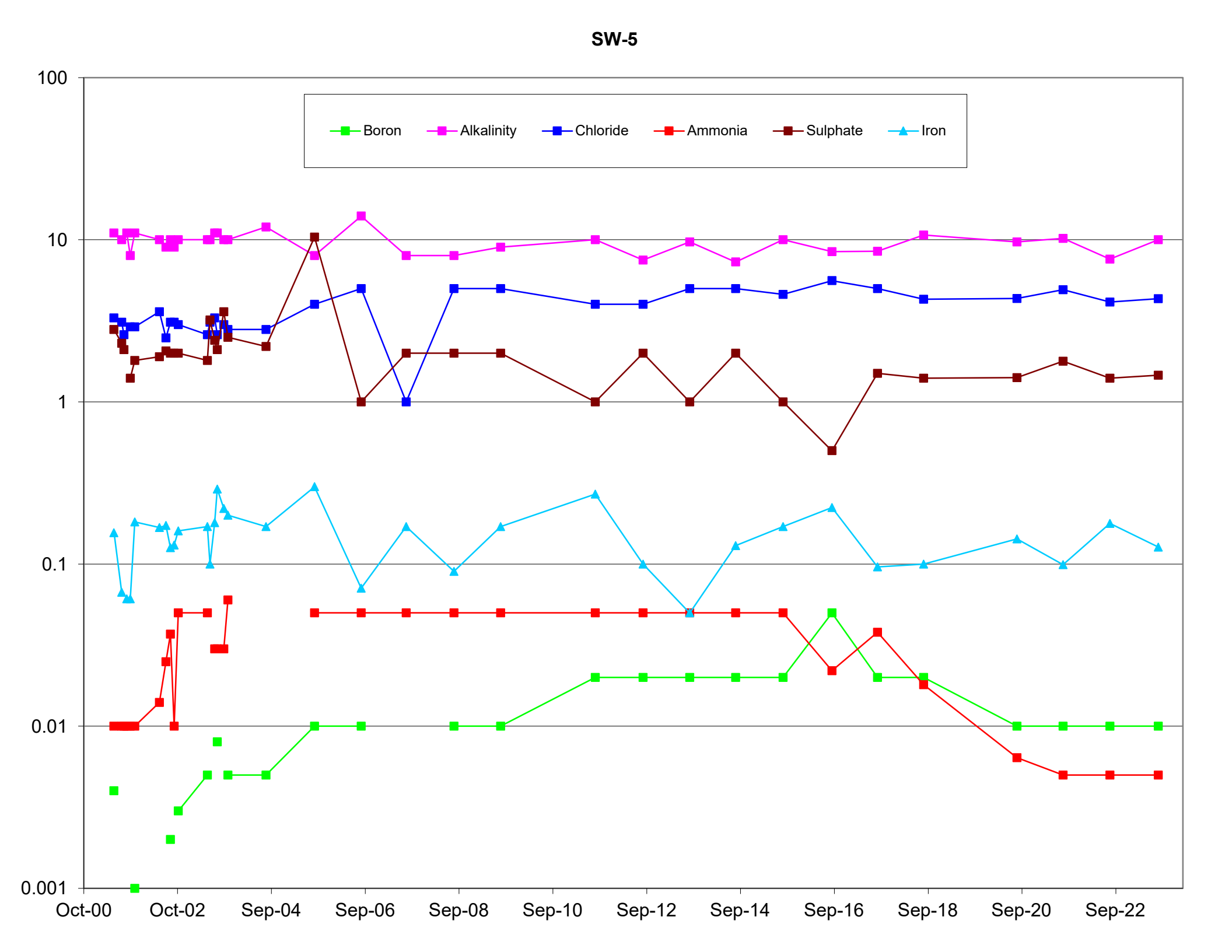
100
10
1
0.1
0.01
0.001
Oct-00
Oct-02
Sep-04
Sep-06
Sep-08
Sep-10
Sep-12
Sep-14
Sep-16
Sep-18
Sep-20
Sep-22


SW-4
Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron
100
10
1
0.1
0.01
0.001
Oct-00
Oct-02
Sep-04
Sep-06
Sep-08
Sep-10
Sep-12
Sep-14
Sep-16
Sep-18
Sep-20
Sep-22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Ammonia
Sulphate
Iron
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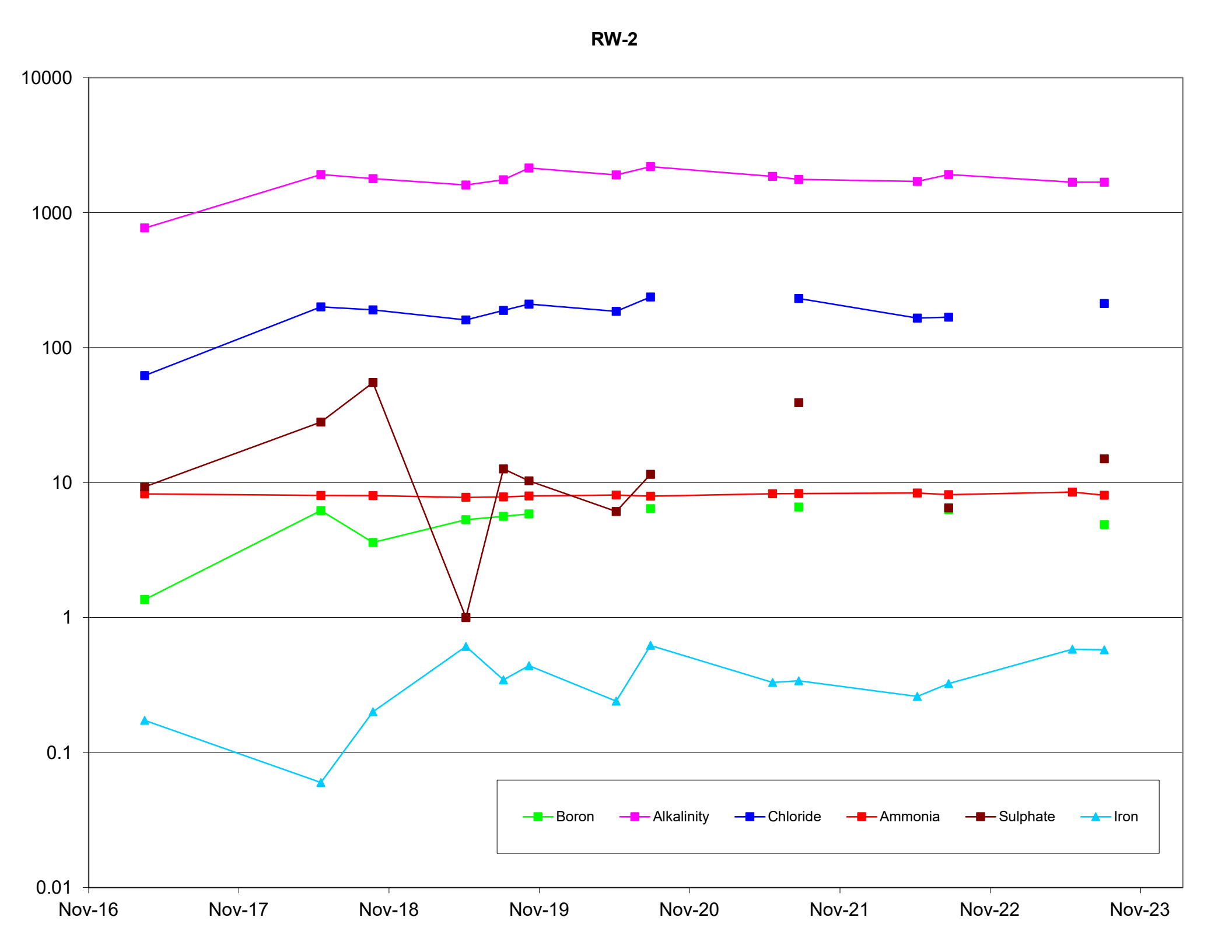
Sep-04
Sep-06
Sep-08
Sep-10
Sep-12
Sep-14
Sep-16
Sep-18
Sep-20
Sep-22


RW-2
10000
1000
100
10
1
0.1
0.01
Nov-16
Nov-17
Nov-18
Nov-19
Nov-20
Nov-21
Nov-22
Nov-23
Boron
Alkalinity
Chloride
Ammonia
Sulphate
Iron

APPENDIX J

MECP Landfill Reporting Submission Forms

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

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

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

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

Monitoring Report and Site Information	
Waste Disposal Site Name	Kenora Area Waste Disposal Site (Jones Road Landfill)
Location (e.g. street address, lot, concession)	Part Lot 1 & 2, Concession II, Township of PettyPiece.
GPS Location (taken within the property boundary at front gate/ front entry)	412895 , 5521124
Municipality	District of Kenora
Client and/or Site Owner	City of Kenora
Monitoring Period (Year)	2021-2023
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	A612018
Director's Order No.:	Type Here
Provincial Officer's Order No.:	Type Here
Other:	Type Here

Report Submission Frequency	○ **Annual** ◉ **Other**	Specify (Type Here): every three years
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		Select Date
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:	Type Here	
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)	○ Yes ◉ No	

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

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

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
see table 2 of report for omitted monitors		Select Date
		Select Date
		Select Date

3) a) Some or all groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
see previous page	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(●) **Yes** ( ) **No**	If no, the potential design and operational concerns/ exceptions are as follows (Type Here):	
6) The site meets compliance and assessment criteria.	(●) **Yes** ( ) **No**	If no, list and explain exceptions (Type Here): t	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	(●) **Yes** ( ) **No**	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	(●) **Yes** ( ) **No**	**Note which practice(s):**	☐ **(a)** ☒ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (●) **No** ( ) **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

Groundwater CEP Declaration:

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

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

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

8-Jun-2024

Recommendations:

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

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

Name:	Colin Ross		
Seal:	Add Image		
Signature:		**Date:**	8-Jun-2024
CEP Contact Information:	Colin Ross		
Company:	Azimuth Environmental Consulting Inc.		
Address:	642 Welham Road, Barrie, ON L4N 9A1		
Telephone No.:	705-721-8451	Fax No. :	705-5721-8926
E-mail Address:	colin@azimuthenvironmental.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

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

Name (s)	Morgan Lake & associated wetland
Distance(s)	3.2 & 2.5km

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

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	(●) Yes ( ) No	If no, identify issues (Type Here): additional temporary locations have been added to assess boron trigger exceedances
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	(●) Yes ( ) No ( ) **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
see report section 3.4 / 3.5		Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

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

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
see report section 3.4 / 3.5	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

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

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Phenols Cadmium Boron Iron Total Phosphorus	0.001 mg/L 0.0001 mg/L 0.02 mg/L 0.3 mg/L 0.03 mg/L	>100% 60% 10% (but within CWQG) >100 % 100%
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	(●) **Yes** ( ) **No**	phenols and total phosphorus have been noted in background locations such that they could at least be partially naturally sourced, while iron was noted to exceed in surface water historically prior to landfill operations Boron was noted to exceed at RW-5 in August 2021, but has been below since. it is also below CWQG of 1.5 mg/L and below detection limits in Morgan Lake at SW-5

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	◉ **Yes** ○ **No**	previous increasing trends are noted at SW-1 and SW-2 for leachate indicator parameters have become more stable since 2017.
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	○ Yes ◉ No ○ Not Known ○ Not Applicable	
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**	

Surface Water CEP Declaration:

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

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

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

8-Jun-2024

Recommendations:

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

○ **No Changes to the monitoring program are recommended**	
◉ **The following change(s) to the monitoring program is/are recommended:**	Addition of two additional surface water monitoring locations to refine leachate quality distribution within the CAZ. See section 4 of report.
◉ **No changes to the site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/are recommended:**	Type Here

CEP Signature	
Relevant Discipline	Water Quality Assessor
Date:	9-Jun-2024
CEP Contact Information:	Colin Ross
Company:	Azimuth Environmental Consulting Inc.
Address:	642 Welhar Road, Barrie, ON. L4N 9A1
Telephone No.:	705-721-8451
Fax No. :	705-721-8926
E-mail Address:	colin@azimuthenvironmental.com

Save As **Print Form**

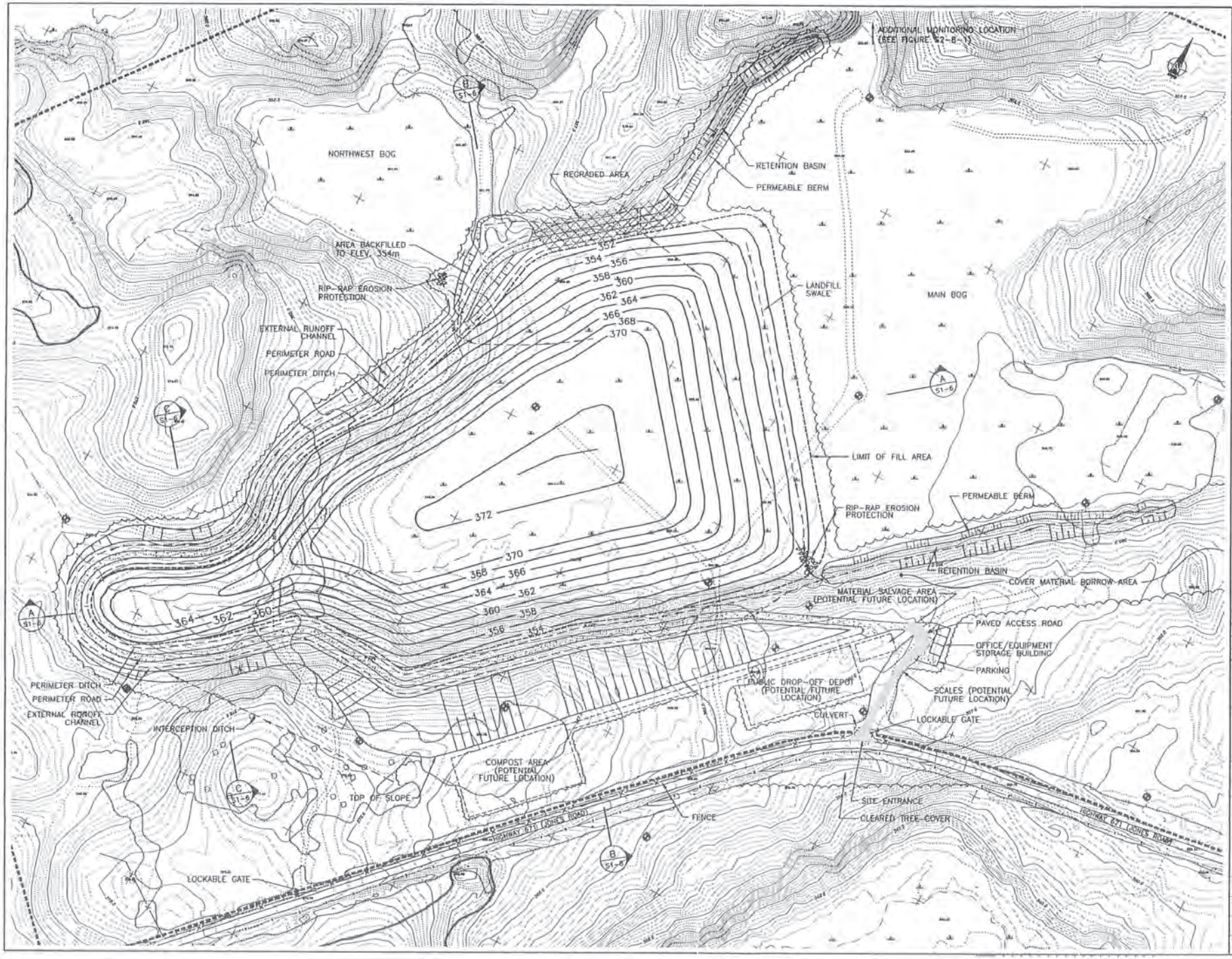
APPENDIX K

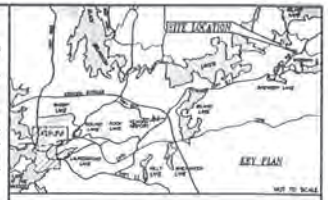
Benthic Invertebrate Monitoring

Benthic Sampling Results - Jones Road Landfill Site												
Biological Endpoints	**SB-1**				**SB-2**				**SB-R**			
	Aug-00	**Aug-01**	**Aug-02**	**Aug-03**	**Aug-00**	**Aug-01**	**Aug-02**	**Aug-03**	**Aug-00**	**Aug-01**	**Aug-02**	**Aug-03**
Density (as number of organisms per square meter) of total benthic invertebrates	752	376	406	1540	731	969	928	4217	1612	434	507	4866
Density by taxon (as number of Families per station)	8	1	5	6	6	4	8	17	12	4	8	12

APPENDIX L

Final Contours Design Drawing





LEGEND

- EXISTING CONTOURS
- STREAM
- INTERMEDIATE STREAM
- EXISTING TRAIL
- EXISTING TREE LINE
- ROCK OUTCROP
- EXISTING DITCH
- BOG
- LIMIT OF CUTBACK TO TREE LINE
- FENCE
- SITE BOUNDARY
- LIMIT OF WASTE DISPOSAL
- 368 FINAL CONTOUR
- PAVED ACCESS ROAD
- GRANULAR PERIMETER/ ACCESS ROAD
- CULVERT
- DITCH/CHANNEL
- PROPOSED FACILITIES
- POTENTIAL FUTURE FACILITIES
- GROUNDWATER MONITORING LOCATION
- GAS MONITORING PROBE

REV.	DATE	POSITIONS/ISSUES/APPROVALS	APP'D

Fenco MacLaren
Member of the MacLaren Group

CLIENT
TOWN OF KENORA

PROJECT
KENORA AREA WASTE MANAGEMENT MASTER PLAN
PROPOSED KENORA AREA LANDFILL

TITLE
FINAL CONTOURS

DESIGNED BY:	T. TAYLOR	DATE:	FEBRUARY 1997
DRAWN BY:	D. McKENZIE	SCALE:	1 : 1500
CHECKED BY:	T. TAYLOR	FILE NAME:	KEN-FCON.DWG
PROJECT NUMBER:	015926	DRAWING NUMBER:	S1-2

APPENDIX M

Borehole Logs

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/12 - 96/2/14 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.9 m;
HQ Coring to 16.9 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-1/17

Piezometers: MW-1/17

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.57 m						
5 1		GRAVELLY SILTY SAND - grey-rust mottled, becoming grey below 2.3 m - with cobbles and some boulders - locally TILL-LIKE - wet below 0.8 m - generally compact; locally dilatant, becoming more dense with depth			1		SS	14
					2		SS	7
10 3					3		SS	41/23cm
				Holeplug and Cave	4		SS	55/15cm
15 5					5		SS	67
					6		SS	102
20 6					7		SS	100/25cm
		- auger refusal at 5.9 m; changed to HQ coring			1		RX	
25 8					2		RX	
30 9					3		RX	
35 11					4		RX	
40 12		- becomes very sandy, less till-like below 12.2 m			5		RX	
45 14					6		RX	
50 15 16				Cave	7		RX	

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-1/17

Continuation Sheet

Sheet 2 of 2

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
55 17	333.7 16.9	End of Borehole @ 16.9 m						
60 18								
19								
65 20								
21								
70 22								
75 23								
24								
80 25								
85 26								
27								
90 28								
95 29								
30								
100 31								
105 32								
33								
110 34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/30 - 96/1/30 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 9.6 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-2/10

Piezometers: MW-2/9

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Ground Surface Elevation: 350.33 m

