REPORT

SPRING 2017
SEMI-ANNUAL MONITORING REPORT

Waste Management of Canada
Richmond Landfill
Town of Greater Napanee, Ontario

Submitted to:

WASTE MANAGEMENT OF CANADA
1271 Beechwood Road
Napanee, ON K7R 3L1

Prepared by:

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

Project Number: 170194-02

July 2017

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1. INTRODUCTION

The purpose of this report is to present results and to provide an interpretation of the data that were collected during the spring 2017 monitoring event at the Waste Management of Canada Corporation (WM) Richmond Landfill.

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

2. METHODOLOGY

2.1 PROGRAM SUMMARY

The spring 2017 monitoring event was conducted in accordance with the requirements outlined in the revised interim Environmental Monitoring Plan (EMP; Revision No. 05) dated April 15, 2016, as specified in the Environmental Compliance Approval (ECA) number A371203, issued by MOE January 9, 2012 and amended by Notice No. 1 dated May 3, 2013 and Environmental Review Tribunal (ERT) Order dated December 24, 2015.

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

The spring monitoring event was conducted between April 28 and May 4, 2017. The activities completed included the following:

- Water levels were recorded at groundwater monitoring wells on April 28, 2017 (41 installed within the shallow groundwater flow zone and 71 from the intermediate bedrock flow zone). No water level was recorded at groundwater monitor M19 because it was damaged;
- Pond water levels were measured on April 28, 2017 from staff gauges at the three ponds located on the south side of the landfill;
- Liquid levels were measured in landfill leachate wells on April 28, 2017;
- Leachate samples were collected from the North Chamber, South Chamber, and leachate monitoring wells LW-P1 and LW-P2 on May 1, 2017, and analyzed for the suite of leachate inorganic and general parameters, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs);

- A total of 61 groundwater monitoring wells were sampled between May 1 and 4, 2017, as summarized in Table 1; no sample was collected from monitoring well M58-4 (damaged) as well as M85 (purged dry with insufficient recharge). Samples were analyzed for the suite of groundwater inorganic and general parameters and Volatile Organic Compounds (VOCs) listed in Table 2;
- Surface water sampling was conducted on May 1, 2017 from 10 locations along Marysville Creek, Beechwood Ditch and the unnamed water course located south of Beechwood Road in the central portion of the proposed Contaminant Attenuation Zone (CAZ). Surface water samples were analyzed for the surface water inorganic and general parameters and for 1,4 dioxane, as listed in Table 2;
- Landfill gas monitoring was conducted on May 4, 2017. Field measurements were made with a RKI Eagle probe calibrated to methane gas response at six gas monitors; and
- A total of 12 Quality Assurance/Quality Control (QA/QC) samples were collected during the spring sampling event, including four field duplicate samples, four field blanks, and four trip blanks. De-ionised water for analysis of blank samples was supplied by the laboratory.

2.2 Water Sample Collection and Laboratory Analysis

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

Surface water samples were collected using a clean bottle where water depth was sufficient; at sampling locations where water depth was an issue, a 50 cc syringe was used to carefully collect the surface water as not to disturb the bottom sediments. Surface water sampling locations were sampled from downstream to upstream to prevent any re-suspension of sediment impacting the downstream sampling locations. The pH, temperature, and conductivity of the surface water were obtained in the field at all surface water sampling points while minimizing disturbance of the bottom sediment.

All water samples were placed in bottles supplied and prepared by the laboratory. The samples were packed in coolers with ice and shipped by courier to the laboratory. All samples were analysed by Maxxam Analytics Inc. of Mississauga, ON, which is accredited by the *Canadian Association for Laboratory Accreditation Inc. (CALA).* Table 2 presents a summary of groundwater, surface water and leachate analytical parameters.

2.3 GROUNDWATER ELEVATIONS

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

3. RESULTS AND DISCUSSION

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

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

[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 Appproval 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

- The dominant fracture orientation is horizontal to sub-horizontal; however, vertical to subvertical fractures are present providing hydraulic connection between horizontal fractures;
- Hydraulic connections of fractures exists in the intermediate bedrock flow zone to the west, south and east of the site (horizontal and vertical connections);
- Intermediate bedrock flownets show that groundwater flow directions are variable with season and generally flows to the west from the western edge of the landfill, to the southeast from the southern edge of the landfill, to the south along the eastern edge of the landfill, and north to northwest from the northern limit of the landfill;
- The hydraulic conductivity of the intermediate bedrock is lower to the north and east of the landfill compared to other areas of the site, implying that the rate of groundwater flow is lower than in areas immediately south, southeast and west of the landfill;
- South of the landfill, the intermediate bedrock flow zone has distinct areas of interacting hydrogeological zones which are not isolated from one another, but are distinct based on hydraulic conductivity, water level variations and the rate of response to recharge events; and
- Groundwater monitoring wells in the southern portion of the proposed CAZ have static groundwater elevations that are similar to each other and much lower than wells further north in the CAZ.

3.1 GROUNDWATER RESULTS

3.1.1 Groundwater Elevations

Groundwater elevations from program monitoring wells listed in Table 3 were measured on April 28, 2017 and are presented in Table 4. An inventory of monitoring well locations is provided in Appendix A. Groundwater elevation contours within the shallow groundwater flow zone are shown on Figure 2, while Figure 3 shows the groundwater elevation contours for the intermediate bedrock flow zone. Groundwater flow directions were inferred by interpolating the water elevations from wells screened within the corresponding groundwater flow zone, and are consistent with historical results.

The spring 2017 shallow groundwater contours (Figure 2) are consistent with historical results and show that the Empey Hill drumlin southwest from the landfill creates a flow divide, with shallow groundwater being directed both to the north and the south towards areas of lower hydraulic heads. The water level from shallow bedrock monitors M85 was not used to prepare the shallow piezometric contours, as the water level at this location, a poor producer that recovers very slowly following purging, is believed to be unrepresentative of static groundwater conditions. North of the landfill, shallow groundwater converges towards Marysville Creek in the area immediately east of County Road 10 (Deseronto Road), while shallow flow in the southern portion of the site converges on Beechwood Ditch and the southern pond system. Shallow groundwater east of the landfill is influenced by a local zone of higher water levels in the vicinity of monitoring well M96; shallow groundwater north of M96 flows to the north-northwest and ultimately Marysville Creek, while groundwater south of M96 flows to the south-southwest, towards Beechwood Ditch and the ponds.

