BluMetric Environmental

FALL 2023
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:

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Kingston, ON K7K 1Z7

Project Number: 230130-03

January 3, 2024

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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 summer and fall 2023 monitoring events 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 summer and fall 2023 monitoring events were 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 the Amended Environmental Compliance Approval (ECA) number A371203, issued 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 summer monitoring event was conducted on July 20 and July 27, 2023. The activities completed include the following:

- Surface water samples were collected on July 27, 2023, with the exception of sites S2, S4R, S6, S8R and S20 because they were dry;
- Groundwater monitoring wells installed in the shallow and intermediate bedrock flow zones (see Table 3) were monitored for water levels on July 20, 2023. No water level was measured at groundwater monitors M18, M23, M53-4, M58-4, M68-4, M70-3 and M105 because they were dry, nor from M19 because it is damaged;
- Water levels were recorded at the staff gauges installed at the three ponds located on site between the landfill and Beechwood Road on July 20, 2023; and
- Liquid levels were measured in landfill leachate wells on July 20, 2023.

The fall monitoring event was conducted between October 23 and October 27, 2023. The activities completed include the following:

- Groundwater monitoring wells installed in the shallow and intermediate bedrock flow zones (see Table 3) were monitored for water levels on October 23, 2023. No water levels were measured at groundwater monitors M15, M18, M35, M58-4, M68-4, M70-3, and M174 because they were dry, nor from M19 because it is damaged;
- Water levels were recorded at the staff gauges installed at the three ponds located on site between the landfill and Beechwood Road on October 23, 2023;
- Liquid levels were measured in landfill leachate wells on October 23, 2023;
- Groundwater monitoring wells were sampled between October 24 and 27, 2023. No samples were collected from monitoring well M53-4 because it was dry, nor from monitoring wells M16-3, M66-2 and M85 because they had not recover sufficiently for sampling after purging. Samples collected were analyzed for the suite of groundwater inorganic and general parameters and Volatile Organic Compounds (VOCs) listed in Table 2;
- Surface water monitoring was conducted on October 24, 2023. All locations (S2, S3, S4S, S5 S7, S8R, S18, S19, and S20) were dry, therefore no samples were able to be collected. When surface water samples are collected, they are analyzed for surface water inorganic and general parameters and for 1,4-dioxane, as listed in Table 2;
- Landfill gas monitoring was conducted on November 3, 2023. Field measurements were made with a RKI Eagle probe calibrated to methane gas response at seven gas monitors (GM1, GM2, GM3, GM4-1, GM4-2, GM5 and GM6); and,
- A total of three Quality Assurance/Quality Control (QA/QC) field duplicate samples were collected during the fall sampling event.

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, temperature, conductivity, and oxidation-reduction potential 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, conductivity, dissolved oxygen, and oxidation-reduction potential 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 Laboratory of Mississauga, ON, which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Table 2 presents a summary of groundwater and surface water analytical parameters.

2.3 GROUNDWATER ELEVATIONS

Water levels were recorded to the nearest 0.005 m using an electronic water level meter for the groundwater monitoring wells listed in Table 3, grouped in relation to their location relative 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 hydrogeological framework for the facility has been defined as follows:

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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

- 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 m below top of bedrock to a depth of approximately 30 m below top of bedrock;
- 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 sub-vertical 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 much deeper 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 updates to the SCM[6,7].

3.1 Leachate Results

3.1.1 Liquid Levels in Leachate Wells

Liquid levels were measured in the two landfill leachate wells on July 20 and October 23, 2023:

- The liquid level at LW-P1 was 147.10 and 144.58 metres above sea level (masl), respectively; and,
- The liquid level at LW-P2 was 145.74 and 147.58 masl, respectively.

3.1.2 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) 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. Starting in 2023, the remaining liquid in the North Lagoon is being pumped out with the aim of draining the lagoon. Over the 2023 summer season, the North Lagoon has been decreased to 8 percent capacity (2185 m^3 of the total capacity 25,600 m^3).

The volume of leachate collected from the landfill and hauled to the Napanee and Cobourg WWTPs from January to December 2023 was approximately 27,332 m^3. A volume of approximately 9,437 m^3 was pumped from the Lagoon to the North Chamber. Consequently, the total leachate volume generated by the landfill from January to December 2023 is estimated at 17,895 m^3.

3.2 GROUNDWATER RESULTS

3.2.1 Groundwater Elevations

Groundwater elevations were measured on July 20 and October 23, 2023, from the monitoring wells listed in Table 3, and are presented in Tables 4a and 4b, respectively. An inventory of all monitoring well locations is provided in Appendix A. Groundwater elevation contours within the shallow groundwater flow zone are shown on Figure 2a (summer) and Figure 2b (fall), while Figure 3a (summer) and Figure 3b (fall) show 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 summer and fall 2023 shallow groundwater contours (Figures 2a and 2b, respectively) 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. The water levels from shallow monitors M15, M18, M19, M23, M35, M53-4, M58-4, M68-4, M70-3, M85 and M86 were not used to prepare the summer and/or fall 2023 groundwater contours because they were dry, did not recover sufficiently after purging or were damaged (M19). North of the landfill, shallow groundwater converges towards Marysville Creek in the area immediately east of County Road 10 (Deseronto Road), while shallow groundwater flow in the southern portion of the site converges along 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 summer and fall 2023 intermediate bedrock zone contours are presented on Figures 3a and 3b, respectively. On the landfill property, groundwater in this hydrostratigraphic unit generally flows to the north, west, and south-southeast relative to the landfill. 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. Groundwater elevation from M80-1 was excluded from the summer interpolation as it was believed to be an outlier; similarly, M191 was excluded from the contouring (low permeability monitoring well). Lastly, intermediate bedrock zone monitoring wells located farther to the south and southwest (e.g., M173, M174 (dry during the summer event), 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. The latter 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 karst assessment in the area south and southeast of the Site have been provided under separate cover [6,7].

3.2.2 Groundwater Analytical Results

Groundwater monitoring results from the wells sampled in fall 2023 are presented in Table 5a and are consistent with 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.

3.2.2.1 Shallow Groundwater Flow Zone

Analytical results from shallow groundwater monitors sampled in fall 2023 were generally consistent with historical results.

As shown in Table 5a, slightly decreased concentrations of a number of water quality parameters (e.g., alkalinity, boron, chloride, conductivity, DOC, magnesium, sodium and/or TDS) were observed in some shallow groundwater zone monitoring wells located in close proximity to the landfill footprint, north and northwest from the unlined portion of the landfill (e.g., M66-2, M86, M101, M103 and M104). 1,4-dioxane was detected at monitoring wells M101, M103 and M104.

The approximate extents of leachate impacted shallow groundwater, consistent with those delineated from recent hydrogeological investigations (6,7), are shown on Figure 4.

Monitor M54-4, located approximately 200 m south of the landfill footprint, also exhibited slightly elevated alkalinity, conductivity, and TDS, as well as low but detectable concentrations of 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).

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 on the Site.

3.2.2.2 Intermediate Groundwater Flow Zone

Analytical results from intermediate bedrock groundwater monitors sampled in fall 2023 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 and OW4, which are located in close proximity to the landfill footprint. These results indicate the presence of leachate impacts at these locations. Despite the relatively higher concentrations of some parameters (e.g., alkalinity at OW1), the absence of 1,4-dioxane indicates no impacts from the landfill are apparent further north from the landfill 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 (e.g., M9-2, M9-3, M64-2, M70-2, M108, M109-1, M110-1, M114-1, M121, M123, M167, M168, M170, M172, M178R-2, M178R-3, M178R-4 and M192). Several locations south and southeast of the landfill with elevated concentrations of chloride, sodium, TDS, and/or BTEX compounds (e.g., M6-3, M106, M121, M186), 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

Several monitoring wells downgradient of these impacted wells (e.g., M177, M179, M185-1, M185-2, M187, M188-1 and M190) do not show impacts associated with landfill leachate (i.e., no 1,4-dioxane detected and alkalinity concentrations of 350 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.

Wells sampled in the western part of the landfill site (e.g., M72, M74 and M82-1) 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 D 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. Consistent with results from previous monitoring events, review of apparent temporal trends in Appendix D shows that:

A) Concentrations are significantly 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, an increasing trend in concentrations is observed at M192. Previously increasing trends at monitoring wells located farther downgradient have stabilized (M170 and M168) or decreased (M167) since approximately fall 2019; and,
D) To the south of the landfill, stable or declining trends have continued in 2023 in the intermediate bedrock flow zone (M114-1, M121, M178R-2, M178R-3, M178R-4 and M64-2.

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.

3.2.3 Guideline B-7 Reasonable Use Limits (RULs)

Constituent concentrations from selected monitoring wells located 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 (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, except for M192 with detectable concentrations that are consistent with historical data. Sample dilution was necessary for some samples (e.g., M106, OW37-s) resulting in a reportable detection limit (RDL) of 0.003 mg/L.

In the shallow groundwater zone, slightly elevated concentrations of a variable number of inorganic or general water quality parameters above their respective RUL (e.g., alkalinity, DOC, iron, manganese, sodium, and/or TDS) were observed in monitoring wells M54-4, M66-2, M67-2, M80-2, M86, M 80-2, M87-2 and OW37-s.

Slightly elevated concentrations of a variable 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, M186, M187, M190 and M192).

The RUL exceedances observed in fall 2023 are consistent with historical results.

3.2.4 Status of Monitoring Wells and Compliance with Ontario Regulation 903

During the fall 2023 monitoring event, the condition of groundwater monitoring wells included in the EMP was 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. All groundwater monitoring wells are fitted with a vermin proof cap to meet the requirements of Ontario Regulation 903 and are locked to provide protection against vandalism as per Waste Management standard operating procedure and in line with industry best practices.

Shallow groundwater monitoring wells M19 and M58-4 are damaged, and it is recommended that they be decommissioned or replaced when a revised EMP is approved as they cannot be repaired.

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

An evaluation of QA/QC data is included in Appendix B. A standard margin of error of 20% relative percent difference (RPD) between regular and duplicate samples was deemed acceptable for field duplicates.

In general, the comparison between samples and duplicates shows very good correlation for the majority of analyzed constituents. All parameters for groundwater duplicate QA/QC sampling were within the 20% margin of error except for dissolved organic carbon at M108 and M123 where the RPD was slightly higher (42% and 27%, respectively).

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 (Figure 1). Surface water levels were monitored at the staff gauges on July 27 and October 24, 2023. Note that S2, S4R, S5, S6, S8R and S20 were dry during the summer sampling round and that all sites were dry during the fall sampling round. Staff gauge locations are shown on Figures 2a and 2b.

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). 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 where it crosses County Road 10 and joins Marysville Creek east of Highway 49 and north of Highway 401. Both 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 ephemeral unnamed local surface water course is present in the central portion of the proposed CAZ, originating from a small man-made pond located directly east of Quarry Road. Surface water flows west from this pond over 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, when flowing, enters into the ground into a near-surface karst feature.

Surface water monitoring locations are shown on Figure 1. Surface water samples were only collected at site S3, S7, S18 and S19 during the summer sampling round (July 27, 2023) as the rest of the sites were dry. Similarly, no samples were collected during the fall sampling event (October 24, 2023) because all the sites were dry.

3.3.3 Surface Water Flow

Surface water flow measurements were not recorded for the fall sampling event (October 24, 2023) as all the sites were dry. Visual observations of surface water flow and general water characteristics for the fall sampling event are summarized in Table 6.

3.3.4 Surface Water Analytical Results

The analytical results from surface water locations sampled during the summer and fall 2023 sampling events are presented in Tables 7a and 7b respectively.

Surface water quality results were compared to Provincial Water Quality Objectives (PWQO). Background surface water quality was monitored on site at upstream station S2 for Marysville Creek. Background surface water quality was monitored at upstream station S18 for the unnamed local water course located in the central portion of the 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.

Parameters analysed in surface water samples collected during the summer 2023 sampling event were all below PWQO, except for phenols, total phosphorus, and iron at all four sampling locations – S3, S7, S18, and S19.

Surface water results from 2023 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 E 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 QA/QC data is included in Appendix B. A standard margin of error of 20% was deemed acceptable for field duplicates. In general, the comparison between regular samples and duplicates shows very good correlation for the majority of analyzed constituents. All parameters for the summer sampling round field duplicate sample (location S18) were within the 20% margin of error, except chemical oxygen demand and total phosphorus.

3.4 Subsurface Gas Sampling

On November 3, 2023, BluMetric inspected the subsurface gas monitoring probes and measured methane concentrations at all locations. The locations of the gas monitors are shown on Figure 1 and results are provided in Table 8. Methane concentrations in gas monitoring wells were between 0 and 45 ppm, well below the LEL for methane of 5% by volume in air (or 50,000 ppm).

3.5 Annual Summary

A comparative review of groundwater quality results between this and previous sampling events indicates that constituent concentrations vary over time but for the most part have remained relatively consistent over the current calendar year and over the past five years or more. Depending on which monitoring point and more importantly the time scale considered, conflicting trends in concentrations can occur sporadically. However, since implementing the revised EMP dated June 29, 2010, most of the patterns have been observed to be seasonally variable but relatively similar.

Where sufficient historical data are available, alkalinity, chloride, dissolved organic carbon (DOC), iron, manganese, sodium and total dissolved solids (TDS) concentration data were reviewed for all groundwater trigger wells listed in Table 12 of the EMP. Time-concentration plots are provided in Appendix C. Over the past twelve years (from the spring of 2012 to the fall of 2023), the vast majority of the analytical results show stabilized and/or variable/oscillating concentrations for almost all parameters. Exceptions to this generalization include:

- For the shallow groundwater monitors:
    - M54-4 for alkalinity, DOC and manganese (increasing trend until fall 2015, then relatively stable trend), and chloride (increased to peak concentration of 130 mg/L in fall 2009 then decreasing trend until 2021 and a current increasing trend);
    - M66-2 for manganese and TDS (decreasing trend);
    - M67-2 for manganese, sodium and TDS (decreasing trend);
    - M80-2 for alkalinity (increasing trend until spring 2018, then stable trend), sodium (increasing trend), chloride (increased to peak of concentration of 85 mg/L in fall 2015 then decreasing trend since that time) and manganese (decreasing trend);
    - M86 for alkalinity (increasing trend), DOC (decreasing trend until 2021 then increasing trend since that time) and chloride, iron, manganese, and TDS (decreasing trend); and,
    - OW37-s for alkalinity, DOC, and iron (increasing trend) and chloride (decreasing trend until 2021 then increasing trend since that time).
- For the intermediate bedrock groundwater monitors:
    - M56-2 for alkalinity (increasing trend), chloride, TDS (decreasing trend);
    - M82-1 for DOC, TDS (decreasing trend);
    - M82-2 for TDS (decreasing trend);
    - M91-1 for chloride, TDS (decreasing trend);
    - M106 for chloride, sodium and TDS (increasing trend);
    - M179 for alkalinity, iron and manganese (decreasing trend);
    - M188-1 for sodium (decreasing);
    - M185-1 for alkalinity and DOC (decreasing) and chloride (increasing trend until 2021 then decreasing trend since that time);
    - M186 for alkalinity (increasing to peak concentration of 30 mg/L in fall of 2017, then decreasing trend) and DOC, iron, manganese and TDS (decreasing trend);
    - M188-1 for alkalinity (decreasing trend until 2020 then stable trend since that time); and,
    - M192 for alkalinity and DOC (increasing) and chloride (decreasing).

The observed trends in groundwater geochemistry outlined here are most likely due to natural groundwater quality variability and are not necessarily indicative of landfill leachate impacts, so they should be interpreted with caution.

3.6 Additional Investigations

Work outside of the scope of the EMP program was performed throughout the year at the Richmond Landfill Site. Table 9 summarizes the activities and reporting completed in 2023, as well as anticipated work planned for 2024.

Non-routine investigations and activities included:

- Investigation and soil cleanup of a small area resulting from a leaking tank used to temporarily store leachate in spring 2023;
- The North Lagoon was pumped between June and October 2023 in an effort to empty it; it is planned to pump out the remaining liquid when weather permits in 2024. An updated water balance was completed of the North Lagoon using recent data. Repairs were also made to patch rodent bite marks observed in some parts of the exposed plastic liner near the top of the perimeter berm and earthworks were completed to restore the protective layer of compacted clay over the liner;
- Updated post-closure environmental monitoring plan (EMP) and southeast hydraulic control system (HCS) design brief, originally prepared to support proposed amendments to site ECAs nos. A371203 (Waste ECA) and 1688-8HZNJG (Industrial Sewage Works ECA), were submitted to MECP in May 2023 to address review comments.

Other activities conducted in 2023 were related to requirements from ECA no. 1688-8HZNJG associated with the monitoring of on-site Ponds and Leachate, as well as those from agreement with the Town of Napanee Waste Water Treatment Plant (WWTP) where landfill leachate is hauled and treated.

4. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The summer and fall 2023 monitoring programs included the collection of groundwater 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 Amended Environmental Compliance Approval (ECA) number A371203, issued by MECP on March 19, 2021.

The following were completed as part of the summer and fall 2023 EMP monitoring events, between July 20 and July 27, 2023, and October 23 and October 27, 2023, respectively:

- Surface water locations were sampled for analytical testing;
- Water levels were recorded from groundwater monitoring wells installed in the Shallow groundwater and Intermediate Bedrock Flow Zones, as well as leachate monitoring wells;
- Groundwater monitors completed in the Shallow and Intermediate Bedrock Flow Zones were sampled for analytical testing;
- Landfill gas monitoring wells were monitored for methane concentrations; and,
- Quality Assurance/Quality Control (QA/QC) samples were collected, including field duplicate samples and field blank samples.

