SPRING 2022
SEMI-ANNUAL MONITORING REPORT

WASTE MANAGEMENT OF CANADA
RICHMOND LANDFILL
TOWN OF GREATER NAPANEE, ONTARIO

Prepared for:

Waste Management of Canada
1271 Beechwood Road
Napanee, ON K7R 3L1

Prepared by:

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

Project Number: 220196-03
12 July 2022

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1. INTRODUCTION

The purpose of this report is to present results and to provide an interpretation of the data that were collected during the spring 2022 monitoring event at the Waste Management of Canada Corporation (WM) Richmond Landfill.

The WM Richmond Landfill is approved as a 16.2-hectare waste disposal (landfilling) facility within a total site area of 138 hectares, located on parts of Lots 1, 2 and 3, Concession IV of the former Township of Richmond, now in the Town of Greater Napanee, Ontario. The landfill has been closed to waste disposal since June 20, 2011.

2. METHODOLOGY

2.1 PROGRAM SUMMARY

The spring 2022 monitoring event was conducted in accordance with the requirements outlined in the revised interim Environmental Monitoring Plan (EMP; Revision No. 05) dated April 15, 2016, as specified in Amended Environmental Compliance Approval (ECA) number A371203, issued by MECP on March 19, 2021.

The site layout and monitoring locations are shown on Figure 1. The monitoring programs for groundwater, surface water, leachate and landfill gas are summarized in Table 1.

The spring monitoring event was conducted between April 25 and May 11, 2022. The activities completed included the following:

- Water levels were recorded at groundwater monitoring wells on April 25, 2022 (42 installed within the shallow groundwater flow zone and 71 from the intermediate bedrock flow zone). No water level was recorded at groundwater monitor M19 because it was damaged;
- Pond water levels were measured on April 25, 2022 from staff gauges at the three ponds located on the south side of the landfill;
- Liquid levels were measured in landfill leachate wells on April 25, 2022;
- Leachate samples were collected from the North Chamber and South Chamber on May 11, 2022, and analyzed for the suite of leachate inorganic and general parameters, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs), as listed in Table 2;

- A total of 62 groundwater monitoring wells were sampled between April 26 – 29, 2022, as summarized in Table 1; no sample was collected from monitoring well M58-4 (damaged). Samples were analyzed for the suite of groundwater inorganic and general parameters and VOCs listed in Table 2 (note that there was insufficient volume at M6-3 to collect a bottle for 1,4-dioxane analysis);
- Surface water sampling was conducted on April 26, 2022 from 10 locations along Marysville Creek, Beechwood Ditch and the unnamed water course located south of Beechwood Road in the central portion of the proposed Contaminant Attenuation Zone (CAZ). Surface water samples were analyzed for the surface water inorganic and general parameters and for 1,4-dioxane, as listed in Table 2;
- Landfill gas monitoring was conducted on April 29, 2022. Field measurements were made with a RKI Eagle probe calibrated to methane gas response at six gas monitors; and
- A total of 10 Quality Assurance/Quality Control (QA/QC) samples were collected during the spring sampling event including three field duplicate samples, four trip blank samples and three field blank samples.

2.2 Water Sample Collection and Laboratory Analysis

Groundwater and surface water samples were collected in accordance with accepted industry protocols. Groundwater samples were collected using dedicated Waterra inertial lift pumps connected to dedicated polyethylene tubing. Three casing volumes of water were purged from each monitoring well prior to the collection of groundwater samples. During purging, readings for pH, conductivity and temperature were recorded on a regular basis. The stabilization of the parameters was used to assess when well purging was complete. Low producing wells were purged dry and allowed to recover prior to sampling. If the monitoring well had not recovered sufficiently for sampling within 24 hours, the monitor was considered dry, and a sample was not collected.

Surface water samples were collected using a clean bottle where water depth was sufficient; at sampling locations where water depth was an issue, a 50-cc syringe was used to carefully collect the surface water as not to disturb the bottom sediments.

Surface water sampling locations were sampled from downstream to upstream to prevent any re-suspension of sediment impacting the downstream sampling locations. The pH, temperature, and conductivity of the surface water were obtained in the field at all surface water sampling points while minimizing disturbance of the bottom sediment.

All water samples were placed in bottles supplied and prepared by the laboratory. The samples were packed in coolers with ice and shipped by courier to the laboratory. All samples were analysed by Bureau Veritas Laboratories of Mississauga, ON, which is accredited by the Canadian

Association for Laboratory Accreditation Inc. (CALA). Table 2 presents a summary of groundwater, surface water and leachate analytical parameters.

2.3 GROUNDWATER ELEVATIONS

Water levels were recorded to the nearest 0.01 m using an electronic water level meter for the groundwater monitoring wells listed in Table 3 in relation to the landfill footprint and groundwater flow zone monitored.

3. RESULTS AND DISCUSSION

Background information concerning the site geology and hydrogeology was described in detail in the Site Conceptual Model (SCM) report[1] and updated based on results from subsequent hydrogeological investigations[2,3,4,5,6,7], and is summarized here. The SCM report describes the groundwater flow conditions at the Richmond Landfill. Based on the results from extensive studies conducted previously at the site, the basic hydrogeological framework for the facility has been defined as follows:

- The active groundwater flow zone at the site extends to a depth of approximately 30 m below the top of bedrock;
- The shallow groundwater flow zone is conceptualized as the overburden, the overburden-bedrock contact and the upper one to two metres of bedrock;
- The direction of groundwater flow in the shallow flow zone is strongly influenced by topography;
- The intermediate bedrock flow zone extends from one to two metres below top of bedrock to a depth of approximately 30 m below top of bedrock;

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[1] *Site Conceptual Model Report, WM Richmond Landfill*, prepared by Dr. B.H. Kueper and WESA Inc., October 2009

[2] *Supporting Document, Application to Amend Environmental Compliance Approval No. A371203, Waste Management Richmond Landfill Site*, prepared by BluMetric Environmental Inc., March 2015

[3] *Site Conceptual Model Update and Contaminant Attenuation Zone Delineation, Waste Management Richmond Landfill Site*, prepared by BluMetric Environmental Inc., January 2016

[4] *Addendum to Site Conceptual Model Update and Contaminant Attenuation Zone Delineation, Waste Management Richmond Landfill Site*, prepared by BluMetric Environmental Inc., April 2016

[5] *Site Conceptual Model Update and Contaminant Attenuation Zone Delineation, Waste Management Richmond Landfill Site*, prepared by BluMetric Environmental Inc., July 2017

[6] *Site Conceptual Model Update and Contaminant Attenuation Zone Delineation, Waste Management Richmond Landfill Site*, prepared by BluMetric Environmental Inc., October 2018

[7] *Addendum to Site Conceptual Model Update and Contaminant Attenuation Zone Delineation, Waste Management Richmond Landfill Site*, prepared by BluMetric Environmental Inc., May 2019

- Groundwater flows through a network of fractures in the upper 30 m of bedrock;
- The dominant fracture orientation is horizontal to sub-horizontal; however, vertical to subvertical fractures are present providing hydraulic connection between horizontal fractures;
- Hydraulic connections of fractures exist in the intermediate bedrock flow zone to the west, south and east of the site (horizontal and vertical connections);
- Intermediate bedrock flownets show that groundwater flow directions are variable with season and generally flows to the west from the western edge of the landfill to the southeast from the southern edge of the landfill, to the south along the eastern edge of the landfill, and north to northwest from the northern limit of the landfill;
- The hydraulic conductivity of the intermediate bedrock is lower to the north and east of the landfill compared to other areas of the site, implying that the rate of groundwater flow is lower than in areas immediately south, southeast and west of the landfill;
- South of the landfill, the intermediate bedrock flow zone has distinct areas of interacting hydrogeological zones which are not isolated from one another, but are distinct based on hydraulic conductivity, water level variations and the rate of response to recharge events; and,
- Groundwater monitoring wells in the southern portion of the proposed CAZ have static groundwater elevations that are similar to each other and much lower than wells further north in the CAZ; these deep groundwater elevations appear to be controlled by karst systems confirmed to exist in the southern portion of the proposed CAZ, as discussed in the latest update to the SCM[6,7].

3.1 GROUNDWATER RESULTS

3.1.1 Groundwater Elevations

Groundwater elevations from program monitoring wells listed in Table 3 were measured on April 25, 2022 and are presented in Table 4. An inventory of monitoring well locations is provided in Appendix A. Groundwater elevation contours within the shallow groundwater flow zone are shown on Figure 2, while Figure 3 shows the groundwater elevation contours for the intermediate bedrock flow zone. Groundwater flow directions were inferred by interpolating the water elevations from wells screened within the corresponding groundwater flow zone and are consistent with historical results.

The spring 2022 shallow groundwater contours (Figure 2) are consistent with historical results and show that the Empey Hill drumlin southwest from the landfill creates a flow divide, with shallow groundwater being directed both to the north and the south towards areas of lower hydraulic heads. North of the landfill, shallow groundwater converges towards Marysville Creek in the area immediately east of County Road 10 (Deseronto Road), while shallow flow in the southern portion of the site converges on Beechwood Ditch and the southern pond system. Shallow groundwater east of the landfill is influenced by a local zone of higher water levels in the vicinity of monitoring well M96; shallow groundwater north of M96 flows to the north-northwest and ultimately Marysville Creek, while groundwater south of M96 flows to the south-southwest, towards Beechwood Ditch and the ponds.

The spring 2022 intermediate bedrock zone contours are presented on Figure 3. On the landfill property, groundwater in this hydrostratigraphic unit generally flows to the north, west, and south-southeast relative to the landfill. Water levels from intermediate bedrock monitors M170 and M191 (low permeability wells with water levels interpreted as not being static) as well as M73, were not used to prepare the spring 2022 groundwater contours. Monitoring wells M178R-1 (low permeability deeper screen) and M178R-4 (shallower screen with lower hydraulic head believed to be reflective of the shallow flow zone in this area) were not used to generate the interpolated groundwater contours for the Intermediate Bedrock flow zone. Additionally, intermediate bedrock zone monitoring wells located farther to the south (e.g., M173, M174, M181-1, M181-2, M182, M187 and M189) were not considered in the groundwater contour interpolation because they exhibit much lower hydraulic heads and appear to be part of a separate group of hydraulically responsive wells within the intermediate bedrock flow zone. This subset of wells appears to be influenced by karst systems that were identified in the southern part of the proposed CAZ. Additional details from the most recent hydrogeological investigations in the area south and southeast of the Site have been provided under separate cover[6,7].

3.1.2 Groundwater Analytical Results

Results from the groundwater monitoring wells sampled in spring 2022 as part of the EMP are presented in Table 5a. Groundwater quality data for the spring 2022 monitoring event are generally similar to historical results. Alkalinity, ammonia and 1,4-dioxane results are shown for the shallow and intermediate bedrock flow zones on Figures 4 and 5, respectively.

3.1.2.1 Shallow Groundwater Flow Zone

As shown in Table 5a, slightly elevated concentrations of a number of water quality parameters (e.g., alkalinity, boron, chloride, conductivity, DOC, sodium and/or TDS) were observed in some shallow groundwater zone monitoring wells located in close proximity to the landfill footprint (e.g., M66-2, M86, M101, M103 and M104), north and northwest from the unlined portion of the landfill. 1,4-dioxane was also detected in monitors M101, M103 and M104, and 1,1-dichloroethane was detected at monitoring well M101. The approximate extents of leachate impacted shallow groundwater, consistent with those delineated from recent hydrogeological investigations[6,7], are shown on Figure 4.

Monitoring well M54-4, located approximately 200 m south of the landfill footprint, also exhibited slightly elevated alkalinity and conductivity, as well as low but detectable concentrations for some chlorinated VOCs (e.g., 1,1,1-trichloroethane, 1,1-dichloroethane, cis-1,2-dichloroethylene, tetrachloroethylene and trichloroethylene). An assessment of the impacts at shallow monitoring well M54-4, attributed to surface contamination from historical local sources rather than from landfill leachate, was submitted under separate cover [8].

In other areas of the site, there is no evidence of groundwater impacts away from the landfill footprint in the shallow groundwater flow zone. Isolated occurrences of elevated concentrations of water quality parameters (i.e., one or two parameters per sample) are seen elsewhere on the Site. No indications of elevated concentrations related to landfill impacts are identified at the property boundary in the shallow flow zone.

3.1.2.2 Intermediate Groundwater Flow Zone

Analytical results from intermediate bedrock groundwater monitors sampled in spring 2022 were generally consistent with historical results.

North of the landfill, elevated concentrations of water quality parameters and detectable 1,4-dioxane concentrations were observed at monitors M6-3[9] and OW4, which are located in close proximity to the footprint. These results indicate the presence of leachate impacts at these locations. Despite the relatively higher concentrations of some parameters (e.g., ammonia at M5-3, M75 and OW1), the absence of 1,4-dioxane indicates that no impacts from the landfill are apparent further north from the footprint and near Marysville Creek (e.g., at OW1, M5-3, M75, M82-1 and M82-2).

South of the landfill, the presence of 1,4-dioxane and elevated concentrations of alkalinity (typically greater than 400 mg/L where 1,4-dioxane is present), DOC, chloride and TDS indicate groundwater impacts from the landfill at several monitoring well locations (M9-2, M9-3, M64-2, M70-2, M108, M109-1, M110-1, M121, M123, M167, M168, M170, M172, M178R-2, M178R-3, M178R-4 and M192). Monitoring well M70-2, as well as other locations south and southeast of the landfill (e.g., M52-2, M106, M121, M170, M185-1 and M186), have elevated concentrations of chloride, sodium, TDS, and/or BTEX compounds that are indicative of naturally poor quality connate (and often saline) groundwater. These pockets of naturally poor-quality groundwater are isolated and do not reflect any widespread or significant upwelling of saline groundwater.

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[8] *Assessment of Chlorinated VOC Impacts at Shallow Groundwater Monitoring Well M54-4, Waste Management Richmond Landfill, Town of Greater Napanee*, BluMetric Environmental Inc., July 2017

[9] There was insufficient volume at M6-3 to collect a bottle for 1,4-dioxane analysis; however, historically M6-3 has had detectable 1,4-dioxane concentrations.

Several monitoring wells downgradient of these impacted wells (e.g., M177, M179, M185-1, M185-2, M186, M187, M188-1 and M190) do not show impacts associated with landfill leachate (i.e., no 1,4-dioxane detected and alkalinity concentrations of 330 mg/L or lower) thus defining the limit of the groundwater plume. The approximate extents of leachate impacted groundwater in the intermediate bedrock flow zone, consistent with those delineated from recent hydrogeological investigations[6,7], are shown on Figure 5.

To the west of the landfill, monitoring well M91-1, located approximately 200 m west of the landfill, exhibited low concentrations reflective of background conditions for all parameters with the exception of detectable benzene above the laboratory's reportable detection limit (RDL). Other wells in the western part of the landfill site (M58-3, M72, M74, M82-1 and M95-1) exhibit concentrations of water quality parameters that are relatively low and continue to reflect background conditions.

3.1.2.3 Trend Analysis of 1,4-Dioxane Concentrations

Time-concentration plots showing 1,4-dioxane results since 2013 are provided in Appendix B for wells located near the distal extent of the delineated leachate impacted groundwater areas, depicted on Figures 4 and 5 for the Shallow and Intermediate Bedrock flow zones, respectively. Review of apparent temporal trends in Appendix B shows that:

A) Concentrations are higher at monitoring wells M6-3, OW4 and M104, located adjacent to the north portion of the landfill, compared to all other monitoring locations. Details for the areas to the north (blue series), southeast (green series) and south (red series) of the landfill are shown on Plots B, C and D, respectively;
B) To the north of the landfill, stable or declining (notably since 2018) trends are observed in the shallow groundwater flow zone (M101, M103 and M104) and intermediate bedrock flow zone (M6-3 and OW4);
C) To the southeast of the landfill, increasing trends are observed at M192, and to a lesser degree at monitoring wells M168 and M170, where 1,4-concentrations have stabilized; and,
D) To the south of the landfill, stable or declining trends are observed in the intermediate bedrock flow zone (M114-1, M121, M178R-2, M178R-3, M178R-4 and M64-2). 1,4-dioxane concentrations at monitoring well M121 may be showing a recent slightly increasing trend.

The stable and declining trends observed in 1,4-dioxane concentrations north and south of the landfill in both shallow and intermediate bedrock zones confirm that the plume is stable and naturally attenuating in these areas. With respect to the southeast portion of the property, WM has recently submitted an application to seek approval for an engineered solution located immediately upgradient from the eastern landfill property limit. The proposed hydraulic control system (HCS) has been designed to intercept impacted groundwater and prevent further off-site migration of impacted groundwater onto the adjacent property located east of the landfill property and north of Beechwood Road.

3.1.3 Guideline B-7 Reasonable Use Limits (RULs)

Constituent concentrations from selected monitoring wells within the low-head areas of the WM Richmond Landfill in both the Shallow and Intermediate Bedrock Groundwater Flow Zones are compared to the RULs derived from laboratory analytical results in Table 5b. The RULs reported in Table 5b for leachate indicator parameters and trigger wells were presented in the interim EMP (Revision No. 05) dated April 2016, including 1,4-dioxane for which the site-specific RUL of 0.001 mg/L was set as required by the ERT Order dated December 24, 2015.