The spring 2017 intermediate bedrock zone contours are presented on Figure 3. On the landfill property, groundwater in this hydrostratigraphic unit generally flows to the north, west, and south-southeast relative to the landfill. Water levels from intermediate bedrock monitors M52-2, M70-2 and M191 (low permeability wells with water levels interpreted as not being static) were not used to prepare the spring 2017 groundwater contours. Additionally, intermediate bedrock zone monitoring wells located farther to the south (e.g., M173, M174, M178R-1, M178R-4, 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. Additional details on the ongoing hydrogeological investigation in the area south and southeast of the Site were provided under separate cover[5,6], while the latest results and interpretations from the complementary investigation focused on this portion of the proposed CAZ will be reported on in July 2017[7].

3.1.2 Groundwater Analytical Results

Results from the groundwater monitoring wells sampled in spring 2017 as part of the EMP are presented in Table 5a. Monitoring well M70-2 was added to the EMP starting spring 2017. Groundwater quality data for the spring 2017 monitoring event are generally similar to historical results, with the notable exception of 1,4 dioxane being detected for the first time at monitoring well M192, located on the property east of the southeast corner of the landfill property.

3.1.2.1 Shallow Groundwater Flow Zone

As shown in Table 5a, slightly elevated concentrations of a number of water quality parameters (e.g., alkalinity, boron, chloride, conductivity, DOC, sodium and/or TDS) were observed in some shallow groundwater zone monitoring wells located in close proximity to the landfill footprint

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

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

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

(e.g., M66-2, M101, M103 and M104), north and northwest from the unlined portion of the landfill. 1,4 dioxane was also detected in monitors M101, M103 and M104.

Monitor M54-4, located approximately 200 m south of the landfill footprint, also exhibited slightly elevated alkalinity and conductivity, as well as low but detectable concentrations for some chlorinated VOCs (e.g., 1,1,1-trichloroethane, 1,1-dichloroethane, cis-1,2-dichloroethylene, tetrachloroethylene, trichloroethylene and vinyl chloride). An assessment of the impacts at shallow monitoring well M54-4 will be submitted under separate cover in July 2017[(8)].

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

3.1.2.2 Intermediate Groundwater Flow Zone

Analytical results from intermediate bedrock groundwater monitors sampled in spring 2017 were generally consistent with historical results. North of the landfill, elevated concentrations of water quality parameters and detectable 1,4 dioxane were observed at M6-3 and OW4, which are located in close proximity to the footprint. These results indicate the presence of leachate impacts at these locations. Despite the relatively higher concentrations of some parameters (e.g., alkalinity at M5-3, M75 and OW1), the absence of 1,4 dioxane indicates that no impacts from the landfill are apparent further north from the footprint and near Marysville Creek (e.g., at OW1, M5-3, M75, M82-1 and M82-2).

South of the landfill, the presence of 1,4 dioxane and elevated concentrations of alkalinity (typically greater than 400 mg/L where 1,4 dioxane is present), DOC, chloride and TDS indicate groundwater impacts from the landfill at several monitoring well locations (M9-2, M9-3, M64-2, M108, M109-1, M110-1, M114-1, M121, M123, M167, M168, M170, M172, M178R-2, M178R-3, M178R-4 and M192). Other locations south and southeast of the landfill with elevated concentrations of chloride, sodium, TDS, and/or BTEX compounds (e.g., M52-2, M70-2, M106, 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

East of the landfill, monitoring well M70-2 was added to the EMP beginning in spring 2017 and was sampled for the first time since 1999. Analytical results indicated that slightly elevated parameters (e.g. chloride, sodium and benzene) are generally consistent with the historical conditions, indicative of naturally poor quality formation groundwater quality. Monitoring well M192 continues to exhibit slightly elevated parameters (e.g. chloride, benzene and toluene) and for the first time, 1,4 dioxane was detected at the reported limit (RL).

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

Alkalinity and 1,4 dioxane results are shown for the shallow and intermediate bedrock flow zones on Figures 4 and 5, respectively.

3.1.3 Guideline B-7 Reasonable Use Limits (RULs)

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

All results for 1,4 dioxane at trigger wells in the shallow and intermediate bedrock flow zones were below the RUL of 0.001 mg/L.

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

Slightly elevated concentrations of a number of water quality parameters above their respective RUL (e.g chloride, DOC, iron, manganese, sodium, and/or TDS) were also observed in some intermediate groundwater flow zone monitoring wells (M82-1, M82-2, M106, M179, M185-1, M185-2 and M186). Additionally, an elevated concentration of toluene above the RUL was observed in groundwater monitor M185-1.

3.1.4 Status of Monitoring Wells and Compliance with Ontario Regulation 903

During the spring 2017 monitoring event, the conditions of groundwater monitoring wells included in the EMP were inspected. Any repairs, such as new locks, labels or well caps, were made as necessary. Watertight casings and seals remain in place at all monitors to ensure that surface water or foreign materials cannot enter groundwater monitoring wells. Where the outer protective casing was deemed to be part of the well construction by MOECC, the protective casing was fitted with a vermin proof cap to meet the requirements of O. Reg 903. All groundwater monitoring wells are locked to provide protection against vandalism as per Waste Management standard operating procedure and in line with industry best practices.

With the exception of shallow groundwater monitoring wells M19 and M58-4 (damaged), all of the monitoring wells listed in the EMP were monitored. It is recommended that M19 and M58-4 be decommissioned when a revised EMP is approved as they cannot be repaired. Both of these locations are considered unnecessary because groundwater flow in the shallow groundwater flow zone can be adequately assessed in this area of the site without these wells. Monitoring wells M54-4, M68-4 and M75 may be damaged (observed presence of sediment while purging/sample) and should be inspected in future monitoring events, and possibly replaced and decommissioned. Intermediate monitoring well M174, used to monitor groundwater elevations, showed the presence of bentonite grout at the bottom; it should be inspected in future monitoring events, and be repaired or replaced and decommissioned if required.

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

An evaluation of the QA/QC data (from duplicate and blank samples) is included in Appendix B, where analytical results are compared between regular samples and their corresponding field duplicate samples. A standard margin of error of 20% (relative percent difference (RPD) between regular sample and duplicate) was deemed acceptable for field duplicates. In general, the comparison between samples and duplicates shows excellent correlation for the majority of analyzed constituents. All parameters for groundwater duplicate QA/QC sampling were well within the 20% margin of error, with the exception of benzene and m+p xylene at monitoring well M110-1, with concentrations were less than 5 times the laboratory's RL in the regular sample and/or field duplicate, and therefore within the acceptable margin of error.

All parameters were near or below the RL in field blanks.

3.2 LEACHATE RESULTS

3.2.1 Leachate Generation

An estimate of the amount of leachate generated at the site is provided by the site records of the volume of leachate hauled to the Napanee and Cobourg municipal sewer systems and treated at the wastewater treatment plants. The volume of leachate collected from the landfill and hauled to the Napanee municipal sewer system from January to May 2017 was 9,761 m^3, or just under 2,000 m^3 per month on average. A volume of approximately 4,000 m^3 of leachate was pumped from the North Chamber to the lined leachate holding lagoon during the spring freshet. WM will dispose of the leachate at the Napanee treatment facility when they are able to accept it.