4.1 GROUNDWATER

- Groundwater flow directions interpreted from water elevations measured in monitors 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 fall 2023 were generally consistent with historical results;
- Slightly elevated groundwater concentrations of a number of water quality parameters are seen in the Shallow Flow 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 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 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, an increasing trend is observed at M192 while previously increasing trends at M170, and to a lesser degree at M167 and M168 located farther downgradient, have begun to decrease or stabilize since fall 2019;

- 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; and,
- Shallow groundwater monitoring wells M19 and M58-4 are damaged and should be repaired or decommissioned upon MECP approval of the updated post-closure EMP.

4.2 SURFACE WATER

- The concentrations observed during the 2023 monitoring events are within the range of historical monitoring results and indicate that the landfill is not causing adverse impacts to surface water quality;
- The following PWQO exceedances were noted during the summer sampling event: phenols, total phosphorus, and iron at all four sampling locations – S3, S7, S18, and S19.;
- No surface water samples were collected during the fall sampling event as all the locations were dry;
- All other measured parameters were below PWQO.

4.3 SUBSURFACE GAS

Measurements for methane gas were between 0 and 45 ppm for the six monitoring locations, well below the LEL for methane of 5% by volume in air (or 50,000 ppm).

5. LIMITING CONDITIONS

The summer and fall 2023 monitoring program involved the collection of groundwater (from on-site and off-site monitoring wells) and surface water for analyses. 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.

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Respectfully submitted,
BluMetric Environmental Inc.

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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 five years, starting in 2021

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

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 4a: Groundwater Elevations - July 20, 2023

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	124.77	M54-4	123.91	M83	123.34	M98	129.02
M14	125.45	M58-4	dry	M84	121.95	M99-2	129.09
M15	dry	M60-4	124.07	M85	119.64	M100	123.92
M18	dry	M65-2	122.82	M86	120.71	M101	122.90
M19	damaged	M66-2	122.08	M87-2	123.49	M102	123.02
M23	dry	M67-2	122.15	M88-2	127.14	M103	122.60
M27	125.71	M68-4	dry	M89-2	128.26	M104	122.76
M35	122.96	M70-3	dry	M94-2	123.49	M114-2	123.00
M41	124.97	M77	124.76	M96	127.44	M115-2	124.05
M47-3	124.22	M80-2	123.32	M97	124.31	OW37-s	121.82
M53-4	dry	M81	124.30				
Intermediate Bedrock Groundwater Flow Zone							
M3A-3	124.48	M71	123.71	M113-1	122.64	M178R-4	116.39
M9-2	120.14	M72	122.46	M114-1	119.96	M179	109.34
M9-3	120.55	M73	122.50	M116	119.98	M180	111.50
M10-1	120.02	M74	123.27	M121	119.98	M181-1	95.90
M46-2	123.20	M80-1	119.95	M122	119.85	M181-2	105.17
M49-1	119.73	M82-1	122.60	M123	119.61	M182	90.60
M50-3	124.19	M82-2	122.65	M125	120.01	M185-1	114.71
M52-2	120.88	M91-1	122.67	M166	119.64	M185-2	114.72
M53-2	119.71	M95-1	122.55	M167	119.37	M186	114.27
M56-2	122.66	M105	120.11	M168	119.64	M187	90.95
M58-3	122.70	M106	122.56	M170	120.09	M188-1	115.06
M59-2	122.73	M107	120.10	M173	99.97	M189	104.73
M59-3	122.71	M108	119.65	M174	90.88	M190	114.36
M59-4	122.70	M109-1	120.10	M176	109.37	M191	118.58
M60-1	122.65	M109-2	120.12	M177	115.20	M192*	119.63
M63-2	120.74	M110-1	120.10	M178R-1	115.22	M193*	121.10
M64-2	118.65	M111-1	122.62	M178R-2	118.92	OW1	122.87
M70-2	120.07	M112-1	122.63	M178R-3	118.82		

Table 4b: Groundwater Elevations - October 23, 2023

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	124.10	M54-4	123.67	M83	123.37	M98	128.29
M14	124.66	M58-4	dry	M84	121.83	M99-2	127.55
M15	dry	M60-4	123.68	M85	119.91	M100	123.40
M18	dry	M65-2	121.72	M86	121.89	M101	122.12
M19	damaged	M66-2	122.02	M87-2	122.77	M102	122.64
M23	125.03	M67-2	121.87	M88-2	125.99	M103	122.11
M27	124.24	M68-4	dry	M89-2	127.49	M104	122.44
M35	dry	M70-3	dry	M94-2	123.38	M114-2	122.23
M41	124.49	M77	123.91	M96	126.37	M115-2	123.41
M47-3	123.61	M80-2	123.01	M97	123.41	OW37-s	121.69
M53-4	124.37	M81	124.05				
Intermediate Bedrock Groundwater Flow Zone							
M3A-3	124.15	M71	123.27	M113-1	122.25	M178R-4	115.94
M9-2	118.17	M72	122.06	M114-1	119.08	M179	108.81
M9-3	119.79	M73	122.10	M116	119.10	M180	110.83
M10-1	119.12	M74	122.72	M121	118.85	M181-1	95.86
M46-2	123.44	M80-1	122.36	M122	119.03	M181-2	104.59
M49-1	118.77	M82-1	122.24	M123	118.87	M182	87.85
M50-3	124.19	M82-2	122.29	M125	118.99	M185-1	113.46
M52-2	120.07	M91-1	122.23	M166	118.89	M185-2	113.46
M53-2	118.82	M95-1	122.17	M167	118.67	M186	114.01
M56-2	112.28	M105	119.12	M168	118.89	M187	88.50
M58-3	122.29	M106	122.18	M170	119.11	M188-1	114.71
M59-2	122.36	M107	119.12	M173	99.46	M189	104.73
M59-3	122.32	M108	118.91	M174	dry	M190	112.71
M59-4	122.33	M109-1	119.11	M176	108.86	M191	118.63
M60-1	122.33	M109-2	119.10	M177	114.49	M192	118.89
M63-2	120.58	M110-1	119.10	M178R-1	114.19	M193	120.47
M64-2	118.43	M111-1	122.20	M178R-2	119.41	OW1	122.68
M70-2	119.04	M112-1	122.26	M178R-3	119.17		

Table 5a: Groundwater Quality Results - October 24-27, 2023

		Alkalinity mg/L	Ammonia mg/L	Boron mg/L	Calcium mg/L	Chloride mg/L	Conductivity µS/cm	Dissolved Organic Carbon mg/L	Iron mg/L	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Potassium mg/L	Sodium mg/L	Sulphate mg/L	Total Dissolved Solids mg/L	1,1,1,2-Tetrachloroethane mg/L	1,1,1-Trichloroethane mg/L	1,1,2,2-Tetrachloroethane mg/L	1,1,2-Trichloroethane mg/L	1,1-Dichloroethane mg/L	1,1-Dichloroethylene mg/L	1,2-Dichlorobenzene (o) mg/L	1,2-Dichloroethane mg/L
Location	Date	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]																									
M54-4	10/24/2023	390	< 0.15	0.041	140	55	990	3.1	< 0.1	29	0.029	< 0.1	< 0.01	1.6	61	37	585	< 0.0002	0.0016	< 0.0002	< 0.0002	0.0023	< 0.0001	< 0.0002	< 0.0002
M66-2	10/25/2023	380	0.24	0.78	94	84	1400	2	< 0.1	31	0.011	< 0.1	< 0.01	6.4	140	96	750	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M67-2	10/24/2023	330	0.69	0.76	45	2	630	2.2	0.43	25	0.018	< 0.1	0.021	8.7	43	4.6	285	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M80-2	10/25/2023	340	< 0.15	0.05	70	30	780	2.5	< 0.1	37	0.006	0.12	< 0.01	3.8	38	29	475	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M81	10/25/2023	310	< 0.15	0.035	84	42	800	1.8	0.16	42	0.063	< 0.1	< 0.01	2.5	11	37	430	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M85	10/25/2023	370	< 0.15	1.6	34	10	1300	2.5	< 0.1	19	0.003	3.14	< 0.01	14	210	74	785	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M86	10/24/2023	400	< 0.15	1.2	36	28	1000	3.8	< 0.1	27	0.003	0.97	< 0.01	14	140	80	565	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M87-2	10/24/2023	230	< 0.15	0.03	58	17	600	1.8	< 0.1	35	0.017	< 0.1	< 0.01	2.1	12	41	415	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M101	10/26/2023	450	< 0.15	0.064	150	37	1000	2.6	< 0.1	42	0.014	< 0.1	< 0.01	4	19	64	575	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M103	10/26/2023	680	< 0.15	0.29	140	160	1800	3.4	< 0.1	85	0.005	< 0.1	< 0.01	7	120	39	940	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M104	10/26/2023	1300	< 0.15	2.5	150	920	5400	52	< 0.1	140	0.61	14.6	0.021	14	850	40	2970	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001
M114-2	10/25/2023	300	< 0.15	0.024	95	12	750	1.7	< 0.1	16	< 0.002	1.59	< 0.01	1	44	13	440	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
OW37-s	10/26/2023	210	0.24	0.081	73	70	800	2.8	4.4	21	0.31	< 0.1	< 0.01	9.5	46	68	415	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
Intermediate BedrockGroundwater Flow Zone [2]																									
M5-3	10/24/2023	450	1.43	1.1	34	38	1000	1.6	< 0.1	26	< 0.002	< 0.1	< 0.01	13	150	13	565	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M6-3	10/25/2023	370	2.09	1.2	38	1300	5300	69	< 0.1	160	< 0.002	< 0.1	< 0.01	21	860	89	2900	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001
M9-2	10/27/2023	450	1.62	0.3	280	840	3600	6.5	21	73	0.63	< 0.1	< 0.01	11	330	< 1	2350	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M9-3	10/27/2023	290	1.27	0.52	57	100	920	2.7	0.57	30	0.047	< 0.1	< 0.01	15	73	2.4	390	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M52-2	10/25/2023	260	2.24	1	40	560	2500	2.2	< 0.1	29	0.006	< 0.1	< 0.01	17	410	15	1250	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M64-2	10/26/2023	300	1.08	0.88	52	97	960	1.4	< 0.1	29	0.006	< 0.1	< 0.01	9.6	88	22	465	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M70-2	10/25/2023	590	1.75	1.5	38	300	2100	3.9	1.3	27	0.012	< 0.1	< 0.01	12	370	4.7	1130	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001
M72	10/24/2023	270	0.57	0.39	58	16	650	1.9	< 0.1	33	0.002	< 0.1	< 0.01	7.3	18	42	390	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M74	10/24/2023	350	1.58	0.47	50	46	830	4.9	0.19	37	0.029	< 0.1	0.021	13	56	10	480	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M75	10/24/2023	430	1.8	1.3	36	73	1200	1.5	< 0.1	26	0.005	< 0.1	< 0.01	15	170	62	585	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M80-1	10/25/2023	150	0.47	0.39	20	3.8	380	1.3	< 0.1	11	0.004	< 0.1	< 0.01	4.4	38	27	180	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M82-1	10/26/2023	320	0.94	0.83	52	38	870	2.9	< 0.1	27	0.004	< 0.1	< 0.01	10	82	65	440	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M82-2	10/26/2023	310	0.37	0.095	96	8.8	700	2.3	< 0.1	26	0.022	< 0.1	< 0.01	3.4	11	48	365	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M106	10/24/2023	290	3.49	1.8	190	2100	7600	1.8	< 0.1	120	0.003	< 0.1	< 0.01	29	1200	71	3960	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M108	10/25/2023	430	0.71	0.18	99	36	940	5.4	3	29	0.14	< 0.1	< 0.01	5.8	53	11	515	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00029	< 0.0001	< 0.0002	< 0.0002
M109-1	10/25/2023	580	1.64	0.34	130	120	1400	8.1	11	42	0.26	< 0.1	< 0.01	7	100	1.9	795	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001
M110-1	10/25/2023	630	0.79	0.47	150	200	1800	9.6	0.25	54	0.023	< 0.1	< 0.01	8.6	130	< 1	895	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M114-1	10/25/2023	370	0.58	0.2	98	62	1200	4.8	5.5	27	0.27	< 0.1	< 0.01	5.4	96	4.3	640	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M121	10/26/2023	500	1.78	1.1	76	640	3200	5.1	< 0.1	51	0.006	< 0.1	< 0.01	14	510	55	1590	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M123	10/27/2023	360	0.24	0.13	92	23	770	5.4	< 0.1	20	0.021	< 0.1	< 0.01	3.7	39	12	350	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00024	< 0.0001	< 0.0002	< 0.0002
M167	10/27/2023	460	1.96	0.92	94	300	2000	3.5	< 0.1	54	0.006	< 0.1	< 0.01	17	210	9.9	955	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M168	10/27/2023	490	1.4	0.75	120	270	1900	4.6	< 0.1	46	0.003	< 0.1	< 0.01	14	200	13	915	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M170	10/25/2023	670	1.57	1.5	35	270	2200	4.3	< 0.1	24	< 0.002	< 0.1	< 0.01	13	400	11	1210	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M172	10/24/2023	490	0.82	0.13	150	72	1200	8.6	19	33	0.57	< 0.1	< 0.01	4.5	46	20	590	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00067	0.0001	< 0.0002	< 0.0002
M177	10/26/2023	240	0.51	0.33	82	2.5	550	2.4	< 0.1	15	0.005	< 0.1	< 0.01	5.8	7.3	39	265	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M178R-2	10/26/2023	350	0.24	0.16	100	27	800	4.7	0.85	20	0.059	< 0.1	< 0.01	4.3	38	23	410	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00068	< 0.0001	< 0.0002	< 0.0002
M178R-3	10/26/2023	400	0.36	0.19	110	36	910	4.7	1.1	24	0.075	< 0.1	< 0.01	4.9	45	23	455	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00072	< 0.0001	< 0.0002	< 0.0002
M178R-4	10/26/2023	400	0.32	0.19	110	37	900	4.5	0.17	23	0.034	< 0.1	< 0.01	4.8	46	21	460	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00062	< 0.0001	< 0.0002	< 0.0002
M179	10/27/2023	320	0.33	0.33	91	62	860	3.1	0.3	16	0.034	< 0.1	0.045	4.7	67	20	395	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M185-1	10/25/2023	230	0.97	0.9	46	260	1500	2	< 0.1	18	0.038	< 0.1	< 0.01	8.6	250	42	765	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M185-2	10/25/2023	270	< 0.15	0.088	110	3	580	2.5	0.15	5.9	0.016	< 0.1	< 0.01	1.6	4.3	28	315	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M186	10/27/2023	330	2.76	1.8	69	1100	4500	1.5	0.16	53	0.046	< 0.1	< 0.01	23	730	2.5	2270	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M187	10/26/2023	250	0.25	0.35	110	130	1100	2.3	< 0.1	15	0.005	0.11	0.073	4.3	100	94	640	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
M188-1	10/26/2023	300	0.64	0.37	60	35	700	2.7	< 0.1	18	0.008	< 0.1	< 0.01	5.2	56	9.4	350	< 0.01	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
M190	10/25/2023	280	< 0.15	0.071	100	28	680	4.7	< 0.1	10	0.005	< 0.1	< 0.01	3.2	19	24	310	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M192	10/25/2023	650	2.06	2.2	65	320	2300	4.7	0.19	43	0.018	< 0.1	< 0.01	18	370	2.6	1200	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
OW1	10/24/2023	430	5.98	1	45	50	1100	3	< 0.1	32	0.006	< 0.1	< 0.01	14	140	61	530	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002
OW4	10/24/2023	990	1.19	1.2	100	230	2500	26	4	71	0.1	< 0.1	< 0.01	12	390	3.1	1490	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.001