All results for 1,4-dioxane at trigger wells in the shallow and intermediate bedrock flow zones were below the RUL of 0.001 mg/L, with the exception of M192, located on the property to the east, directly adjacent to the landfill property and north of Beechwood Road.

In the shallow groundwater zone, slightly elevated concentrations of a number of inorganic or general water quality parameters above their respective RUL (e.g., alkalinity, iron, manganese and/or TDS) were observed in monitoring wells M54-4, M66-2, M67-2, M80-2 and OW37-s.

Slightly elevated concentrations of a number of water quality parameters above their respective RUL (e.g., alkalinity, chloride, DOC, iron, manganese, sodium, and/or TDS) were also observed in some intermediate groundwater flow zone monitoring wells (e.g., M82-1, M82-2, M106, M179, M185-1, M185-2, M186 and M192) and benzene exceeded the RUL at monitoring well M80-1. These observations are consistent with historical results.

3.1.4 Status of Monitoring Wells and Compliance with Ontario Regulation 903

During the spring 2022 monitoring event, the conditions of groundwater monitoring wells included in the EMP were inspected. Any repairs, such as new locks, labels or well caps, were made as necessary. Watertight casings and seals remain in place at all monitors to ensure that surface water or foreign materials cannot enter groundwater monitoring wells. Where the outer protective casing was deemed to be part of the well construction by MECP, the protective casing was fitted with a vermin proof cap to meet the requirements of O. Reg 903. All groundwater monitoring wells are locked to provide protection against vandalism as per Waste Management standard operating procedure and in line with industry best practices.

Shallow groundwater monitoring wells M19, M58-4 and M68-4 are damaged, and it is recommended that they be decommissioned when a revised EMP is approved as they cannot be repaired. These wells are considered unnecessary because flow in the shallow groundwater flow zone can be adequately assessed across the site without them.

3.1.5 Groundwater Chemistry Quality Assurance / Quality Control (QA/QC)

An evaluation of the QA/QC data (from duplicate and blank samples) is included in Appendix C. A standard margin of error of 20% relative percent difference (RPD) between regular samples and corresponding field duplicate samples was deemed acceptable for field duplicates. In general, the comparison between samples and duplicates shows excellent correlation for the majority of analyzed constituents. All parameters for groundwater duplicate QA/QC sampling were within the 20% margin of error. All parameters were near or below the laboratory RDL in the field blank and trip blank samples.

3.2 Leachate Results

3.2.1 Leachate Generation

An estimate of the amount of leachate generated at the site is provided by the site records of the volume of leachate hauled to the Town of Greater Napanee Waste Water Treatment Plant (WWTP), Kingston's Ravensview WWTP or Cobourg's WWTP. The use of the North Lagoon, where leachate can be stored temporarily on an as needed basis when volumes exceed the WWTP's ability to accept leachate, has been discontinued and remaining liquid will be pumped out through 2022.

The volume of leachate collected from the landfill and hauled to the Napanee, Ravensview and Cobourg WWTPs from January to June 2022 was approximately 14,649 m^3, or 2,441 m^3 per month on average. This includes approximately 1,601 m^3 that was pumped from the North Lagoon to the North Chamber.

3.2.2 Liquid Levels in Leachate Wells

Liquid levels were measured in the two landfill leachate wells on April 25, 2022 and provided the following:

- The liquid level at LW-P1 was 145.91 m above sea level (masl); and
- The liquid level at LW-P2 was 148.63 masl.

3.2.3 Leachate Chemistry

The leachate chemistry results for May 11, 2022 are summarized in Table 6 and are similar to historical results. Leachate at the Richmond Landfill is characterized by elevated concentrations of general water quality parameters such as alkalinity, ammonia, chloride, conductivity, DOC, hardness, sodium, TDS and TKN, as well as selected VOCs (e.g., 1,4-dioxane, 1,4-dichlorobenzene, chlorobenzene and BTEX). VOC concentrations were below the laboratory RDL for most parameters, with a few exceptions where VOC concentrations were measured at detectable concentrations in leachate. Concentrations were generally higher in the South Chamber compared to the North Chamber where leachate is diluted by shallow groundwater collected from the perimeter toe drain located in the northwest portion of the landfill footprint.

3.3 SURFACE WATER RESULTS

3.3.1 Pond Elevations

Staff gauges are installed in the three ponds on the south side of the landfill labeled SG1, SG2 and SG3. Staff gauge locations and pond elevations measured on April 25, 2022, are shown on Figure 2.

3.3.2 Surface Water Monitoring Locations

The two water courses that may receive surface water/storm water runoff from the Richmond Landfill site are Marysville Creek to the north of the waste mound and Beechwood Ditch to the south (Figure 1). The Beechwood Ditch is a man-made surface water course that flows from the east onto WM property. It then flows west across a portion of the site before again crossing Beechwood Road and travelling southwest to cross County Road 10 and joins Marysville Creek east of Highway 49 and north of Highway 401. Both the Beechwood Ditch and Marysville Creek flow intermittently in the vicinity of the landfill. Marysville Creek has some base flow locally and flows on a continuous basis west of County Road 10 (Deseronto Road). Marysville Creek eventually discharges into the Bay of Quinte at Hungry Bay.

An unnamed local surface water course is present in the central portion of the proposed CAZ boundary, originating from a small man-made pond located directly the east of Quarry Road (see Figure 1). Surface water flows westerly from this pond over a distance of approximately 600 m along a topographically low area, to a second pond located near monitoring well M187 and finally to a local topographic depression located approximately 75 m farther west, where water enters into the ground through a near-surface local karstic feature.

Surface water monitoring locations are shown on Figure 1.

3.3.3 Surface Water Flow

Visual observations of surface water flow and general water characteristics for the spring sampling program are summarized in Table 7a. Surface water flow velocity was measured between no flow and 0.85 m/s, and estimated flow rates between no flow and 0.34 m^3/s.

3.3.4 Surface Water Analytical Results

The results from surface water locations sampled during the spring 2022 sampling event are presented in Table 7b.

Surface water quality was compared to the Provincial Water Quality Objectives (PWQO). Background surface water quality was monitored on site from upstream sampling locations S2 for Marysville Creek, S5 for Beechwood Ditch and S18 for the unnamed local water course located in the central portion of the proposed CAZ. Storm water runoff from the existing landfill area flows to one of three storm water sedimentation retention ponds, located to the northeast, northwest and south of the landfill footprint. Sampling location S3 is located near the downstream property boundary along Marysville Creek, while sampling location S8R is located along Beechwood Ditch near the downstream property boundary.

Constituents analysed in surface water samples collected during the spring 2021 sampling event were below their respective PWQO, with the exception of slight exceedances for iron (sampling locations S2, S3, S6 and S7) and total phosphorous (sampling location S2, S3, S4R, S5, S6, S7, S8R, S19 and S20). Results from spring 2022 are consistent with historical results and indicate that the landfill is not causing adverse impacts to surface water quality.

3.3.5 Historical Surface Water Analytical Results

Historical surface water analytical results are plotted in Appendix D and compared with PWQO. Throughout the history of surface water sampling, various parameters have exceeded their respective PWQO concentrations on occasion (e.g., ammonia (unionized), chromium III, chromium VI, cobalt, copper, iron, phenols, phosphorus (total), and zinc). Concentrations of these parameters fluctuate readily with no notable trends.

Iron and total phosphorus concentrations in surface water have frequently exceeded their PWQO of 0.3 and 0.03 mg/L, respectively, including at upstream locations S2 (Marysville Creek), S5 (Beechwood Ditch) and S18 (unnamed water course in central CAZ), indicating upstream sources unrelated to the landfill.

3.3.6 Surface Water Quality Assurance / Quality Control (QA/QC)

An evaluation of the QA/QC data (from duplicate and blank samples) is included in Appendix C. A standard margin of error of 20% RPD was deemed acceptable for field duplicates. In general, the comparison between samples and duplicates shows very good correlation for the majority of analysed constituents. All parameters for the surface water duplicate QA/QC sample from S20 were within the 20% margin of error.

3.4 SUBSURFACE GAS SAMPLING

On April 29, 2022, BluMetric inspected the subsurface gas monitoring probes and obtained measurements at all locations. The location of the gas monitors and the measurement results are shown in Table 8. Gas well readings were between 10 and 55 ppm (the LEL for methane is 5% by volume in air, or 50,000 ppm).

4. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The spring 2022 monitoring program included the collection of groundwater, leachate and surface water samples, as well as landfill gas monitoring, in accordance with the site monitoring requirements outlined in the revised interim EMP (Revision No. 05) dated April 15, 2016, as specified in the Environmental Compliance Approval (ECA) number A371203, issued by MECP July 14, 2017 to reflect all amendments to the ECA that had been issued since the original ECA was issued in January 2012 and Environmental Review Tribunal (ERT) Order dated December 24, 2015.

The following were completed as part of the spring 2021 monitoring event conducted between April 25 and May 11, 2022:

- Water levels were measured at 112 groundwater monitoring wells (41 in the shallow groundwater flow zone and 71 in the intermediate bedrock flow zone), two leachate monitoring wells and three ponds on the south side of the landfill;
- A total of 62 groundwater monitors were sampled for analytical testing (18 completed in the shallow flow zone and 44 in the intermediate bedrock flow zone);
- Leachate samples were collected from the North Chamber and South Chamber;
- Ten surface water locations were sampled for analytical testing;
- A total of ten QA/QC samples were collected; and
- Subsurface gas concentrations were recorded from six on-site gas monitoring wells.

Results, interpretations from the spring 2022 monitoring event are summarized below, along with recommendations.

4.1 GROUNDWATER

- Groundwater flow directions interpreted from water elevations measured in monitoring wells were consistent with historical flownets:
  - Shallow groundwater flow on site is influenced by local topographic highs in the southwestern (Empey Hill Drumlin) and eastern (groundwater monitor M96 area) portions of the site and is characterized by a flow divide with shallow groundwater being directed both to the north (toward Marysville Creek) and the south (toward Beechwood Ditch). South of Beechwood Road shallow groundwater flow converges from local topographic highs to the north and south, and discharges to a local surface water course within a topographically low area running east-west in the central portion of the proposed CAZ;
  - Groundwater in the intermediate bedrock flow zone generally flows to the north, west, and south-southeast relative to the landfill;
- Groundwater quality data from spring 2022 were generally consistent with historical results;
- Slightly elevated concentrations of a number of water quality parameters were observed in the shallow groundwater zone within the property in the immediate vicinity of the landfill footprint to the south, north and northwest of the landfill footprint;
- The geochemical results for the intermediate bedrock groundwater flow zone indicate higher concentrations of water quality parameters associated with landfill leachate impacts to the south-southeast and immediately north of the landfill relative to the concentrations west and east of the landfill;
- Time-concentration plots of 1,4-dioxane results indicate that to the north of the landfill, stable or declining trends are observed in the shallow and intermediate bedrock flow zones; to the south of the landfill, generally stable or declining trends are observed in the intermediate bedrock flow zone; and, to the southeast of the landfill, increasing trends are observed at M170 and M192, and to a lesser degree at M168 located farther downgradient;
- Continued groundwater monitoring within the shallow and intermediate bedrock groundwater flow zones between the landfill footprint and the low-head areas is warranted in order to further examine groundwater quality and any trends over time;
- The proposed Contaminant Attenuation Zone (CAZ) should be extended onto the property adjacent to the southeast portion of the landfill property if an agreement can be reached with the owner; failing this, an engineered hydraulic control system (HCS) will be implemented in the southeastern portion of the landfill property upgradient of this area to prevent further off-site migration of leachate impacted groundwater; and,
- Shallow groundwater monitoring wells M19, M58-4 and M68-4 are damaged and should be repaired (M68-4 included in the proposed post-closure EMP) or decommissioned.

4.2 SURFACE WATER

- The concentrations observed during spring 2022 monitoring events were within the range of historical monitoring results and indicate that the landfill is not causing adverse impacts to surface water quality;
- The concentrations of iron (sampling locations S2, S3, S6 and S7) and total phosphorous (sampling location S2, S3, S4R, S5, S6, S7, S8R, S19 and S20) were slightly above PWQO; and,
- All other measured parameters were consistent with natural surface water quality and below PWQO.

4.3 SUBSURFACE GAS

Measurements for methane gas were between 10 and 55 ppm for all six monitoring locations.

5. LIMITING CONDITIONS

The spring 2022 monitoring program involved the collection of groundwater (from on-site and off-site monitoring wells as well as off-site domestic supply wells) and surface water for analyses at the site monitoring locations. The data collected during this investigation represent the conditions at the sampled locations only.

The conclusions presented in this report represent our professional opinion and are based on the conditions observed on the dates set out in the report, the information available at the time this report was prepared, the scope of work, and any limiting conditions noted herein.

BluMetric Environmental Inc. provides no assurances regarding changes to conditions subsequent to the time of the assessment. BluMetric Environmental Inc. makes no warranty as to the accuracy or completeness of the information provided by others or of the conclusions and recommendations predicated on the accuracy of that information.

This report has been prepared for Waste Management of Canada. Any use a third party makes of this report, any reliance on the report, or decisions based upon the report, are the responsibility of those third parties unless authorization is received from BluMetric Environmental Inc. in writing. BluMetric Environmental Inc. accepts no responsibility for any loss or damages suffered by any unauthorized third party as a result of decisions made or actions taken based on this report.

Respectfully submitted,
BluMetric Environmental Inc.

Madeleine Corriveau, M.Sc., P.Geo.
Senior Geoscientist

François A. Richard, Ph.D, P.Geo.
Senior Hydrogeologist

TABLES

Table 1: Summary of Environmental Monitoring Program

Monitoring Locations		Parameter Suite	Monitoring Frequency
Shallow Groundwater Flow Zone Monitors			
M58-4, M68-4, M70-3, M96, M99-2		Groundwater Inorganic & General	Once each year, in spring
		VOCs	
M53-4, M54-4, M66-2, M67-2, M80-2, M81, M85, M86, M87-2, M101, M103, M104, M114-2, OW37-s		Groundwater Inorganic & General	Twice each year, in spring and fall
		VOCs	
Intermediate Bedrock Groundwater Flow Zone Monitors			
M56-2, M58-3, M59-2, M59-4, M91-1, M95-1		Groundwater Inorganic & General	Once each year, in spring
		VOCs	
M5-3, M6-3, M9-2, M9-3, M52-2, M64-2, M70-2, M72, M74, M75, M80-1, M82-1, M82-2, M106, M108, M109-1, M110-1, M114-1, M121, M123, M167, M168, M170, M172, M177, M178R-2, M178R-3, M178R-4, M179, M185-1, M185-2, M186, M187, M188, M190, M192, OW1, OW4		Groundwater Inorganic & General	Twice each year, in spring and fall
		VOCs	
Surface Water Sampling Locations			
Beechwood Ditch	S4R, S5 and S8R	Surface Water Inorganic and General	Three times each year, in spring, summer[1] and fall.
Marysville Creek	S2, S3, S6 and S7		
Unnamed water course in central portion of proposed CAZ	S18, S19 and S20		
Leachate Monitoring Locations			
North Chamber and South Chamber		Leachate Inorganic & General	Once each year, in spring
		VOCs	
Landfill Gas Monitoring Wells			
GM1, GM3, GM4-1, GM4-2, GM5, GM6		% methane by volume	Twice each year, in spring and fall
Off-site Domestic Water Supply Wells			
1441 County Road 1 West 1483 County Road 1 West 1494 County Road 1 West (UNKN)[2] 1499 County Road 1 West 1556 County Road 1 West (UNKN)[2] 1614 County Road 1 West 1654 County Road 1 West 1680 County Road 1 West 1695 County Road 1 West 1866 County Road 1 West 614 Belleville Road 696 Belleville Road		1,4 dioxane	Once every two years, starting in 2015

[1] The summer monitoring event shall be scheduled after a rainfall of more than 25 mm

[2] The final list of domestic well locations will depend on confirmation of which addresses have drilled wells (locations where well construction is unknown are denoted UNKN). A residential survey will be completed in order to determine which of these locations are to be sampled. Only those residences with drilled bedrock wells that supply water for domestic use will be sampled; residences that use shallow dug wells or cisterns for water supplies are not included in the program.