3.2.2 Liquid Levels in Leachate Wells

Liquid levels were measured in the two landfill leachate wells on April 28, 2017 and provided the following:

- The liquid level at LW-P1 was 146.87 m above sea level (masl); and
- The liquid level at LW-P2 was 151.52 masl.

3.2.3 Leachate Chemistry

The leachate chemistry results for May 1, 2017 are summarized in Table 6 and are similar to historical results. Leachate at the Richmond Landfill is characterized by elevated concentrations of general water quality parameters such as alkalinity, ammonia, chloride, conductivity, DOC, hardness, sodium, TDS and TKN, as well as selected VOCs (1,4 dioxane, dichloromethane and BTEX). Generally, the inorganic and general parameters that characterize the leachate were more elevated in the samples collected from the leachate wells compared to the leachate chambers. VOC concentrations were below the laboratory reporting limit (RL) for most parameters, with a few exceptions where VOC concentrations were measured at detectable concentrations in leachate. Concentrations were generally higher in leachate well LW-P2 compared to LW-P1, and were higher in the South Chamber compared to the North Chamber where leachate is diluted by shallow groundwater collected from the perimeter toe drain located in the northwest portion of the landfill footprint.

3.3 SURFACE WATER RESULTS

3.3.1 Pond Elevations

Staff gauges are installed in the three ponds on the south side of the landfill labeled SG1, SG2 and SG3. Staff gauge locations and pond elevations measured on April 28, 2017 are shown on Figure 2.

3.3.2 Surface Water Monitoring Locations

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

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

Surface water monitoring locations are shown on Figure 1.

3.3.3 Surface Water Flow

Visual observations of surface water flow and general water characteristics for the spring sampling program are summarized in Table 7a. Surface water flow velocity was measured between no flow and 0.48 m/s, giving estimated flow rates between no flow and 0.54 m^3/s.

3.3.4 Surface Water Analytical Results

The results from surface water locations sampled during the spring 2017 sampling event are presented in Table 7b.

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

Constituents analysed in surface water samples collected during the spring 2017 sampling event were below their respective PWQO, with the exception of total phosphorous and/or iron at most stations including upstream (S2, S5 and S18) and downstream (S3, S4R, S6 and S7) sampling locations. Additionally, unionized ammonia was marginally above its PWQO at upstream sampling location S2 (0.021 mg/L vs. 0.02 mg/L). Similar to previous sampling events, increased mineralization was observed along the unnamed water course in the proposed CAZ, in particular at sampling location S19 relative to upstream location S18, a result of groundwater discharge occurring over a diffuse area to the north of the creek and south of Beechwood Road.

Results from spring 2017 indicate that the landfill is not causing adverse impacts to surface water quality.

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

An evaluation of the QA/QC data (from duplicate and blank samples) is included in Appendix B, where analytical results are compared between regular samples and their corresponding field duplicate samples, submitted to the laboratory without identifying the location they were collected from. A standard margin of error of 20% 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 the surface water duplicate QA/QC sample (location S3) were well within the 20% margin of error, with the exception of ammonia and unionized ammonia which was measured at low concentrations in the field duplicate (less than 5 times the RDL) and is therefore within an acceptable margin of error.

3.4 SUBSURFACE GAS SAMPLING

On May 4, 2017, BluMetric inspected the subsurface gas monitoring probes and obtained measurements at all locations. The location of the gas monitors and the measurement results are shown in Table 8. Measurements of gas wells were between 0 and 10 ppm, well below the LEL for methane of 5% by volume in air (or 50,000 ppm).

3.5 MARYSVILLE CREEK CONDUCTIVITY INVESTIGATION

In response to item 11.1 from the Order issued by the Environmental Review Tribunal (Case 12-033) dated December 24, 2015, specifically as it relates to Condition 8.5(a)i of the ECA, continuous conductivity monitoring on Marysville Creek was implemented for a period of one year on starting May 1, 2016. Solinst (3001 LTC Levelogger) conductivity loggers were installed at two locations along Marysville Creek: one location upstream of the landfill near surface water sampling location S2, and the second location downstream of the landfill approximately 50 m east of sampling location S3. Complete results of the monitoring program from May 1, 2016 until May 18, 2017 are included in Appendix C.

The upstream location, near sampling point S2, was in place from May 1, 2016 until December 22, 2016 (Appendix C-1). The conductivity logger was removed for the winter months and reinstalled for the period from March 28, 2017 until May 18, 2017 (Appendix C-2). From May 29, 2016 until November 26, 2016 the upstream location was dry and the conductivity logger recorded conductivity readings of zero, while temperature readings for this period are reflective of air temperatures and should not be interpreted as representing surface water temperatures.

The downstream location, near sampling point S3, was in place from May 1, 2016 until December 22, 2016 (Appendix C-3). The conductivity logger was removed for the winter months and reinstalled for the period from March 28, 2017 until May 18, 2017 (Appendix C-4). The conductivity logger was within Marysville Creek for the duration of the installation period.

The upstream location, S2, exhibited a correlated relationship between temperature and conductivity for the duration that it was installed within the surface waters of Marysville Creek. The dry period from the end of May 2016 until the end of November 2016 can be explained by the dry conditions experienced in the region during the spring and summer of 2016. These results are consistent with historical observations and confirm that Marysville Creek is an ephemeral surface water course on the property, except for a limited segment that extends approximately 50 m east of the culvert at Deseronto Road.

Similarly, results near the downstream location, S3, also showed a strong correlation between temperature and conductivity for the majority of the time is was installed within the surface waters of Marysville Creek, particularly for the 2017 monitoring period (Appendix C-4). During the late summer and early fall of 2016, conductivity readings at S3 deviated from the water temperature trend observed throughout the rest of the monitoring period. Two notable spikes were observed in the conductivity readings during this period.

The two observed spikes in conductivity are shown on a more detailed plot presented as Appendix C-5. The first was on August 13, 2016 were conductivity increased from 855 us/cm to 1681 us/cm between 17:00 and 18:00. Conductivity remained elevated until approximately August 22, 2016 at which time conductivity readings showed a downward trend with the expected fluctuations similar to those of water temperature. The second spike occurred on September 8, 2016 were conductivity increased from 759 us/cm to 1299 us/cm between 14:00 and 15:00. These elevated conductivity readings lasted until approximated September 12, 2016 prior to returning to the previously observed ranges and proportional response with temperature.