[1] M53-4 Purged Dry - No Sample Collected

[2] M6-3 and OW4 Purged Dry - No Samples Collected

BluMetric®

Table 5a: Groundwater Quality Results - October 24-27, 2023

		1,3,5-Trimethylbenzene mg/L	1,3-Dichlorobenzene (m) mg/L	1,4-Dichlorobenzene (p) mg/L	1,4-Dioxane mg/L	Benzene mg/L	Chlorobenzene mg/L	Chloroethane mg/L	Chloromethane mg/L	Cis-1,2-Dichloroethylene mg/L	Dichloromethane mg/L	Ethylbenzene mg/L	m+p-Xylene mg/L	o-Xylene mg/L	Styrene mg/L	Tetrachloroethylene mg/L	Toluene mg/L	Total Xylenes mg/L	Trans-1,2-dichloroethylene mg/L	Trichloroethylene mg/L	Vinyl Chloride mg/L
Location	Date	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]	Shallow Groundwater Flow Zone[1,2]																				
M54-4	10/24/2023	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	0.0008	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	0.0034	< 0.0002	< 0.0001	< 0.0001	0.001	< 0.0002
M66-2	10/25/2023	< 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	10/24/2023	< 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
M80-2	10/25/2023	< 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	10/25/2023	< 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	10/25/2023	< 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	10/24/2023	< 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	10/24/2023	< 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	10/26/2023	< 0.0002	< 0.0002	< 0.0002	0.0021	< 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	10/26/2023	< 0.0002	< 0.0002	< 0.0002	0.0098	< 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	10/26/2023	< 0.001	< 0.001	< 0.001	0.11	< 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	10/25/2023	< 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	10/26/2023	< 0.01	< 0.01	< 0.01	< 0.003	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
Intermediate BedrockGroundwater Fl	Intermediate BedrockGroundwater Flow Zone																				
M5-3	10/24/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M6-3	10/25/2023	< 0.001	< 0.001	< 0.001	0.3	< 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
M9-2	10/27/2023	< 0.0002	< 0.0002	< 0.0002	0.018	0.00053	< 0.0001	0.028	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	0.00024
M9-3	10/27/2023	< 0.01	< 0.01	< 0.01	0.002	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M52-2	10/25/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M64-2	10/26/2023	< 0.01	< 0.01	< 0.01	0.003	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M70-2	10/25/2023	< 0.001	< 0.001	< 0.001	0.0068	< 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
M72	10/24/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M74	10/24/2023	< 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
M75	10/24/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M80-1	10/25/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M82-1	10/26/2023	< 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
M82-2	10/26/2023	< 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
M106	10/24/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M108	10/25/2023	< 0.0002	< 0.0002	< 0.0002	0.0087	< 0.0001	< 0.0001	0.0034	< 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	10/25/2023	< 0.001	< 0.001	< 0.001	0.032	< 0.0005	< 0.0005	0.0087	< 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
M110-1	10/25/2023	< 0.002	< 0.002	< 0.002	0.034	< 0.001	< 0.001	0.01	< 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
M114-1	10/25/2023	< 0.01	< 0.01	< 0.01	0.005	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M121	10/26/2023	< 0.01	< 0.01	< 0.01	0.0059	0.13	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	0.0064	0.061	< 0.005	< 0.01	< 0.005	< 0.01	0.061	< 0.005	< 0.005	< 0.01
M123	10/27/2023	< 0.0002	< 0.0002	< 0.0002	0.0044	< 0.0001	< 0.0001	0.0032	< 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	10/27/2023	< 0.01	< 0.01	< 0.01	0.0041	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M168	10/27/2023	< 0.01	< 0.01	< 0.01	0.0084	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M170	10/25/2023	< 0.002	< 0.002	< 0.002	0.012	< 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
M172	10/24/2023	< 0.0002	< 0.0002	< 0.0002	0.008	< 0.0001	< 0.0001	0.0026	< 0.0005	< 0.0001	0.0037	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002
M177	10/26/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M178R-2	10/26/2023	< 0.0002	< 0.0002	< 0.0002	0.0037	< 0.0001	< 0.0001	0.00056	< 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	10/26/2023	< 0.0002	< 0.0002	< 0.0002	0.0047	< 0.0001	< 0.0001	0.00093	< 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	10/26/2023	< 0.0002	< 0.0002	< 0.0002	0.0052	< 0.0001	< 0.0001	0.0013	< 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	10/27/2023	< 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
M185-1	10/25/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M185-2	10/25/2023	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.00015	< 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	10/27/2023	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.00017	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	0.00011	0.00024	< 0.0002	< 0.0001	< 0.0002	0.00035	< 0.0001	< 0.0001	< 0.0002
M187	10/26/2023	< 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
M188-1	10/26/2023	< 0.01	< 0.01	< 0.01	< 0.001	< 0.005	< 0.005	< 0.01	< 0.025	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01
M190	10/25/2023	< 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
M192	10/25/2023	< 0.002	< 0.002	< 0.002	0.0094	< 0.001	< 0.001	< 0.002	< 0.005	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	0.0021	< 0.001	< 0.001	< 0.001	< 0.002
OW1	10/24/2023	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.002	< 0.005	< 0.001	< 0.005	0.002	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.002
OW4	10/24/2023	< 0.001	< 0.001	< 0.001	0.044	< 0.0005	< 0.0005	< 0.001	< 0.0025	< 0.0005	< 0.0025	0.003	< 0.0005	< 0.0005	< 0.001	< 0.0005	0.0037	< 0.0005	< 0.0005	< 0.0005	< 0.001

[1] M53-4 Purged Dry - No Sample Collecte

[2] M6-3 and OW4 Purged Dry - No Sam

Table 5b: Groundwater Quality Results and Reasonable Use Limits - October 24 - 26, 2023

Name	Date	1,4-dioxane	Alkalinity	Chloride	Dissolved Organic Carbon	Iron	Manganese	Sodium	Total Dissolved Solids	1,1-dichloroethylene	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		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**	*390*	*130*	*3.6*	*0.18*	*0.034*	*109*	*452*	*0.0035*	*0.0014*	*0.0013*	*0.0121*	*0.15*
M54-4	10/24/2023	< 0.001	*390*	55	3.1	< 0.1	0.029	61	*585*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001
M66-2	10/25/2023	< 0.001	380	84	2	< 0.1	0.011	*140*	*750*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001
M67-2	10/24/2023	< 0.001	330	2	2.2	*0.43*	0.018	43	285	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001
M86	10/24/2023	< 0.001	*400*	28	*3.8*	< 0.1	0.003	*140*	*565*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001
75% RUL†		*n/a*	*293*	*98*	*2.7*	*0.14*	*0.026*	*82*	*339*	*0.0026*	*0.0011*	*0.00098*	*0.0091*	*0.11*
M80-2	10/25/2023	< 0.001	*340*	30	2.5	< 0.1	0.006	38	*475*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001
M87-2	10/24/2023	< 0.001	230	17	1.8	< 0.1	0.017	12	*415*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001
OW37-s	10/26/2023	< 0.003	210	70	*2.8*	*4.4*	*0.31*	46	*415*	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005
Intermediate BedrockGroundwater Flow Zone														
RUL		*0.001**	*400*	*132*	*3.5*	*0.18*	*0.032*	*106*	*465*	*0.0035*	*0.0014*	*0.0013*	*0.0121*	*0.15*
M177	10/26/2023	< 0.001	240	2.5	2.4	< 0.1	0.005	7.3	265	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005
M179	10/27/2023	< 0.001	320	62	3.1	*0.3*	*0.034*	67	395	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001
M185-1	10/25/2023	< 0.001	230	*260*	2	< 0.1	*0.038*	*250*	*765*	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005
M185-2	10/25/2023	< 0.001	270	3	2.5	0.15	0.016	4.3	315	< 0.0001	0.00015	< 0.0001	< 0.0002	< 0.0001
M186	10/27/2023	< 0.001	330	*1100*	1.5	0.16	*0.046*	*730*	*2270*	< 0.0001	0.00017	< 0.0001	< 0.0002	0.00035
M187	10/26/2023	< 0.001	250	*130*	2.3	< 0.1	0.005	100	*640*	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001
M188-1	10/26/2023	< 0.001	300	35	2.7	< 0.1	0.008	56	350	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005
M190	10/25/2023	< 0.001	280	28	*4.7*	< 0.1	0.005	19	310	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001
M192	10/25/2023	*0.0094*	*650*	*320*	*4.7*	*0.19*	0.018	*370*	*1200*	< 0.001	< 0.001	< 0.001	0.0021	< 0.001
75% RUL†		*n/a*	*300*	*99*	*2.63*	*0.14*	*0.024*	*80*	*349*	*0.0026*	*0.0011*	*0.00098*	*0.0091*	*0.11*
M80-1	10/25/2023	< 0.001	150	3.8	1.3	< 0.1	0.004	38	180	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005
M82-1	10/26/2023	< 0.001	*320*	38	*2.9*	< 0.1	0.004	82	*440*	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001
M82-2	10/26/2023	< 0.001	*310*	8.8	2.3	< 0.1	0.022	11	*365*	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001
M106	10/24/2023	< 0.001	290	*2100*	1.8	< 0.1	0.003	*1200*	*3960*	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005

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

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

0.05 Groundwater results exceed Reasonable Use Limits (RUL)

Table 6a: Surface Water Characteristics - July 27, 2023

Date	Parameter		Surface Water Station									
			S2	S3	S4R	S5	S6	S7	S8R	S18	S19	S20
7/27/2023	Velocity:	m/s	Dry	NM	Dry	Dry	Dry	NM	Dry	NM	NM	Dry
	Depth:	m										
	Width:	m										
	Estimated Flow Rate:	m^3/s										

NM: Not Measured (Flow was insufficient, water was ponded, or unable to measure due to vegetation)

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Table 6b: Surface Water Characteristics - October 24 , 2023

Date	Parameter		Surface Water Station									
			S2	S3	S4R	S5	S6	S7	S8R	S18	S19	S20
2021-10-27	Velocity:	m/s	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Depth:	m										
	Width:	m										
	Estimated Flow Rate:	m^3/s										

NM: Not Measured (Flow was insufficient, water was ponded, or unable to measure due to vegetation)

Table 7a: Surface Water Quality Results - July 27 , 2023

			Marysville Creek				Beechwood Ditch			South of Beechwood Road		
			S2	S3	S6	S7	S5	S4R	S8R	S18	S19	S20
			(upstream)	(downstream)	(downstream)	(downstream)	(upstream)	(downstream)	(downstream)	(upstream)	(downstream)	(downstream)
		Date	7/27/2023	7/27/2023	7/27/2023	7/27/2023	7/27/2023	7/27/2023	7/27/2023	7/27/2023	7/27/2023	7/27/2023
Reading Name	Units	PWQO										
Inorganic and General Parameters												
Alkalinity	mg/L			290		84				180	160	
Ammonia	mg/L			0.19		1.43				< 0.15	< 0.15	
Ammonia (unionized)	mg/L	0.02		< 0.00061		0.0089				< 0.00057	< 0.0012	
Biochemical Oxygen Demand	mg/L			< 2		5				3	< 2	
Chemical Oxygen Demand	mg/L			12		42				36	48	
Chloride	mg/L			43		9.1				< 1	11	
Conductivity	µS/cm			840		450				380	400	
Hardness	mg/L		*DRY*	390	*DRY*	210	*DRY*	*DRY*	*DRY*	200	200	*DRY*
Nitrate	mg/L			0.14		17.7				< 0.1	< 0.1	
Nitrite	mg/L			< 0.01		0.05				< 0.01	< 0.01	
Phenols	mg/L	0.001		*0.0011*		*0.0013*				*0.0015*	*0.0015*	
Phosphorus (total)	mg/L	0.03		*0.037*		*0.15*				*0.081*	*0.076*	
Sulphate	mg/L			71		48				13	25	
Total Dissolved Solids	mg/L			560		370				255	285	
Total Suspended Solids	mg/L			< 10		< 10				< 10	19	
Metals												
Boron	mg/L	0.2		0.092		0.034				< 0.02	0.056	
Cadmium	mg/L			< 0.0001		< 0.0001				< 0.0001	< 0.0001	
Calcium	mg/L			110		98				73	67	
Chromium (III)	mg/L	0.0089		< 0.005		< 0.005				< 0.005	< 0.005	
Chromium (VI)	mg/L	0.001		< 0.0005		< 0.0005				< 0.0005	< 0.0005	
Chromium (Total)	mg/L			< 0.005		< 0.005				< 0.005	< 0.005	
Cobalt	mg/L	0.0009		< 0.0005		0.0007				< 0.0005	< 0.0005	
Copper	mg/L	0.005	*DRY*	< 0.002	*DRY*	0.008	*DRY*	*DRY*	*DRY*	< 0.002	< 0.002	*DRY*
Iron	mg/L	0.3		*0.35*		*1*				*0.96*	*1.1*	
Lead	mg/L	0.005		< 0.0005		0.0006				< 0.0005	< 0.0005	
Magnesium	mg/L			21		8.8				4.8	5.6	
Nickel	mg/L	0.025		< 0.001		0.001				< 0.001	< 0.001	
Potassium	mg/L			7.1		3.8				3.3	2	
Sodium	mg/L			31		8.4				5.7	12	
Zinc	mg/L	0.02		< 0.01		< 0.01				< 0.01	< 0.01	
Volatile Organic Compounds (VOCs)												
1,4-dioxane	mg/L	0.02	*DRY*	< 0.001	*DRY*	< 0.001	*DRY*	*DRY*	*DRY*	< 0.001	< 0.001	*DRY*
Naphthalene	mg/L	0.007		< 0.00005		< 0.00005				< 0.00005	< 0.00005	
Field Measurements												
pH (Field)	unitless	6.5-8.5		6.87		7.12				6.72	7.22	
Conductivity (Field)	µS/cm		*DRY*	726	*DRY*	404.7	*DRY*	*DRY*	*DRY*	292	360	*DRY*
Dissoved Oxygen (Field)	mg/L			1.27		2.46				3.65	3.06	
Temperature (Field)	°C			11.4		19.7				25.8	20.3	

Exceeds PWQO

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Table 7b: Surface Water Quality Results - October 24, 2023

			Marysville Creek				Beechwood Ditch			South of Beechwood Road		
			S2	S3	S6	S7	S5	S4R	S8R	S18	S19	S20
			(upstream)	(downstream)	(downstream)	(downstream)	(upstream)	(downstream)	(downstream)	(upstream)	(downstream)	(downstream)
		Date	10/24/2023	10/24/2023	10/24/2023	10/24/2023	10/24/2023	10/24/2023	10/24/2023	10/24/2023	10/24/2023	10/24/2023
Reading Name	Units	PWQO										
Inorganic and General Parameters												
Alkalinity	mg/L		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Ammonia	mg/L											
Ammonia (unionized)	mg/L	0.02										
Biochemical Oxygen Demand	mg/L											
Chemical Oxygen Demand	mg/L											
Chloride	mg/L											
Conductivity	µS/cm											
Hardness	mg/L											
Nitrate	mg/L											
Nitrite	mg/L											
Nitrate + Nitrite	mg/L											
Phenols	mg/L	0.001										
Phosphorus (total)	mg/L	0.03										
Sulphate	mg/L											
Total Dissolved Solids	mg/L											
Total Suspended Solids	mg/L											
Metals												
Boron	mg/L	0.2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Cadmium	mg/L											
Calcium	mg/L											
Chromium (III)	mg/L	0.0089										
Chromium (VI)	mg/L	0.001										
Chromium (Total)	mg/L											
Cobalt	mg/L	0.0009										
Copper	mg/L	0.005										
Iron	mg/L	0.3										
Lead	mg/L	0.005										
Magnesium	mg/L											
Nickel	mg/L	0.025										
Potassium	mg/L											
Sodium	mg/L											
Zinc	mg/L	0.02										
Volatile Organic Compounds (VOCs)												
1,4-dioxane	mg/L	0.02	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Naphthalene	mg/L	0.007										
Field Measurements												
pH (Field)	unitless	6.5-8.5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Conductivity (Field)	µS/cm											
Dissoved Oxygen (Field)	mg/L											
Temperature (Field)	°C											

Exceeds PWQO

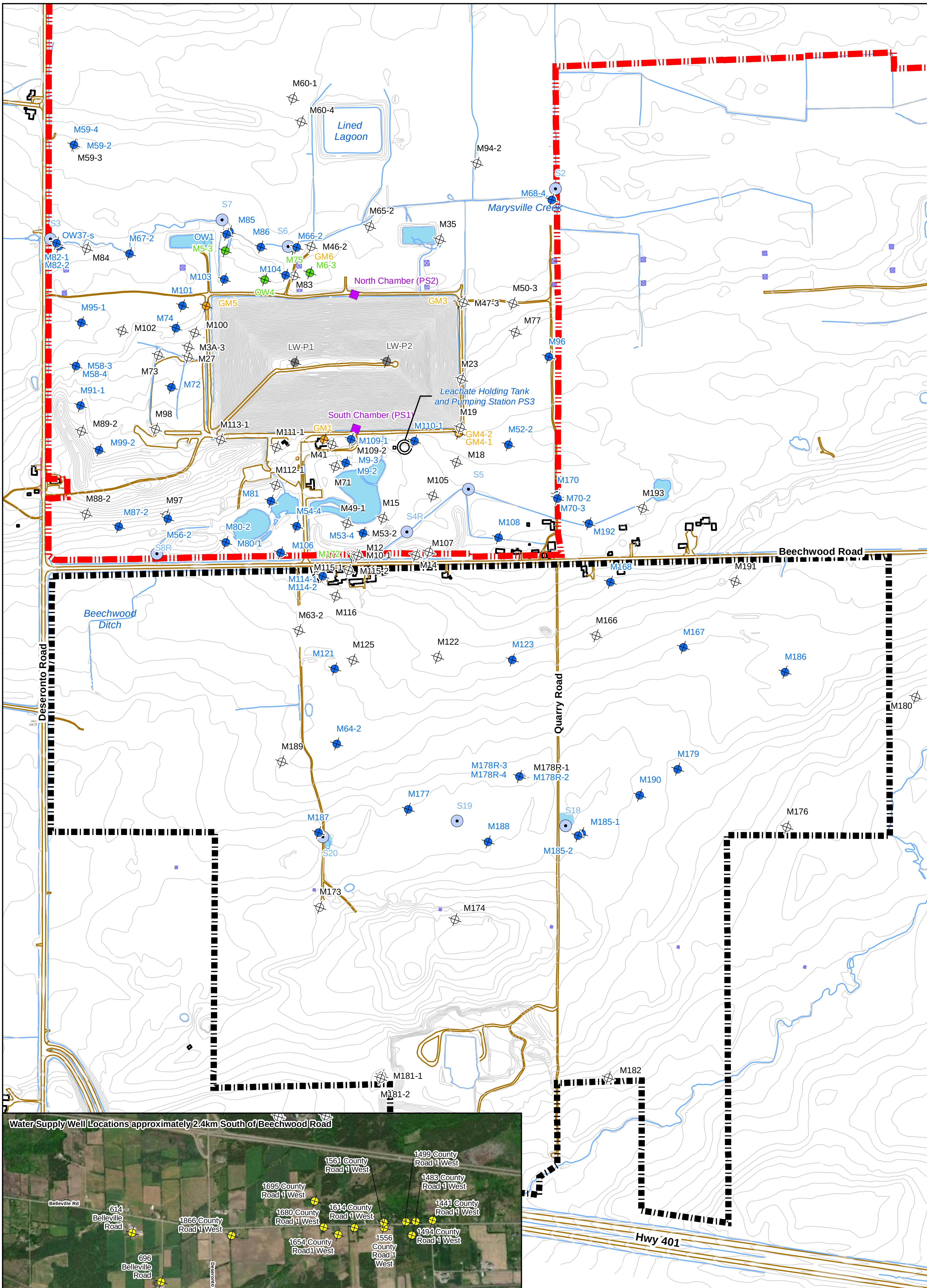
Table 8: Subsurface Gas Monitoring Results - November 3, 2023