Scale (ft.)	Scale (m)	Elev. (m GSD) / Depth (m)	Description	Monitor Details	Sample No.	Sample Type	Vapour Conc.
			PEAT/ORGANICS - frozen to 0.6 m, wet below - dark brown to black		1	GRAB	
					2	SS	1
		347.2 3.1	CLAYEY SILT - bluish grey - very soft - increasing silt content with depth, becoming SILT, SOME CLAY below 5.5 m - wet	Holeplug	3	SS	push
					4	SS	push
					5	SS	push
					6	SS	2
		344.0 6.3	SAND - trace to some silt - grey - generally fine to medium, locally medium to coarse - wet		7	SS	3
					8	SS	6
					9	SS	2
		341.7 8.6	SILT-SAND TILL - grey - gravelly - compact; wet	Cave			
		340.7 9.6	End of Borehole @ 9.6 m		10	SS	24

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/7 - 96/2/7 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 11.4 m;
HQ Coring to 13.3 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No. BH-2/13

Piezometers MW-2/13

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.11 m						
		See Borehole BH-2/10 for Geology Above 10.7 m		Holeplug				
				Cave				
	339.4 10.7	SILT-SAND TILL - grey - with coarse sand and fine gravel - dense to very dense - wet		Holeplug	1A		SS	50/15cm
	338.7 11.4	BEDROCK - granodiorite - RQD = 100%		Silica Sand	1		RX	
	336.7 13.4	End of Borehole @ 13.4 m			2		RX	

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/27 - 96/1/27 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 10.7 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Threaded PVC, #10 Slot with Geosock

Borehole No.: BH-3/11

Piezometers: MW-3/8

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.63 m						
	350.2 / 0.5	PEAT/ORGANICS - black						
		SAND TILL - some silt to silty, some gravel to gravelly - brown, becoming grey below 1.5 m - evidence of roots to 2.7 m - wet - generally compact		Holeplug	1		SS	11
					2		SS	15
					3		SS	14
					4		SS	19
				Cave	5		SS	9
					6		SS	18
					7		SS	30
				Geosock on Screen	8		SS	20
		- augering continued to 10.7 m, however, due to bouldery conditions and flowing sands, samples were not recovered below 8 m.			9		SS	47
				Cave				
	340.0 / 10.7	End of Borehole @ 10.7 m						

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/26 - 96/1/26 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-4/6

Piezometers: MW-4/6

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.75 m						
		PEAT/ORGANICS - black, wet			1		SS	push
					2		SS	push
	348.5 2.3	CLAYEY SILT - green-brown to grey-brown - with trace, very thin silty fine sand layers - soft to very soft - wet		Holeplug	3		SS	5
					4		SS	5
					5		SS	push
	346.2 4.6	SAND TILL - some silt, some gravel and cobbles - grey - loose - wet		Silica Sand and Cave	6		SS	11
	345.0 5.8				7		SS	11
		End of Borehole @ 5.8 m						

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/9 - 96/2/9 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.8 m;
HQ Coring to 18.3 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-4/18

Piezometers: MW-4/18

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (With date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.56 m						
5 1 / 10 3 / 15 5		See Borehole Log BH-4/6 for Descriptions to 5.8 m		Holeplug				
20 6	344.8 / 5.8	SAND to SILTY SAND TILL - with cobbles, some boulders - grey to greenish grey			1		RX	
25 8					2		RX	
30 9 / 35 11					3		RX	
40 12 / 45 14				Cave	4		RX	
					5		RX	
50 15 / 16					6		RX	

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-4/18

Continuation Sheet

Sheet 2 of 2

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Sample Plot	Sample Type	Vapour Conc.
55 17								
60 18	332.3							
	18.3	End of Borehole @ 18.3 m		Cave	7		RX	
65 19								
70 20								
75 21								
80 22								
85 23								
90 24								
95 25								
100 26								
105 27								
110 28								
29								
30								
31								
32								
33								
34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/23 - 96/1/25 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 6.6 m;
HQ Coring to 17.5 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-5/17

Piezometers: MW-5/17

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 369.35 m						
5 1		SAND TILL - some silt to silty - with gravel and cobbles - grey-brown - dry to damp - loose to crumbly texture		Holeplug	1		GRAB	
					2		SS	32
10 3					3		SS	7/15cm
					4		SS	31
15 5					5		SS	25
					6		SS	21
20 6					7		SS	4/10cm
				Silica Sand	8		SS	5/13cm
25 8		- auger refusal at 6.6 m; continued with HQ coring			1		RX	
					2		RX	
30 9					3		RX	
35 11					4		RX	
40 12					5		RX	
45 14				Cave	6		RX	
50 15 16					7		RX	

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-5/17

Continuation Sheet

Sheet 2 of 2

Scale (ft.)	(m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Sample Plot	Sample Type	Vapour Conc.
55	17	352.7 / 16.6	probable BEDROCK - granodiorite - RQD = 63%		Cave	8		RX	
60	18	351.9 / 17.5	End of Borehole @ 17.5 m						
65	19								
70	20								
75	21								
80	22								
85	23								
90	24								
95	25								
100	26								
105	27								
110	28								
	29								
	30								
	31								
	32								
	33								
	34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/25 - 96/1/25 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 5.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Threaded PVC, #10 Slot with Geosock

Borehole No.: BH-6/6

Piezometers: MW-6/5

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.34 m					
5 / 1		SILTY SAND TILL (weathered) - sand is fine to medium grained - locally with thin sand or silt laminae - grey to brown, with rust discolouration to 1.5 m - root traces noted to 1.9 m - wet - loose to compact		Holeplug	1	SS	11
					2	SS	14
					3	SS	24
10 / 3	347.3 3.1	SILTY SAND TILL - with some thin sand laminae - some gravel to gravelly - grey - wet		Cave	4	SS	34
15 / 5				Geosock on Screen	5	SS	38/23cm
20 / 6	344.6 5.8	End of Borehole @ 5.8 m			6	SS	105
25 / 8							
30 / 9							
35 / 11							
40 / 12							
45 / 14							
50 / 15							
	16						

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/5 - 96/2/5 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 4.6 m;
HQ Coring to 14.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-6/15

Piezometers: MW-6/14

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log / Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 349.96 m						
		See Borehole Log BH-6/6 for Descriptions to 4.6 m		Holeplug and Cave				
	345.4 4.6	SILTY SAND TILL - some gravel to gravelly - some cobbles with depth - grey - wet		Cave	1 2 3 4 5 6 7		RX RX RX RX RX RX RX	
	335.2 14.8	End of Borehole @ 14.8 m						

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/26 - 96/1/26 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 4.4 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Threaded PVC, #10 Slot with Geosock

Borehole No.: BH-7/4

Piezometers: MW-7/4

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.)	(m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Sample Type	Vapour Conc.
			Ground Surface Elevation: 349.47 m					
		349.0 / 0.5	PEAT/ORGANICS - black			1	GRAB	
5	1		CLAYEY SILT - with organics - soft					
		347.8 / 1.7	- wet		Holeplug	2	SS	20
	2		SILTY SAND and GRAVEL (TILL-LIKE) - grey-brown - loose to compact			3	SS	20
10	3		- wet		Cave	4	SS	17
	4				Geosock on Screen	5	SS	3/23cm
15		345.1 / 4.4	End of Borehole @ 4.4 m					
	5							
20	6							
	7							
25	8							
30	9							
	10							
35	11							
	12							
40	13							
45	14							
	15							
50	16							

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/14 - 96/2/15 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 13.8 m; HQ Coring to 21.6 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-8/22

Piezometers: MW-8/22

Sheet 1 of 2

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 358.96 m						
5 1		SAND to SILTY SAND TILL - some gravel to gravelly - brown, becoming grey below 1.2 m - compact to very compact - damp to moist, wet below 10.7 m - with numerous thin (<3 cm) sand lenses throughout			1		SS	78
					2		SS	54
					3		SS	70
10 3					4		SS	90/23cm
					5		SS	60/15cm
15 5				Holeplug	6		SS	80
					7		SS	57
20 6					8		SS	110/25cm
					9		SS	75
25 8					10		SS	50/15cm
					11		SS	70/15cm
30 9					12		SS	100/8cm
10					13		SS	135/23cm
35 11					14		SS	105/18cm
40 12					15		SS	110/23cm
13								
45 14		- possible thick sand and gravel lens at approximately 13.7 m - soils too loose to continue with solid stem augers below 13.8 m; continued with HQ coring		Cave	1		RX	
50 15								
16								

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-8/22

Continuation Sheet

Sheet 2 of 2

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
55 17 60 18 19 65 20 21 70 22 75 23 24 80 25 85 26 27 90 28 95 29 30 100 31 105 32 33 110 34	337.3 21.6	End of Borehole @ 21.6 m		Cave				

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/15 - 96/2/15 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 1.5 m; HQ Coring to 5.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-9/6

Piezometers: MW-9/6

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log / Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 352.98 m						
		Primarily SILT TILL, with numerous interbeds of silt and sand - grey - dry			1		SS	18/15cm
	351.5 1.5				2		SS	70/23cm
		BEDROCK - granodiorite - RQD = 94% - subvertical fracturing noted		Holeplug	1		RX	
					2		RX	
					3		RX	
					4		RX	
					5		RX	
				Silica Sand	6		RX	
	347.2 5.8	End of Borehole @ 5.8 m			7		RX	

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/16 - 96/2/16 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.2 m;
HQ Coring to 16.6 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-10/17

Piezometers: MW-10/17

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 361.83 m						
5 1		SILTY SAND to SANDY SILT TILL - some gravel to gravelly, some cobbles and boulders - brown to grey - compact to dense - damp to moist			1		SS	47
					2		SS	42
10 3					3		SS	85
					4		SS	80/23cm
15 5					5		SS	90/23cm
					6		SS	80/15cm
20 6		- auger refusal at 5.2 m; continued with HQ coring			1		RX	
					2		RX	
25 8				Holeplug and Cave				
30 9					3		RX	
35 11					4		RX	
40 12								
45 14					5		RX	
50 15				Cave	6		RX	
	16							