Table 2: Analytical Parameters for Water and Leachate Samples

Groundwater Inorganic and General Parameters		
Total dissolved solids	Magnesium	Manganese
Alkalinity	Sodium	Ammonia (total)
Conductivity	Potassium	Nitrate
Dissolved organic carbon	Boron	Nitrite
Calcium	Iron	Chloride
		Sulphate
Volatile Organic Compounds (VOCs)		
1,4-dioxane	1,2-Dichlorobenzene	1,1,2-Trichloroethane
Benzene	1,3-Dichlorobenzene	1,1-Dichloroethane
Toluene	1,4-Dichlorobenzene	1,2-Dichloroethane
Ethylbenzene	Methylene chloride	1,1-Dichloroethylene
m&p-Xylene	Chloromethane	Cis-1,2-Dichloroethylene
o-Xylene	Chloroethane	Trans-1,2-Dichloroethylene
Styrene	1,1,2,2-Tetrachloroethane	Trichloroethylene
1,3,5-Trimethylbenzene	1,1,1,2-Tetrachloroethane	Tetrachloroethylene
Chlorobenzene	1,1,1-Trichloroethane	Vinyl chloride
Surface Water Inorganic and General Parameters		
1,4-dioxane	Potassium	Nitrate
Total suspended solids	Boron	Nitrite
Total dissolved solids	Cadmium	Chloride
Biological oxygen demand	Chromium (Total, Cr6+, Cr3+)	Sulphate
Chemical oxygen demand	Cobalt	Phenols
Alkalinity	Copper	Total phosphorous
Conductivity	Iron	Naphthalene
Hardness	Lead	
Calcium	Nickel	*Field measurements:*
Magnesium	Zinc	*pH, temperature, conductivity, dissolved*
Sodium	Ammonia (total & un-ionized)	*oxygen, estimated flow rate*
Leachate Inorganic and General Parameters		
Total dissolved solids	Dissolved organic carbon	Ammonia (total)
Conductivity	Boron	Total Kjeldahl nitrogen
Alkalinity	Cadmium	Nitrate
pH	Chromium (total)	Nitrite
Hardness	Cobalt	Chloride
Calcium	Copper	Sulphate
Magnesium	Iron	Total phosphorous
Sodium	Lead	Phenols
Potassium	Manganese	Naphthalene
Biological oxygen demand	Nickel	N-nitrosodimethylamine (NDMA)
Chemical oxygen demand	Zinc	

Table 3: Groundwater Elevation Monitoring Locations

Location	Shallow Groundwater Flow Zone	Intermediate Groundwater Flow Zone
West of landfill footprint	M27, M58-4, M67-2, M84, M87-2, M88-2, M89-2, M97, M98, M99-2, M100, M101, M102, OW37-s	M3A-3, M56-2, M58-3, M59-2, M59-3, M59-4, M72, M73, M74, M82-1, M82-2, M91-1, M95-1
East of landfill footprint	M19, M23, M47-3, M68-4, M70-3, M77, M94-2, M96	M50-3, M52-2, M70-2, M108, M170
North of landfill footprint	M35, M60-4, M65-2, M66-2, M83, M85, M86, M103, M104	M46-2, M60-1, OW1
South of landfill footprint; north of Beechwood Road	M12, M14, M15, M18, M41, M53-4, M54-4, M80-2, M81	M9-2, M9-3, M10-1, M49-1, M53-2, M71, M80-1, M105, M106, M107, M109-1, M109-2, M110-1, M111-1, M112-1, M113-1, M192, M193
South of landfill footprint; south of Beechwood Road	M114-2, M115-2	M63-2, M64-2, M114-1, M116, M121, M122, M123, M125, M166, M167, M168, M173, M174, M176, M177, M178R-1, M178R-2, M178R-3, M178R-4, M179, M180, M181-1, M181-2, M182, M185-1, M185-2, M186, M187, M188, M189, M190, M191

Table 4: Groundwater Elevations - April 25, 2022

Monitoring Well	Water Level (masl)	Monitoring Well	Water Level (masl)	Monitoring Well	Water Level (masl)	Monitoring Well	Water Level (masl)
Shallow Groundwater Flow Zone							
M12	125.70	M54-4	124.44	M83	123.26	M98	130.32
M14	127.34	M58-4	125.25	M84	121.94	M99-2	130.76
M15	125.61	M60-4	124.40	M85	121.73	M100	125.58
M18	127.49	M65-2	123.48	M86	122.18	M101	124.07
M19	damaged	M66-2	123.31	M87-2	124.73	M102	124.18
M23	127.54	M67-2	122.85	M88-2	128.54	M103	124.01
M27	126.38	M68-4	124.25	M89-2	129.86	M104	123.30
M35	124.34	M70-3	127.32	M94-2	123.77	M114-2	123.93
M41	125.82	M77	126.53	M96	129.24	M115-2	124.92
M47-3	124.87	M80-2	123.85	M97	125.69	OW37-s	122.15
M53-4	125.51	M81	124.58				
Intermediate Bedrock Groundwater Flow Zone							
M3A-3	125.04	M71	124.53	M113-1	123.59	M178R-4	116.85
M9-2	125.38	M72	123.42	M114-1	124.28	M179	112.94
M9-3	125.44	M73	121.10	M116	>124.21	M180	112.22
M10-1	124.44	M74	123.92	M121	123.54	M181-1	97.93
M46-2	122.90	M80-1	123.69	M122	123.39	M181-2	105.56
M49-1	124.81	M82-1	122.88	M123	123.02	M182	102.22
M50-3	124.23	M82-2	122.96	M125	123.77	M185-1	114.75
M52-2	123.38	M91-1	123.63	M166	123.02	M185-2	116.79
M53-2	124.14	M95-1	123.48	M167	122.02	M186	114.90
M56-2	123.63	M105	125.42	M168	123.06	M187	98.15
M58-3	123.66	M106	123.53	M170	125.72	M188-1	115.75
M59-2	123.72	M107	125.32	M173	101.31	M189	105.40
M59-3	123.68	M108	123.14	M174	98.26	M190	116.53
M59-4	123.68	M109-1	125.40	M176	111.46	M191	117.23
M60-1	122.73	M109-2	125.51	M177	115.38	M192	123.06
M63-2	121.59	M110-1	125.43	M178R-1	117.09	M193	122.54
M64-2	119.15	M111-1	126.86	M178R-2	122.71	OW1	122.74
M70-2	123.13	M112-1	123.59	M178R-3	122.40		

Table 5a: Groundwater Quality Results - April 26 - 29, 2022

Name	Date	Alkalinity	Ammonia	Boron	Calcium	Chloride	Conductivity	Dissolved Organic Carbon	Iron	Magnesium	Manganese	Nitrate	Nitrite	Potassium	Sodium	Sulphate	Total Dissolved Solids	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	1,2-Dichlorobenzene (o)	1,2-Dichloroethane	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene (m)	1,4-Dichlorobenzene (p)	1,4-Dioxane	Benzene	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,2-Dichloroethylene	Dichloromethane	Ethylbenzene	m+p-Xylene	o-Xylene	Styrene	Tetrachloroethylene	Toluene	Total Xylenes	Trans-1,2-dichloroethylene	Trichloroethylene	Vinyl Chloride
Name	Date	mg/L	mg/L	mg/L	mg/L	mg/L	mS/cm	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	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	mg/L	mg/L
Shallow Groundwater Flow Zone[1]																																													
M53-4	4/26/2022	410	0.16	< 0.02	140	< 1	680	3.2	0.14	21	0.087	< 0.1	< 0.01	< 0.2	21	33	485	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M54-4	4/26/2022	450	0.16	0.031	150	24	830	2.9	< 0.1	30	0.022	< 0.1	< 0.01	1.2	40	34	490	< 0.0002	0.0012	< 0.0002	< 0.0002	0.0013	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	0.00052	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	0.0031	< 0.0002	< 0.0001	< 0.0001	0.00041	< 0.0002
M66-2	4/28/2022	260	< 0.15	0.38	100	130	1300	1.1	< 0.1	31	< 0.002	0.45	< 0.01	3.6	89	240	790	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M67-2	4/27/2022	370	< 0.15	0.72	53	4.8	670	1.6	1.5	29	0.062	< 0.1	0.028	7.8	50	1.4	355	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M68-4	4/26/2022	330	0.26	< 0.02	120	7.1	580	2.2	< 0.1	20	0.13	< 0.1	< 0.01	< 0.2	15	28	380	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M70-3	4/27/2022	430	< 0.15	< 0.02	160	16	970	3.3	1.2	29	0.38	< 0.1	< 0.01	0.43	20	95	575	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	0.00021	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M80-2	4/27/2022	330	< 0.15	0.048	78	37	780	1.4	< 0.1	41	< 0.002	< 0.1	< 0.01	3.6	30	43	400	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M81	4/27/2022	320	< 0.15	0.03	92	53	800	1.2	< 0.1	46	0.003	< 0.1	< 0.01	2.1	10	38	495	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M85	4/28/2022	430	< 0.15	1.8	41	35	1400	1.8	< 0.1	25	< 0.002	3.41	< 0.01	15	250	240	860	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M86	4/28/2022	370	< 0.15	1	54	37	1000	1.9	< 0.1	31	0.003	0.17	< 0.01	15	130	140	620	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M87-2	4/26/2022	210	< 0.15	0.03	52	30	540	1.1	< 0.1	36	0.005	< 0.1	< 0.01	1.7	12	44	310	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M96	4/26/2022	290	< 0.15	0.038	65	2.3	560	1	< 0.1	32	< 0.002	1.05	< 0.01	3.5	21	32	295	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M99-2	4/27/2022	280	< 0.15	0.08	58	20	730	2	0.17	53	0.016	< 0.1	< 0.01	2.5	15	100	425	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M101	4/27/2022	450	< 0.15	0.052	150	50	1100	1.8	< 0.1	45	< 0.002	< 0.1	< 0.01	3.2	16	54	610	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00011	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0046	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M103	4/27/2022	640	< 0.15	0.22	140	170	1700	3.1	< 0.1	85	< 0.002	0.28	< 0.01	5.5	120	45	940	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.011	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M104	4/28/2022	860	< 0.15	2.4	180	1100	5800	44	< 0.1	170	0.48	126	0.024	16	900	66	3340	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.073	< 0.0005	< 0.0005	< 0.001	< 0.0025	< 0.0005	< 0.0025	< 0.0005	< 0.0005	< 0.0005	< 0.001	< 0.0005	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.001
M114-2	4/29/2022	270	< 0.15	< 0.02	110	76	820	1.3	< 0.1	16	< 0.002	0.89	< 0.01	0.76	65	38	470	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
OW37-s	4/29/2022	160	0.35	0.071	39	34	440	2.4	1.3	15	0.13	< 0.1	< 0.01	6.2	22	8.3	220	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
Intermediate BedrockGroundwater Flow Zone [2]																																													
M5-3	4/28/2022	440	1.35	1.1	38	42	980	0.9	< 0.1	28	< 0.002	< 0.1	< 0.01	14	150	19	580	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.00011	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	0.00011	< 0.0002	< 0.0001	< 0.0002	0.00011	< 0.0001	< 0.0001	< 0.0002
M6-3	4/28/2022	250	2.76	1.7	40	1500	5700	75	< 0.1	190	< 0.002	< 0.1	< 0.01	20	810	73	4150	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		0.00068	< 0.0005	< 0.001	< 0.0025	< 0.0005	< 0.0025	< 0.0005	0.00079	< 0.0005	< 0.001	< 0.0005	0.0023	0.00079	< 0.0005	< 0.0005	< 0.001
M9-2	4/26/2022	500	0.87	0.24	130	99	1200	6.5	12	35	0.38	< 0.1	< 0.01	5.5	81	11	650	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00031	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.02	< 0.0001	< 0.0001	0.017	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	0.00021
M9-3	4/26/2022	380	0.63	0.14	97	47	810	4.1	5.8	25	0.33	< 0.1	< 0.01	5.6	53	11	445	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00038	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0081	< 0.0001	< 0.0001	0.011	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M52-2	4/26/2022	250	2.3	1.1	48	650	2500	1	< 0.1	35	0.002	< 0.1	< 0.01	18	430	< 1	1280	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.002	< 0.005	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.002
M56-2	4/26/2022	300	< 0.15	0.066	84	15	690	1.4	< 0.1	43	0.057	< 0.1	< 0.01	3	11	67	370	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M58-3	4/27/2022	310	< 0.15	< 0.02	86	3.1	630	0.9	< 0.1	31	< 0.002	0.11	< 0.01	1.5	4.7	31	320	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M59-2	4/28/2022	430	0.45	0.23	140	67	1100	7.2	< 0.1	36	0.014	< 0.1	< 0.01	5.2	35	54	685	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M59-4	4/28/2022	260	< 0.15	0.48	76	10	700	1.2	< 0.1	36	0.007	< 0.1	< 0.01	5.8	25	110	430	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M64-2	4/27/2022	280	1.1	0.94	54	120	960	1	< 0.1	31	0.007	< 0.1	< 0.01	9.9	91	24	475	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.003	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M70-2	4/27/2022	440	1.8	1.4	48	450	2300	1.9	0.96	33	0.017	< 0.1	< 0.01	14	390	12	1200	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0019	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M72	4/27/2022	270	0.57	0.37	62	33	660	1.4	< 0.1	37	0.003	< 0.1	< 0.01	7.5	16	38	345	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M74	4/27/2022	340	1.78	0.46	55	71	840	4.6	< 0.1	35	0.037	< 0.1	< 0.01	16	66	5.8	425	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M75	4/28/2022	430	1.5	1.3	38	75	1100	1.1	< 0.1	26	0.007	< 0.5	< 0.05	15	170	59	645	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M80-1	4/27/2022	160	0.44	0.41	21	12	370	0.8	< 0.1	11	0.004	< 0.1	< 0.01	4.4	37	13	200	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.0025	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	0.00016	0.0009	0.00029	< 0.0002	< 0.0001	< 0.0002	0.0012	< 0.0001	< 0.0001	< 0.0002
M82-1	4/29/2022	330	1.01	0.77	56	41	840	2.2	< 0.1	31	0.003	< 0.1	< 0.01	10	75	45	460	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M82-2	4/29/2022	330	0.21	0.14	110	25	770	2.4	< 0.1	30	0.019	< 0.1	< 0.01	3.8	17	56	445	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M91-1	4/28/2022	280	0.77	0.86	45	8	630	0.8	< 0.1	22	0.005	< 0.1	< 0.01	7	59	47	365	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M95-1	4/27/2022	310	< 0.15	< 0.02	98	4.4	640	1.5	< 0.1	24	0.003	< 0.1	< 0.01	2.2	4.7	37	365	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M106	4/26/2022	370	2.55	1.8	110	1500	5400	1.1	< 0.1	72	< 0.002	< 0.1	< 0.01	23	920	6.9	2970	< 0.04	< 0.02	< 0.04	< 0.04	< 0.02	< 0.02	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.001	< 0.02	< 0.02	< 0.04	< 0.1	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.04	< 0.02	< 0.04	< 0.02	< 0.02	< 0.02	< 0.04
M108	4/28/2022	460	0.7	0.21	120	57	1000	5.1	3.4	33	0.15	< 0.1	< 0.01	6.6	63	18	600	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.0003	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.01	< 0.0001	< 0.0001	0.0029	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M109-1	4/29/2022	490	1.36	0.3	120	99	1200	6.6	12	37	0.28	< 0.1	< 0.01	6.7	89	7.5	620	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.022	0.00014	< 0.0001	0.0051	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M110-1	4/29/2022	650	0.64	0.37	170	140	1600	8.6	0.76	54	0.037	< 0.1	< 0.01	7.9	120	2.1	865	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.036	0.00081	< 0.0001	0.0078	< 0.0005	< 0.0001	< 0.0005	< 0.0001	0.0003	< 0.0001	< 0.0002	< 0.0001	< 0.0002	0.0003	< 0.0001	< 0.0001	< 0.0002
M114-1	4/29/2022	350	0.36	0.15	89	42	790	4.3	6.5	21	0.3	< 0.1	< 0.01	4.5	53	12	430	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00027	0.00015	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0053	< 0.0001	< 0.0001	0.0035	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M121	4/27/2022	510	1.31	0.31	100	74	1200	4.3	< 0.1	45	0.003	< 0.1	< 0.01	12	79	10	600	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	0.00025	< 0.0002	< 0.0002	0.0085	0.0037	< 0.0001	0.0038	< 0.0005	< 0.0001	< 0.0005	0.00023	0.0021	0.00027	< 0.0002	< 0.0001	< 0.0002	0.0023	< 0.0001	< 0.0001	< 0.0002
M123	4/27/2022	440	0.29	0.19	130	45	940	4.2	< 0.1	26	0.02	< 0.1	< 0.01	4.3	50	16	485	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00023	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0063	< 0.0001	< 0.0001	0.003	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M167	4/27/2022	480	1.74	0.7	110	200	1600	3.7	< 0.1	55	0.003	< 0.1	< 0.01	17	140	4.1	790	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0072	< 0.0001	< 0.0001	< 0.002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M168	4/27/2022	510	1.29	0.8	120	210	1700	3.8	< 0.1	42	0.003	< 0.1	< 0.01	13	170	5.4	880	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0086	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M170	4/27/2022	740	1.58	2	33	380	2500	3.9	< 0.1	24	< 0.002	< 0.1	< 0.01	14	520	4.6	1410	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.014	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M172	4/26/2022	310	0.63	0.091	82	27	650	4.3	12	19	0.33	< 0.1	< 0.01	3.2	35	12	360	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00063	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0046	< 0.0001	< 0.0001	0.0026	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M177	4/28/2022	240	0.42	0.25	86	4.7	540	1.8	< 0.1	16	0.005	< 0.1	< 0.01	4.9	6.8	44	335	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M178R-2	4/26/2022	390	0.23	0.17	120	56	910	4.2	1.4	26	0.079	< 0.1	< 0.01	4.7	48	24	505	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00075	0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0049	< 0.0001	< 0.0001	0.001	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M178R-3	4/26/2022	430	0.35	0.2	120	63	970	4.3	1.1	28	0.06	< 0.1	< 0.01	4.7	52	27	545	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00068	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0052	< 0.0001	< 0.0001	0.0011	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M178R-4	4/26/2022	440	0.3	0.17	120	68	1000	4.1	0.21	28	0.037	< 0.1	< 0.01	4.3	54	25	520	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00056	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0062	< 0.0001	< 0.0001	0.0015	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M179	4/28/2022	220	0.15	0.11	78	33	550	2.9	0.43	10	0.021	< 0.1	< 0.01	3.6	26	22	325	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M185-1	4/28/2022	250	1.13	1.3	49	440	2100	1.3	< 0.1	18	0.025	< 0.1	< 0.01	11	370	88	1130	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M185-2	4/28/2022	280	< 0.15	0.21	150	88	840	1.8	0.12	10	0.016	< 0.1	< 0.01	2.5	16	26	535	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.00012	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M186	4/28/2022	330	2.51	2	71	1200	4400	1	0.27	51	0.05	< 0.1	< 0.01	23	770	4.4	2260	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.00025	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	0.0002	< 0.0002	< 0.0001	< 0.0002	0.0002	< 0.0001	< 0.0001	< 0.0002
M187	4/27/2022	250	< 0.15	0.061	100	18	580	2.4	< 0.1	7.1	< 0.002	< 0.1	< 0.01	2	13	34	325	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M188-1	4/28/2022	300	0.56	0.43	63	43	720	1.5	< 0.1	20	0.007	< 0.1	< 0.01	5.5	65	13	420	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M190	4/28/2022	220	< 0.15	0.052	93	36	590	2.5	< 0.1	8.8	0.004	< 0.1	< 0.01	3.2	20	27	360	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0004	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M192	4/28/2022	630	2.11	2.4	81	460	2600	3.8	0.19	52	0.021	< 0.1	< 0.01	21	410	6.4	1370	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.009	0.00025	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
OW1	4/28/2022	410	1.55	1.3	41	48	1000	1.4	< 0.1	29	0.004	< 0.1	< 0.01	13	140	56	575	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	0.0013	< 0.0001	0.00012	< 0.0002	< 0.0001	< 0.0002	0.00012	< 0.0001	< 0.0001	< 0.0002
OW4	4/28/2022	1000	1.04	1.8	120	390	3000	30	9.7	82	0.13	< 0.1	< 0.01	13	440	< 1	1710	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.054	< 0.0005	< 0.0005	< 0.001	< 0.0025	< 0.0005	< 0.0025	0.0019	< 0.0005	< 0.0005	< 0.001	< 0.0005	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.001