The observed spikes in conductivity at the downstream location cannot be compared with the upstream location since that location was dry during the summer and fall of 2016. Rainfall data were examined to look for a possible correlation between precipitation and the observed conductivity spikes. Daily rainfall statistics from Environment Canada's Centreville weather station, located 20 km from the site, are provided in Appendix C-6. Total monthly rainfall during July, August and September, 2016 was 23, 76 and 61 mm, respectively. The 15 days prior to the first conductivity spike were very dry with only a single day that registered rain (5.4 mm) followed by a total of 68.8 mm between August 12 and 21, 2016. This increased precipitation period coincides with the spike in conductivity. Prior to the second spike, a total of 2.8 mm of rain fell as five small rainfall events (< 1 mm each) over a period of 16 days between August 22 and September 6, 2016, followed by a total of 34.2 mm of rain between September 7 to 10, 2016. This period of increased precipitation correlated to the second spike of conductivity observed in the downstream location.

It is hypothesized that the large rain events recorded following extended periods of little to no precipitation around the time corresponding to each of the observed spikes in conductivity increased surface runoff into Marysville Creek causing increased dissolved solids and the observed conductivity spikes. No evidence from the conductivity study suggests that landfill leachate has caused any impacts to Marysville Creek.

4. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The spring 2017 monitoring program included the collection of groundwater, leachate and surface water samples, as well as landfill gas monitoring, in accordance with the site monitoring requirements outlined in the revised interim EMP (Revision No. 05) dated April 15, 2016, as specified in the Environmental Compliance Approval (ECA) number A371203, issued by MOE January 9, 2012 and amended by Notice No. 1 dated May 3, 2013 and Environmental Review Tribunal (ERT) Order dated December 24, 2015. Condition 8.5 (b) of the ECA requires that

WM carry out monitoring in accordance with the interim EMP until such time as further amendments to the ECA and EMP are directed by the ERT.

The following were completed as part of the spring 2017 monitoring event conducted between April 28 and May 4, 2017:

- Water levels were measured from 112 groundwater monitoring wells: 41 in the shallow groundwater flow zone and 71 in the intermediate bedrock flow zone;
- A total of 61 groundwater monitors were sampled for analytical testing (17 completed in the shallow flow zone and 44 in the intermediate bedrock flow zone including M70-2, added to the EMP beginning spring 2017);
- Ten surface water locations were sampled for analytical testing;
- A total of 12 Quality Assurance/Quality Control (QA/QC) samples were collected (four field duplicates, four field blanks and four trip blanks); and
- Subsurface gas concentrations were recorded from six on-site gas monitoring wells.

Results, interpretations from the spring 2017 monitoring event are summarized below, along with recommendations.

4.1 GROUNDWATER

- Groundwater flow directions interpreted from water elevations measured in monitoring wells were consistent with historical flownets:
    - Shallow groundwater flow on site is influenced by local topographic highs in the southwestern (Empey Hill Drumlin) and eastern (groundwater monitor M96 area) portions of the site, and is characterized by a flow divide with shallow groundwater being directed both to the north (toward Marysville Creek) and the south (toward Beechwood Ditch). South of Beechwood Road shallow groundwater flow converges from local topographic highs to the north and south, and discharges to a local surface water course within a topographically low area running east-west in the central portion of the proposed CAZ;
    - Groundwater in the intermediate bedrock flow zone generally flows to the north, west, and south-southeast relative to the landfill;
- Groundwater quality data from spring 2017 were generally consistent with historical results;
- Slightly elevated concentrations of a number of water quality parameters were observed in the shallow groundwater zone within the property to the south, north and northwest of the landfill footprint. In other areas of the site including at property boundaries, there is no evidence of groundwater impact away from the landfill footprint in the shallow groundwater flow zone;

- The geochemical results for the intermediate bedrock groundwater flow zone indicate higher concentrations of water quality parameters associated with landfill leachate impacts to the south-southeast and immediately north of the landfill relative to the concentrations west and east of the landfill. 1,4 dioxane was detected at monitoring well M192 for the first time;
- Recent investigation of the groundwater conditions south of the landfill were completed to delineate the groundwater impacts from the landfill and to define the extent of a contaminant attenuation zone. Results from these investigations will be submitted to MOECC by July 15, 2017;
- 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
- It is recommended that damaged groundwater monitoring wells M19 and M71, used to monitor groundwater elevations, be decommissioned and removed from the monitoring program. Similarly, wells M58-4, M68-4, M74 and M75 should be decommissioned and removed from the monitoring program, because of integrity concerns (presence of bentonite in purge water). Intermediate monitoring well M174, used to monitor groundwater elevations, showed the presence of bentonite grout at the bottom; it should be inspected in future monitoring events, and be repaired or replaced and decommissioned if required.

4.2 SURFACE WATER

- The concentrations observed during spring 2017 monitoring events were within the range of historical monitoring results and indicate that the landfill is not causing adverse impacts to surface water quality;
- The concentration of total phosphorous and/or iron at most stations including upstream (S2, S5 and S18) and downstream (S3, S4R, S6 and S7) sampling locations was slightly above PWQO, while unionized ammonia was marginally above PWQO at upstream sampling location S2;
- All measured parameters downstream from the landfill were consistent with upstream (background) surface water quality and confirm that the landfill is not causing adverse impacts to surface water quality; and
- Increased mineralization observed along the unnamed water course in the central portion of the proposed CAZ, in particular at sampling location S19 relative to upstream location S18, are indicative of groundwater discharge occurring over a diffuse area to the north of the creek and south of Beechwood Road.

4.3 SUBSURFACE GAS

Measurements for methane gas were between 0 and 10 ppm for the six monitoring location, well below the LEL for methane of 5% by volume in air (or 50,000 ppm).

4.4 ADDITIONAL INVESTIGATIONS

A one year study of the continuous temperature and conductivity in Marysville Creek was concluded in May 2017. The upstream monitoring location near station S2 was dry during summer and fall seasons, confirming that Marysville Creek is an ephemeral water course that only flows during spring freshet and early summer, except for a small area near the culvert at Deseronto Road. Temperature and conductivity were strongly correlated with the exception of two notable events in summer months at the S3 location, when conductivity spikes were observed after significant rainfall events following extended dry periods, and believed to result from increased mineralization from surface runoff associated with these events. No evidence from the conductivity study suggests that landfill leachate has caused any impacts to Marysville Creek.

5. LIMITING CONDITIONS

The spring 2017 monitoring program involved the collection of groundwater (from on-site and off-site monitoring wells as well as off-site domestic supply wells) and surface water for analyses at the site monitoring locations. The data collected during this investigation represent the conditions at the sampled locations only.