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-10/17

Continuation Sheet

Sheet 2 of 2

Scale (ft.)	(m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
55	17	345.2 / 16.6	End of Borehole @ 16.6 m						
60	18								
	19								
65	20								
	21								
70	22								
75	23								
	24								
80	25								
85	26								
	27								
90	28								
95	29								
	30								
100	31								
105	32								
	33								
110	34								

Borehole Record

Fenco MacLaren

97/2/19

APPENDIX N

Geotech Reports

Submitted to: **City of Kenora**

IN-SITU SHEAR STRENGTH TESTING

JONES ROAD LANDFILL SITE
KENORA, ONTARIO

JULY 2020

FILE NO.: 20-415-01

ENG-TECH CONSULTING LIMITED

"Engineering and Testing Solutions That Work for You"

420 Turenne Street
Winnipeg, Manitoba
Canada
R2J 3W8

1999 20 2019
YEARS OF EXCELLENCE

Phone: (204) 233-1694
Facsimile: (204) 235-1579
e-mail: engtech@mymts.net
www.eng-tech.ca

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION

ENG-TECH Consulting Limited (ENG-TECH) completed the in-situ shear strength testing of the soils at the Jones Road Landfill Site. The purpose of the testing was to determine the in-situ shear strengths of the soil in order to verify that values obtained were as recommended in previous reports.

The Jones Road landfill Site is located on the north side of Highway 671 (i.e., Jones Road) approximately 22 km northwest of the City of Kenora. The Site is located within part of Lots 1 and 2 of Concession I, and part of Lots 1 and 2 of Concession II, in the Townships of Pettypiece and Jackman, of the District of Kenora.

1.1 Scope of Work

ENG-TECH completed the following scope of work:

- Reviewed existing information related to the project.
- Drilled two (2) test holes at locations selected by the City of Kenora and completed vane shear strength tests at select depths.
- Collected soil samples at selected depths and compared these samples with existing information.
- Completed a laboratory testing program on select soil samples consisting of moisture contents, Atterberg limits and particle size analysis.
- Prepared a report on the summarizing the results of the field program and providing conclusions and recommendations.

1.2 Background Information

ENG-TECH has conducted several investigations at the Site. The following were previously completed:

Previous Reports

Date of Report	Name
2014-AUG-08	In-Situ Shear Strength Testing and Piezometer Installation, City of Kenora ENG-TECH File No. 14-415-01
2009-AUG-19	In-Situ Shear Strength Testing, City of Kenora ENG-TECH File No. 09-415-01
2001-JAN	Geotechnical Investigation, Wardrop Engineering Inc. ENG-TECH File No. 00-071-03

2.0 FIELD PROGRAM AND LABORATORY TESTING

ENG-TECH supervised the drilling of two (2) test holes at the Site on June 12, 2020. The drilling was conducted by Maple Leaf Drilling Ltd. using an Acker MP5 track-mounted drill rig using 125-mm solid stem augers. The test holes (TH1 and TH2) were drilled to depths of 12.2 and 10.7 metres below grade (mbg), respectively. Both of the test holes were backfilled with auger cuttings and bentonite.

The soil stratigraphy was visually classified at the time of drilling using the modified Unified Soil Classification System (USCS). Soil samples were collected off the auger flights at regular depths during drilling. All soil samples collected were retained for testing in ENG-TECH's Winnipeg laboratory.

Moisture contents were determined on all collected soil samples (6), with two (2) Atterberg limits and one (1) hydrometer test completed on select samples. Five (5) shear vane tests were conducted at various depths in the clay and peat. The analytical results are presented on the test hole summary logs in Appendix B. Photographs taken during the field program are presented in Appendix A.

3.0 DISCUSSION

3.1 Stratigraphy

The stratigraphy at the site consisted of waste fill, sand fill, peat, clay and clay till to the depths explored. The following table summarizes the stratigraphy based on the two test holes from the current investigation:

Stratigraphy

Depth Range (m)	Description
0.0 – 0.3	Sand Fill, medium brown, moist, medium dense
0.4 – 3.4	Waste Fill, dark grey/black, saturated, loose, some sand, wood pieces, nuisance odour
3.4 – 5.5	Sand/Wood Fill, saturated, loose, trace silt/clay
5.5 – 7.2	Peat (Category 5), dark brown, moist, predominantly amorphous granular, containing non-woody fine fibres, held in a woody, fine-fibrous framework
7.2 – 9.8	Clay, light grey, moist, very soft, highly plastic, with silt, trace sand
9.8 – 12.2	Clay Till, medium grey, wet, dense, low plastic, with sand, with silt, trace gravel

The depths to the various stratigraphic layers were shallower to the north (TH2) when compared to the south (TH1). Seepage was observed from the waste fill layer; groundwater levels were at depths ranging from 0.9 to 1.8 mbg immediately after the completion of drilling.

The stratigraphic details are presented on the test hole summary logs in Appendix B.

3.2 In-Situ Shear Strength Testing

The in-situ undrained shear strength was measured in the field by conducting vane shear tests with a trapezoidal vane with dimensions of 63.5 mm x 114.3 mm (2½" x 4½"). Results of the in-situ vane shear tests on the clay soil ranged from 22 to 50 ft-lb (29.8 to 67.8 N-m) for initial shear strength and 10 to 20 ft-lb (13.6 to 27.1 N-m) for rebound shear strength.

The plasticity index of the silty clay ranged from 34% to 60%. Using the higher of the two values (i.e., 60%), the shear strength values were corrected using Bjerrum's corresponding correction factor (μ) of 0.75. The resulting corrected values for undrained shear strength [$(S_u)_{fv}$] ranged from 24 to 56 kPa and 11 to 22 kPa for rebound shear strength [$(S_{ur})_{fv}$].

4.0 CONCULSIONS AND RECOMMENDATIONS

The in-situ shear strength values are greater than the minimum recommended value of 5.5 kPa by R. Kerry Rowe Inc. in their report *Kenora Landfill*, dated February 21, 1997. Based on the soil stratigraphy and shear strength values obtained on site, ENG-TECH concluded that the results comply with the values as stated in our previous reports. Therefore, ENG-TECH supports the loading as recommended by R. Kerry Rowe Inc. in Stage 14 of the Jones Road Landfill Development Plan.

5.0 THIRD PARTY USE AND STATEMENT OF LIMITATIONS

This report has been prepared for the City of Kenora and any use a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third party. ENG-TECH accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

The findings and recommendations presented in this report were based on the scope of work outlined for the purpose of the geotechnical investigation and were prepared in accordance with generally accepted principles and practices. The findings and recommendations are based on the results of field and laboratory investigations, combined with the soil and groundwater conditions encountered. Other materials or compounds not investigated or addressed or beyond the scope of work could be present at the Site. If conditions encountered during construction appear to be different from that reported by ENG-TECH or if the assumptions stated herein are not in keeping with the design, this office should be notified in order that the recommendations can be reviewed and modified if necessary.

6.0 CLOSURE

This report was based on the scope of work outlined for the purpose of the investigation, and was prepared in accordance with acceptable professional engineering principles and practices. If you have any questions, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

Walter Holowka, C.E.T., NCSO
Senior Geoenvironmental Technologist

Clark Hryhoruk, M.Sc., P. Eng.
Principal

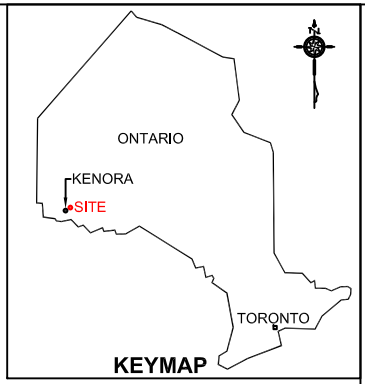
CDH/wgh

Professional Engineers Ontario
Certificate of Authorization
ENG-TECH Consulting Limited
No. 100036802

LICENSED PROFESSIONAL ENGINEER
C. D. HRYHORUK
July 9/20
PROVINCE OF ONTARIO

1999 20 2019
YEARS OF EXCELLENCE

FIGURES



LEGEND

NO.	DATE	ISSUE / REVISION
0	JUL 2020	REPORT

ENG-TECH CONSULTING LIMITED
420 Turenne Street
Winnipeg, MB
R2J 3W8
Phone: (204) 233-1694
Fax: (204) 235-1579

ENG. STAMP:

Professional Engineers Ontario
Certificate of Authorization
ENG-TECH Consulting Limited
No. 10036802

CLIENT:
CITY OF KENORA

PROJECT:
INSITU SHEAR STRENGTH TESTING
JONES ROAD LANDFILL
NORTHEAST OF KENORA, ONTARIO

DWG DESCRIPTION:
SITE LOCATION PLAN

SCALE:
1:100,000

DRAWN BY:	DATE:
WGH	JULY 2020

FILE No.:	CLIENT DWG/FIG. No.:
20-415-01	

ENG-TECH DWG/FIG. No.:	NO.:
1	0

P:\2020\415(City of Kenora)\01(Kenora Landfill – Jones Rd)\Report\Figures\20-415-01 Figure 1 Site Location.dwg

GPS COORDINATES OF TEST HOLES		
TEST HOLE	COORDINATE DATUM: WSG84	
	UTM	15U
TH1	5521292	412688
TH2	5521365	412628

0 50m 100m 150m 200m 400m 600m

SCALE

P:\2020\415(City of Kenora)\01(Kenora Landfill – Jones Rd)\Report\Figures\20-415-01 Figure 2 Site Plan.dwg

LEGEND

TH1 — TEST HOLE

GM1 — GROUNDWATER MONITORING WELL (PREVIOUSLY INSTALLED)

1 — PHOTOGRAPH DIRECTION AND NUMBER

NO.	DATE	ISSUE / REVISION
0	JUL 2020	REPORT

ENG-TECH CONSULTING LIMITED
420 Turenne Street
Winnipeg, MB
R2J 3W8
Phone: (204) 233-1694
Fax: (204) 235-1579

ENG. STAMP:

Professional Engineers Ontario
Certificate of Authorization
ENG-TECH Consulting Limited
No. 10036802

CLIENT:
CITY OF KENORA

PROJECT:
INSITU SHEAR STRENGTH TESTING
JONES ROAD LANDFILL
NORTHEAST OF KENORA, ONTARIO

DWG DESCRIPTION:
TEST HOLE LOCATIONS

SCALE: 1:5,000

DRAWN BY: WGH

DATE: JULY 2020

FILE No.: 20-415-01

CLIENT DWG/FIG. No.:

ENG-TECH DWG/FIG. No.: 2

NO.: 0

APPENDICES

Appendix A – Site Photographs
Appendix B – Test Hole Logs

APPENDIX A

Site Photographs (4)

PHOTOGRAPH #1: View of the Site as seen facing west.