Gas Monitor	Location	Reading (ppm)
GM1	North of garage area, south of waste mound	0
GM3	Northeast corner of waste mound	10
GM4-1	Southeast corner of waste mound	45
GM4-2		0
GM5	Northwest corner of waste mound	15
GM6	North of waste mound	5

Table 9: Additional Investigations

Description of Activities in 2023	Reporting Completed in 2023	Anticipated / Planned Work in 2024
Non-Routine Investigations · Sampling and cleanup related to minor leachate release from leaking temporary storage tank	- Notification of On-Site Leachate Release dated March 30, 2023 - Sampling Results Following Leachate Release dated June 14, 2023	- None
· North Lagoon Investigation, Water Balance update and Pumping (June to October)	- North Lagoon Monitoring Results dated May 5, 20223 - 2022/2023 Water Balance for the North Lagoon dated June 21, 2023	- Finish Emptying North Lagoon
· North Lagoon Liner/Earthworks Repair	N/A	N/A
· ECA No. xxx Amendment	- Updated Post-Closure Environmental Monitoring Plan (EMP) dated May 5, 2023	- Finalize ECA Amendment Application (CAZ Approval & Final Post-Closure EMP)
· ECA No. xxx Amendment	- Updated Conceptual Design for Southeast Hydraulic Control System (HCS) dated May 5, 2023	- Finalize ECA Amendment Application (CAZ Approval & Final Post-Closure EMP)
Town of Greater Napanee & Kingston WWTP Requirements: · Monthly North/South Chambers combined leachate sampling (Jan-Dec)	- Monthly reports prepared for the Town of Greater Napanee and City of Kingston	- Monitoring and reporting to continue in 2024
ISW ECA Monitoring Requirements - Storm Water Ponds and Leachate: · Storm Water Ponds · Monthly sampling for inorganic and general chemistry parameter lists (March, April, May, October, November, December) · Quarterly Sampling of the ECA Storm water ponds for Toxicity (March, June, September, December) · Leachate (North Chamber) · Quarterly sampling list (March, August, October, December) · Annual sampling chemistry list (May)	- Monitoring results from the 2022 calendar year for the stormwater ponds and leachate locations were reported in the 2022 Annual Report, prepared by WSP Canada Inc. and dated January 2023	- Monitoring and reporting to continue in 2024

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

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CLIENT

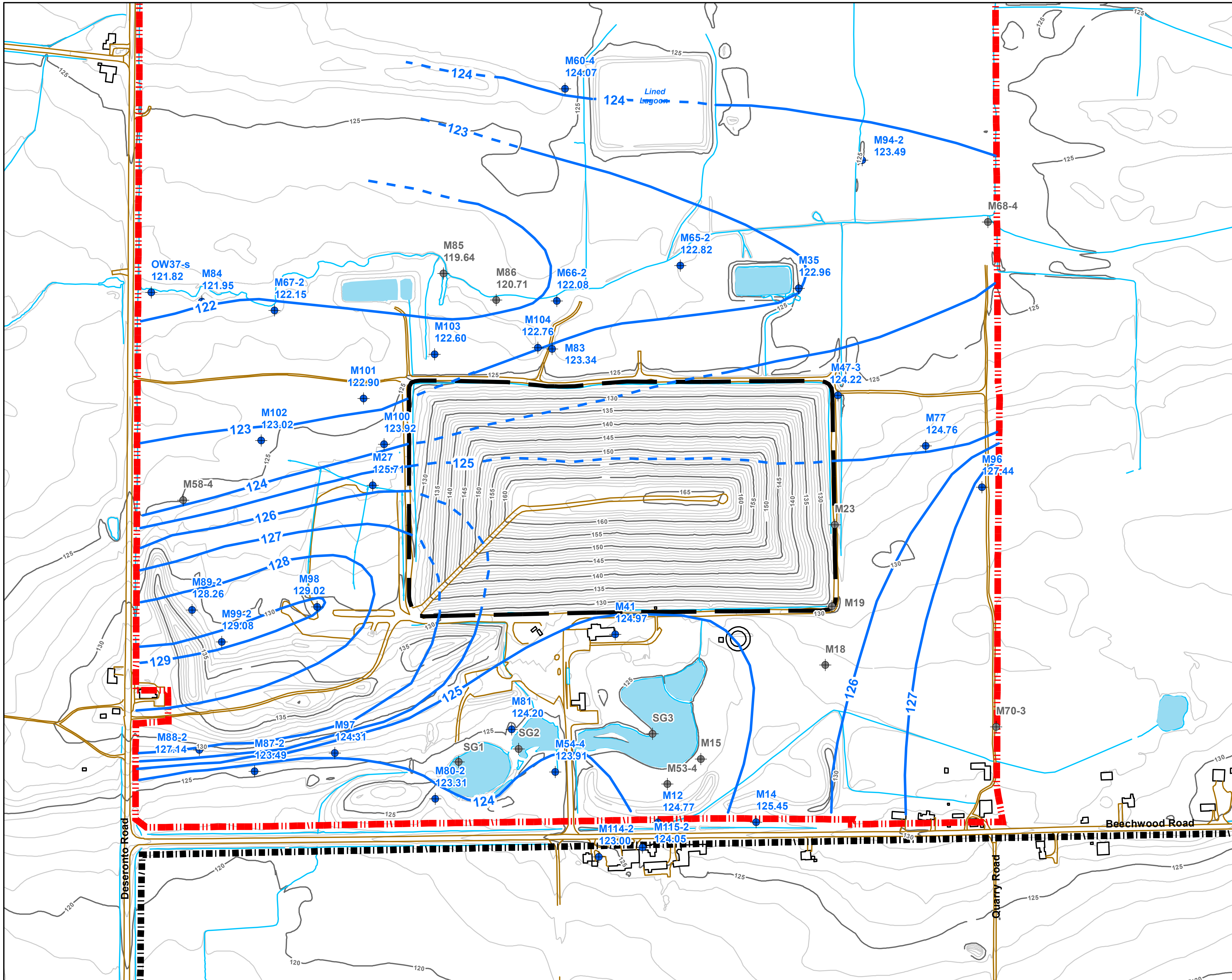
PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL
FALL 2023 SEMI-ANNUAL REPORT

TITLE

SITE PLAN AND
MONITORING LOCATIONS

PROJECT #	DATE		
230130-03	January 2024		
DRAWN	CHECKED	FIG NO.	REV
EB	FR	01	0



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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				

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Metres
1:5,000

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WASTE MANAGEMENT

PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL FALL 2023 SEMI-ANNUAL REPORT

TITLE

SHALLOW GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE – JULY 20, 2023

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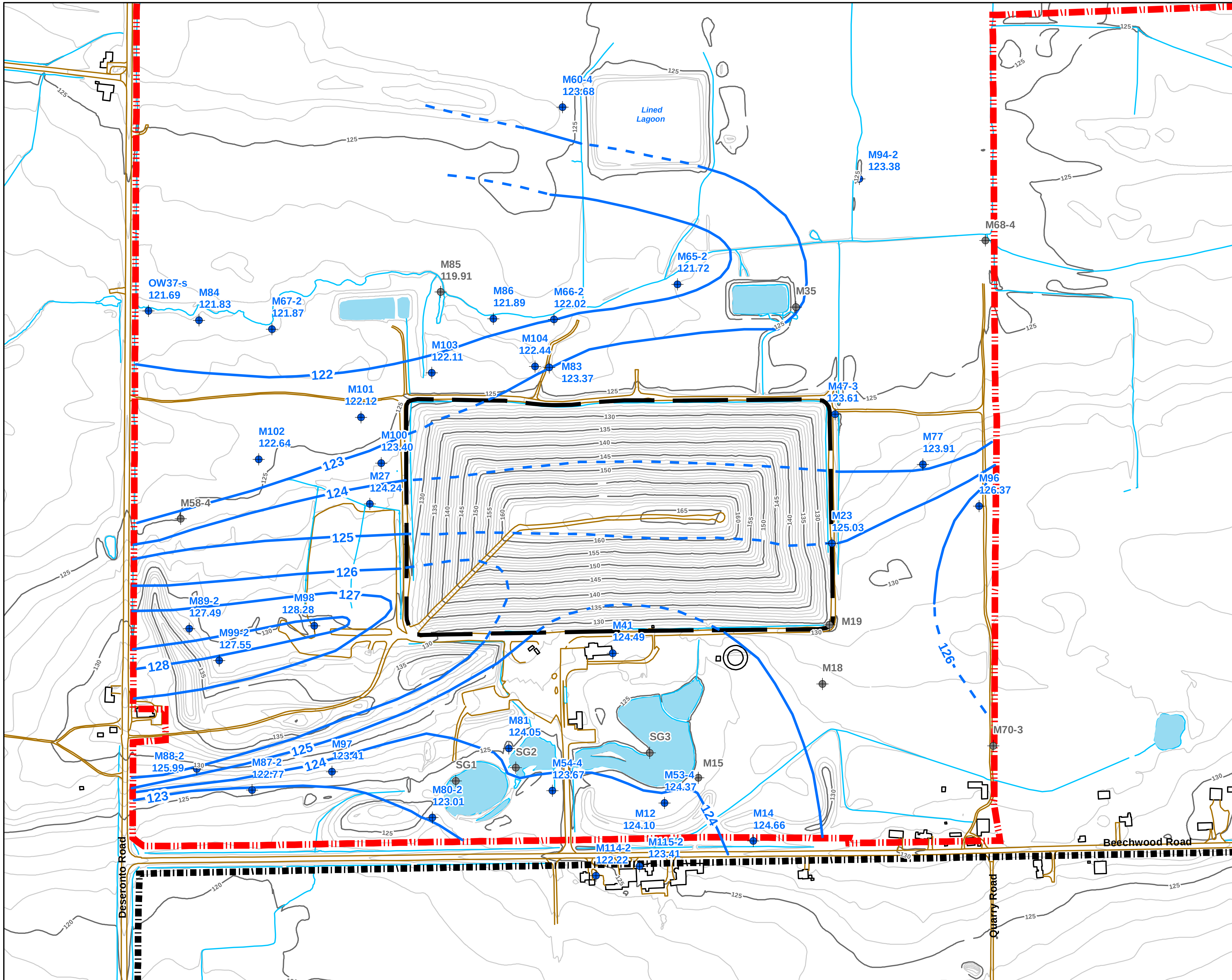
PROJECT #	DATE
230130-03	January 2024

DRAWN	CHECKED	FIG NO.	REV
EB	FR	02a	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				

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Metres
1:5,000

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WASTE MANAGEMENT RICHMOND LANDFILL FALL 2023 SEMI-ANNUAL REPORT

TITLE

SHALLOW GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE – OCTOBER 23, 2022

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PROJECT #	DATE
230130-03	January 2024

DRAWN	CHECKED	FIG NO.	REV
EB	FR	02b	0

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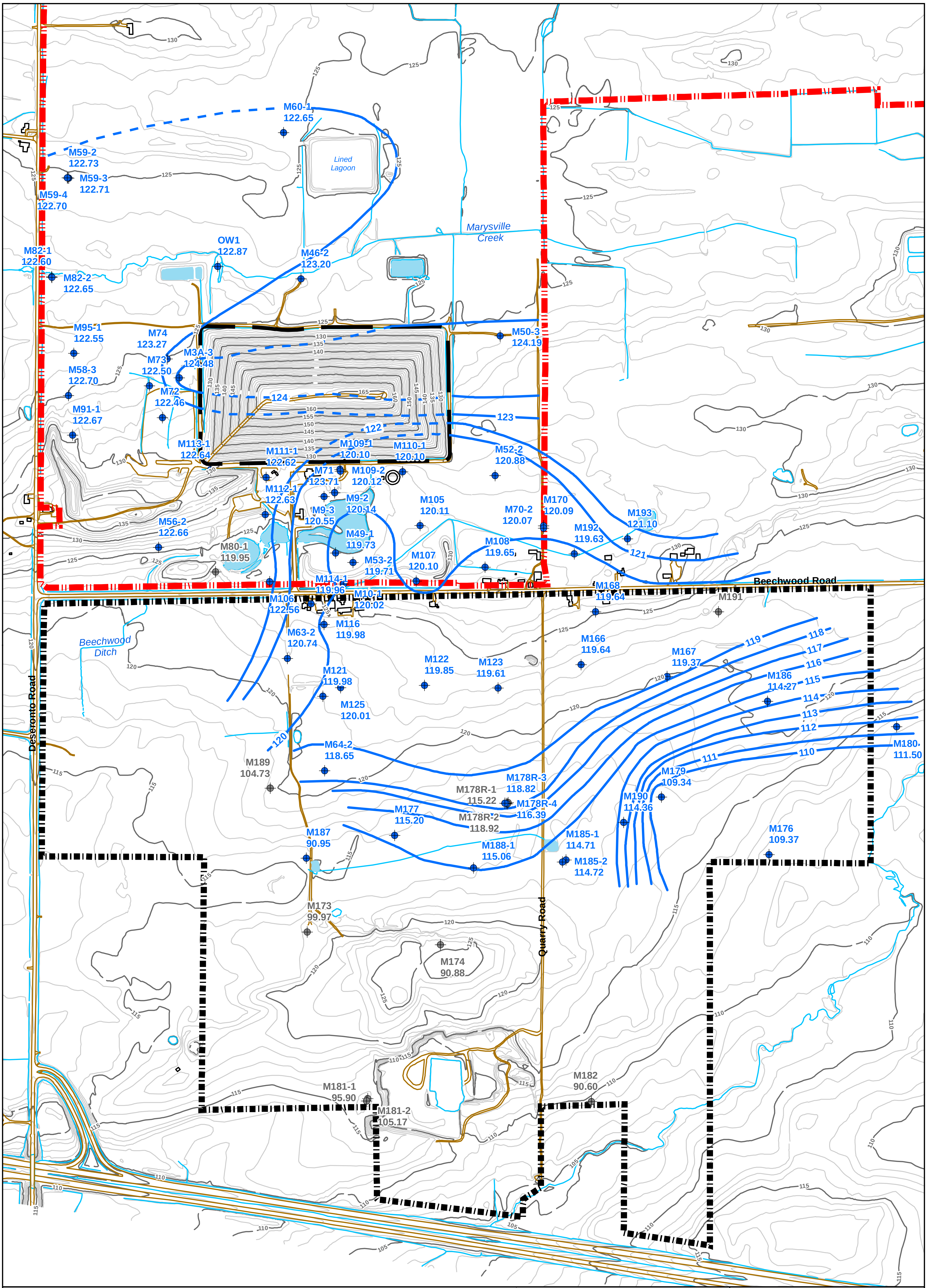

LEGEND

- 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

PROPRIETARY INFORMATION MAY NOT BE REPRODUCED OR DIVULGED WITHOUT PRIOR WRITTEN CONSENT OF BLUMETRIC ENVIRONMENTAL INC.
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-PROJECTION: UTM NAD83 ZONE 18
-DATA SOURCE: WM CANADA, BLUMETRIC, MNRO, NRCAN

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

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CLIENT
WM WASTE MANAGEMENT

PROJECT
WASTE MANAGEMENT RICHMOND LANDFILL FALL 2023 SEMI-ANNUAL REPORT

TITLE
INTERMEDIATE BEDROCK GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE – JULY 20, 2022

PROJECT #	DATE		
230130-03	January 2024		
DRAWN	CHECKED	FIG NO.	REV
EB	FR	03a	0

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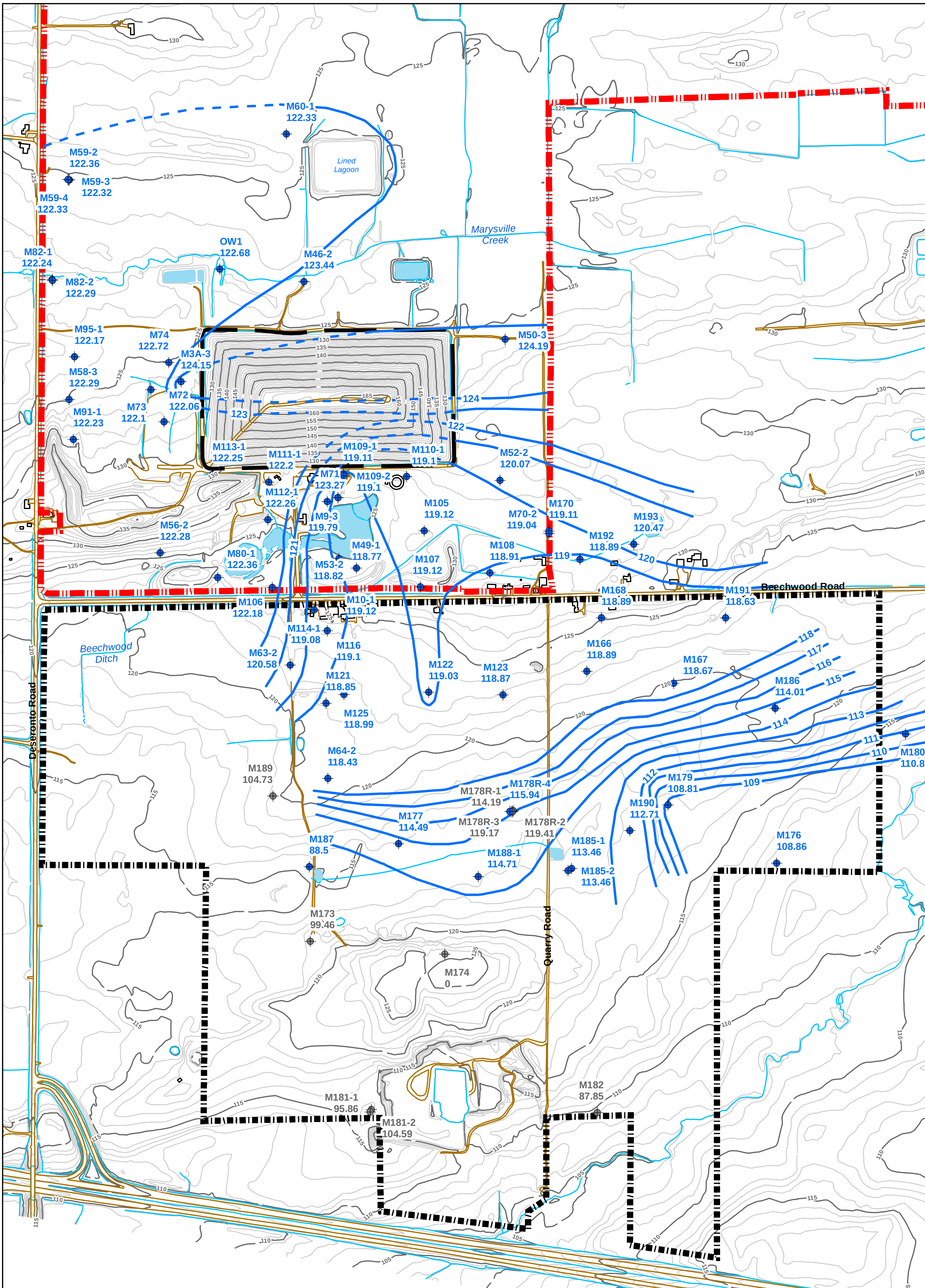