[1] M58-4 damaged - no sample collected

[2] Insufficient volume at M6-3 to collect a bottle for 1,4-dioxane analysis

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Table 5b: Groundwater Quality Results and Reasonable Use Limits - April 26 - 29, 2022

Name	Date	1,4-dioxane	Alkalinity	Chloride	Dissolved Organic Carbon	Iron	Manganese	Sodium	Total Dissolved Solids	1,1-dichloroethylene	Benzene	Ethylbenzene	Xylenes (Total)	Toluene
		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
Shallow Groundwater Flow Zone														
RUL		*0.001* [1]	*390*	*130*	*3.6*	*0.18*	*0.034*	*109*	*452*	*0.0035*	*0.0014*	*0.0013*	*0.15*	*0.0121*
M54-4	4/26/2022	< 0.001	*450*	24	2.9	< 0.1	0.022	40	*490*	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M66-2	4/28/2022	< 0.001	260	130	1.1	< 0.1	< 0.002	89	*790*	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M67-2	4/27/2022	< 0.001	370	4.8	1.6	*1.5*	*0.062*	50	355	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
75% RUL [2]		*n/a*	*293*	*98*	*2.7*	*0.14*	*0.026*	*82*	*339*	*0.0026*	*0.0011*	*0.00098*	*0.11250*	*0.0091*
M80-2	4/27/2022	< 0.001	*330*	37	1.4	< 0.1	< 0.002	30	*400*	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M87-2	4/26/2022	< 0.001	210	30	1.1	< 0.1	0.005	12	310	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
OW37-s	4/29/2022	< 0.001	160	34	2.4	*1.3*	*0.13*	22	220	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
Intermediate BedrockGroundwater Flow Zone														
RUL		*0.001* [1]	*400*	*132*	*3.5*	*0.18*	*0.032*	*106*	*465*	*0.0035*	*0.0014*	*0.0013*	*0.15*	*0.0121*
M177	4/28/2022	< 0.001	240	4.7	1.8	< 0.1	0.005	6.8	335	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M179	4/28/2022	< 0.001	220	33	2.9	*0.43*	0.021	26	325	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M185-1	4/28/2022	< 0.001	250	*440*	1.3	< 0.1	0.025	*370*	*1130*	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M185-2	4/28/2022	< 0.001	280	88	1.8	0.12	0.016	16	*535*	< 0.0001	0.00012	< 0.0001	< 0.0001	< 0.0002
M186	4/28/2022	< 0.001	330	*1200*	1	*0.27*	*0.05*	*770*	*2260*	< 0.0001	0.00025	< 0.0001	0.0002	< 0.0002
M187	4/27/2022	< 0.001	250	18	2.4	< 0.1	< 0.002	13	325	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M188-1	4/28/2022	< 0.001	300	43	1.5	< 0.1	0.007	65	420	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M190	4/28/2022	< 0.001	220	36	2.5	< 0.1	0.004	20	360	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M192	4/28/2022	*0.009*	*630*	*460*	*3.8*	*0.19*	0.021	*410*	*1370*	< 0.0001	0.00025	< 0.0001	< 0.0001	< 0.0002
75% RUL [2]		*n/a*	*300*	*99*	*2.6*	*0.14*	*0.024*	*80*	*349*	*0.0026*	*0.0011*	*0.00098*	*0.11*	*0.0091*
M80-1	4/27/2022	< 0.001	160	12	0.8	< 0.1	0.004	37	200	< 0.0001	*0.0025*	0.00016	0.0012	< 0.0002
M82-1	4/29/2022	< 0.001	*330*	41	2.2	< 0.1	0.003	75	*460*	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M82-2	4/29/2022	< 0.001	*330*	25	2.4	< 0.1	0.019	17	*445*	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M106	4/26/2022	< 0.001	*370*	*1500*	1.1	< 0.1	< 0.002	*920*	*2970*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.04

0.05 Groundwater results exceed Reasonable Use Limits (RUL)

[1] Site-specific RUL for 1,4 dioxane set by ERT Order dated December 24, 2015

[2] Wells located on the boundary of WM property, including the CAZ boundary, are compared to 75% of RUL concentrations

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Table 6: Leachate Chemistry Results - May 11, 2022

		North Chamber	South Chamber
General and Inorganic Parameters			
Alkalinity	mg/L	1300	1900
Ammonia	mg/L	103	210
Biochemical Oxygen Demand	mg/L	11	13
Chemical Oxygen Demand	mg/L	140	190
Chloride	mg/L	250	590
Conductivity	µS/cm	3100	5100
Dissolved Organic Carbon	mg/L	45	74
Hardness	mg/L	720	810
Naphthalene	mg/L	0.0053	0.004
Nitrate	mg/L	< 0.1	< 0.1
Nitrite	mg/L	< 0.01	< 0.01
N-nitrosodimethylamine	ng/L	< 8	< 8
pH (Lab)	unitless	7.73	7.81
Phenols	mg/L	0.0045	0.0074
Phosphorus (total)	mg/L	0.58	0.97
Sulphate	mg/L	48	< 1
Total Dissolved Solids	mg/L	1320	2040
Total Kjeldahl Nitrogen	mg/L	110	180
Metals			
Boron	mg/L	0.98	1.9
Cadmium	mg/L	< 0.0001	< 0.0001
Calcium	mg/L	170	150
Chromium (Total)	mg/L	0.005	0.012
Cobalt	mg/L	0.004	0.0071
Copper	mg/L	0.008	0.004
Iron	mg/L	11	7.5
Lead	mg/L	0.0014	0.0009
Magnesium	mg/L	58	92
Manganese	mg/L	0.83	0.54
Nickel	mg/L	0.016	0.044
Potassium	mg/L	54	110
Sodium	mg/L	220	490
Zinc	mg/L	0.016	0.013
Volatile Organic Compounds (VOCs)			
1,1,1,2-Tetrachloroethane	mg/L	< 0.001	< 0.001
1,1,1-Trichloroethane	mg/L	< 0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	< 0.001	< 0.001
1,1,2-Trichloroethane	mg/L	< 0.001	< 0.001
1,1-Dichloroethane	mg/L	< 0.0005	< 0.0005
1,1-Dichloroethylene	mg/L	< 0.0005	< 0.0005
1,2-Dichlorobenzene (o)	mg/L	< 0.001	< 0.001
1,2-Dichloroethane	mg/L	< 0.001	< 0.001
1,3,5-Trimethylbenzene	mg/L	0.0024	< 0.001
1,3-Dichlorobenzene (m)	mg/L	< 0.001	< 0.001
1,4-Dichlorobenzene (p)	mg/L	0.0066	0.0054
1,4-Dioxane	mg/L	0.022	0.016
Benzene	mg/L	0.005	0.0067
Chlorobenzene	mg/L	0.0048	0.0043
Chloroethane	mg/L	0.002	< 0.001
Chloromethane	mg/L	< 0.0025	< 0.0025
Cis-1,2-Dichloroethylene	mg/L	< 0.0005	< 0.0005
Dichloromethane	mg/L	0.0085	0.011
Ethylbenzene	mg/L	0.013	0.009
m+p-Xylene	mg/L	0.036	0.02
o-Xylene	mg/L	0.0077	0.0062
Styrene	mg/L	< 0.001	< 0.001
Tetrachloroethylene	mg/L	< 0.0005	< 0.0005
Toluene	mg/L	0.0065	0.0025
Trans-1,2-dichloroethylene	mg/L	< 0.0005	< 0.0005
Trichloroethylene	mg/L	< 0.0005	< 0.0005
Vinyl Chloride	mg/L	< 0.001	< 0.001

Table 7a: Surface Water Characteristics - April 26, 2022

Date	Parameter	Unit	Surface Water Station									
			S2	S3	S4R	S5	S6	S7	S8R	S18	S19	S20
4-May-20	Velocity:	m/s	NM	NM	NM	0.15	NM	NM	0.60	NM	0.1	0.85
	Depth:	m	NM	NM	NM	0.22	NM	NM	0.15	NM	0.18	0.22
	Width:	m	NM	NM	NM	2.20	NM	NM	0.9	NM	1.90	1.80
	Estimated Flow Rate:	m^3/s	NM	NM	NM	0.07	NM	NM	0.08	NM	0.03	0.34

NM: Not Measured (Flow was insufficient to measure or water was ponded)

Table 7b: Surface Water Quality Results – April 26, 2022

			Marysville Creek				Beechwood Ditch			South of Beechwood Road		
			S2	S6	S7	S3	S5	S4R	S8R	S18	S19	S20
			(upstream)	(downstream)	(downstream)	(downstream)	(upstream)	(downstream)	(downstream)	(upstream)	(downstream)	(downstream)
		Date	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022
Reading Name	Units	PWQO										
Inorganic and General Parameters												
Alkalinity	mg/L		170	160	160	160	180	210	220	170	190	200
Ammonia	mg/L		< 0.15	< 0.15	0.49	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	0.17	< 0.15
Ammonia (unionized)	mg/L	0.02	< 0.0025	< 0.0023	0.0076	< 0.0025	< 0.0017	< 0.0024	< 0.0028	< 0.0017	0.0017	< 0.0012
Biochemical Oxygen Demand	mg/L		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chemical Oxygen Demand	mg/L		28	27	29	24	19	21	19	25	21	14
Chloride	mg/L		22	17	16	13	2.2	1.9	26	4.1	14	8.4
Conductivity	µS/cm		380	360	350	340	350	410	520	320	400	410
Hardness	mg/L		170	160	160	160	180	210	220	170	190	200
Nitrate	mg/L		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nitrite	mg/L		0.018	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.031
Nitrate + Nitrite	mg/L											
Phenols	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Phosphorus (total)	mg/L	0.03	*0.084*	*0.038*	*0.086*	*0.063*	*0.065*	*0.064*	*0.034*	< 0.03	*0.09*	*0.032*
Sulphate	mg/L		< 1	< 1	< 1	< 1	< 1	3.4	22	< 1	5.4	< 1
Total Dissolved Solids	mg/L		170	165	150	160	160	185	220	135	155	160
Total Suspended Solids	mg/L		< 10	< 10	< 10	11	< 10	< 10	< 10	< 10	< 10	< 10
Metals												
Boron	mg/L	0.2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.032	0.026	< 0.02	< 0.02	0.021
Cadmium	mg/L		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Calcium	mg/L		60	53	51	54	57	68	71	64	70	69
Chromium (III)	mg/L	0.0089	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chromium (VI)	mg/L	0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chromium (Total)	mg/L		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	mg/L	0.0009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Copper	mg/L	0.005	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Iron	mg/L	0.3	*0.35*	*0.58*	*0.58*	*0.62*	0.3	0.12	< 0.1	< 0.1	< 0.1	< 0.1
Lead	mg/L	0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Magnesium	mg/L		7.9	7.7	7.9	7.6	9.2	10	13	2.6	4.4	5.6
Nickel	mg/L	0.025	< 0.001	0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L		3	2.2	1.9	1.9	1.9	3.3	3.3	1.7	1.9	1.6
Sodium	mg/L		14	10	10	8.9	3.3	4.8	20	2.2	8.5	6.7
Zinc	mg/L	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Volatile Organic Compounds (VOCs)												
1,4-dioxane	mg/L	0.02	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	mg/L	0.007	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Field Measurements												
pH (Field)	unitless	6.5-8.5	7.72	7.69	7.69	7.74	7.62	7.79	7.84	7.62	7.54	7.46
Conductivity (Field)	µS/cm		395	360	355	348	355	415	516	340	405	412
Dissoved Oxygen (Field)	mg/L		5.51	5.3	5.38	5.35	4.84	5.26	5.55	3.76	4.04	3.33
Temperature (Field)	°C		14.4	14.4	14.4	13.8	12.5	12.1	12.4	12.6	13.1	12.4

Exceeds PWQO

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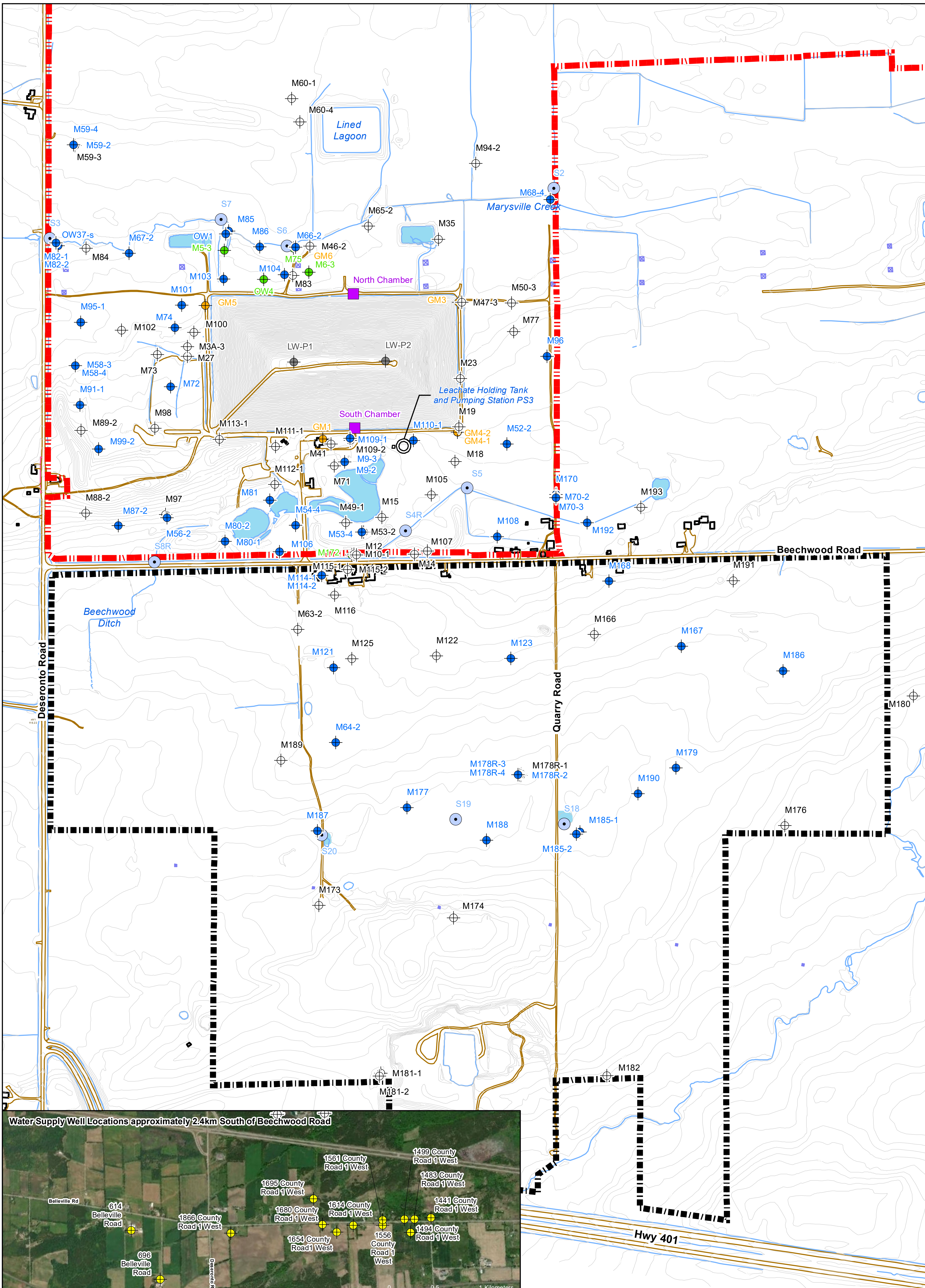
Table 8: Subsurface Gas Monitoring Results - April 29, 2022