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

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

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

Respectfully submitted,
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TABLES

Table 1: Summary of Environmental Monitoring Program

<table>
<tr><th colspan="2">Monitoring Locations</th><th>Parameter Suite</th><th>Monitoring Frequency</th></tr>
<tr><td colspan="4">Shallow Groundwater Flow Zone Monitors</td></tr>
<tr><td colspan="2" rowspan="2">M58-4, M68-4, M70-3, M96, M99-2</td><td>Groundwater Inorganic & General</td><td rowspan="2">Once each year, in spring</td></tr>
<tr><td>VOCs</td></tr>
<tr><td colspan="2" rowspan="2">M53-4, M54-4, M66-2, M67-2, M80-2, M81, M85, M86, M87-2, M101, M103, M104, M114-2, OW37-s</td><td>Groundwater Inorganic & General</td><td rowspan="2">Twice each year, in spring and fall</td></tr>
<tr><td>VOCs</td></tr>
<tr><td colspan="4">Intermediate Bedrock Groundwater Flow Zone Monitors</td></tr>
<tr><td colspan="2" rowspan="2">M56-2, M58-3, M59-2, M59-4, M91-1, M95-1</td><td>Groundwater Inorganic & General</td><td rowspan="2">Once each year, in spring</td></tr>
<tr><td>VOCs</td></tr>
<tr><td colspan="2" rowspan="2">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</td><td>Groundwater Inorganic & General</td><td rowspan="2">Twice each year, in spring and fall</td></tr>
<tr><td>VOCs</td></tr>
<tr><td colspan="4">Surface Water Sampling Locations</td></tr>
<tr><td>Beechwood Ditch</td><td>S4R, S5 and S8R</td><td rowspan="3">Surface Water Inorganic and General</td><td rowspan="3">Three times each year, in spring, summer[1] and fall.</td></tr>
<tr><td>Marysville Creek</td><td>S2, S3, S6 and S7</td></tr>
<tr><td>Unnamed water course in central portion of proposed CAZ</td><td>S18, S19 and S20</td></tr>
<tr><td colspan="4">Leachate Monitoring Locations</td></tr>
<tr><td colspan="2" rowspan="2">North Chamber, South Chamber, LW-P1 and LW-P2</td><td>Leachate Inorganic & General</td><td rowspan="2">Once each year, in spring</td></tr>
<tr><td>VOCs</td></tr>
<tr><td colspan="4">Landfill Gas Monitoring Wells</td></tr>
<tr><td colspan="2">GM1, GM3, GM4-1, GM4-2, GM5, GM6</td><td>% methane by volume</td><td>Twice each year, in spring and fall</td></tr>
<tr><td colspan="4">Off-site Domestic Water Supply Wells</td></tr>
<tr><td colspan="2">1441 County Road 1 West
1483 County Road 1 West
1494 County Road 1 West (UNKN)[2]
1499 County Road 1 West (UNKN)[2]
1556 County Road 1 West (UNKN)[2]
1561 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</td><td>1,4 dioxane</td><td>Once every two years, starting in 2015</td></tr>
</table>

[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 4: Groundwater Elevations - April 28, 2017

Monitoring Well	Water Level (masl)	Monitoring Well	Water Level (masl)	Monitoring Well	Water Level (masl)	Monitoring Well	Water Level (masl)
Shallow Groundwater Flow Zone							
M12	125.62	M54-4	124.43	M83	123.25	M98	130.23
M14	127.12	M58-4	125.08	M84	121.91	M99-2	130.52
M15	125.46	M60-4	124.34	M85	120.52	M100	125.48
M18	127.42	M65-2	123.45	M86	122.74	M101	124.08
M19	Damaged	M66-2	123.21	M87-2	124.57	M102	124.19
M23	127.41	M67-2	122.78	M88-2	128.33	M103	123.93
M27	126.38	M68-4	124.25	M89-2	129.82	M104	123.33
M35	124.26	M70-3	127.33	M94-2	123.57	M114-2	123.92
M41	125.68	M77	126.59	M96	129.15	M115-2	124.74
M47-3	124.75	M80-2	123.72	M97	126.54	OW37-s	122.15
M53-4	125.39	M81	124.64				
Intermediate Bedrock Groundwater Flow Zone							
M3A-3	125.06	M71	124.43	M113-1	123.39	M178R-4	116.69
M9-2	124.28	M72	123.22	M114-1	123.13	M179	111.60
M9-3	124.58	M73	123.28	M116	123.13	M180	112.15
M10-1	123.26	M74	123.86	M121	122.85	M181-1	96.26
M46-2	122.76	M80-1	123.49	M122	122.37	M181-2	105.54
M49-1	123.56	M82-1	122.86	M123	122.05	M182	99.57
M50-3	124.33	M82-2	122.98	M125	123.11	M185-1	116.53
M52-2	123.50	M91-1	123.42	M166	122.06	M185-2	116.37
M53-2	123.03	M95-1	123.32	M167	>122.18	M186	115.89
M56-2	123.42	M105	124.31	M168	122.08	M187	96.27
M58-3	123.46	M106	123.36	M170	124.16	M188	115.63
M59-2	123.51	M107	124.21	M173	101.02	M189	104.95
M59-3	123.46	M108	122.18	M174	96.30	M190	116.16
M59-4	123.47	M109-1	124.28	M176	110.70	M191	98.40
M60-1	123.72	M109-2	124.38	M177	115.33	M192	122.09
M63-2	121.31	M110-1	124.29	M178R-1	116.92	M193	122.53
M64-2	118.95	M111-1	123.39	M178R-2	>120.29	OW1	122.71
M70-2	123.16	M112-1	123.38	M178R-3	>120.19		

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Table 5a: Groundwater Quality Results - May 1 - 4, 2017