LEGEND

- 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

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

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PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL FALL 2023 SEMI-ANNUAL REPORT

TITLE

INTERMEDIATE BEDROCK GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE – OCTOBER 23, 2022

PROJECT #		DATE	
230130-03		January 2024	
DRAWN	CHECKED	FIG NO.	REV
EB	FR	03b	0

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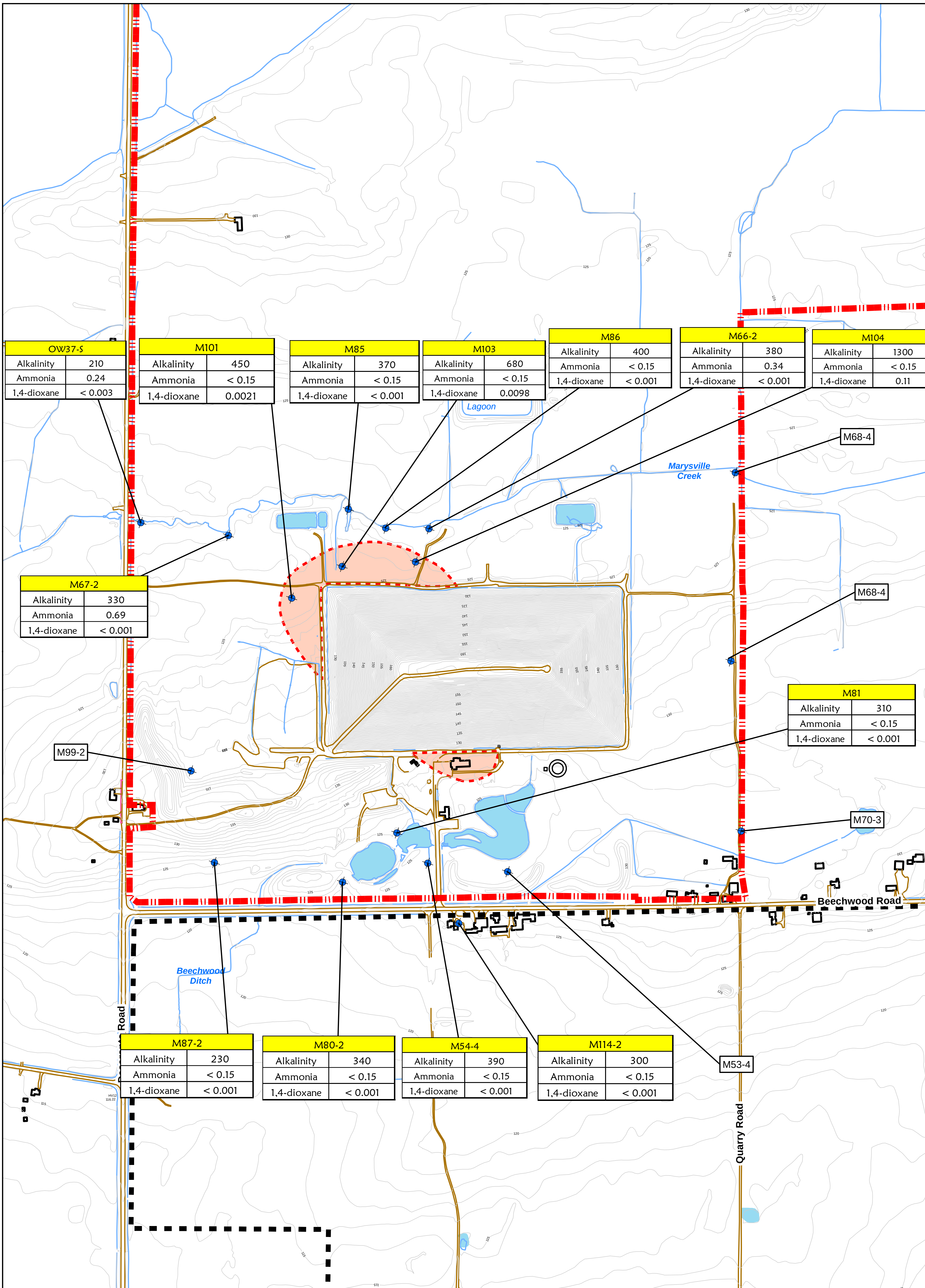

LEGEND

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

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

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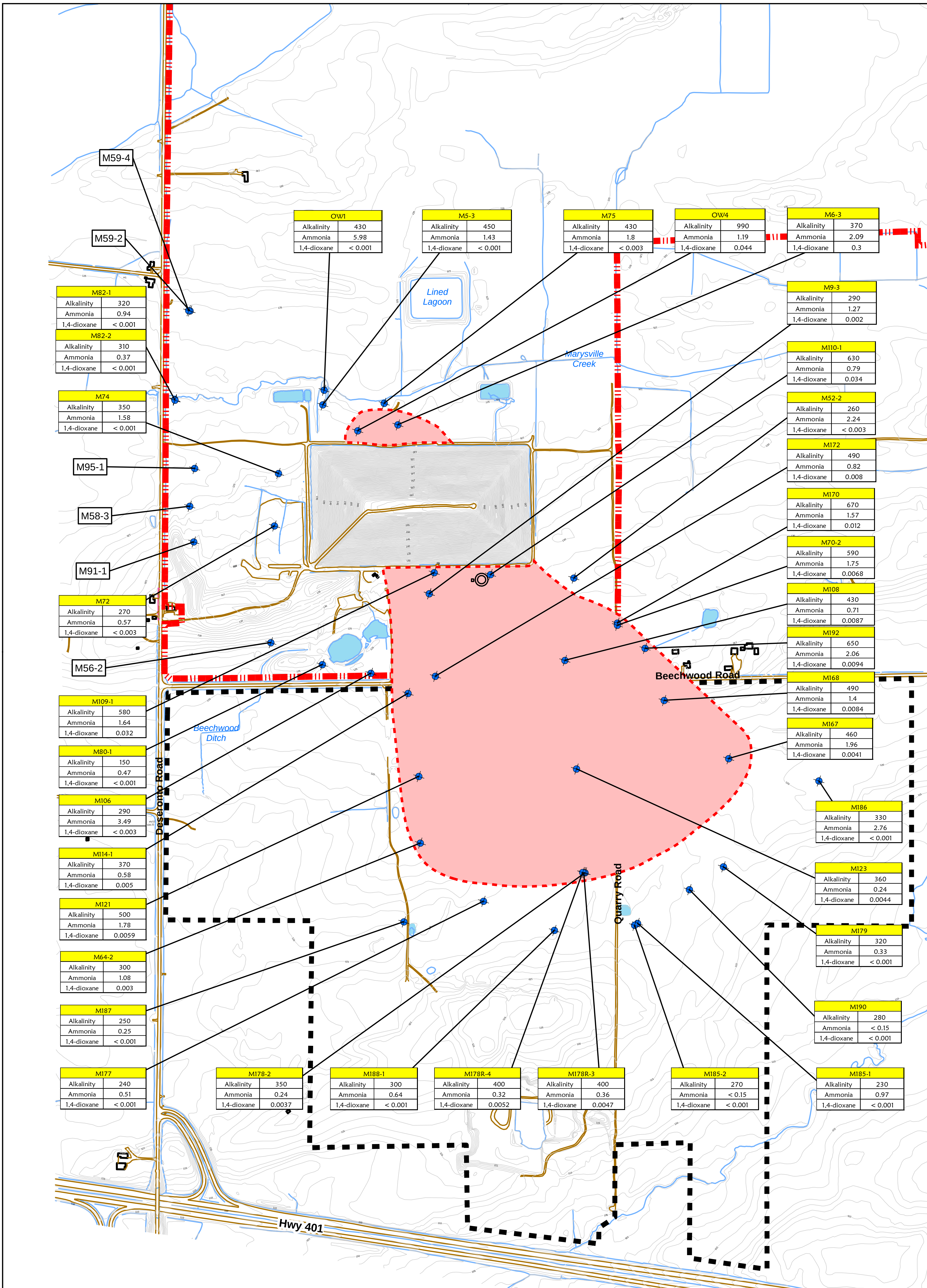
CLIENT
WASTE MANAGEMENT

PROJECT
WASTE MANAGEMENT RICHMOND LANDFILL FALL 2023 SEMI-ANNUAL REPORT

TITLE
SHALLOW GROUNDWATER FLOW ZONE CONCENTRATIONS

PROJECT #	DATE		
230130-03	January 2024		
DRAWN	CHECKED	FIG NO.	REV
EB	FR	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.
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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
1:9,000

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PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL
FALL 2023 SEMI-ANNUAL REPORT

TITLE

INTERMEDIATE BEDROCK GROUNDWATER FLOW ZONE CONCENTRATIONS

PROJECT #	DATE
230130-03	January 2024

DRAWN	CHECKED	FIG NO.	REV
EB	FR	05	0

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
M48-1	334838	4902564
M48-2	334839	4902565

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
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
M64-1	335585	4902174
M64-2	335585	4902176
M65-1	335297	4903314
M65-2	335298	4903316

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
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
M95-2	334740	4902917
M96	335774	4903158
M97	335059	4902551
M98	334976	4902730
M99-1	334869	4902646
M99-2	334869	4902646

Appendix A: Monitoring Well Inventory

	Coordinates (UTM NAD83 Zone 18)	
Monitoring Well	Easting	Northing
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
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

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

APPENDIX B

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

Appendix B - QAQC Results (Summer 2023 Sampling Event)

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

Location	Parameter	Unit	Regular Sample	Field Duplicate	RPD (%)	RDL[2]	Comment
S18	Chemical Oxygen Demand	mg/L	36	49	30.59	4	
S18	Phosphorus (total)	mg/L	0.081	0.14	53.39	0.03	within 5x RDL

[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

Parameter	Units	S18 Regular Sample	S18 Field Duplicate	RPD (%)
General/Inorganics				
Alkalinity	mg/L	180	190	5.41
Ammonia	mg/L	< 0.15	< 0.15	0.00
Ammonia (unionized)	mg/L	< 0.00057	< 0.00057	0.00
Biochemical Oxygen Demand	mg/L	3	< 2	0.00
Chemical Oxygen Demand	mg/L	36	49	30.59
Chloride	mg/L	< 1	1.6	0.00
Conductivity	µS/cm	380	380	0.00
Hardness	mg/L	200	210	4.88
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Phenols	mg/L	0.0015	0.0013	14.29
Phosphorus (total)	mg/L	0.081	0.14	53.39
Sulphate	mg/L	13	14	7.41
Total Dissolved Solids	mg/L	255	285	11.11
Total Suspended Solids	mg/L	< 10	12	0.00
Metals				
Boron	mg/L	< 0.02	< 0.02	0.00
Cadmium	mg/L	< 0.0001	0.0002	0.00
Calcium	mg/L	73	67	8.57
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
Copper	mg/L	< 0.002	< 0.002	0.00
Iron	mg/L	0.96	0.98	2.06
Lead	mg/L	< 0.0005	< 0.0005	0.00
Magnesium	mg/L	4.8	4.6	4.26
Nickel	mg/L	< 0.001	< 0.001	0.00
Potassium	mg/L	3.3	3.2	3.08
Sodium	mg/L	5.7	5.8	1.74
Zinc	mg/L	< 0.01	< 0.01	0.00
Naphthalene	mg/L	< 0.00005	< 0.00005	0.00
1,4-Dioxane	mg/L	< 0.001	< 0.001	0.00
Field Conductivity	µS/cm	292	292	0.00
Field Temperature	Celsius	25.8	25.8	0.00

Appendix B - QAQC Results (Fall 2023 Sampling Event)

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

Location	Parameter	Unit	Regular Sample	Field Duplicate	RPD (%)	RDL [2]	Comment
M108	Dissolved Organic Carbon	mg/L	5.4	8.3	42.34	0.4	
M123	Dissolved Organic Carbon	mg/L	5.4	4.1	27.37	0.4	

[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	M108 Regular Sample	M108 Field Duplicate	RPD (%)
General Inorganic Parameters				
Alkalinity	mg/L	430	440	2.30
Ammonia	mg/L	0.71	0.7	1.42
Chloride	mg/L	36	37	2.74
Conductivity	µS/cm	940	930	1.07
Dissolved Organic Carbon	mg/L	5.4	8.3	42.34
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Sulphate	mg/L	11	11	0.00
Total Dissolved Solids	mg/L	515	495	3.96
Boron	mg/L	0.18	0.18	0.00
Calcium	mg/L	99	99	0.00
Iron	mg/L	3	3	0.00
Magnesium	mg/L	29	29	0.00
Manganese	mg/L	0.14	0.13	7.41
Potassium	mg/L	5.8	5.7	1.74
Sodium	mg/L	53	53	0.00
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	0.00029	0.0003	3.39
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	0.0087	0.009	3.39
Benzene	mg/L	< 0.0001	< 0.0001	0.00
Chlorobenzene	mg/L	< 0.0001	< 0.0001	0.00
Chloroethane	mg/L	0.0034	0.0034	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	M109-1 Regular Sample	M109-1 Field Duplicate	RPD (%)
General/Inorganics				
Alkalinity	mg/L	580	580	0.00
Ammonia	mg/L	1.64	1.61	1.85
Chloride	mg/L	120	100	18.18
Conductivity	µS/cm	1400	1400	0.00
Dissolved Organic Carbon	mg/L	8.1	8	1.24
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Sulphate	mg/L	1.9	< 1	0.00
Total Dissolved Solids	mg/L	795	735	7.84
Boron	mg/L	0.34	0.34	0.00
Calcium	mg/L	130	130	0.00
Iron	mg/L	11	11	0.00
Magnesium	mg/L	42	42	0.00
Manganese	mg/L	0.26	0.26	0.00
Potassium	mg/L	7	7.1	1.42
Sodium	mg/L	100	100	0.00
Volatile Organic Compounds (VOCs)				
1,1,1,2-Tetrachloroethane	mg/L	< 0.001	< 0.001	0.00
1,1,1-Trichloroethane	mg/L	< 0.0005	< 0.0005	0.00
1,1,2,2-Tetrachloroethane	mg/L	< 0.001	< 0.001	0.00
1,1,2-Trichloroethane	mg/L	< 0.001	< 0.001	0.00
1,1-Dichloroethane	mg/L	< 0.0005	< 0.0005	0.00
1,1-Dichloroethylene	mg/L	< 0.0005	< 0.0005	0.00
1,2-Dichlorobenzene (o)	mg/L	< 0.001	< 0.001	0.00
1,2-Dichloroethane	mg/L	< 0.001	< 0.001	0.00
1,3,5-Trimethylbenzene	mg/L	< 0.001	< 0.001	0.00
1,3-Dichlorobenzene (m)	mg/L	< 0.001	< 0.001	0.00
1,4-Dichlorobenzene (p)	mg/L	< 0.001	< 0.001	0.00
1,4-Dioxane	mg/L	0.032	0.031	3.17
Benzene	mg/L	< 0.0005	< 0.0005	0.00
Chlorobenzene	mg/L	< 0.0005	< 0.0005	0.00
Chloroethane	mg/L	0.0087	0.0085	2.33
Chloromethane	mg/L	< 0.0025	< 0.0025	0.00
Cis-1,2-Dichloroethylene	mg/L	< 0.0005	< 0.0005	0.00
Dichloromethane	mg/L	< 0.0025	< 0.0025	0.00
Ethylbenzene	mg/L	< 0.0005	< 0.0005	0.00
m+p-Xylene	mg/L	< 0.0005	< 0.0005	0.00
o-Xylene	mg/L	< 0.0005	< 0.0005	0.00
Styrene	mg/L	< 0.001	< 0.001	0.00
Tetrachloroethylene	mg/L	< 0.0005	< 0.0005	0.00
Toluene	mg/L	< 0.001	< 0.001	0.00
Total Xylenes	mg/L	< 0.0005	< 0.0005	0.00
Trans-1,2-dichloroethylene	mg/L	< 0.0005	< 0.0005	0.00
Trichloroethylene	mg/L	< 0.0005	< 0.0005	0.00
Vinyl Chloride	mg/L	< 0.001	< 0.001	0.00