Gas Monitor	Location	Reading (ppm)
GM1	North of garage area, south of waste mound	45
GM3	Northeast corner of waste mound	35
GM4-1	Southeast corner of waste mound	50
GM4-2		55
GM5	Northwest corner of waste mound	10
GM6	North of waste mound	55

FIGURES



LEGEND

	Topographic Contour Lines
	Surface Water
	Property Boundary
	Proposed CAZ Boundary
M35	Monitoring Well Used to Measure Water Level (Not Sampled)
M53-4	Monitoring Well Used to Measure Water Level and Sampled for Chemistry
M5-3	Monitoring Well Sampled for Chemistry (Not used for Water Levels)
GM1	Gas Monitoring Well
	Leachate Chambers
	Lechate Monitoring Well
S2	Surface Water Monitoring Location
1097 Beechwood	Domestic Water Supply Well Sampled for Chemistry

REFERENCES

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-UNITS: METERS
-PROJECTION: UTM NAD83 ZONE 18
-DATA SOURCE: WM CANADA, BLUMETRIC, MNRO, NRCAN

0 25 50 100 150 200
Metres
1:8,000

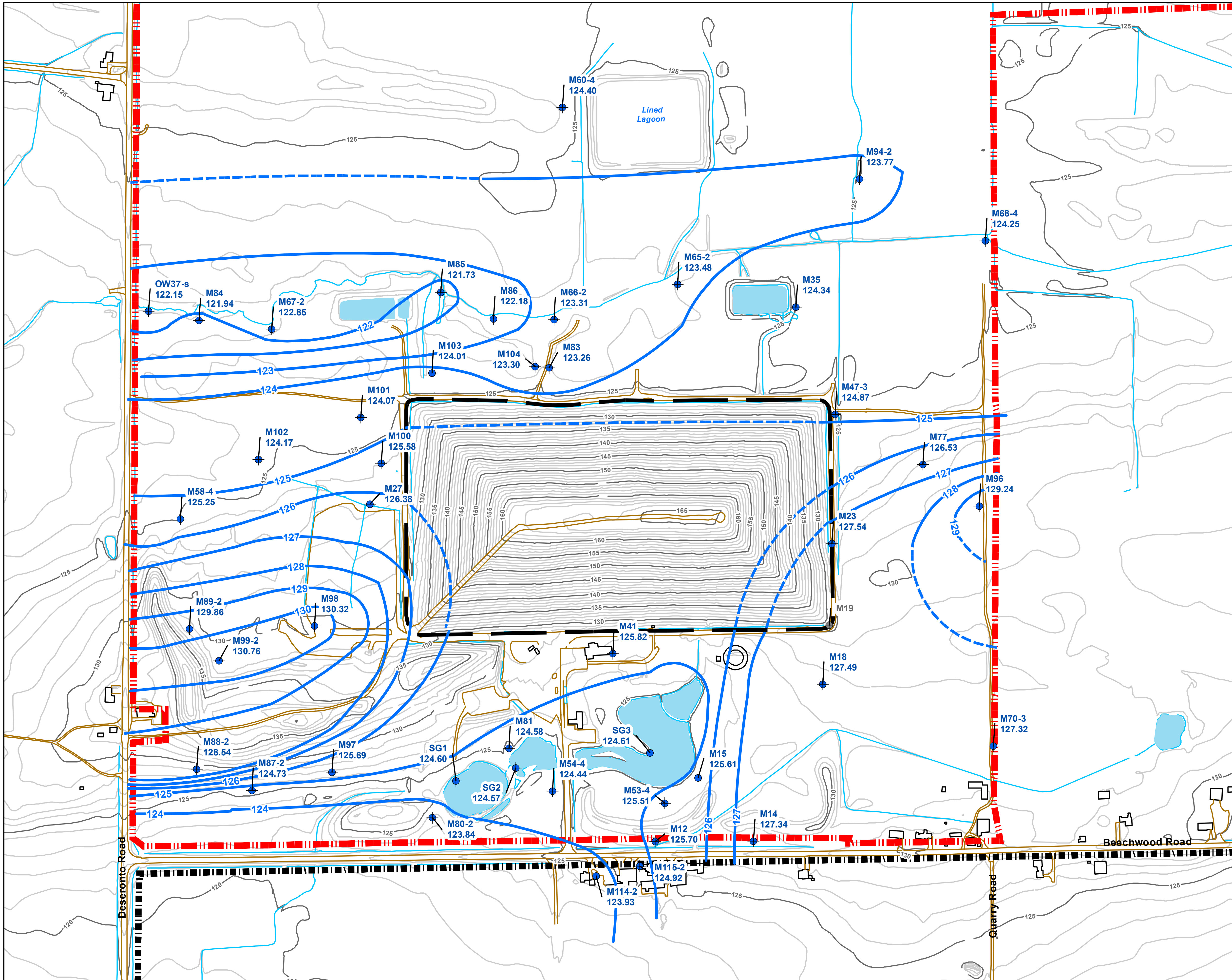
BluMetric Environmental
The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

CLIENT
WM WASTE MANAGEMENT

PROJECT
WASTE MANAGEMENT RICHMOND LANDFILL SPRING 2022 SEMI-ANNUAL REPORT

TITLE
SITE PLAN AND MONITORING LOCATIONS

PROJECT #	DATE		
210166-03	June 2021		
DRAWN	CHECKED	FIG NO.	REV
IT	MC	01	0



LEGEND

- Potentiometric Surface (masl)
- InferredPotentiometric Surface (masl)
- Topographic Contour Lines (5 m)
- Topographic Contour Lines (1 m)
- Surface Water
- Property Boundary
- Proposed CAZ Boundary
- M53-4 Shallow Groundwater Zone Elevation Monitor
- M5-3 Monitor Not Used in Contouring
- M35 Staff Gauge Location

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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0 40 80 160 240
Metres
1:5,000

CLIENT

WASTE MANAGEMENT

PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL SPRING 2022 SEMI-ANNUAL REPORT

TITLE

SHALLOW GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE – APRIL 25, 2022

BluMetric™ Environmental

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

PROJECT #	DATE
220196-03	July, 2022

DRAWN	CHECKED	FIG NO.	REV
IT	FR	02	0

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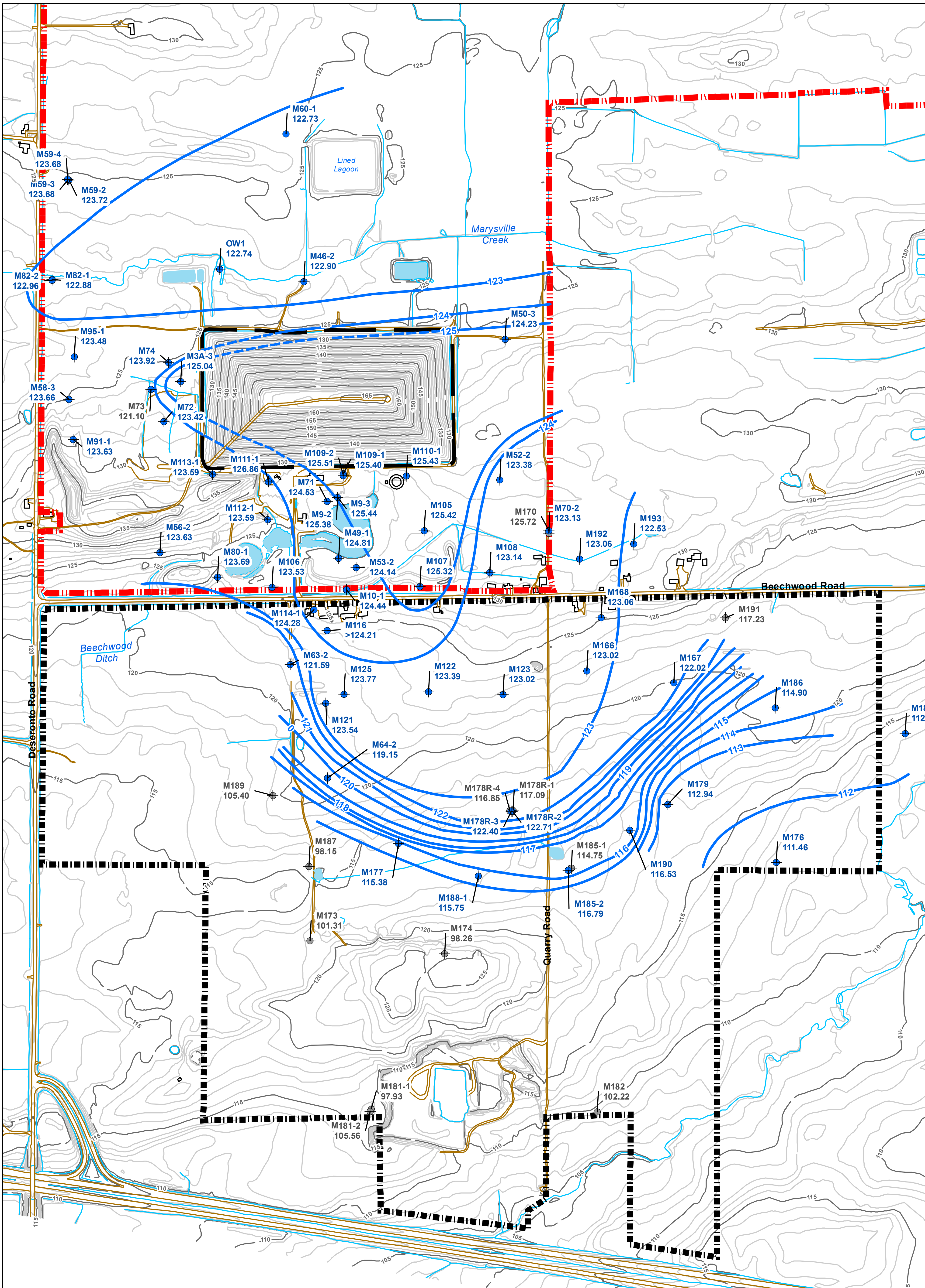

LEGEND

- Potentiometric Surface (masl)
- Inferred Potentiometric Surface (masl)
- Topographic Contour Lines (5 m)
- Topographic Contour Lines (1 m)
- Surface Water
- Property Boundary
- Proposed CAZ Boundary
- M166 Intermediate Groundwater Zone Elevation Monitor
- M189 Monitor Not Used in Contouring

REFERENCES

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0 50 100 200 300 400
Metres
1:8,000

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

CLIENT

WM WASTE MANAGEMENT

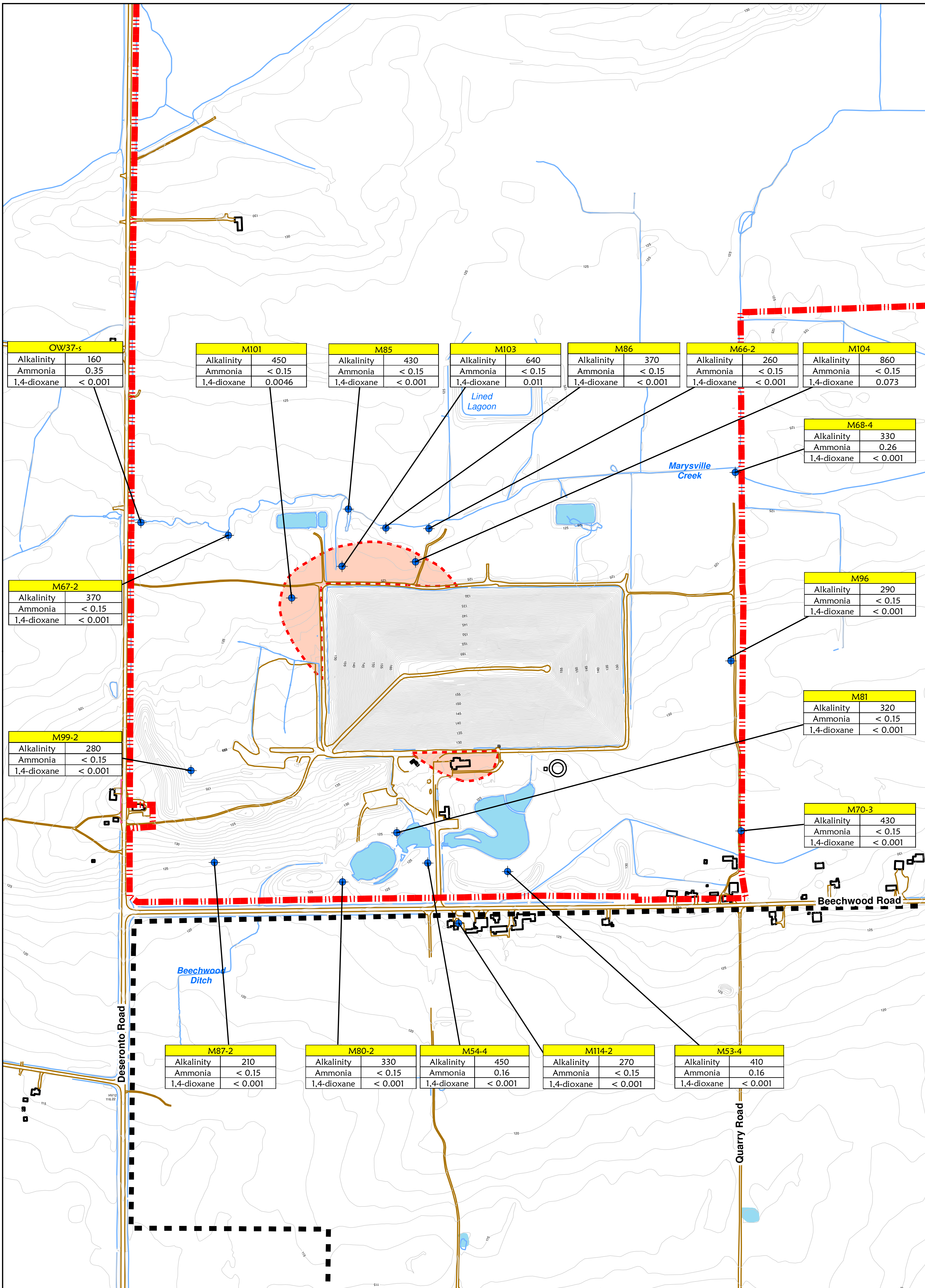
PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL
SPRING 2022 SEMI-ANNUAL REPORT

TITLE

INTERMEDIATE BEDROCK GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE – APRIL 25, 2022

PROJECT #	DATE		
220196-03	July, 2022		
DRAWN	CHECKED	FIG NO.	REV
IT	FR	03	0



LEGEND

- Topographic Contour Lines
- Surface Water
- Property Boundary
- Proposed CAZ Boundary
- M99-2 Shallow Monitoring Well Sampled for Chemistry
- M99-2 Shallow Monitoring Well Not Sampled (see text for detailed)
- 1,4 Dioxane Impacted Area

NOTE:
M58-4 damaged - no sample collected.