PHOTOGRAPH #2: View of TH1 during drilling with GM-3 on the left side of the photograph.

PHOTOGRAPH #3: Waste materials on the auger during the drilling on TH1.

PHOTOGRAPH #4: View of TH2 during drilling as seen facing south.

APPENDIX B

Test Hole Logs (2)

ENG-TECH CONSULTING LIMITED

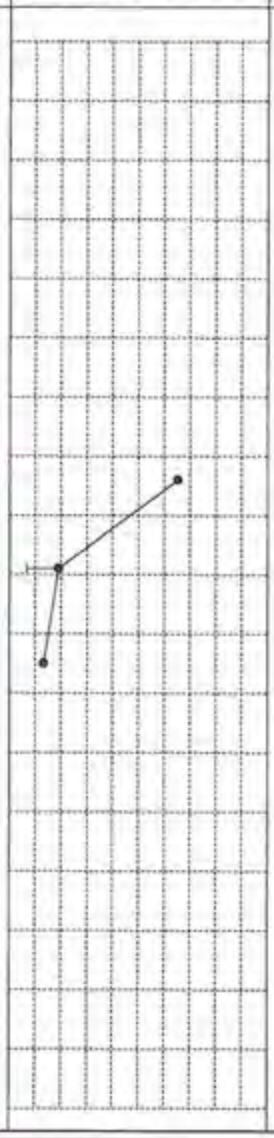
Engineering And Testing Solutions That Work For You

Test Hole #: TH1

Client: City of Kenora
Site: See Figure 1
Location: James Road Landfill, Kenora, ON
Project: Insitu Shear Strength Testing

File No.: 20-415-01
Date Drilled: June 12, 2020
Grade Elevation: 100.0 m
Water Elevation: -

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm	P. Pen	(Su)Fv / (Sur)Fv	Torvane
0.0	Ground Surface	100.0							
0.0 – 1.0	***Sand Fill (SP)*** - medium brown, moist, medium dense, poorly graded (fine), some gravel, trace silt.	100.0 – 99.0							
1.0 – 3.0	***Waste Fill*** - dark grey/black, saturated, loose, some sand, wood pieces, nuisance odour.	99.0 – 97.0							
3.0 – 6.0	***Sand and Wood Fill*** - dark grey, saturated, loose, trace silt, trace clay.	97.0 – 94.0							
6.0 – 8.0	***Peat (Category 5)*** - dark brown, moist, predominantly amorphous granular, containing non-woody fine fibres, held in a woody, fine-fibrous framework.	94.0 – 92.0	S1						
			S2		326.6				
8.0 – 11.0	***Clay (CH)*** - light grey, moist, very soft, high plastic, with silt, trace sand.	92.0 – 89.0	S3		95.6			24/22	15
			S4		66.6			56/22	15
11.0 – 12.2	***Clay Till (CL)*** - grey, wet, dense, low plastic, with sand, with silt, trace gravel.	89.0 – 87.8							
12.2	***End of Test Hole*** - test hole completed at 12.2 m below grade. - seepage and sloughing observed from waste fill layer. - water at 1.5 m, slough at 3.7 m immediately after drilling. - test hole backfilled with auger cuttings and bentonite upon completion of drilling.	87.8							



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Logged by: WGH
Reviewed by:

Drilled By: Maple Leaf Drilling Ltd.
Drill Rig: Acker MP5
Auger Size: 125 mm

Completion Depth: 12.2 m
Completion Elevation: 87.8 m
Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH2

Client: City of Kenora
Site: See Figure 1
Location: James Road Landfill, Kenora, ON
Project: Insitu Shear Strength Testing

File No.: 20-415-01
Date Drilled: June 12, 2020
Grade Elevation: 100.0 m
Water Elevation: -

Depth (m)	Description	Elevation (m)
0.0	Ground Surface	100.0
	Sand Fill (SP) - medium brown, moist, medium dense, poorly graded (fine), some gravel, trace silt.	
1.0		99.0
2.0	***Waste Fill*** - dark grey/black, saturated, loose, some sand, wood pieces, nuisance odour.	98.0
3.0		97.0
4.0	***Sand and Wood Fill*** - dark grey, saturated, loose, trace silt, trace clay.	96.0
5.0		95.0
6.0	***Peat (Category 5)*** - dark brown, moist, predominantly amorphous granular, containing non-woody fine fibres, held in a woody, fine-fibrous framework.	94.0
7.0		93.0
8.0	***Clay (CH)*** - light grey, moist, very soft, high plastic, with silt, trace sand.	92.0
9.0		91.0
10.0	***Clay Till (CL)*** - grey, wet, dense, low plastic, with sand, with silt, trace gravel.	90.0
11.0	***End of Test Hole*** - test hole completed at 10.7 m below grade. - seepage and sloughing observed from waste fill layer. - water at 0.9 m, slough at 1.2 m immediately after drilling. - test hole backfilled with auger cuttings and bentonite upon completion of drilling.	89.0
12.0		88.0
13.0		87.0
14.0		86.0
15.0		85.0
16.0		84.0
17.0		83.0
18.0		82.0

SAMPLE DATA

Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
S1		350.9	
S2		56.2	
S3		14.4	

Moisture Content (%)
PL I--------X--------I LL
50 150 250 350 450

SHEAR STRENGTH (kPa)

P. Pen	(Su)Fv / (Sur)Fv	Torvane
	28/11	20

{\rtf1\ansi\deff0\deftab254{\fonttbl

Logged by: WGH
Reviewed by: JJT

Drilled By: Maple Leaf Drilling Ltd.
Drill Rig: Acker MP5
Auger Size: 125 mm

Completion Depth: 12.2 m
Completion Elevation: 87.8 m
Sheet: 1 of 1

ENG-TECH
CONSULTING LIMITED

420 Turenne Street, Winnipeg, Manitoba R2J 3W8
Phone: (204) 233-1694 Fax: (204) 235-1579
E-mail: engtech@mymts.net
www.eng-tech.ca

June 15, 2021,

File No. 20-415-01

City of Kenora
60 14th Street
Kenora, Ontario
P9N 4A9

Attention: Mukesh Pokharel, P.Eng,

RE: Jones Road Landfill, Kenora Ontario

ENG-TECH Consulting Limited (ENG-TECH) is following up on your request to review the piezometric data and interpret if the landfill loading is complying with the insitu shear strengths that was determined in the ENG-TECH July 2020 report.

Attached are two drawings that summarize the eight (8) piezometer readings for the monitoring program. It is understood that the final stage of loading of the landfill (stage 14) is underway.

Based on the fact that groundwater levels have not significantly changed for all of the piezometers over the history of loading of the landfill it can be concluded that pore water pressure has remained stable. As such, the insitu shear strength values that were measured are unchanged. ENG-TECH's recommendation is still valid that the in-situ shear strength values are greater than the minimum recommended value of 5.5 kPa by R. Kerry Rowe Inc. in their report *Kenora Landfill*, dated February 21, 1997.

If you have any questions or require additional information, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

Clark Hryhoruk, M.Sc., P. Eng.
President, Geotechnical Engineer

LICENSED PROFESSIONAL ENGINEER
C. D. HRYHORUK
June 15/21
PROVINCE OF ONTARIO

CDH/cdh

Attachments:

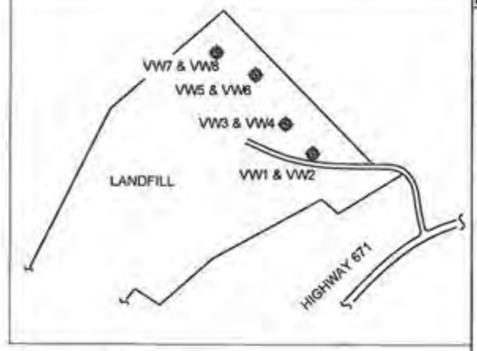
Figure 1 of 2 Piezometer Data (VW1 to VW4)
Figure 2 of 2 Piezometer Data (VW5 to VW8)

ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW1	95.5	October 1, 2014	2.17	97.83	2.27	97.73
		November 18, 2014	-3.98	103.98	-3.84	103.84
		January 20, 2015	-3.98	103.98	-3.82	103.82
		June 2, 2020	1.86	96.14	1.95	98.05
		June 3, 2020	1.86	98.14	1.95	98.05
		July 7, 2020	1.76	98.24	1.85	98.15
		August 5, 2020	1.86	98.16	1.94	98.06
		September 11, 2020	1.76	98.26	1.84	98.16
		October 13, 2020	1.99	98.01	2.08	97.92
		November 3, 2020	2.03	97.97	2.12	97.88
		December 3, 2020	1.98	98.02	2.07	97.93
		January 8, 2021	1.82	98.18	1.91	98.09
		February 18, 2021	1.85	98.16	1.94	98.06
		April 6, 2021	1.94	98.06	2.03	97.97
		May 4,2021	1.85	98.15	1.94	98.06