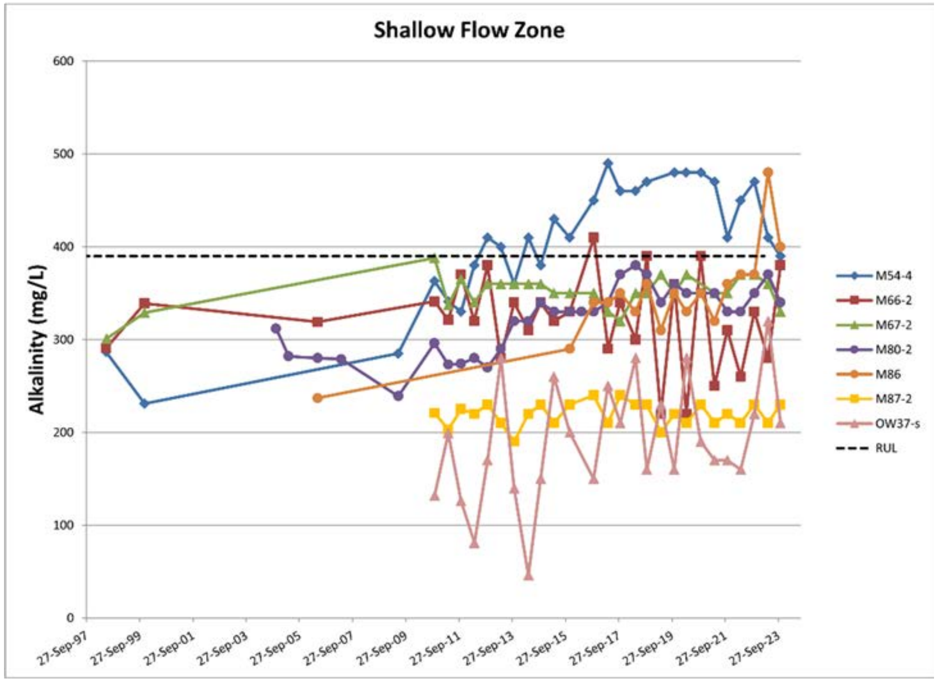
Detailed Results from Field Duplicate vs. Regular Samples

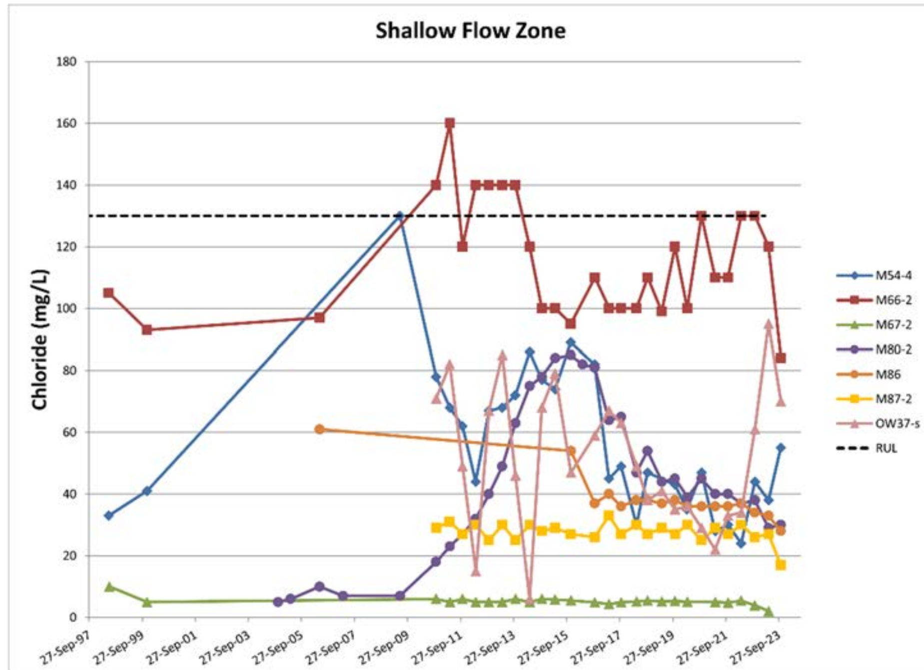
Reading Name	Units	M123 Regular Sample	M123 Field Duplicate	RPD (%)
General/Inorganics				
Alkalinity	mg/L	360	350	2.82
Ammonia	mg/L	0.24	0.23	4.26
Chloride	mg/L	23	23	0.00
Conductivity	µS/cm	770	760	1.31
Dissolved Organic Carbon	mg/L	5.4	4.1	27.37
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Sulphate	mg/L	12	12	0.00
Total Dissolved Solids	mg/L	350	365	4.20
Boron	mg/L	0.13	0.13	0.00
Calcium	mg/L	92	96	4.26
Iron	mg/L	< 0.1	< 0.1	0.00
Magnesium	mg/L	20	20	0.00
Manganese	mg/L	0.021	0.022	4.65
Potassium	mg/L	3.7	3.9	5.26
Sodium	mg/L	39	40	2.53
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	0.00022	8.70
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	0.0044	0.0044	0.00
Benzene	mg/L	< 0.0001	< 0.0001	0.00
Chlorobenzene	mg/L	< 0.0001	< 0.0001	0.00
Chloroethane	mg/L	0.0032	0.0035	8.96
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

APPENDIX C

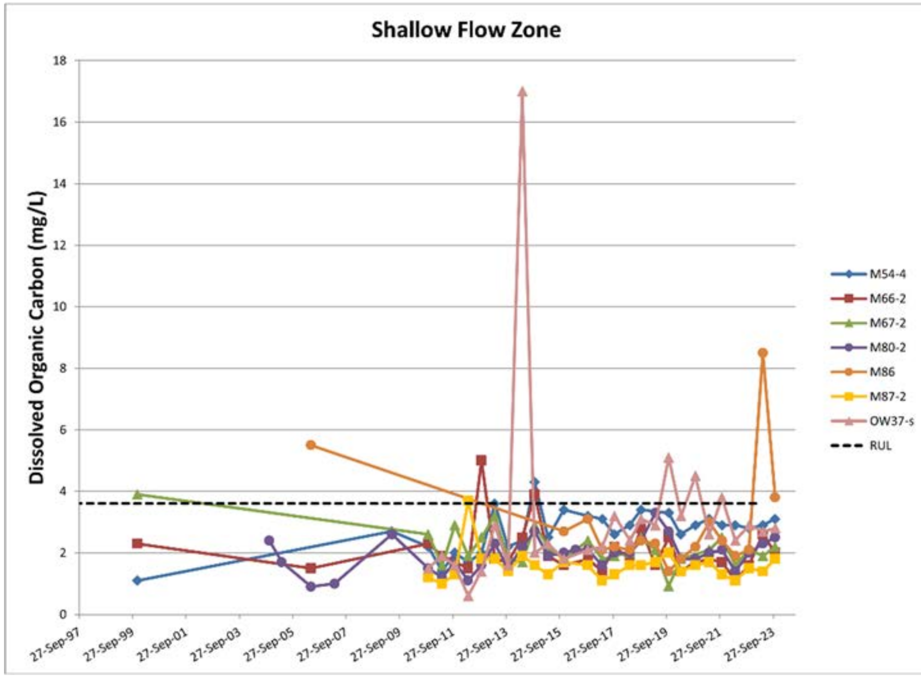
Time-Concentration Plots from Groundwater Trigger Wells

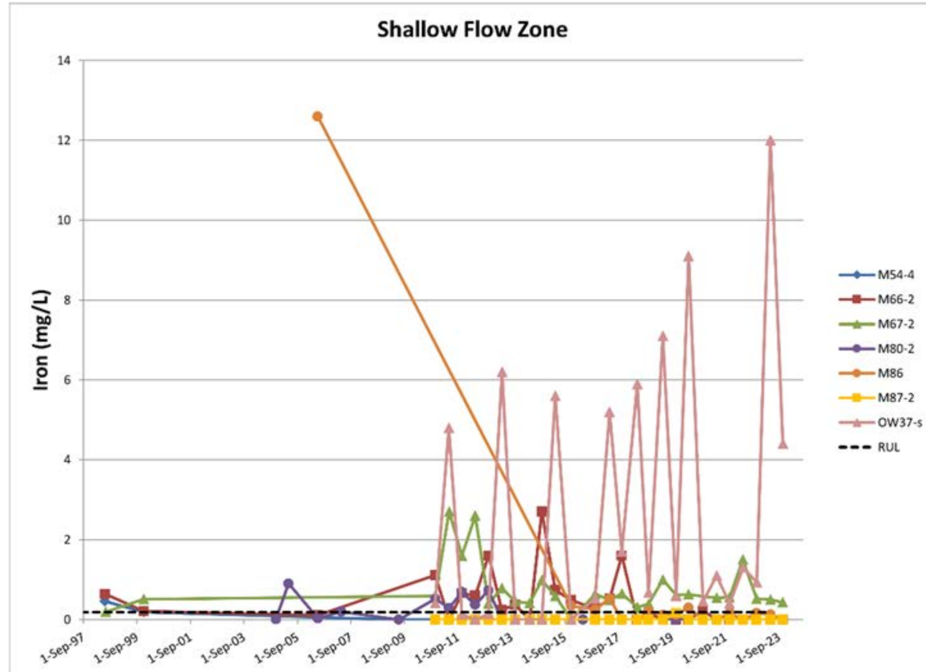
Appendix C – Groundwater Trigger Wells Time-Concentration Plots



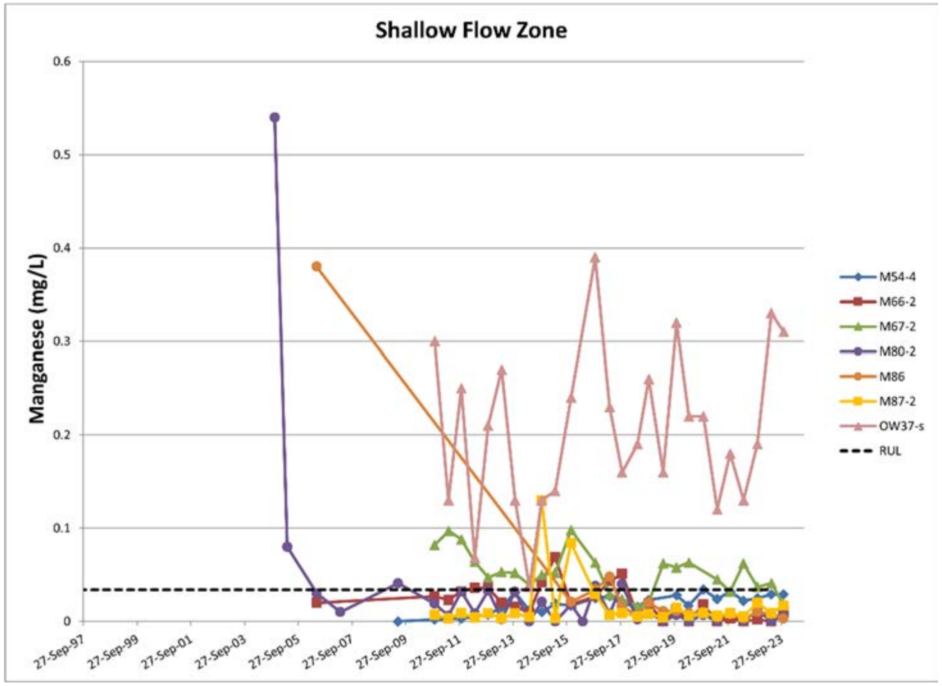


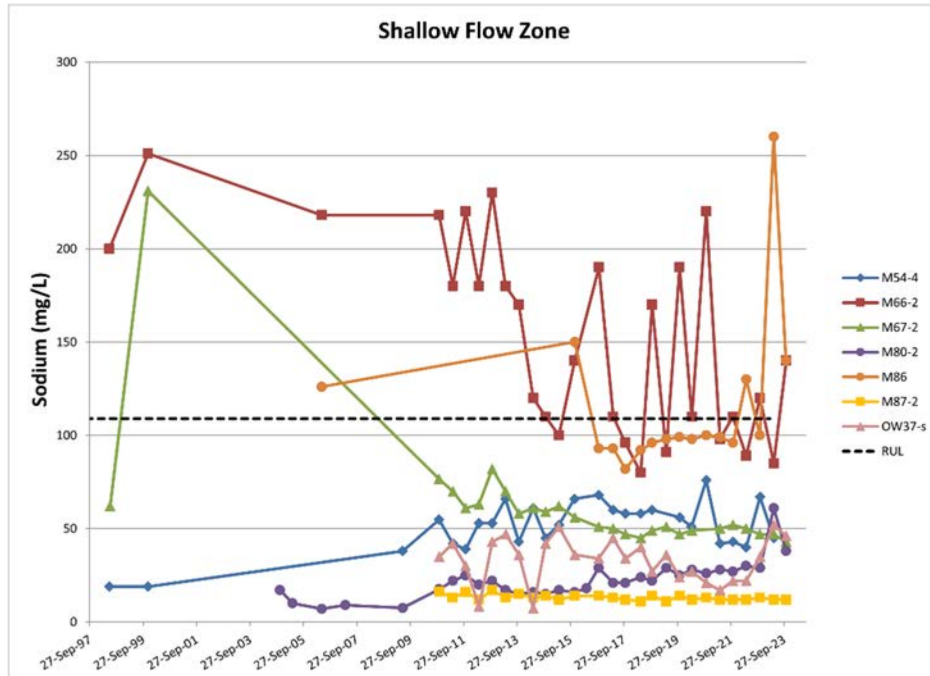
Appendix C – Groundwater Trigger Wells Time-Concentration Plots



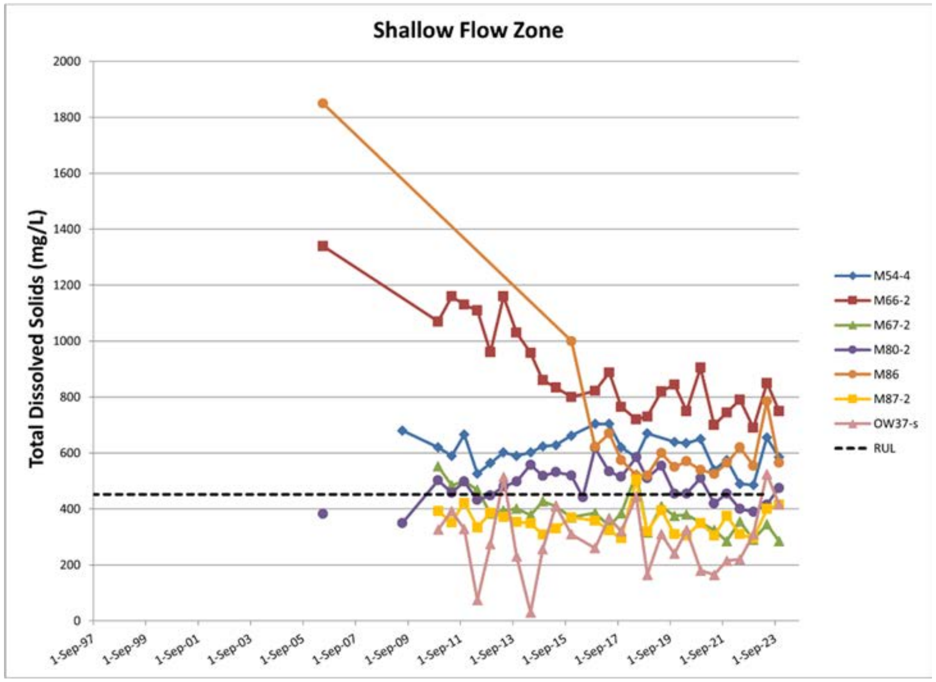


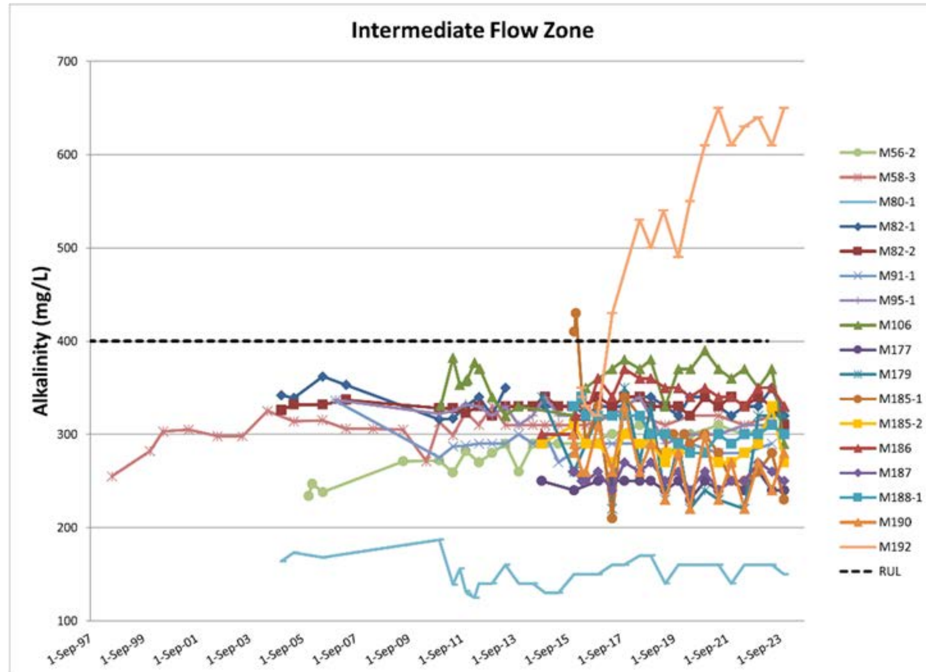
Appendix C – Groundwater Trigger Wells Time-Concentration Plots