Parameter	Units
Alkalinity	mg/L CaCO3
Ammonia	mg/L
1,4-dioxane	mg/L

Note:
Monitoring Well M85 was Purged
Dry - No Samples Collected

REFERENCES

PROPRIETARY INFORMATION MAY NOT BE REPRODUCED OR DIVULGED WITHOUT PRIOR WRITTEN CONSENT OF BLUMETRIC ENVIRONMENTAL INC.
DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.
-UNITS: METERS
-PROJECTION: UTM NAD83 ZONE 18
-DATA SOURCE: WM CANADA, BLUMETRIC, MNRO, NRCAN

0 25 50 100 150 200
Metres
1:6,650

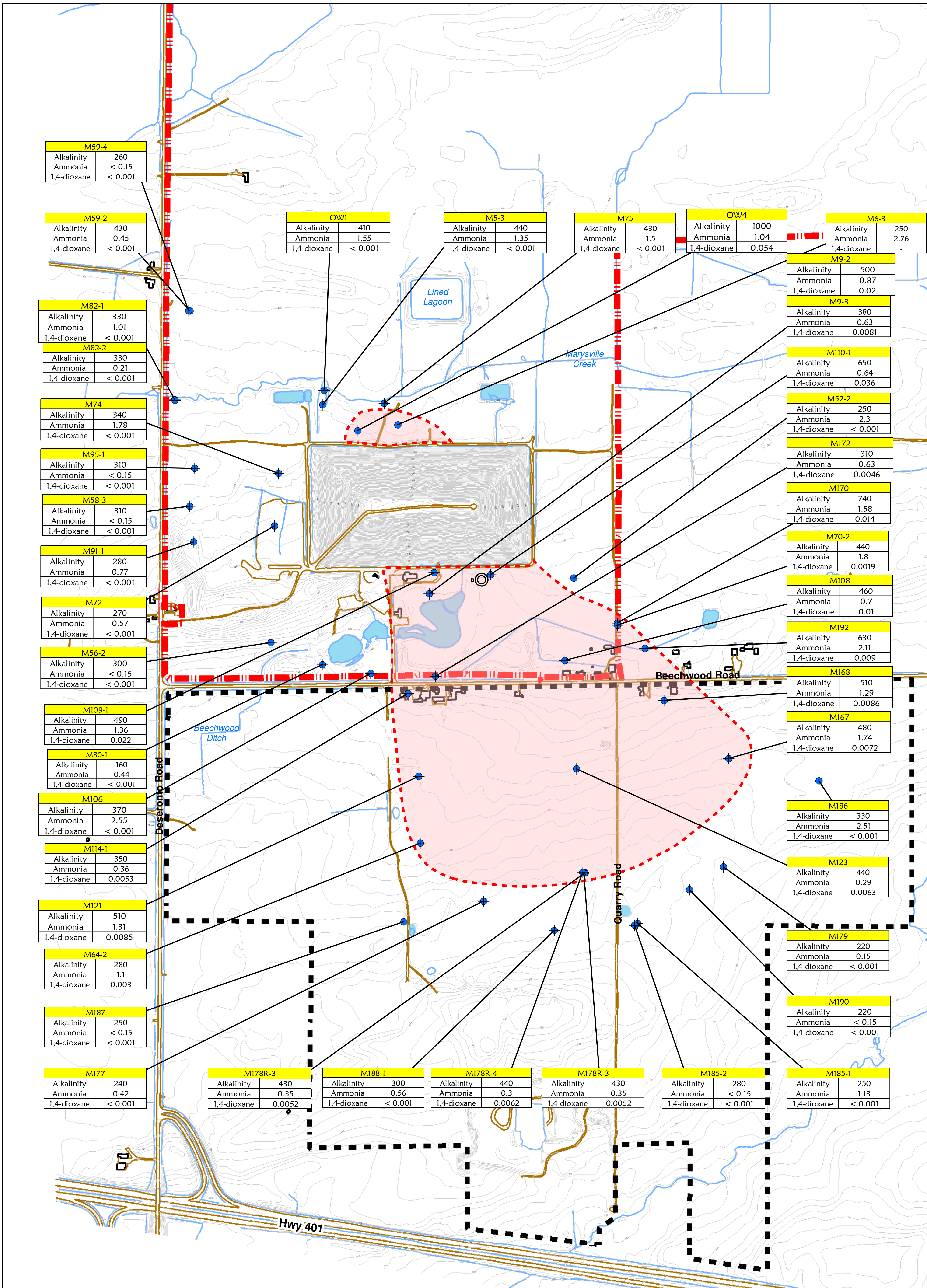
BluMetric Environmental
The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

CLIENT
WASTE MANAGEMENT

PROJECT
WASTE MANAGEMENT RICHMOND LANDFILL
SPRING 2022 SEMI-ANNUAL REPORT

TITLE
SHALLOW GROUNDWATER
FLOW ZONE CONCENTRATIONS

PROJECT #	DATE		
220196-03	June 2021		
DRAWN	CHECKED	FIG NO.	REV
IT	MC	04	0



LEGEND

- Topographic Contour Lines
- Surface Water
- Property Boundary
- Proposed CAZ Boundary
- M9-2 Intermediate Monitoring Well Sampled for Chemistry
- 1,4 Dioxane Impacted Area

Parameter	Units
Alkalinity	mg/L CaCO3
Ammonia	mg/L
1,4-dioxane	mg/L

REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.
-UNITS: METERS
-PROJECTION: UTM NAD83 ZONE 18
-DATA SOURCE: WM CANADA, BLUMETRIC, MNRO, NRCAN

0 25 50 100 150 200
Metres
1:9,000

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

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WASTE MANAGEMENT

PROJECT
WASTE MANAGEMENT RICHMOND LANDFILL SPRING 2022 SEMI-ANNUAL REPORT

TITLE
INTERMEDIATE BEDROCK GROUNDWATER FLOW ZONE CONCENTRATIONS

PROJECT #	DATE
220196-03	June 2021

DRAWN	CHECKED	FIG NO.	REV
IT	MC	05	0

APPENDIX A

Monitoring Well Inventory

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
2054	335293	4902797
2055	335402	4902782
M3A-1	334990	4902928
M3A-2	334990	4902930
M3A-3	334990	4902930
M4-1	335006	4903036
M4-2	335006	4903038
M4-3	335006	4903038
M5-1	335003	4903162
M5-2	335003	4903163
M5-3	335003	4903163
M6-1	335200	4903172
M6-2	335201	4903174
M6-3	335201	4903174
M9-1	335410	4902787
M9-2	335410	4902789
M9-3	335410	4902789
M9R-1	335400	4902787
M10-1	335494	4902596
M10-2	335494	4902596
M10-3	335494	4902594
M12	335500	4902596
M14	335625	4902637
M15	335528	4902695
M16	335447	4902710
M18	335648	4902866
M19	335632	4902944
M23	335602	4903049
M27	334997	4902908
M28	334897	4902853
M29	334924	4902983
M30	334999	4903033
M31	334857	4902977
M35	335458	4903336
M38	335006	4902978
M39	335299	4903310
M41	335368	4902818
M42-1	335006	4903006
M42-2	335007	4903008
M42-3	335007	4903008
M43-1	335475	4902588
M43-2	335476	4902590
M43-3	335476	4902590
M45-1	334790	4904582
M45-2	334790	4904582
M45-3	334790	4904582
M46-1	335185	4903230
M46-2	335185	4903232
M47-1	335552	4903214
M47-2	335552	4903215
M47-3	335552	4903215

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
M48-1	334838	4902564
M48-2	334839	4902565
M48-3	334839	4902565
M49-1	335454	4902658
M49-2	335455	4902660
M49-3	335455	4902660
M50-1	335660	4903247
M50-2	335660	4903248
M50-3	335660	4903248
M51-1	335714	4903073
M51-2	335714	4903075
M51-3	335714	4903075
M52-1	335748	4902939
M52-2	335748	4902940
M52-3	335748	4902940
M53-1	335501	4902651
M53-2	335499	4902650
M53-3	335498	4902650
M53-4	335496	4902649
M54-1	335346	4902623
M54-2	335347	4902622
M54-3	335347	4902620
M54-4	335348	4902618
M55-1	334961	4903151
M55-2	334962	4903149
M55-3	334962	4903148
M55-4	334963	4903146
M56-1	335066	4902508
M56-2	335065	4902545
M57	335418	4902623
M58-1	334760	4902816
M58-2	334760	4902814
M58-3	334761	4902812
M58-4	334761	4902811
M59-1	334609	4903287
M59-2	334607	4903287
M59-3	334606	4903287
M59-4	334604	4903287
M60-1	335044	4903538
M60-3	335079	4903494
M60-4	335077	4903494
M61-1	334457	4903750
M61-2	334456	4903749
M61-3	334455	4903748
M61-4	334454	4903747
M62-1	335166	4904438
M62-2	335168	4904441
M62-3	335166	4904441
M62-4	335165	4904440
M63-1	335424	4902393
M63-2	335425	4902394

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
M64-1	335585	4902174
M64-2	335585	4902176
M65-1	335297	4903314
M65-2	335298	4903316
M66-1	335154	4903218
M66-2	335155	4903219
M67-1	334799	4903089
M67-2	334799	4903090
M68-1	335670	4903504
M68-2	335671	4903502
M68-3	335671	4903500
M68-4	335672	4903499
M69-1	335062	4904299
M69-2	335063	4904298
M69-3	335063	4904296
M69-4	335064	4904295
M70-1	335890	4902862
M70-2	335891	4902860
M70-3	335891	4902858
M71	335390	4902773
M72	334981	4902831
M73	334931	4902891
M74	334950	4902962
M75	335151	4903215
M76	335675	4903217
M77	335685	4903188
M78	335391	4902776
M79	335673	4903215
M80-1	335207	4902532
M80-2	335206	4902534
M81	335275	4902654
M82-1	334640	4903060
M82-2	334641	4903058
M83	335169	4903156
M84	334702	4903072
M85	334999	4903208
M86	335077	4903195
M87-1	334959	4902493
M87-2	334965	4902495
M88-1	334883	4902497
M88-2	334885	4902499
M89-1	334815	4902673
M89-2	334818	4902674
M90-1	334520	4903845
M90-2	334522	4903843
M91-1	334798	4902729
M91-2	334792	4902734
M93	335006	4903908
M94-1	335497	4903519
M94-2	335486	4903526
M95-1	334743	4902908

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
M95-2	334740	4902917
M96	335774	4903158
M97	335059	4902551
M98	334976	4902730
M99-1	334869	4902646
M99-2	334869	4902646
M100	334994	4902965
M101	334949	4903015
M102	334836	4902919
M103	335021	4903101
M104	335150	4903152
M105	335620	4902778
M106	335331	4902549
M107	335650	4902654
M108	335791	4902733
M109-1	335405	4902844
M109-2	335407	4902840
M110-1	335543	4902883
M110-2	335546	4902884
M111-1	335250	4902774
M111-2	335254	4902774
M112-1	335274	4902692
M112-2	335277	4902693
M113-1	335123	4902751
M113-2	335119	4902750
M114-1	335437	4902530
M114-2	335439	4902528
M115-1	335489	4902561
M115-2	335490	4902558
M116	335480	4902494
M117	335586	4902525
M121	335529	4902337
M122	335742	4902433
M123	335905	4902479
M125	335561	4902368
M166	336069	4902589
M167	336266	4902624
M168	336063	4902714
M170	335889	4902865
M171	335759	4903206
M172	335490	4902593
M173	335661	4901812
M174	335961	4901879
M176	336613	4902308
M177	335784	4902084
M178-1	336032	4902203
M178-2	336032	4902206
M178-3	336035	4902209
M178R-1	336008	4902236
M178R-2	336008	4902233
M178R-3	336005	4902233

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
M178R-4	336002	4902232
M178R-5	335997	4902232
M179	336338	4902357
M180	336801	4902677
M181-1	335912	4901492
M181-2	335912	4901492
M182	336402	4901643
M183	336953	4901770
M184	336176	4901998
M185-1	336170	4902151
M185-2	336170	4902151
M186	336509	4902627
M187	335607	4901972
M188-1	335979	4902069
M188-2	335978	4902068
M189	335479	4902099
M190	336274	4902275
M191	336332	4902802
M192	335976	4902826
M193	336082	4902896
M194-1	335564	4901886
M194-2	335568	4901889
M195	335592	4902084
M199	335717	4902027
M200	335793	4902059
M201	335829	4901991
M202	335932	4902013
M203	335709	4902128
M204	335910	4902186
M205	336077	4902128
M206	335938	4902329
M207	336131	4902261
M217	335158	4903386
M218	335260	4903407
OW1	334995	4903200
OW4	335108	4903128
OW5	335113	4903134
OW36	334799	4903100
OW37-d	334630	4903063
OW37-s	334634	4903062
OW54-d	335406	4902785
OW54-i	335406	4902785
OW54-s	335406	4902785
OW55-d	335376	4903186
OW55-i	335376	4903186
OW55-s	335376	4903184
OW56-d	335106	4903131
OW56-i	335106	4903131
OW56-s	335106	4903129
OW57	335117	4902762
PW1	335465	4902639
PW2	334988	4903095

Appendix A: Monitoring Well Inventory

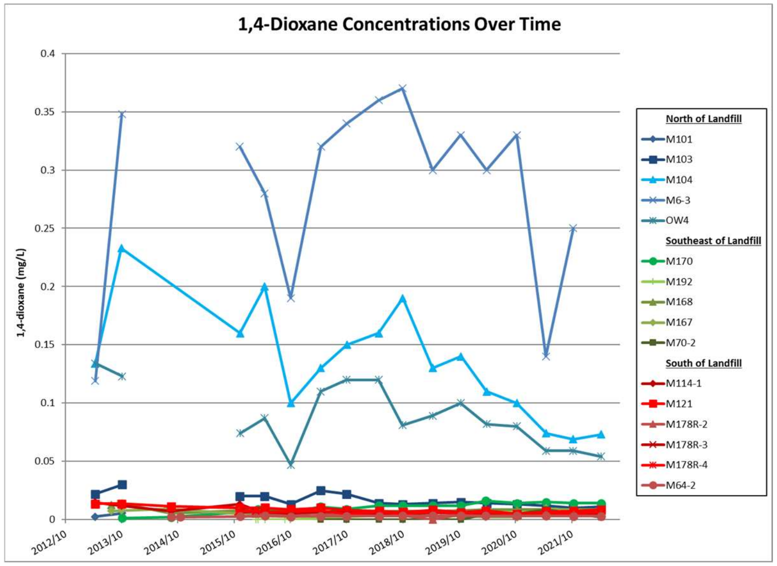
	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
PW3	335620	4902778
PW4	335626	4902775
PW5	335066	4902547

APPENDIX B

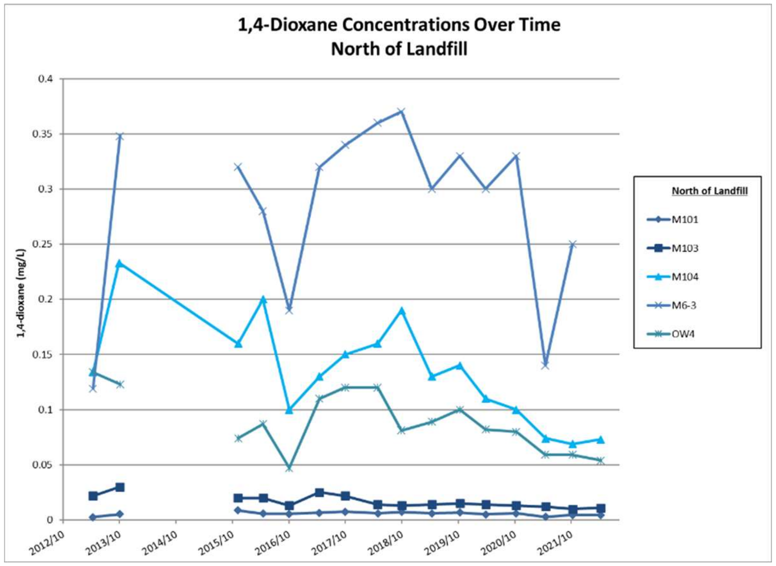
Time-Concentration Plots for 1,4-Dioxane and Alkalinity at Selected Wells

Appendix B – 1,4-Dioxane at Selected Wells Time-Concentration Plots

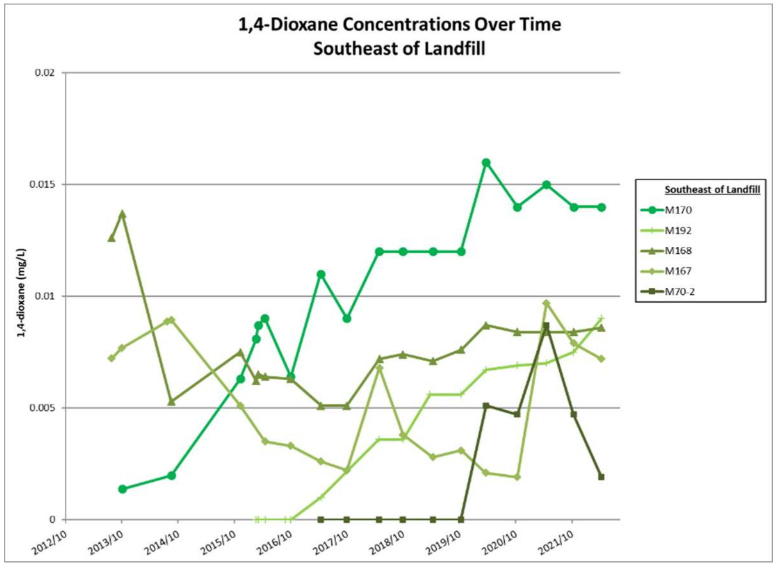
Plot A



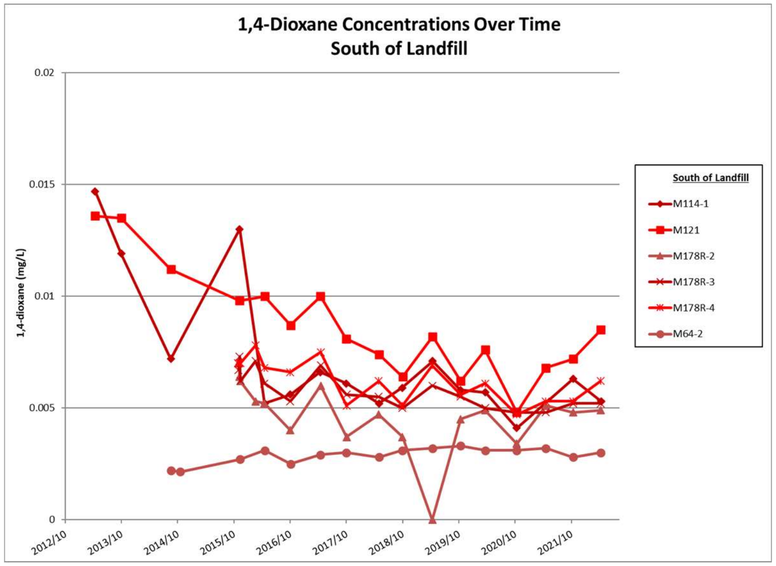
Plot B



Plot C



Plot D



APPENDIX C

Results from Analytical Quality Assurance / Quality Control (QA/QC) Program

Appendix C

Summary of Results with Relative Percent Difference (RPD [1]) greater than 20%

Location	Parameter	Unit	Regular Sample	Field Duplicate	RPD (%)	RDL[2]	Comment

[1] RPD (%) = 100 * ABS (Regular Sample - Duplicate Sample) / ([Regular Sample + Duplicate Sample] / 2)