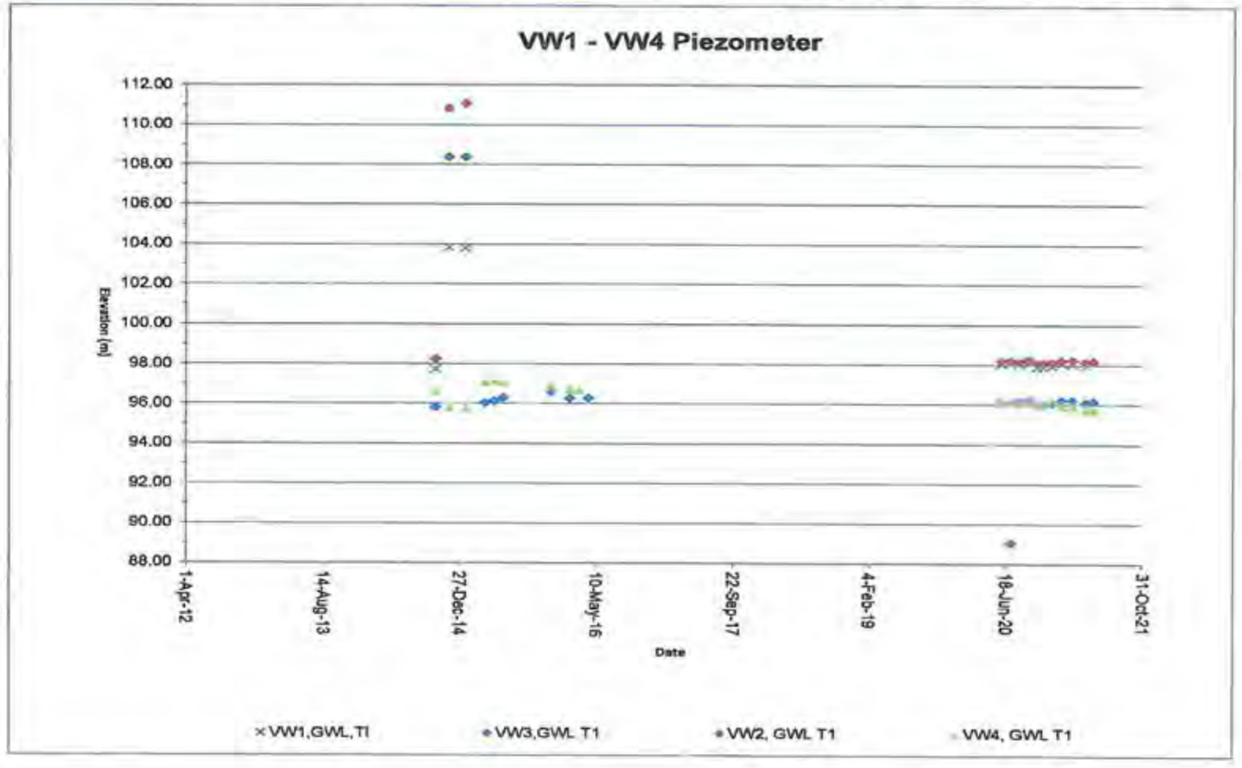
ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW2	97.3	October 1, 2014	1.67	99.33	1.77	99.23
		November 18, 2014	-10.98	110.98	-10.84	110.84
		January 20, 2015	-11.22	111.22	-11.08	111.08
		June 2, 2020	1.70	99.30	1.82	99.18
		June 3, 2020	1.70	99.30	1.81	99.19
		July 7, 2020	1.67	99.33	1.78	99.22
		August 5, 2020	1.74	99.26	1.84	99.16
		September 11, 2020	1.82	99.38	1.73	99.27
		October 13, 2020	1.79	99.21	1.90	99.10
		October 13, 2020	1.81	99.19	1.91	99.09
		November 3, 2020	1.81	99.19	1.91	99.09
		December 3, 2020	1.76	99.24	1.87	99.13
		January 8, 2021	1.67	99.33	1.78	99.22
		February 18, 2021	1.64	99.36	1.75	99.25
		April 6, 2021	1.72	99.28	1.84	99.16
		May 4, 2021	1.71	99.29	1.82	99.18

ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW3	92.5	October 1, 2014	4.01	95.99	4.16	95.84
		November 18, 2014	-8.57	108.57	-8.39	108.39
		January 20, 2015	-8.57	108.57	-8.39	108.39
		March 31, 2015	3.82	96.18	3.97	96.03
		May 6, 2015	3.73	96.27	3.88	96.12
		June 6, 2015	3.55	96.45	3.69	96.31
		November 27, 2015	3.26	96.74	3.41	96.59
		February 3, 2016	3.57	96.43	3.72	96.28
		April 10, 2016	3.56	96.44	3.72	96.28
		June 2, 2020	3.73	96.27	3.88	96.12
		June 3, 2020	3.73	96.27	3.87	96.13
		July 7, 2020	10.79	89.21	10.93	89.07
		August 5, 2020	3.68	96.32	3.82	96.18
		September 11, 2020	3.59	96.41	3.74	96.26
		October 13, 2020	3.79	96.21	3.93	96.07
		November 3, 2020	3.83	96.17	3.97	96.03
		December 3, 2020	3.78	96.22	3.93	96.07
		January 8, 2021	3.63	96.37	3.77	96.23
		February 18, 2021	3.65	96.35	3.79	96.21
		April 6, 2021	3.76	96.24	3.90	96.10
		May 4, 2021	3.70	96.30	3.84	96.16

ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW4	95.5	October 1, 2014	2.84	97.16	3.33	96.67
		November 18, 2014	3.61	96.39	4.17	95.83
		January 20, 2015	3.70	96.30	4.26	95.74
		March 31, 2015	2.35	97.65	2.87	97.13
		May 6, 2015	2.30	97.70	2.83	97.17
		June 6, 2015	2.35	97.65	2.90	97.10
		November 27, 2015	2.54	97.46	3.09	96.91
		February 3, 2016	2.75	97.25	3.27	96.73
		March 10, 2016	2.79	97.21	3.29	96.71
		June 2, 2020	3.35	96.65	3.85	96.15
		June 3, 2020	3.35	96.65	3.87	96.13
		July 7, 2020	3.27	96.73	3.80	96.20
		August 5, 2020	3.34	96.66	3.86	96.14
		September 11, 2020	3.32	96.68	3.83	96.17
		October 13, 2020	3.39	96.61	3.88	96.11
		November 3, 2020	3.45	96.55	3.94	96.06
		December 3, 2020	3.22	96.78	3.73	96.27
		January 8, 2021	3.56	96.44	4.05	95.96
		February 18, 2021	3.55	96.45	4.05	95.95
		April 6, 2021	3.69	96.31	4.20	95.80
		May 4, 2021	3.73	96.27	4.24	95.76



SITE PLAN



LEGEND

VIBRATING WIRE PIEZOMETER

NOTES

- TWO VIBRATING WIRE PIEZOMETERS INSTALLED IN SAME BOREHOLE.
- ALL TEST HOLE GRADE ELEVATION ARE REFERENCED TO A LOCAL ELEVATION OF 100.0 m.

NO.	DATE	ISSUE / REVISION
0	JUN. 2021	report

ENG-TECH CONSULTING LIMITED
420 Turenne Street
Winnipeg, MB
R2J 3W8
Phone: (204) 233-1694
Fax: (204) 235-1579

ENG. STAMP:

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
ENG-TECH Consulting Limited
No.3475

CLIENT:
CITY OF KENORA

PROJECT:
VW ASSESSMENT
JONES ROAD LANDFILL
KENORA, ONTARIO

DWG DESCRIPTION:
PIEZOMETER DATA (VW 1 TO VW 4)

SCALE:
N/A

DRAWN BY:	DATE:
TDR	JUNE 2021
FILE No.: 20-415-01	CLIENT DWG/FIG. No.:
ENG-TECH DWG/FIG. No.: 1 OF 2	REV.:

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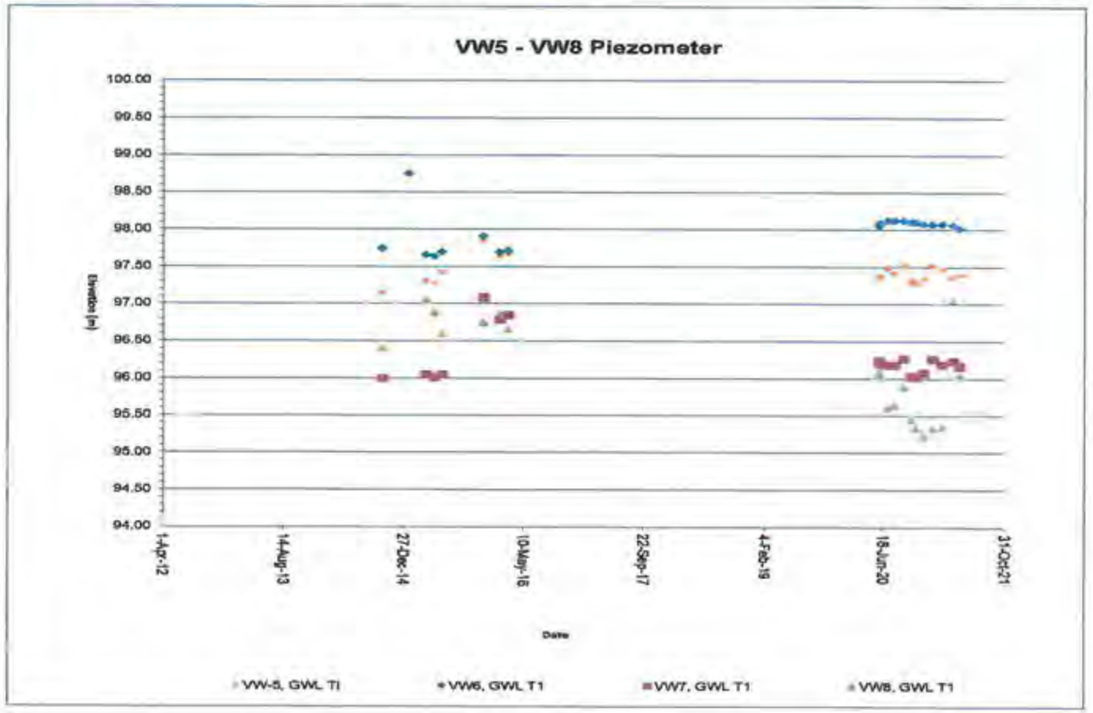
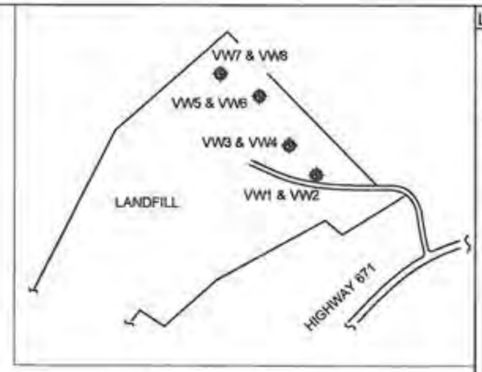
ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW5	91.0	October 1, 2014	2.60	97.40	2.85	97.16
		January 20, 2015	14.31	85.69	14.51	85.49
		March 31, 2015	2.45	97.55	2.69	97.31
		May 6, 2015	2.48	97.52	2.72	97.28
		June 8, 2015	2.33	97.67	2.57	97.43
		November 27, 2015	1.90	98.10	2.14	97.86
		February 3, 2016	2.11	97.89	2.35	97.65
		March 10, 2016	2.09	97.91	2.33	97.67
		June 2, 2020	2.40	97.60	2.64	97.36
		June 3, 2020	2.41	97.59	2.61	97.39
		June 2, 2020	2.40	97.60	2.60	97.40
		July 7, 2020	2.32	97.68	2.52	97.48
		August 5, 2020	2.38	97.62	2.58	97.42
		September 11, 2020	2.27	97.73	2.48	97.52
		October 13, 2020	2.47	97.53	2.68	97.32
		November 3, 2020	2.52	97.48	2.72	97.28
		December 3, 2020	2.45	97.55	2.65	97.35
		January 8, 2021	2.28	97.72	2.48	97.52
		February 18, 2021	2.32	97.68	2.53	97.47
		April 6, 2021	2.45	97.55	2.65	97.35
		May 4, 2021	2.40	97.60	2.60	97.40

ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW6	93.1	October 1, 2014	2.00	97.94	2.25	97.75
		January 20, 2015	1.13	98.87	1.25	98.75
		March 31, 2015	2.16	97.84	2.34	97.66
		May 6, 2015	2.17	97.83	2.36	97.64
		June 8, 2015	2.11	97.89	2.30	97.70
		November 27, 2015	1.90	98.10	2.09	97.91
		February 3, 2016	2.11	97.89	2.30	97.70
		March 10, 2016	2.10	97.90	2.28	97.72
		June 2, 2020	1.77	98.23	1.95	98.05
		June 3, 2020	1.77	98.23	1.91	98.09
		July 7, 2020	1.73	98.27	1.87	98.13
		August 5, 2020	1.73	98.27	1.87	98.13
		September 11, 2020	1.73	98.27	1.88	98.12
		October 13, 2020	1.75	98.25	1.90	98.10
		November 3, 2020	1.75	98.25	1.90	98.10
		December 3, 2020	1.78	98.22	1.92	98.08
		January 8, 2021	1.78	98.22	1.93	98.07
		February 18, 2021	1.78	98.22	1.92	98.08
		April 6, 2021	1.79	98.21	1.93	98.07
		May 4, 2021	1.84	98.16	1.99	98.01

ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW7	89.9	October 1, 2014	3.82	86.18	4.00	85.90
		November 18, 2014	9.36	80.64	9.49	80.51
		January 20, 2015	9.33	80.67	9.45	80.56
		March 31, 2015	3.77	86.23	3.95	86.05
		May 6, 2015	3.81	86.19	3.98	86.02
		June 8, 2015	3.78	86.22	3.96	86.06
		November 27, 2015	2.73	87.27	2.91	87.09
		February 3, 2016	3.03	86.97	3.21	86.79
		March 10, 2016	2.97	87.03	3.15	86.85
		June 2, 2020	3.58	86.42	3.76	86.24
		June 3, 2020	3.63	86.37	3.80	86.20
		June 2, 2020	3.58	86.42	3.76	86.26
		July 7, 2020	3.64	86.36	3.81	86.19
		August 5, 2020	3.64	86.36	3.81	86.19
		September 11, 2020	3.56	86.44	3.73	86.27
		October 13, 2020	3.78	86.21	3.96	86.04
		November 3, 2020	3.81	86.19	3.98	86.02
		December 3, 2020	3.75	86.25	3.92	86.08
		January 8, 2021	3.56	86.44	3.73	86.27
		February 18, 2021	3.64	86.36	3.81	86.19
		April 6, 2021	3.59	86.41	3.76	86.24
		May 4, 2021	3.66	86.34	3.84	86.16

ID	Installation Elevation (m)	Date (mm/dd/yyyy) & Time	Using ABC Factors		Using TI Factors	
			Depth of Water Below Grade (m)	Groundwater Elevation (m)	Depth of Water Below Grade (m)	Groundwater Elevation (m)
VW8	92.5	October 1, 2014	3.38	88.61	3.59	88.41
		November 18, 2014	16.05	83.95	16.18	83.82
		January 20, 2015	15.82	84.18	15.97	84.03
		March 31, 2015	2.75	97.25	2.94	97.06
		May 6, 2015	2.92	97.08	3.11	96.89
		June 8, 2015	3.19	96.81	3.40	96.60
		November 27, 2015	3.04	96.96	3.25	96.75
		February 3, 2016	2.97	97.03	3.13	96.87
		March 10, 2016	3.17	96.83	3.34	96.66
		June 2, 2020	3.74	96.26	3.90	96.10
		June 2, 2020	3.74	96.26	3.95	96.05
		July 7, 2020	4.19	95.82	4.39	95.61
		August 5, 2020	4.15	95.85	4.35	95.65
		September 11, 2020	3.90	96.10	4.11	95.89
		October 13, 2020	4.36	95.64	4.56	95.44
		November 3, 2020	4.47	95.53	4.66	95.34
		December 3, 2020	4.57	95.43	4.77	95.23
		January 8, 2021	4.48	95.52	4.67	95.33
		February 18, 2021	4.46	95.54	4.64	95.36
		April 6, 2021	3.75	97.25	3.94	97.06
		May 4, 2021	3.73	96.27	3.95	96.05





SITE PLAN

LEGEND

VIBRATING WIRE PIEZOMETER

NOTES

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ENG-TECH Consulting Limited
420 Turenne Street
Winnipeg, MB
R2J 3W8
Phone: (204) 233-1694
Fax: (204) 235-1579

ENG. STAMP:

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
ENG-TECH Consulting Limited
No.2475

CLIENT:
CITY OF KENORA

PROJECT:
VW ASSESSMENT
JONES ROAD LANDFILL
KENORA, ONTARIO

DWG DESCRIPTION:
PIEZOMETER DATA (VW 5 TO VW 8)