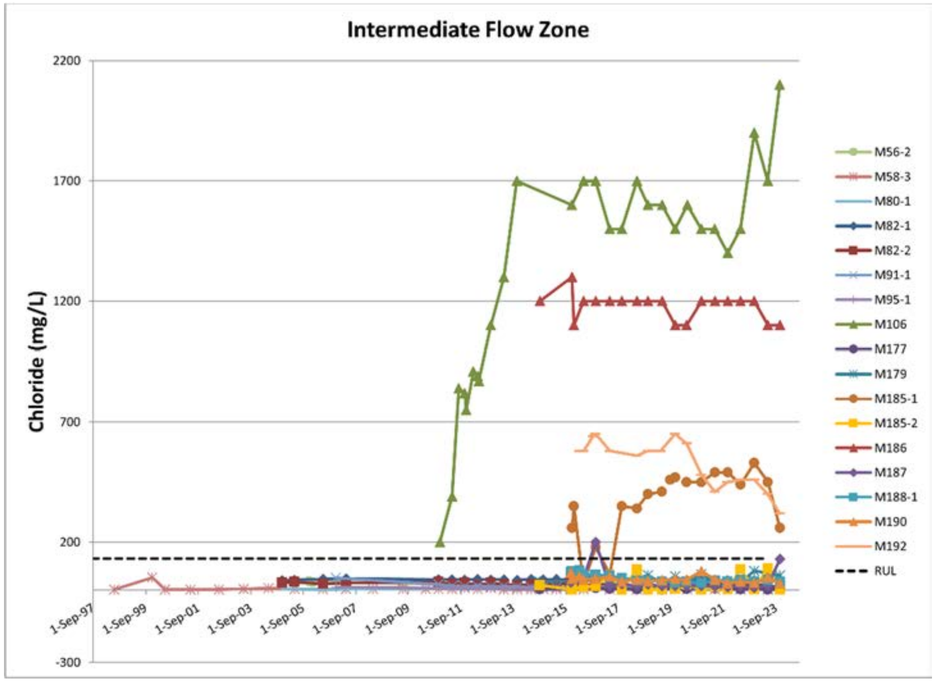


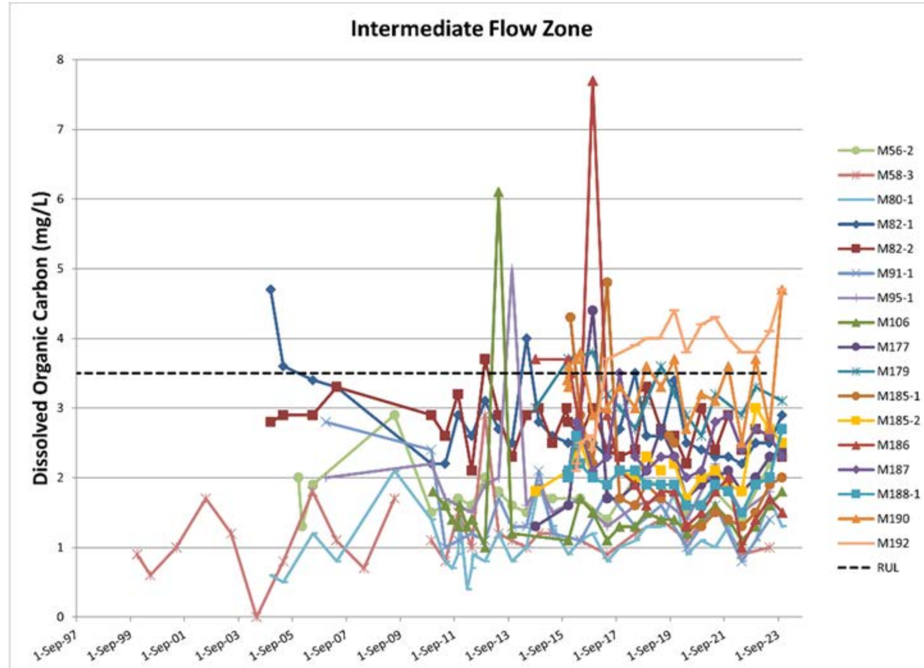
Appendix C – Groundwater Trigger Wells Time-Concentration Plots



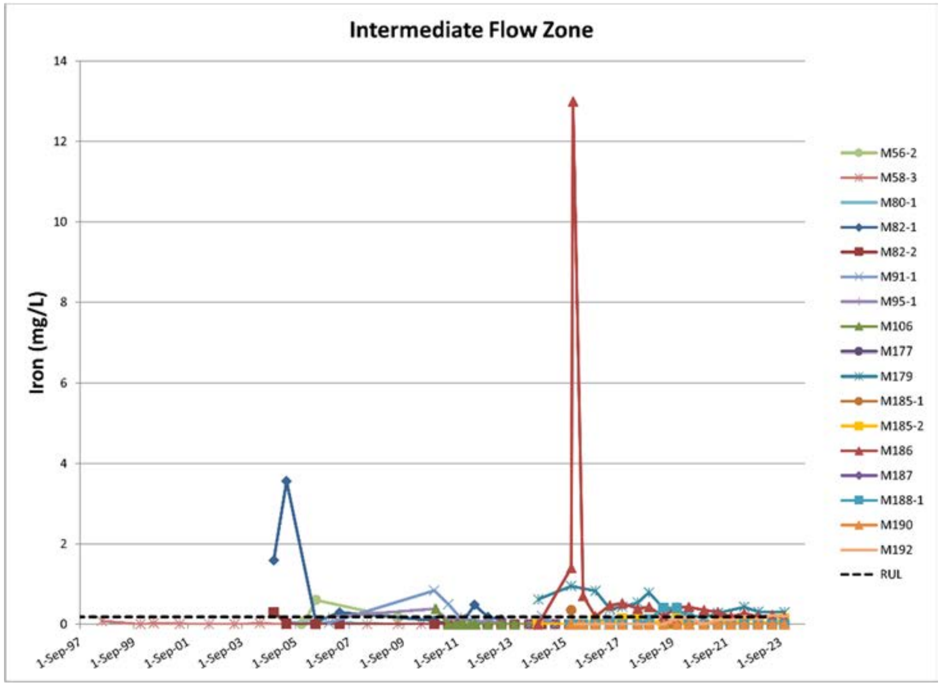


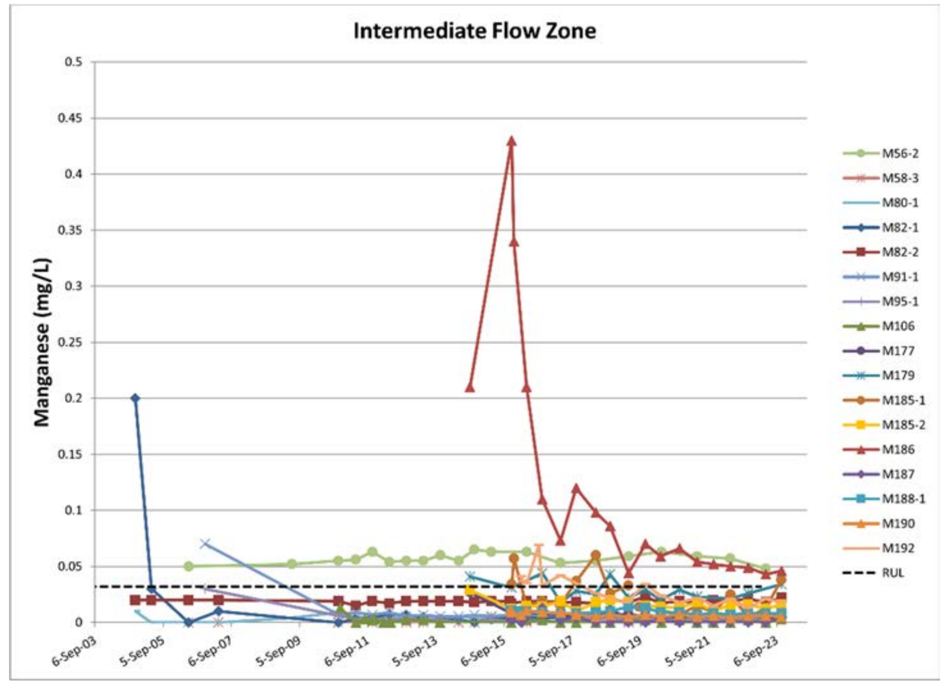
Appendix C – Groundwater Trigger Wells Time-Concentration Plots



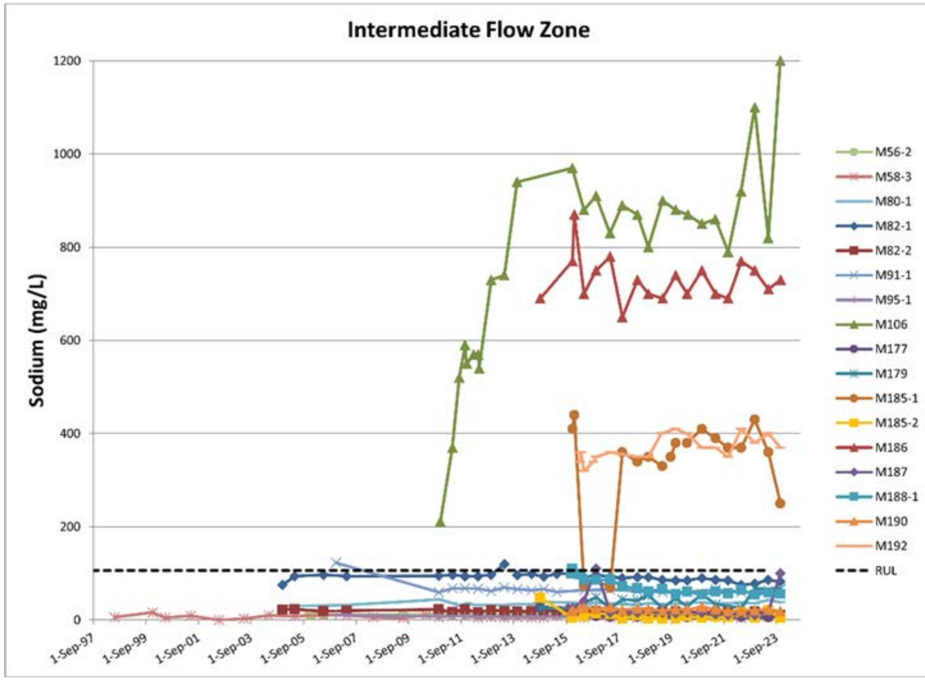


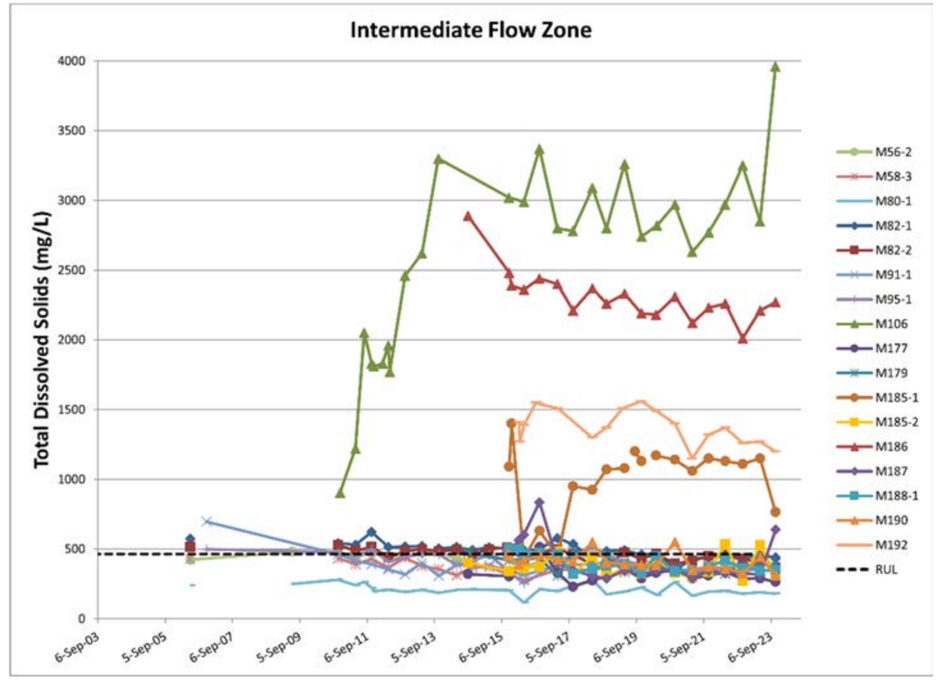
Appendix C – Groundwater Trigger Wells Time-Concentration Plots





Appendix C – Groundwater Trigger Wells Time-Concentration Plots



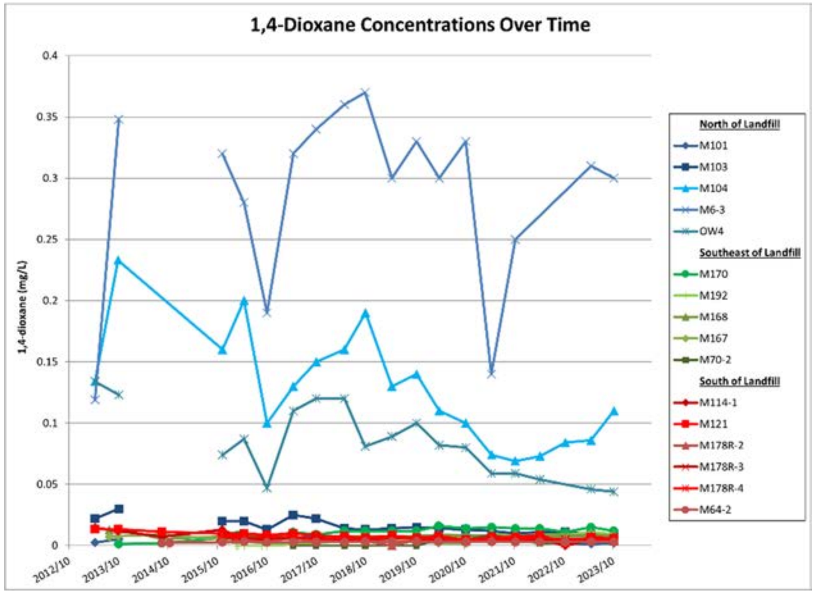


APPENDIX D

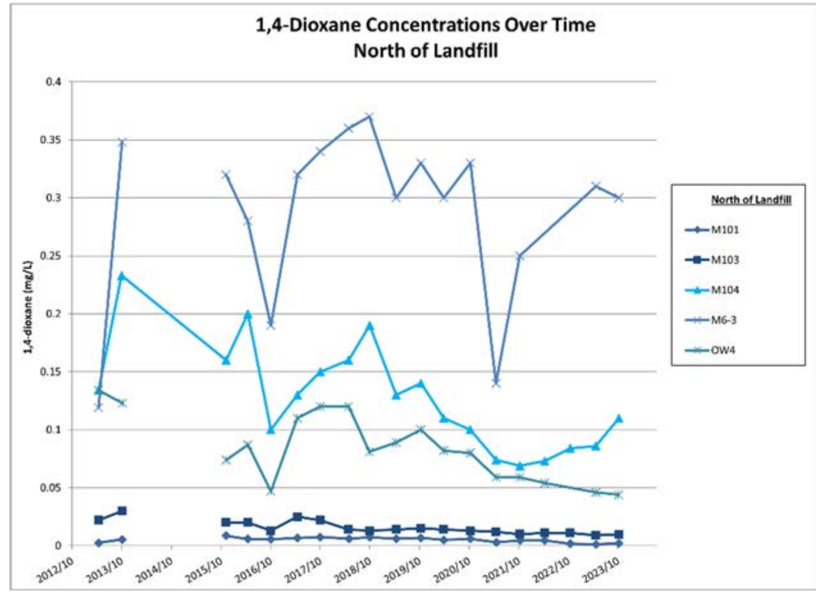
Time-Concentration Plots for 1,4-Dioxane at Selected Wells