		Alkalinity	Ammonia	Boron	Calcium	Chloride	Conductivity	Dissolved Organic Carbon	Iron	Magnesium	Manganese	Nitrate	Nitrite	Potassium	Sodium	Sulphate	Total Dissolved Solids	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene
Name	Date	mg/L	mg/L	mg/L	mg/L	mg/L	mS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Shallow Groundwater Flow Zone																							
M53-4	5/3/2017	370	< 0.15	< 0.02	120	1.6	780	2.9	< 0.1	20	0.008	< 0.1	< 0.01	< 0.2	25	62	534	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M54-4	5/3/2017	490	< 0.15	0.042	140	45	1100	3.1	< 0.1	31	0.027	< 0.1	< 0.01	1.4	60	61	704	< 0.0002	0.0019	< 0.0002	< 0.0002	0.0016	< 0.0001
M66-2	5/4/2017	290	< 0.15	0.39	130	100	1400	1.4	0.52	42	0.043	< 0.1	< 0.01	4.6	110	290	888	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M67-2	5/4/2017	330	0.44	0.75	50	4.9	660	1.8	0.49	29	0.029	< 0.1	< 0.01	8.3	50	24	338	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M68-4	5/4/2017	300	< 0.15	< 0.02	98	10	640	2.5	< 0.1	16	0.066	< 0.1	< 0.01	0.23	14	37	376	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M70-3	5/1/2017	310	< 0.15	< 0.02	120	14	860	2.9	0.96	34	0.13	< 0.1	< 0.01	0.38	23	140	548	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M80-2	5/2/2017	340	< 0.15	0.05	94	64	890	1.6	< 0.1	51	0.008	< 0.1	< 0.01	4.6	21	39	534	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M81	5/2/2017	340	< 0.15	0.027	100	86	950	1.1	< 0.1	52	0.007	< 0.1	< 0.01	2.2	11	37	480	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M86	5/4/2017	340	< 0.15	1	72	40	1100	2.1	0.53	37	0.048	< 0.1	< 0.01	16	93	190	670	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M87-2	5/2/2017	210	< 0.15	0.037	48	33	580	1.1	< 0.1	35	0.007	< 0.1	< 0.01	1.9	13	46	324	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M96	5/4/2017	310	< 0.15	0.072	63	3.2	650	1	< 0.1	34	< 0.002	1.37	< 0.01	5.1	28	44	362	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M99-2	5/2/2017	300	< 0.15	0.068	63	23	790	2.2	0.48	58	0.016	< 0.1	< 0.01	2.4	16	100	486	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M101	5/4/2017	490	< 0.15	0.069	160	74	1200	2.3	< 0.1	53	0.011	< 0.1	< 0.01	4.1	17	65	722	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00056	< 0.0001
M103	5/3/2017	700	< 0.15	0.25	160	260	2200	4.8	< 0.1	110	0.003	0.35	< 0.01	6.7	150	60	1240	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M104	5/3/2017	1400	4.57	2.3	140	840	5200	72	< 0.1	140	0.31	23.9	1.18	15	880	67	3150	< 0.0005	< 0.00025	< 0.0005	< 0.0005	< 0.00025	< 0.00025
M114-2	5/1/2017	310	< 0.15	0.033	110	83	930	1.2	< 0.1	18	< 0.002	1.69	< 0.01	0.79	61	40	512	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
OW37-s	5/2/2017	250	< 0.15	0.11	57	67	720	2.2	5.2	22	0.23	< 0.1	< 0.01	11	45	15	368	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
Intermediate BedrockGroundwater Flow Zone																							
M5-3	5/3/2017	460	1.26	1.1	35	46	990	0.7	< 0.1	26	< 0.002	< 0.1	< 0.01	12	140	6.6	624	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005
M6-3	5/4/2017	2100	5.28	0.041	1200	1500	12000	32	< 0.1	< 0.05	0.006	< 0.1	< 0.01	55	580	< 1	4900	< 0.0005	< 0.00025	< 0.0005	< 0.0005	< 0.00025	< 0.00025
M9-2	5/2/2017	470	0.62	0.24	120	93	1200	6.1	11	34	0.38	< 0.1	< 0.01	5.2	77	5	578	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00062	0.00019
M9-3	5/2/2017	400	0.71	0.37	76	73	970	3.7	3.9	28	0.22	< 0.1	< 0.01	14	72	7.5	544	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00067	0.00017
M52-2	5/4/2017	340	1.6	1.2	25	310	1800	0.7	< 0.1	19	0.002	< 0.1	< 0.01	14	320	14	904	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M56-2	5/2/2017	300	< 0.15	0.064	78	17	760	1.4	< 0.1	43	0.053	< 0.1	< 0.01	3.1	12	81	434	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M58-3	5/2/2017	320	< 0.15	< 0.02	84	4.1	650	0.9	< 0.1	32	< 0.002	0.17	< 0.01	1.6	5	35	352	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M59-2	5/2/2017	450	0.44	0.23	130	62	1100	7.5	< 0.1	38	0.015	< 0.1	< 0.01	5.4	35	35	598	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M59-4	5/2/2017	280	0.18	0.44	66	8.7	640	1.2	0.58	33	0.013	< 0.1	< 0.01	5.8	14	49	338	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M64-2	5/3/2017	310	1.01	0.95	54	120	970	1	< 0.1	31	0.008	< 0.1	< 0.01	10	95	2.9	558	< 0.0004	< 0.0002	< 0.0004	< 0.0004	< 0.0002	< 0.0002
M70-2	5/1/2017	390	2.84	1.5	71	640	2800	2	4.5	58	0.031	< 0.1	0.011	18	510	< 1	1280	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M72	5/2/2017	280	0.52	0.4	58	29	670	1.4	< 0.1	35	0.003	< 0.1	< 0.01	7.9	18	42	362	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M74	5/2/2017	360	1.86	0.94	30	20	760	2.1	0.17	17	0.044	< 0.1	< 0.01	14	110	18	400	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M75	5/2/2017	460	2.3	1.2	32	54	1100	2.7	< 0.1	22	0.018	< 0.1	< 0.01	16	180	36	548	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M80-1	5/2/2017	160	0.36	0.4	22	7.1	370	0.8	< 0.1	13	0.005	< 0.1	0.01	4.7	35	37	198	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M82-1	5/3/2017	330	0.97	0.98	47	45	890	2.3	< 0.1	26	0.004	< 0.1	< 0.01	10	92	49	578	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005
M82-2	5/3/2017	330	0.2	0.14	100	24	790	2.4	< 0.1	30	0.018	< 0.1	< 0.01	3.8	17	63	500	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005
M91-1	5/2/2017	290	0.68	0.85	42	14	690	1.8	0.14	22	0.006	< 0.1	< 0.01	7.6	65	49	382	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M95-1	5/4/2017	320	< 0.15	< 0.02	100	5.9	700	1.3	< 0.1	26	< 0.002	< 0.1	< 0.01	2.2	5.8	49	402	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M106	5/1/2017	370	2.43	1.9	100	1500	5300	1.1	< 0.1	70	< 0.002	< 0.1	< 0.01	21	830	< 1	2800	< 0.004	< 0.002	< 0.004	< 0.004	< 0.002	< 0.002
M108	5/1/2017	490	0.92	0.31	110	80	1100	4.7	1.3	37	0.091	< 0.1	< 0.01	7.7	76	5	664	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00033	< 0.0001
M109-1	5/2/2017	560	1.04	0.39	130	140	1500	7.8	11	45	0.3	< 0.1	< 0.01	7.4	110	< 1	784	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M110-1	5/2/2017	650	0.52	0.46	150	160	1700	8.4	< 0.1	52	0.013	< 0.1	< 0.01	7.3	130	< 1	918	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00014	< 0.0001
M114-1	5/1/2017	380	0.28	0.18	94	47	870	4.1	6.1	22	0.32	< 0.1	< 0.01	4.7	59	8.7	450	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00043	0.00024
M121	5/3/2017	520	1.26	0.34	99	96	1300	4.2	< 0.1	47	0.003	< 0.1	< 0.01	12	98	10	770	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M123	5/4/2017	430	0.28	0.18	120	59	980	3.6	< 0.1	25	0.013	< 0.1	< 0.01	4.1	52	8.1	556	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00011	< 0.0001
M167	5/3/2017	380	1.93	0.95	100	360	1900	3.2	< 0.1	62	0.002	< 0.1	< 0.01	19	190	12	1060	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005
M168	5/3/2017	350	1.19	0.36	120	260	1700	4.3	< 0.1	43	0.003	< 0.1	< 0.01	13	130	35	918	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005
M170	5/1/2017	740	1.44	2.3	26	390	2700	4.4	< 0.1	20	0.004	< 0.1	< 0.01	12	520	1.1	1410	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M172	5/4/2017	330	0.53	0.11	86	34	720	4.4	12	19	0.44	< 0.1	< 0.01	3.6	39	8.6	398	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.0019	0.0002
M177	5/4/2017	250	0.42	0.26	77	6.4	560	1.7	< 0.1	16	0.006	< 0.1	< 0.01	5.2	7.1	38	330	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M178R-2	5/4/2017	390	0.22	0.19	110	57	930	3.9	0.98	24	0.056	< 0.1	< 0.01	5	50	20	524	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.0012	< 0.0001
M178R-3	5/4/2017	430	0.29	0.22	120	71	1000	4	0.81	28	0.053	< 0.1	< 0.01	5.4	57	20	556	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00099	< 0.0001
M178R-4	5/4/2017	450	0.27	0.23	130	81	1100	4.3	< 0.1	29	0.02	< 0.1	< 0.01	5	60	19	608	< 0.0002	< 0.0001	< 0.0002	< 0.0002	0.00049	< 0.0001
M179	5/4/2017	220	< 0.15	0.1	75	31	560	3.2	0.38	9.1	0.018	< 0.1	< 0.01	3.9	25	22	310	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M185-1	5/4/2017	210	1.15	0.29	48	66	700	4.8	< 0.1	8.2	0.016	0.59	< 0.01	7.4	69	37	450	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005
M185-2	5/4/2017	270	0.16	0.22	130	64	760	1.9	< 0.1	11	0.019	< 0.1	< 0.01	3	13	29	482	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M186	5/3/2017	340	2.56	2.1	72	1200	4500	2.9	0.47	52	0.073	< 0.1	< 0.01	22	780	12	2400	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001
M187	5/3/2017	240	< 0.15	0.072	98	19	580	2.3	< 0.1	7.2	0.002	0.57	< 0.01	2.3	16	34	404	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M188	5/4/2017	320	0.56	0.56	54	61	830	1.9	< 0.1	20	0.008	< 0.1	< 0.01	6.2	87	18	458	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M190	5/4/2017	260	0.15	0.11	100	57	740	3	< 0.1	12	0.009	< 0.1	< 0.01	3.6	27	33	424	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
M192	5/4/2017	430	2.16	1.8	99	580	2900	3.7	< 0.1	70	0.042	< 0.1	< 0.01	22	360	2.6	1510	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
OW1	5/3/2017	420	1.55	1.2	42	55	1100	1.7	< 0.1	30	0.003	< 0.1	< 0.01	12	140	53	658	< 0.0002	< 0.0001	< 0.0002	< 0.0002	< 0.0001	< 0.0001
OW4	5/3/2017	1000	1.34	1.3	150	510	3400	45	11	100	0.16	< 0.1	< 0.01	14	480	33	1980	< 0.001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.0005