SCALE:
N/A

DRAWN BY:	DATE:
TDR	JUNE 2021
FILE No.:	CLIENT DWG/FIG. No.:
20-415-01	
ENG-TECH DWG/FIG. No.:	REV:
2 OF 2	

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APPENDIX O

Sediment Sampling

2023 Grain Size Distribution

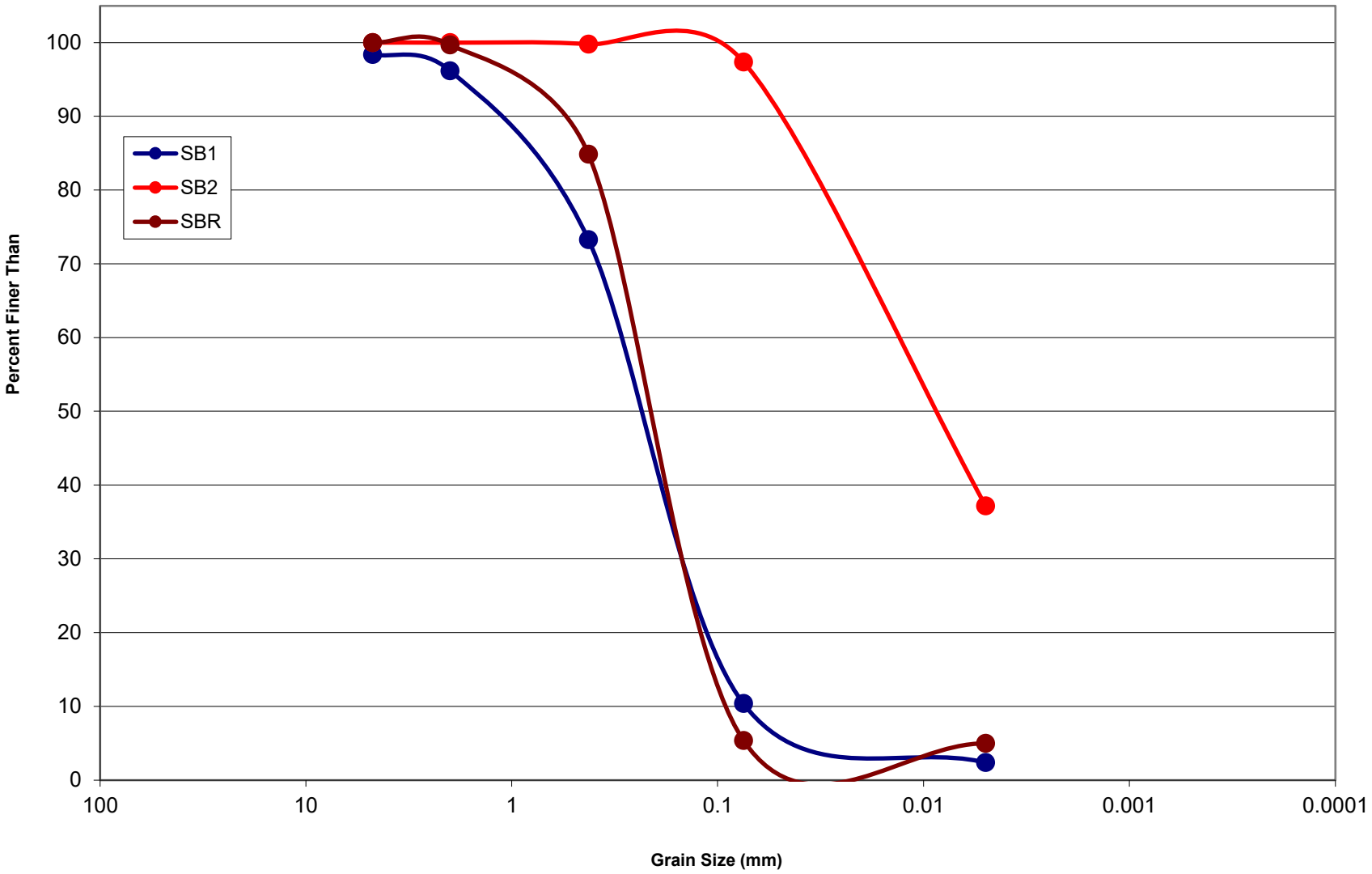

Table 7: Sediment Sampling Analysis

Parameter	Lowest Effect Level	Severe Effect Level	Units	Measured Concentration SB-1 24-Sep-01	30-Aug-03	23-Aug-04	2-Sep-05	30-Aug-06	15-Aug-07	20-Aug-08	18-Aug-09	22-Aug-10	25-Aug-11	29-Aug-23
Aluminum			ug/g	573	1710	3930	7500	800	970	1300	640	590	530	995
Ammonia	100		ug/g	1	**196**	**280**	69.9	< 25	25	< 25	< 25	<25	<25	1.9
Arsenic	6	33	ug/g	1.9	0.7	1.0	NA	< 1	<1	<1	< 1	<1	<1	0.59
Cadmium	0.6	10	ug/g	< 0.04	< 0.5	< 0.5	< 0.3	< 0.3	<0.3	<0.3	< 0.3	<0.3	<0.3	0.022
Chromium	26	110	ug/g	1.15	4	9	21	2.5	3.3	3.5	1.3	1.3	1.2	
Cobalt	50		ug/g	< 0.04	< 2	3	5.4	0.9	0.6	1.1	< 0.5	<0.5	<0.5	0.41
Copper	16	110	ug/g	< 0.04	2	7	**30**	2.6	2.2	2.5	1.8	0.7	0.8	1.07
Iron	2%	4%	%	0.07	0.26	0.47	1.10	0.15	0.16	0.2	0.11	0.8	0.065	0.11
Lead	31	250	ug/g	0.93	5	11	12	2	2	3	2	2	2	1.72
Manganese	460	1100	ug/g	6.75	59	62	110	17	13	21	13	10	10	14.2
Mercury	0.2	2	ug/g	< 0.04	<0.01	0.02	< 0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.005
Nickel	16	75	ug/g	1.07	3	8	**22**	1.7	1.3	2.7	1.1	0.9	0.7	1.38
Oil & Grease	0.15%	-	%	< 0.006	< 0.010	0.010	**0.400**	0.006	0.014	0.047	0.04	**0.46**	<0.01	<0.05
Phosphorous	600	2000	ug/g	186	**956**	**882**	**920**	530	NA	NA	300	540	**1000**	**773**
Total Kjeldahl Nitrogen	550	4800	ug/g	127	**1450**	**2180**	**6330**	510	**724**	**553**	343	163	131	240
Total Organic Carbon	1%	10%	%	0.32	0.76	**2.39**	**7.8**	0.64	0.53	**1.3**	0.51	0.002	0.14	0.46
Zinc	120	820	ug/g	< 0.04	9	18	57	6	4	8	4	<3	<3	3.2

Bold Denotes Exceedance in Lowest Effect Level

Underline Denotes Exceedance in Severe Effect Level

NA - Not Analyzed

Table 7: Sediment Sampling Analysis

Parameter	Lowest Effect Level	Severe Effect Level	Units	Measured Concentration SB-2 24-Sep-01	30-Aug-03	23-Aug-04	2-Sep-05	30-Aug-06	15-Aug-07	20-Aug-08	18-Aug-09	25-Aug-11	29-Aug-23
Aluminum			ug/g	1424	14500	9930	4100	6800	3400	3100	4200	2400	12500
Ammonia	100		ug/g	7.3	**1590**	**887**	1.09	< 25	<30	<25	< 25	<25	91.4
Arsenic	6	33	ug/g	1.4	3.8	1.5	NA	1	<1	<1	< 1	1	3.44
Cadmium	0.6	10	ug/g	< 0.04	0.5	< 0.5	< 0.3	< 0.3	<0.3	<0.3	< 0.3	<0.3	0.45
Chromium	26	110	ug/g	2.53	26	18	8.4	15	8.7	8.8	11	7.9	
Cobalt	50		ug/g	< 0.04	13	5	4.3	5.9	3.4	2.8	3.7	2	10.6
Copper	16	110	ug/g	< 0.04	16	14	12	9	13	5.4	11	7	**22.3**
Iron	2%	4%	%	0.27	**2.89**	1.24	0.85	1.3	0.57	0.6	0.79	0.65	0.06
Lead	31	250	ug/g	0.93	12	11	5.1	5	3	3	4	3	8.67
Manganese	460	1100	ug/g	6.75	**2920**	235	310	210	89	61	88	72	**647**
Mercury	0.2	2	ug/g	< 0.04	0.1	0.09	< 0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05	0.101
Nickel	16	75	ug/g	2.18	**21**	14	6.9	11	6	5.3	7.8	4.5	**21**
Oil & Grease	0.15%	-	%	0.020	**0.336**	**0.273**	**0.200**	0.003	0.028	<0.01	0.02	<0.01	<0.05
Phosphorous	600	2000	ug/g	228	**998**	583	440	570	NA	NA	300	290	**772**
Total Kjeldahl Nitrogen	550	4800	ug/g	**686**	**8900**	**7700**	**1180**	120	142	149	87	65	**13800**
Total Organic Carbon	1%	10%	%	0.91	**9.94**	**17**	**4.1**	0.19	0.78	0.84	0.03	0.24	**22.1**
Zinc	120	820	ug/g	10.8	88	45	27	47	17	15	22	12	72.4

Bold Denotes Exceedance in Lowest Effect Level

Underline Denotes Exceedance in Severe Effect Level

NA - Not Analyzed

Table 7: Sediment Sampling Analysis

Parameter	Lowest Effect Level	Severe Effect Level	Units	Measured Concentration SB-R 24-Sep-01	30-Aug-03	23-Aug-04	2-Sep-05	30-Aug-06	15-Aug-07	20-Aug-08	18-Aug-09	25-Aug-10	25-Aug-11	29-Aug-23
Aluminum			ug/g	939	1460	829	1000	710	660	760	580	860	960	1300
Ammonia	100		ug/g	2.2	**322**	98	1.99	< 25	<30	<25	< 25	<25	<25	<1
Arsenic	6	33	ug/g	2.92	0.4	< 0.2	NA	< 1	<1	<1	< 1	<1	<1	0.85
Cadmium	0.6	10	ug/g	< 0.04	<0.5	< 0.5	< 0.3	< 0.3	<0.3	<0.3	< 0.3	<0.3	<0.3	<0.02
Chromium	26	110	ug/g	3.02	4	3	3	2	1.6	2	1.5	2.8	2.7	
Cobalt	50		ug/g	0.86	<2	<2	0.9	0.6	<0.5	0.6	< 0.5	0.6	0.7	1.26
Copper	16	110	ug/g	< 0.04	3	1	4.8	2.1	1.3	1	6	1.2	1.3	2.12
Iron	2%	4%	%	0.20	0.25	0.14	0.19	0.12	0.1	0.16	0.12	1.6	0.2	0.236
Lead	31	250	ug/g	2.49	6	6	5	4	3	4	2	3	3	2.86
Manganese	460	1100	ug/g	< 0.04	65	27	23	12	13	34	12	19	22	35.2
Mercury	0.2	2	ug/g	< 0.04	< 0.01	**6**	< 0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.005
Nickel	16	75	ug/g	2.3	4	< 2	3.3	1.7	1.2	1.6	1.3	2.3	2.2	3.63
Oil & Grease	0.15%	-	%	0.048	0.014	< 0.010	0.052	0.0025	0.024	<0.01	0.04	**0.2**	<0.01	<0.05
Phosphorous	600	2000	ug/g	359	575	385	370	410	NA	NA	170	520	570	**1110**
Total Kjeldahl Nitrogen	550	4800	ug/g	454	**1960**	336	**666**	348	120	**732**	163	402	191	<200
Total Organic Carbon	1%	10%	%	**3.05**	**2.28**	0.67	**1.8**	0.61	0.48	0.71	0.33	0.005	0.46	0.13
Zinc	120	820	ug/g	7.43	15	6	12	8	5	5	9	8	7	5.9

Bold Denotes Exceedance in Lowest Effect Level

Underline Denotes Exceedance in Severe Effect Level

NA - Not Analyzed