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

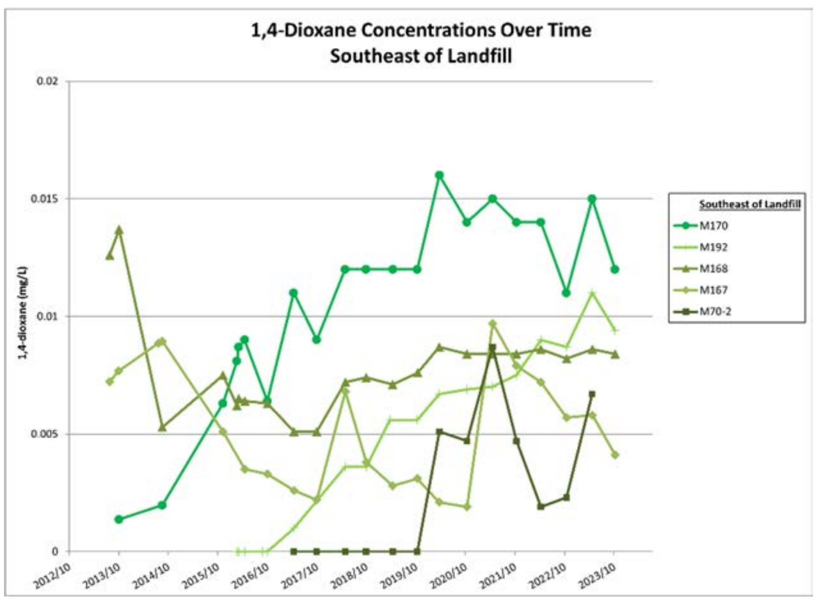
Plot A



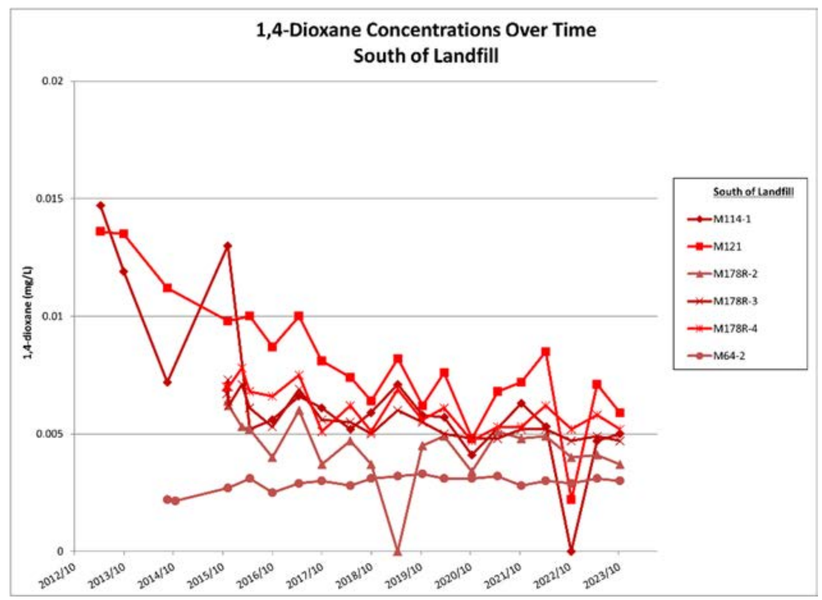
Plot B



Plot C



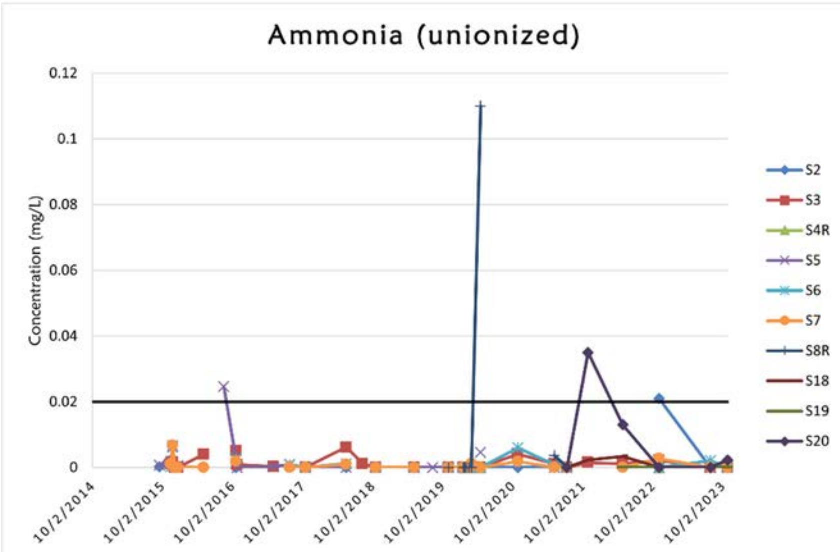
Plot D

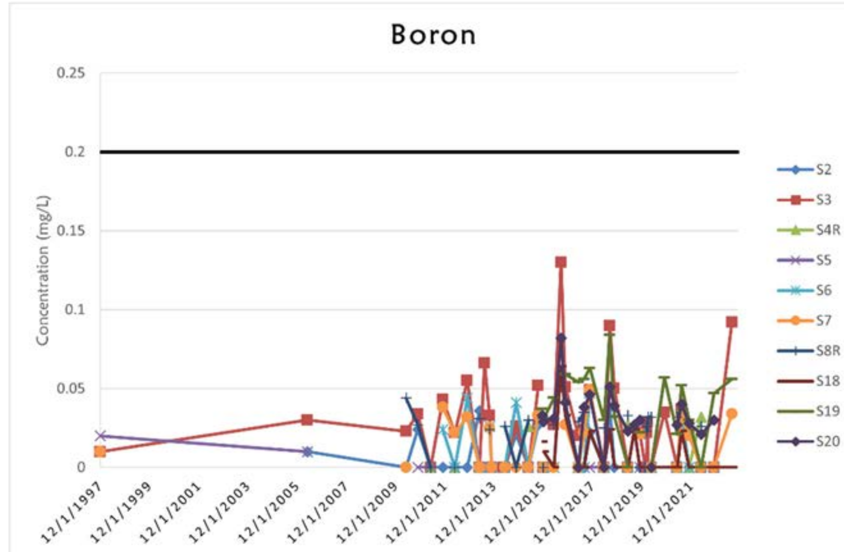


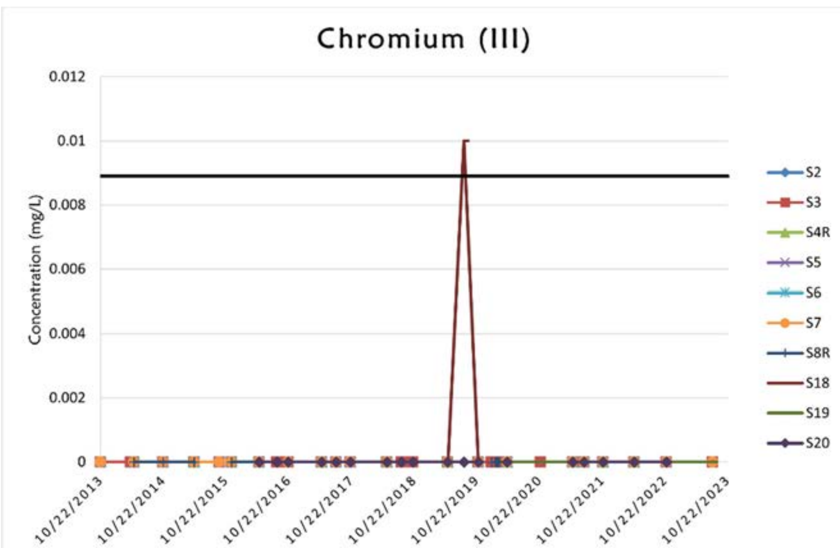
APPENDIX E

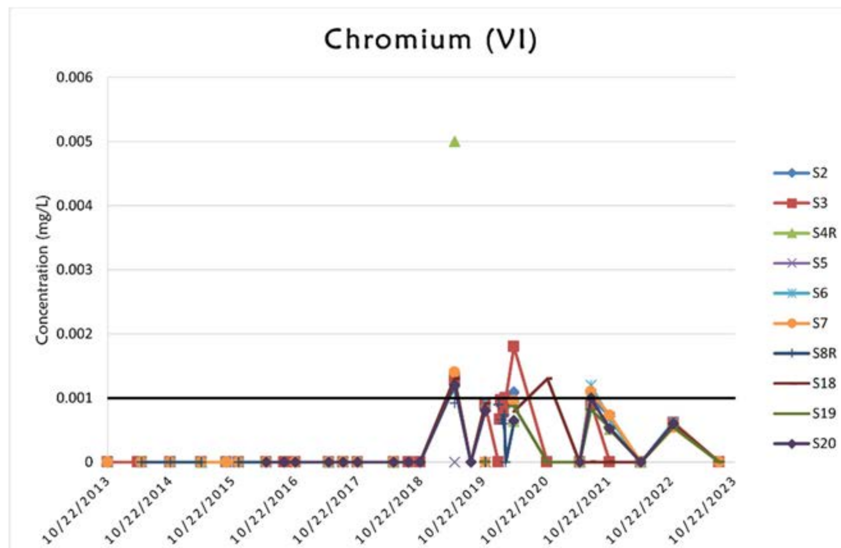
Time-Concentration Plots from Surface Water Sampling Locations

Appendix E – Historical Surface Water Time-Concentration Plots

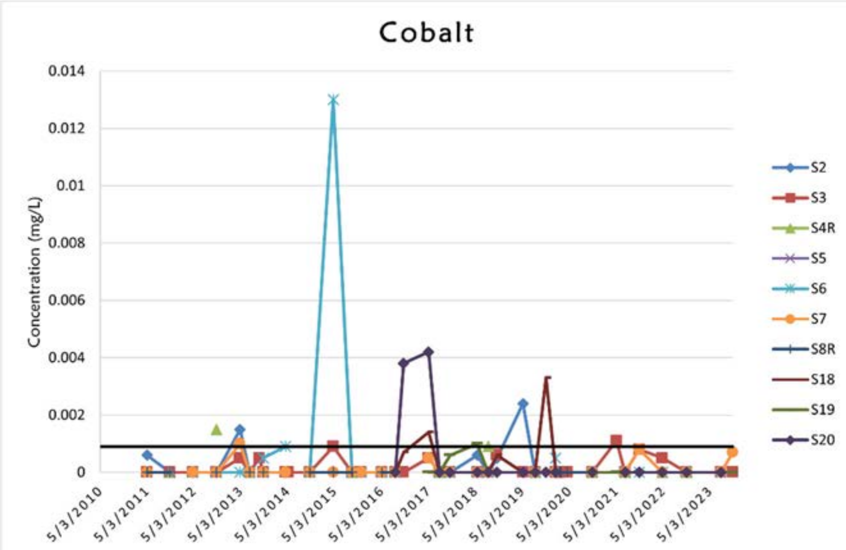


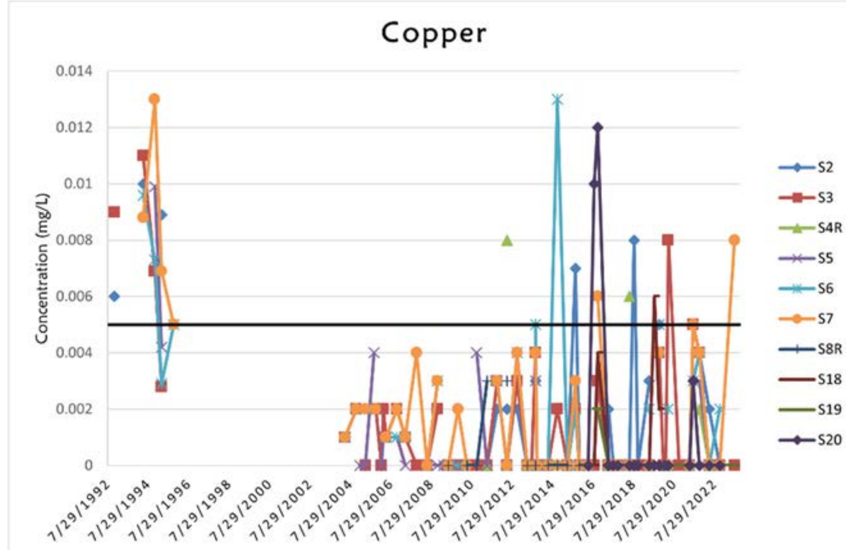


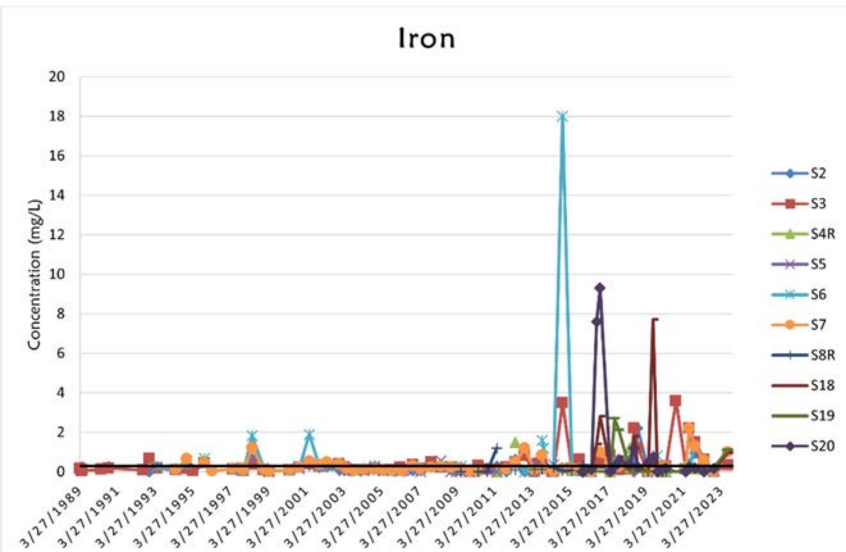


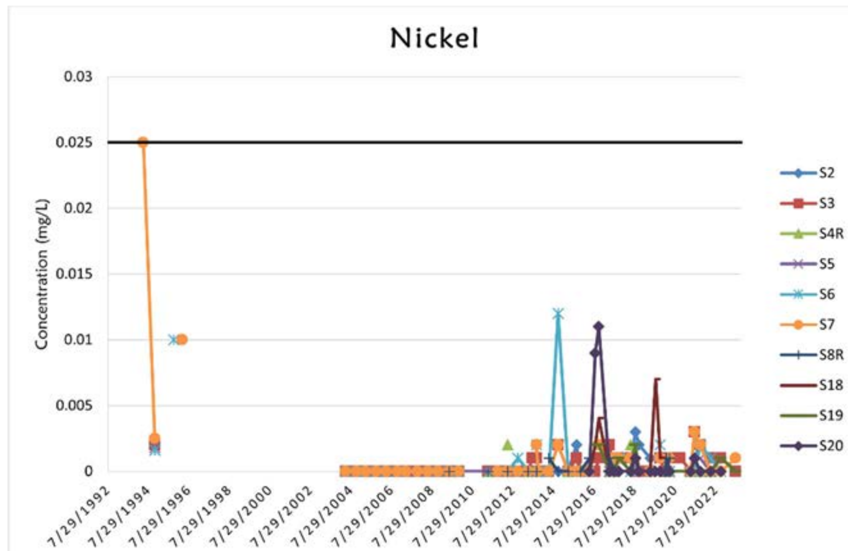


Appendix E – Historical Surface Water Time-Concentration Plots

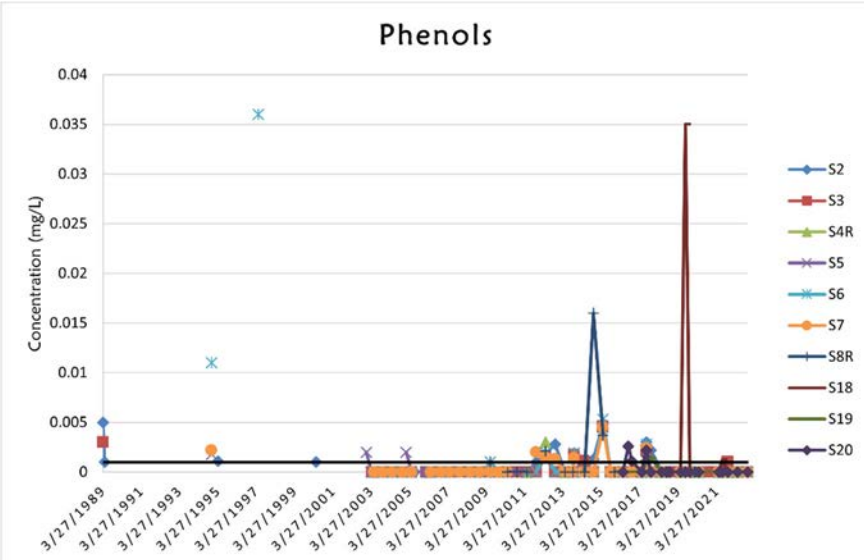


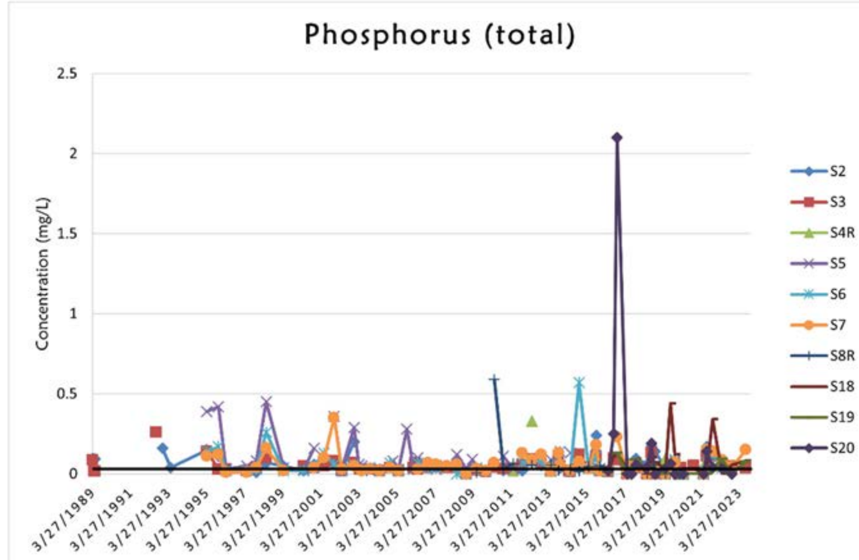


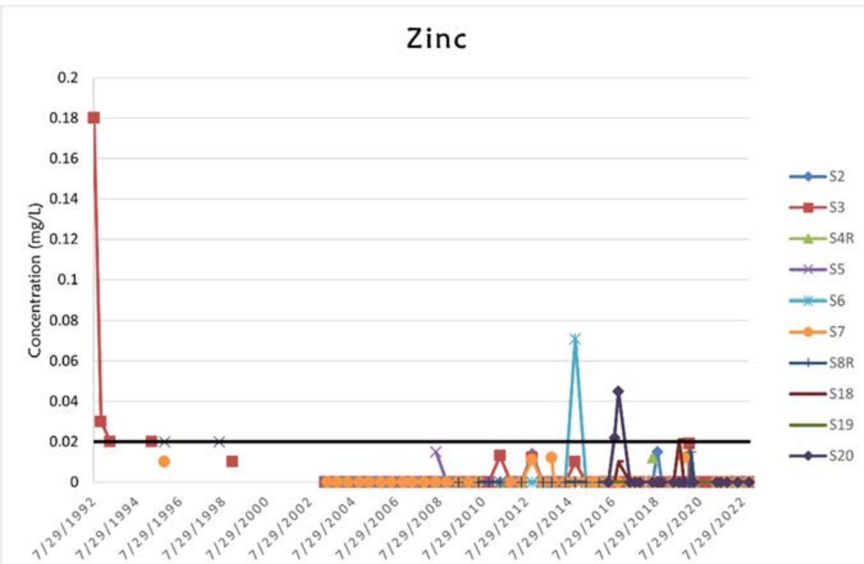




Appendix E – Historical Surface Water Time-Concentration Plots







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