[2] RDL = Laboratory Reportable Detection Limit

Detailed Results from Field Duplicate vs. Regular Samples

Reading Name	Units	M123 2022-04-27 Field Duplicate	M123 2022-04-27 Regular Sample	RPD (%)
General/Inorganic Parameters				
Alkalinity	mg/L	430	440	2.30
Ammonia	mg/L	0.28	0.29	3.51
Boron	mg/L	0.17	0.19	11.11
Calcium	mg/L	120	130	8.00
Chloride	mg/L	45	45	0.00
Conductivity	µS/cm	910	940	3.24
Dissolved Organic Carbon	mg/L	3.9	4.2	7.41
Iron	mg/L	< 0.1	< 0.1	0.00
Magnesium	mg/L	26	26	0.00
Manganese	mg/L	0.019	0.02	5.13
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Potassium	mg/L	4.2	4.3	2.35
Sodium	mg/L	49	50	2.02
Sulphate	mg/L	16	16	0.00
Total Dissolved Solids	mg/L	515	485	6.00
Volatile Organic Compounds (VOCs)				
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,1,1-Trichloroethane	mg/L	< 0.0001	< 0.0001	0.00
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,1,2-Trichloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,1-Dichloroethane	mg/L	0.00024	0.00023	4.26
1,1-Dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
1,2-Dichlorobenzene (o)	mg/L	< 0.0002	< 0.0002	0.00
1,2-Dichloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,3,5-Trimethylbenzene	mg/L	< 0.0002	< 0.0002	0.00
1,3-Dichlorobenzene (m)	mg/L	< 0.0002	< 0.0002	0.00
1,4-Dichlorobenzene (p)	mg/L	< 0.0002	< 0.0002	0.00
1,4-Dioxane	mg/L	0.0063	0.0063	0.00
Benzene	mg/L	< 0.0001	< 0.0001	0.00
Chlorobenzene	mg/L	< 0.0001	< 0.0001	0.00
Chloroethane	mg/L	0.0035	0.003	15.38
Chloromethane	mg/L	< 0.0005	< 0.0005	0.00
Cis-1,2-Dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Dichloromethane	mg/L	< 0.0005	< 0.0005	0.00
Ethylbenzene	mg/L	< 0.0001	< 0.0001	0.00
m+p-Xylene	mg/L	< 0.0001	< 0.0001	0.00
o-Xylene	mg/L	< 0.0001	< 0.0001	0.00
Styrene	mg/L	< 0.0002	< 0.0002	0.00
Tetrachloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Toluene	mg/L	< 0.0002	< 0.0002	0.00
Total Xylenes	mg/L	< 0.0001	< 0.0001	0.00
Trans-1,2-dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Trichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Vinyl Chloride	mg/L	< 0.0002	< 0.0002	0.00

Detailed Results from Field Duplicate vs. Regular Samples

Reading Name	Units	M188-1 2022-04-28 Field Duplicate	M188-1 2022-04-28 Regular Sample	RPD (%)
General/Inorganic Parameters				
Alkalinity	mg/L	300	300	0.00
Ammonia	mg/L	0.53	0.56	5.50
Boron	mg/L	0.44	0.43	2.30
Calcium	mg/L	63	63	0.00
Chloride	mg/L	44	43	2.30
Conductivity	µS/cm	710	720	1.40
Dissolved Organic Carbon	mg/L	1.4	1.5	6.90
Iron	mg/L	< 0.1	< 0.1	0.00
Magnesium	mg/L	20	20	0.00
Manganese	mg/L	0.007	0.007	0.00
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Potassium	mg/L	5.6	5.5	1.80
Sodium	mg/L	66	65	1.53
Sulphate	mg/L	13	13	0.00
Total Dissolved Solids	mg/L	395	420	6.13
Volatile Organic Compounds (VOCs)				
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,1,1-Trichloroethane	mg/L	< 0.0001	< 0.0001	0.00
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,1,2-Trichloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,1-Dichloroethane	mg/L	< 0.0001	< 0.0001	0.00
1,1-Dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
1,2-Dichlorobenzene (o)	mg/L	< 0.0002	< 0.0002	0.00
1,2-Dichloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,3,5-Trimethylbenzene	mg/L	< 0.0002	< 0.0002	0.00
1,3-Dichlorobenzene (m)	mg/L	< 0.0002	< 0.0002	0.00
1,4-Dichlorobenzene (p)	mg/L	< 0.0002	< 0.0002	0.00
1,4-Dioxane	mg/L	< 0.001	< 0.001	0.00
Benzene	mg/L	< 0.0001	< 0.0001	0.00
Chlorobenzene	mg/L	< 0.0001	< 0.0001	0.00
Chloroethane	mg/L	< 0.0002	< 0.0002	0.00
Chloromethane	mg/L	< 0.0005	< 0.0005	0.00
Cis-1,2-Dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Dichloromethane	mg/L	< 0.0005	< 0.0005	0.00
Ethylbenzene	mg/L	< 0.0001	< 0.0001	0.00
m+p-Xylene	mg/L	< 0.0001	< 0.0001	0.00
o-Xylene	mg/L	< 0.0001	< 0.0001	0.00
Styrene	mg/L	< 0.0002	< 0.0002	0.00
Tetrachloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Toluene	mg/L	< 0.0002	< 0.0002	0.00
Total Xylenes	mg/L	< 0.0001	< 0.0001	0.00
Trans-1,2-dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Trichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
Vinyl Chloride	mg/L	< 0.0002	< 0.0002	0.00

Detailed Results from Field Duplicate vs. Regular Samples

Reading Name	Units	S19 2022-04-26 Field Duplicate	S19 2022-04-26 Regular Sample	RPD (%)
1,4-Dioxane	mg/L	< 0.001	< 0.001	0.00
Alkalinity	mg/L	180	190	5.41
Ammonia	mg/L	< 0.15	0.17	0.00
Ammonia (unionized)	mg/L	< 0.0015	0.0017	0.00
Biochemical Oxygen Demand	mg/L	< 2	< 2	0.00
Boron	mg/L	< 0.02	< 0.02	0.00
Cadmium	mg/L	< 0.0001	< 0.0001	0.00
Calcium	mg/L	72	70	2.82
Chemical Oxygen Demand	mg/L	21	21	0.00
Chloride	mg/L	14	14	0.00
Chromium (III)	mg/L	< 0.005	< 0.005	0.00
Chromium (Total)	mg/L	< 0.005	< 0.005	0.00
Chromium (VI)	mg/L	< 0.0005	< 0.0005	0.00
Cobalt	mg/L	< 0.0005	< 0.0005	0.00
Conductivity	µS/cm	400	400	0.00
Copper	mg/L	< 0.002	< 0.002	0.00
Dissolved Oxygen	mg/L	4.04	4.04	0.00
Field Conductivity	µS/cm	405	405	0.00
Field Temperature	Celsius	13.1	13.1	0.00
Hardness	mg/L	190	190	0.00
Iron	mg/L	< 0.1	< 0.1	0.00
Lead	mg/L	< 0.0005	< 0.0005	0.00
Magnesium	mg/L	4.4	4.4	0.00
Naphthalene	mg/L	< 0.00005	< 0.00005	0.00
Nickel	mg/L	< 0.001	< 0.001	0.00
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Phenols	mg/L	< 0.001	< 0.001	0.00
Phosphorus (total)	mg/L	< 0.03	0.09	0.00
Potassium	mg/L	2	1.9	5.13
Sodium	mg/L	8	8.5	6.06
Sulphate	mg/L	5.7	5.4	5.41
Total Dissolved Solids	mg/L	185	155	17.65
Total Suspended Solids	mg/L	< 10	< 10	0.00
Zinc	mg/L	< 0.01	< 0.01	0.00

Detailed Results from Field Blank Samples - Spring 2022

Reading Name	Units	2022-04-26 Field Blank
General/Inorganic Parameters		
Alkalinity	mg/L	1.6
Ammonia	mg/L	< 0.15
Boron	mg/L	< 0.02
Calcium	mg/L	< 0.2
Chloride	mg/L	< 1
Conductivity	µS/cm	1.3
Dissolved Organic Carbon	mg/L	< 0.4
Iron	mg/L	< 0.1
Magnesium	mg/L	< 0.05
Manganese	mg/L	< 0.002
Nitrate	mg/L	< 0.1
Nitrite	mg/L	< 0.01
Potassium	mg/L	< 0.2
Sodium	mg/L	< 0.1
Sulphate	mg/L	< 1
Total Dissolved Solids	mg/L	< 10
Volatile Organic Compounds (VOCs)		
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002
1,1,1-Trichloroethane	mg/L	< 0.0001
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002
1,1,2-Trichloroethane	mg/L	< 0.0002
1,1-Dichloroethane	mg/L	< 0.0001
1,1-Dichloroethylene	mg/L	< 0.0001
1,2-Dichlorobenzene (o)	mg/L	< 0.0002
1,2-Dichloroethane	mg/L	< 0.0002
1,3,5-Trimethylbenzene	mg/L	< 0.0002
1,3-Dichlorobenzene (m)	mg/L	< 0.0002
1,4-Dichlorobenzene (p)	mg/L	< 0.0002
1,4-Dioxane	mg/L	< 0.001
Benzene	mg/L	< 0.0001
Chlorobenzene	mg/L	< 0.0001
Chloroethane	mg/L	< 0.0002
Chloromethane	mg/L	< 0.0005
Cis-1,2-Dichloroethylene	mg/L	< 0.0001
Dichloromethane	mg/L	< 0.0005
Ethylbenzene	mg/L	< 0.0001
m+p-Xylene	mg/L	< 0.0001
o-Xylene	mg/L	< 0.0001
Styrene	mg/L	< 0.0002
Tetrachloroethylene	mg/L	< 0.0001
Toluene	mg/L	< 0.0002
Total Xylenes	mg/L	< 0.0001
Trans-1,2-dichloroethylene	mg/L	< 0.0001
Trichloroethylene	mg/L	< 0.0001
Vinyl Chloride	mg/L	< 0.0002

Reading Name	Units	2022-04-28 Field Blank
General/Inorganic Parameters		
Alkalinity	mg/L	1.8
Ammonia	mg/L	< 0.15
Boron	mg/L	< 0.02
Calcium	mg/L	< 0.2
Chloride	mg/L	< 1
Conductivity	µS/cm	1
Dissolved Organic Carbon	mg/L	< 0.4
Iron	mg/L	< 0.1
Magnesium	mg/L	< 0.05
Manganese	mg/L	< 0.002
Nitrate	mg/L	< 0.1
Nitrite	mg/L	< 0.01
Potassium	mg/L	< 0.2
Sodium	mg/L	< 0.1
Sulphate	mg/L	< 1
Total Dissolved Solids	mg/L	< 10
Volatile Organic Compounds (VOCs)		
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002
1,1,1-Trichloroethane	mg/L	< 0.0001
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002
1,1,2-Trichloroethane	mg/L	< 0.0002
1,1-Dichloroethane	mg/L	< 0.0001
1,1-Dichloroethylene	mg/L	< 0.0001
1,2-Dichlorobenzene (o)	mg/L	< 0.0002
1,2-Dichloroethane	mg/L	< 0.0002
1,3,5-Trimethylbenzene	mg/L	< 0.0002
1,3-Dichlorobenzene (m)	mg/L	< 0.0002
1,4-Dichlorobenzene (p)	mg/L	< 0.0002
1,4-Dioxane	mg/L	< 0.001
Benzene	mg/L	< 0.0001
Chlorobenzene	mg/L	< 0.0001
Chloroethane	mg/L	< 0.0002
Chloromethane	mg/L	< 0.0005
Cis-1,2-Dichloroethylene	mg/L	< 0.0001
Dichloromethane	mg/L	< 0.0005
Ethylbenzene	mg/L	< 0.0001
m+p-Xylene	mg/L	< 0.0001
o-Xylene	mg/L	< 0.0001
Styrene	mg/L	< 0.0002
Tetrachloroethylene	mg/L	< 0.0001
Toluene	mg/L	< 0.0002
Total Xylenes	mg/L	< 0.0001
Trans-1,2-dichloroethylene	mg/L	< 0.0001
Trichloroethylene	mg/L	< 0.0001
Vinyl Chloride	mg/L	< 0.0002

Reading Name	Units	2022-04-29 Field Blank
General/Inorganic Parameters		
Alkalinity	mg/L	2.6
Ammonia	mg/L	< 0.15
Boron	mg/L	< 0.02
Calcium	mg/L	6.3
Chloride	mg/L	< 1
Conductivity	µS/cm	1.1
Dissolved Organic Carbon	mg/L	0.4
Iron	mg/L	< 0.1
Magnesium	mg/L	1.6
Manganese	mg/L	< 0.002
Nitrate	mg/L	< 0.1
Nitrite	mg/L	< 0.01
Potassium	mg/L	0.68
Sodium	mg/L	10
Sulphate	mg/L	< 1
Total Dissolved Solids	mg/L	< 10
Volatile Organic Compounds (VOCs)		
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002
1,1,1-Trichloroethane	mg/L	< 0.0001
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002
1,1,2-Trichloroethane	mg/L	< 0.0002
1,1-Dichloroethane	mg/L	< 0.0001
1,1-Dichloroethylene	mg/L	< 0.0001
1,2-Dichlorobenzene (o)	mg/L	< 0.0002
1,2-Dichloroethane	mg/L	< 0.0002
1,3,5-Trimethylbenzene	mg/L	< 0.0002
1,3-Dichlorobenzene (m)	mg/L	< 0.0002
1,4-Dichlorobenzene (p)	mg/L	< 0.0002
1,4-Dioxane	mg/L	< 0.001
Benzene	mg/L	< 0.0001
Chlorobenzene	mg/L	< 0.0001
Chloroethane	mg/L	< 0.0002
Chloromethane	mg/L	< 0.0005
Cis-1,2-Dichloroethylene	mg/L	< 0.0001
Dichloromethane	mg/L	< 0.0005
Ethylbenzene	mg/L	< 0.0001
m+p-Xylene	mg/L	< 0.0001
o-Xylene	mg/L	< 0.0001
Styrene	mg/L	< 0.0002
Tetrachloroethylene	mg/L	< 0.0001
Toluene	mg/L	< 0.0002
Total Xylenes	mg/L	< 0.0001
Trans-1,2-dichloroethylene	mg/L	< 0.0001
Trichloroethylene	mg/L	< 0.0001
Vinyl Chloride	mg/L	< 0.0002

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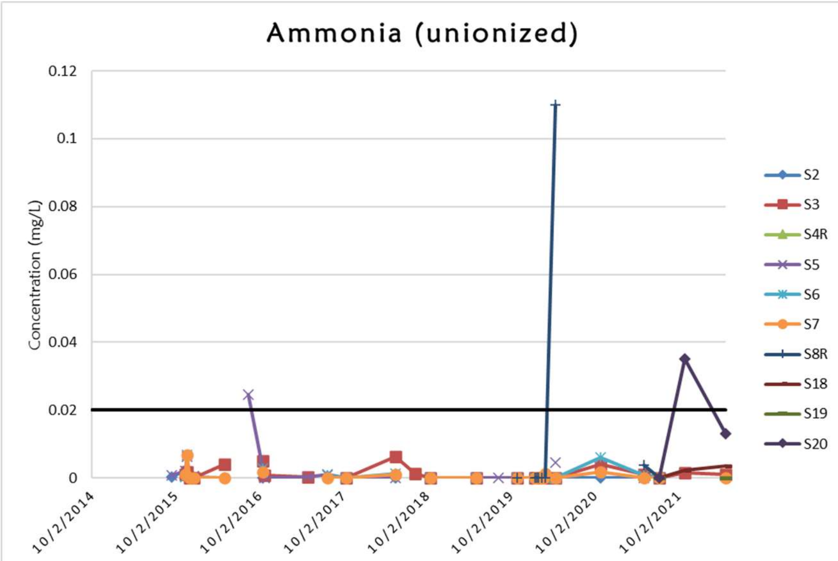
Detailed Results from Trip Blank Samples - Spring 2022