BluMetric™ Environmental

Table 5a: Groundwater Quality Results - May 1 - 4, 2017

Name	Date	1,2-Dichlorobenzene (o)	1,2-Dichloroethane	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene (m)	1,4-Dichlorobenzene (p)	1,4-Dioxane	Benzene	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,2-Dichloroethylene	Dichloromethane	Ethylbenzene	m+p-Xylene	o-Xylene	Styrene	Tetrachloroethylene	Toluene	Trans-1,2-dichloroethylene	Trichloroethylene	Vinyl Chloride
		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 Z																						
M53-4	5/3/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M54-4	5/3/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	0.0011	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	0.0043	< 0.0002	< 0.0001	0.00053	0.00022
M66-2	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M67-2	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M68-4	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M70-3	5/1/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M80-2	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	0.002	< 0.0001	< 0.0001	< 0.0002
M81	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M86	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M87-2	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M96	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M99-2	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M101	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0066	< 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	< 0.0002
M103	5/3/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.025	< 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	< 0.0002
M104	5/3/2017	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.13	< 0.00025	< 0.00025	< 0.0005	< 0.0013	< 0.00025	< 0.0013	< 0.00025	< 0.00025	< 0.00025	< 0.0005	< 0.00025	< 0.0005	< 0.00025	< 0.00025	< 0.0005
M114-2	5/1/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
OW37-s	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
Intermediate BedrockGround																						
M5-3	5/3/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 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	< 0.001
M6-3	5/4/2017	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.32	0.001	< 0.00025	< 0.0005	< 0.0013	< 0.00025	< 0.0013	< 0.00025	0.0015	0.00052	< 0.0005	< 0.00025	0.0065	< 0.00025	< 0.00025	< 0.0005
M9-2	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.015	< 0.0001	< 0.0001	0.031	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	0.00051
M9-3	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0094	< 0.0001	< 0.0001	0.023	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	0.00023
M52-2	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M56-2	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M58-3	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M59-2	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M59-4	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M64-2	5/3/2017	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	0.0029	< 0.0002	< 0.0002	< 0.0004	< 0.001	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0004	< 0.0002	< 0.0004	< 0.0002	< 0.0002	< 0.0004
M70-2	5/1/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.0058	< 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	< 0.0002
M72	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M74	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M75	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M80-1	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	0.00013	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M82-1	5/3/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 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	< 0.001
M82-2	5/3/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 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	< 0.001
M91-1	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	0.0004	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	0.00047	< 0.0001	< 0.0001	< 0.0002
M95-1	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M106	5/1/2017	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.001	< 0.002	< 0.002	< 0.004	< 0.01	< 0.002	< 0.01	< 0.002	< 0.002	< 0.002	< 0.004	< 0.002	< 0.004	< 0.002	< 0.002	< 0.004
M108	5/1/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.012	< 0.0001	< 0.0001	0.0052	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M109-1	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.025	0.0001	< 0.0001	0.016	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	0.00026
M110-1	5/2/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.031	0.0009	< 0.0001	0.019	< 0.0005	< 0.0001	< 0.0005	< 0.0001	0.00056	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	0.00028
M114-1	5/1/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0066	< 0.0001	< 0.0001	0.0098	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M121	5/3/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.01	0.0025	< 0.0001	0.0049	< 0.0005	< 0.0001	< 0.0005	0.00015	0.00084	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M123	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0067	< 0.0001	< 0.0001	0.0053	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M167	5/3/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0026	< 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	< 0.001
M168	5/3/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0051	< 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	< 0.001
M170	5/1/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.011	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M172	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0049	< 0.0001	< 0.0001	0.0068	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	0.00027
M177	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M178R-2	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.006	< 0.0001	< 0.0001	0.0023	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M178R-3	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0069	< 0.0001	< 0.0001	0.0035	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M178R-4	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0075	< 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	< 0.0002
M179	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M185-1	5/4/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.001	< 0.0025	< 0.0005	< 0.0025	< 0.0005	< 0.0005	< 0.0005	< 0.001	< 0.0005	0.042	< 0.0005	< 0.0005	< 0.001
M185-2	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M186	5/3/2017	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.002	< 0.005	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.001	< 0.001	< 0.002
M187	5/3/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
M188	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	0.0011	< 0.0001	< 0.0001	< 0.0002
M190	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	0.0014	< 0.0001	< 0.0001	< 0.0002
M192	5/4/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.001	0.0004	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0001	0.00042	< 0.0001	< 0.0001	< 0.0002
OW1	5/3/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0001	< 0.0001	< 0.0002	< 0.0005	< 0.0001	< 0.0005	0.0012	< 0.0001	0.00014	< 0.0002	< 0.0001	< 0.0002	< 0.0001	< 0.0001	< 0.0002
OW4	5/3/2017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.11	0.0009	0.0017	< 0.001	< 0.0025	< 0.0005	< 0.0025	0.0025	< 0.0005	< 0.0005	< 0.001	< 0.0005	< 0.001	< 0.0005	< 0.0005	< 0.001