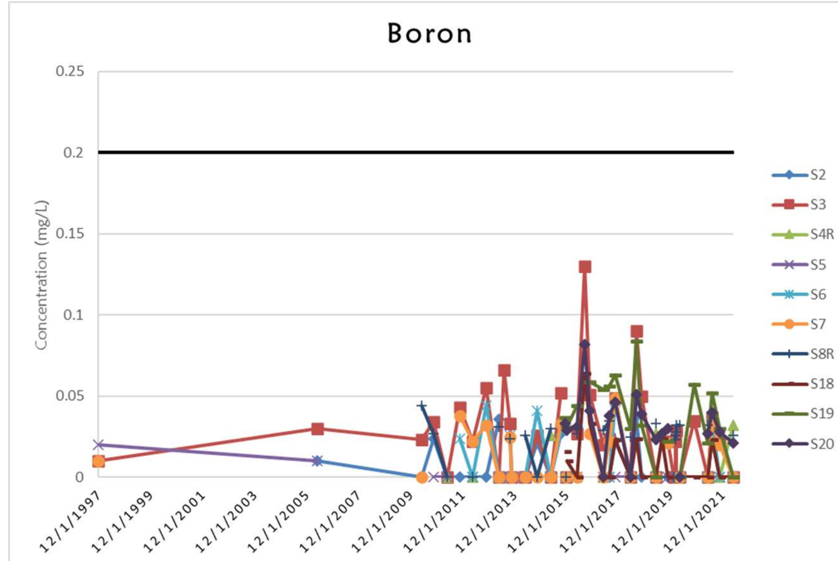
Reading Name	Units	2022-04-26 Trip Blank	2022-04-27 Trip Blank	2022-04-28 Trip Blank	2022-04-29 Trip Blank
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002		< 0.0002	< 0.0002
1,1,1-Trichloroethane	mg/L	< 0.0001	< 0.0002	< 0.0001	< 0.0001
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0001	< 0.0002	< 0.0002
1,1,2-Trichloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,1-Dichloroethane	mg/L	< 0.0001	< 0.0002	< 0.0001	< 0.0001
1,1-Dichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,2-Dichlorobenzene (o)	mg/L	< 0.0002	< 0.0001	< 0.0002	< 0.0002
1,2-Dichloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,3,5-Trimethylbenzene	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,3-Dichlorobenzene (m)	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,4-Dichlorobenzene (p)	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,4-Dioxane	mg/L		< 0.0002		
Benzene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlorobenzene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chloromethane	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Cis-1,2-Dichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dichloromethane	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Ethylbenzene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
m+p-Xylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
o-Xylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Styrene	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toluene	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Xylenes	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Trans-1,2-dichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Trichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Vinyl Chloride	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002

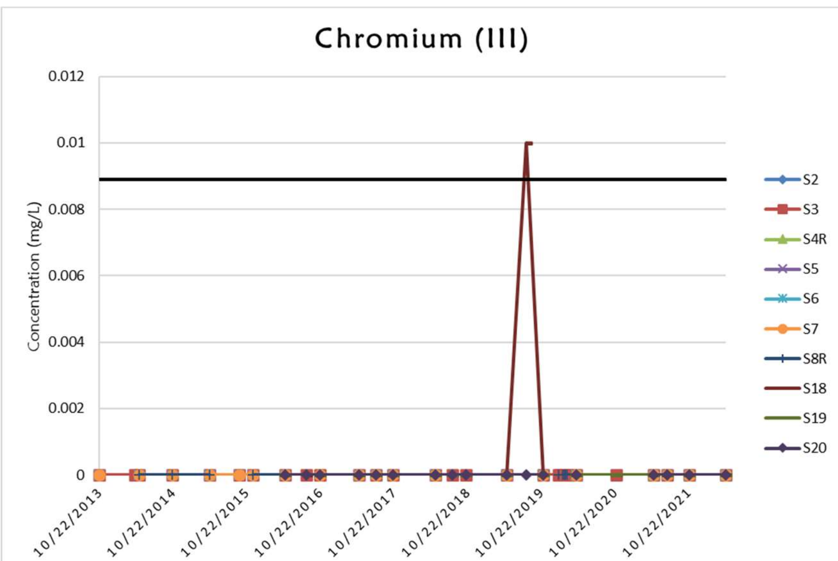
APPENDIX D

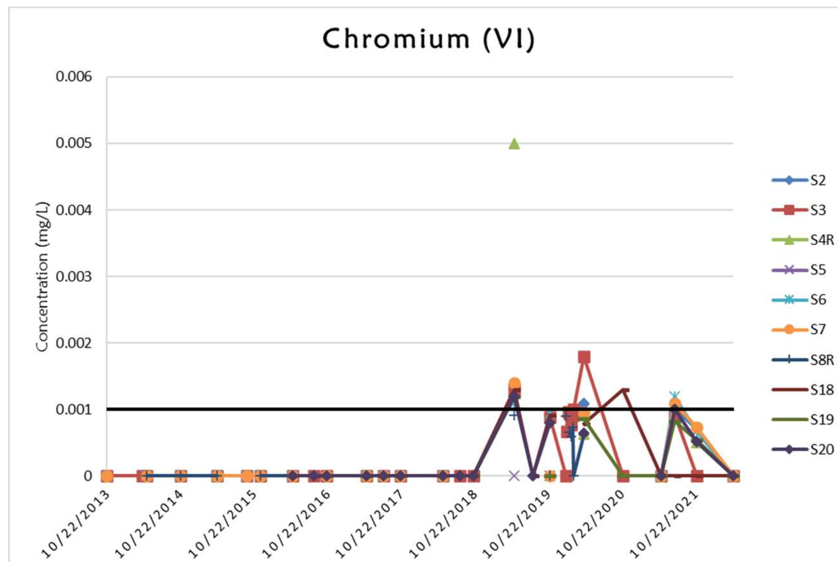
Time-Concentration Plots from Surface Water Sampling Locations

Appendix D – Historical Surface Water Time-Concentration Plots

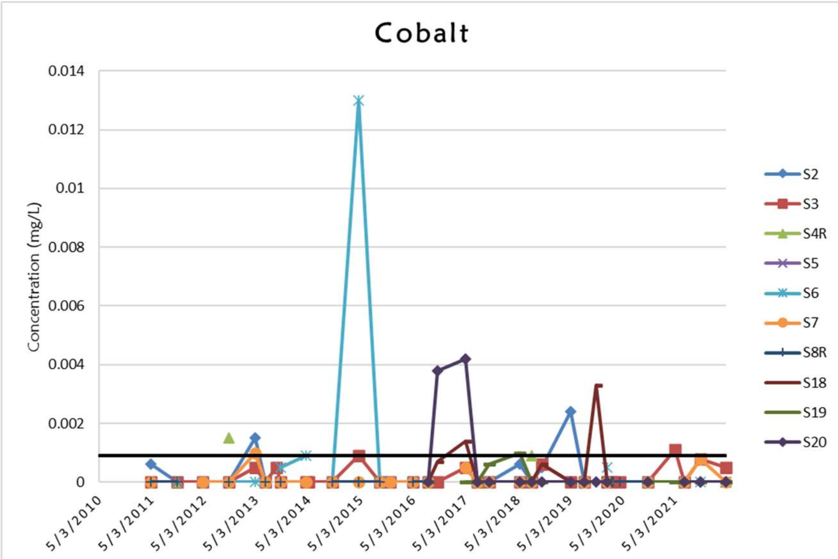


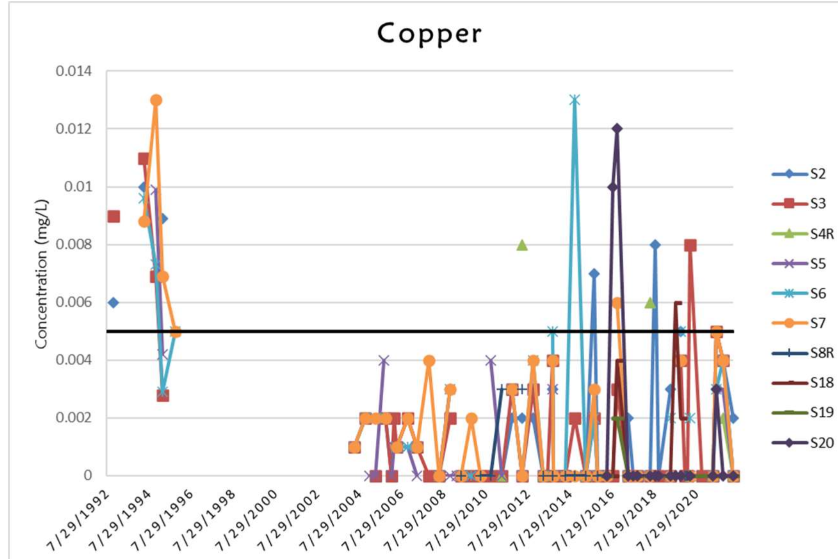


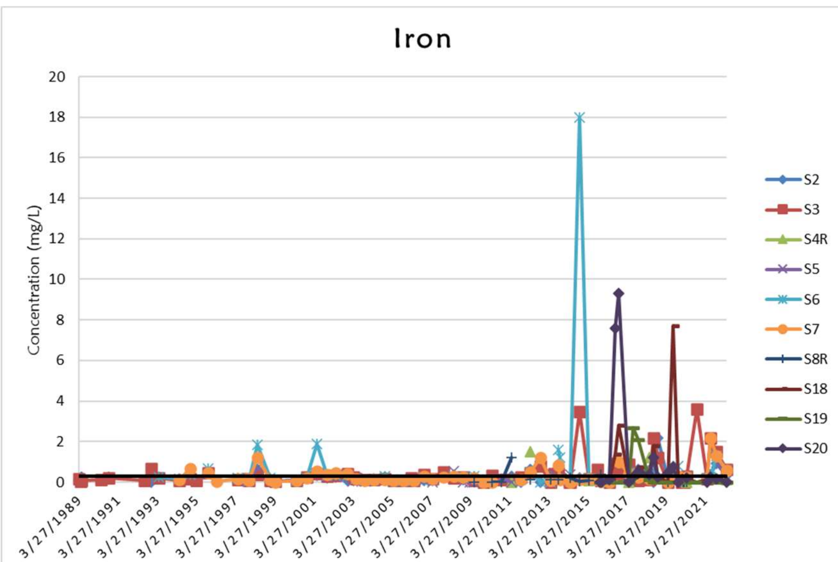


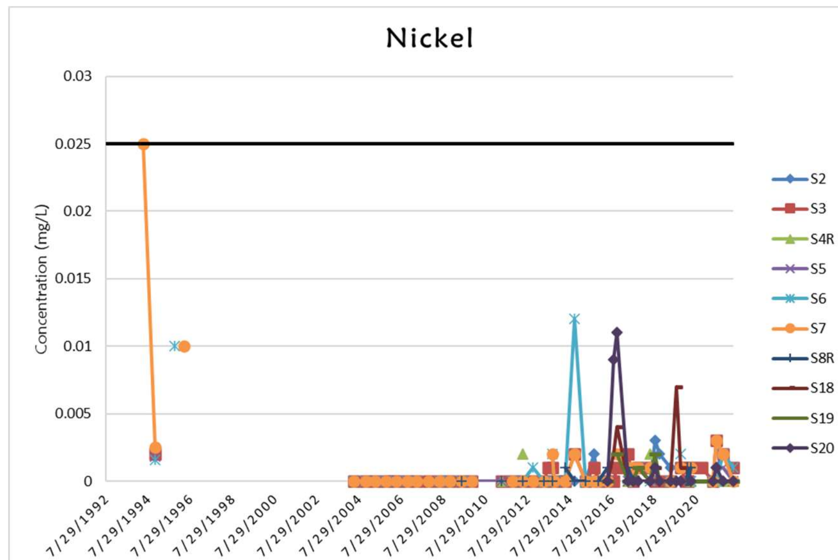


Appendix D – Historical Surface Water Time-Concentration Plots

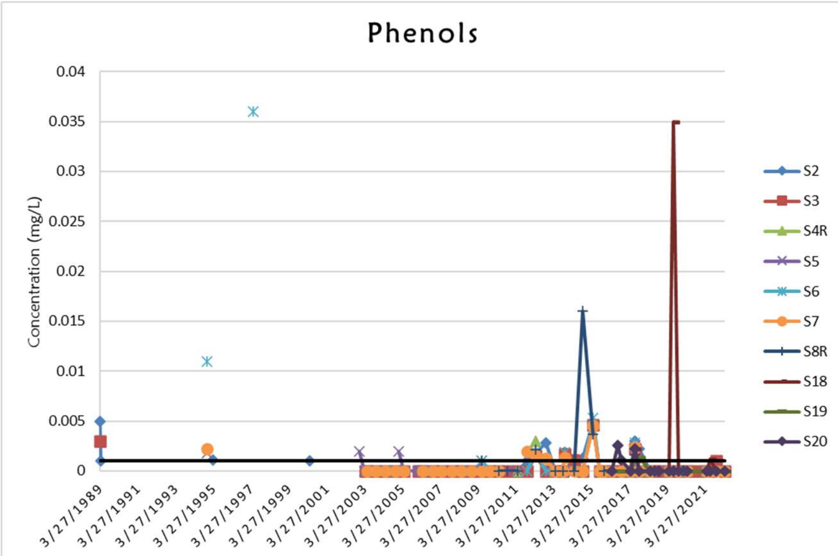


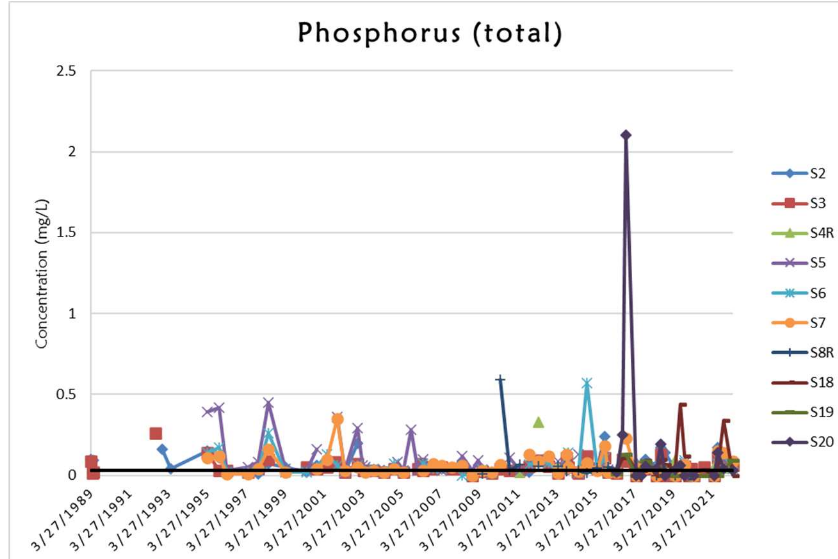


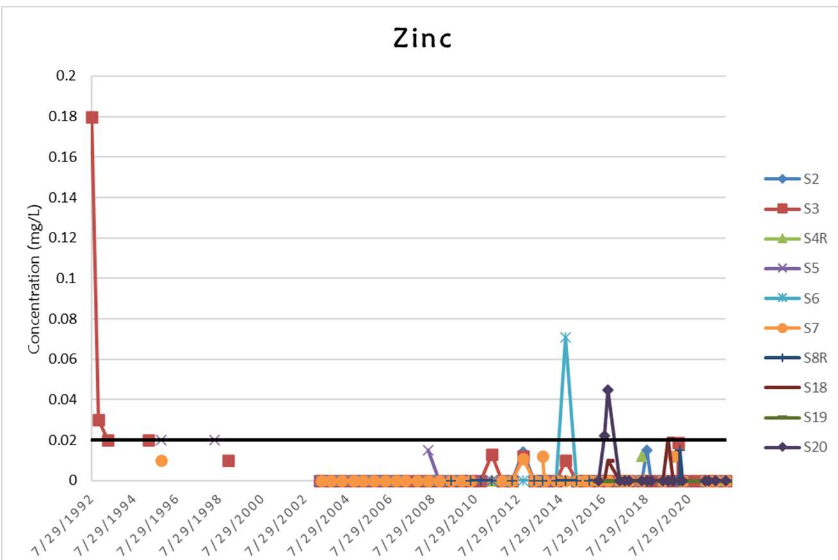




Appendix D – Historical Surface Water Time-Concentration Plots







BluMetric Environmental Inc.

1682 Woodward Drive
Ottawa, Ontario
Canada K2C 3R8
Tel: 613.839.3053
Fax: 613.839.5376
ottawa@blumetric.ca

4 Cataraqui Street
The Tower, The Woolen Mill
Kingston, Ontario
Canada K7K 1Z7
Tel: 613.531.2725
kingston@blumetric.ca

209 Frederick Street
Unit 3B
Kitchener, Ontario
Canada N2H 2M7
Tel: 519.742.6685
kitchener@blumetric.ca

825 Milner Avenue
Toronto, Ontario
Canada M1B 3C3
Tel: 877.487.8436
toronto@blumetric.ca

410 Falconbridge Road
Unit 6
Sudbury, Ontario
Canada P3A 4S4
Tel: 705.525.6075
sudbury@blumetric.ca

1046 Gorham Street
Thunder Bay, Ontario
Canada P7B 5X5
Tel: 807.707.4736
thunderbay@blumetric.ca

4-41 de Valcourt Street
Gatineau, Quebec
Canada J8T 8G9
Tel: 819.243.7555
gatineau@blumetric.ca

200-1500 Du College Street
Saint-Laurent, Quebec
Canada H4L 5G6
Tel: 514.844.7199
montreal@blumetric.ca

4916 – 49th Street
Yellowknife, NT
Canada X1A 1P3
Tel: 867.873.3500
Fax: 867.873.3499
yellowknife@blumetric.ca

202b Strickland Street
Whitehorse, Yukon
Canada Y1A 2J8
Tel: 867.689.8465
whitehorse@blumetric.ca

www.blumetric.ca