Table 5b: Groundwater Quality Results and Reasonable Use Limits - May 1 - 4, 2017

Name	Date	1,4-dioxane	Alkalinity	Chloride	Dissolved Organic Carbon	Iron	Manganese	Sodium	Total Dissolved Solids	1,1-dichloroethylene	Benzene	Ethylbenzene	Xylenes (Total)	Toluene
Name	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
Shallow Groundwater Flow Zone														
RUL		*0.001**	*390*	*130*	*3.6*	*0.18*	*0.034*	*109*	*452*	*0.0035*	*0.0014*	*0.0013*	*0.15*	*0.0121*
M54-4	5/3/2017	< 0.001	*490*	45	3.1	< 0.1	0.027	60	*704*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M66-2	5/4/2017	< 0.001	290	100	1.4	*0.52*	*0.043*	*110*	*888*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M67-2	5/4/2017	< 0.001	330	4.9	1.8	*0.49*	0.029	50	338	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
75% RUL†		*n/a*	*293*	*98*	*2.7*	*0.14*	*0.026*	*82*	*339*	*0.0026*	*0.0011*	*0.00098*	*0.11*	*0.0091*
M80-2	5/2/2017	< 0.001	*340*	64	1.6	< 0.1	0.008	21	*534*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	0.002
M87-2	5/2/2017	< 0.001	210	33	1.1	< 0.1	0.007	13	324	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
OW37-s	5/2/2017	< 0.001	250	67	2.2	*5.2*	*0.23*	45	*368*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
Intermediate BedrockGroundwater Flow Zone														
RUL		*0.001**	*400*	*132*	*3.5*	*0.18*	*0.032*	*106*	*465*	*0.0035*	*0.0014*	*0.0013*	*0.15*	*0.0121*
M177	5/4/2017	< 0.001	250	6.4	1.7	< 0.1	0.006	7.1	330	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M179	5/4/2017	< 0.001	220	31	3.2	*0.38*	0.018	25	310	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M185-1	5/4/2017	< 0.001	210	66	*4.8*	< 0.1	0.016	69	450	< 0.0005	< 0.0005	< 0.0005	< 0.001	*0.042*
M185-2	5/4/2017	< 0.001	270	64	1.9	< 0.1	0.019	13	*482*	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M186	5/3/2017	< 0.001	340	*1200*	2.9	*0.47*	*0.073*	*780*	*2400*	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002
M187	5/3/2017	< 0.001	240	19	2.3	< 0.1	0.002	16	404	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002
M188	5/4/2017	< 0.001	320	61	1.9	< 0.1	0.008	87	458	< 0.0001	< 0.0001	< 0.0001	< 0.0002	0.0011
M190	5/4/2017	< 0.001	260	57	3	< 0.1	0.009	27	424	< 0.0001	< 0.0001	< 0.0001	< 0.0002	0.0014
75% RUL†		*n/a*	*300*	*99*	*2.6*	*0.14*	*0.024*	*80*	*349*	*0.0026*	*0.0011*	*0.00098*	*0.11*	*0.0091*
M80-1	5/2/2017	< 0.001	160	7.1	0.8	< 0.1	0.005	35	198	< 0.0001	< 0.0001	< 0.0001	0.00013	< 0.0002
M82-1	5/3/2017	< 0.001	*330*	45	2.3	< 0.1	0.004	*92*	*578*	< 0.0005	< 0.0005	< 0.0005	< 0.001	< 0.001
M82-2	5/3/2017	< 0.001	*330*	24	2.4	< 0.1	0.018	17	*500*	< 0.0005	< 0.0005	< 0.0005	< 0.001	< 0.001
M106	5/1/2017	< 0.001	*370*	*1500*	1.1	< 0.1	< 0.002	*830*	*2800*	< 0.002	< 0.002	< 0.002	< 0.004	< 0.004

* 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

Groundwater results exceed Reasonable Use Limits (RUL) *0.05*

Table 6: Leachate Chemistry Results - May 1, 2017

		North Chamber	South Chamber	LW-P1	LW-P2
General and Inorganic Parameters					
Alkalinity	mg/L	2500	3200	6400	7000
Ammonia	mg/L	302	431	1260	1160
Biochemical Oxygen Demand	mg/L	70	54	110	610
Boron	mg/L	2.6	3.5	11	20
Cadmium	mg/L	0.0001	< 0.0001	< 0.0005	< 0.0005
Calcium	mg/L	180	150	60	48
Chemical Oxygen Demand	mg/L	450	480	2500	4900
Chloride	mg/L	620	920	2200	3200
Chromium	mg/L	0.037	0.041	0.1	0.15
Cobalt	mg/L	0.014	0.014	0.061	0.066
Conductivity	µS/cm	6700	8900	17000	21000
Copper	mg/L	0.036	0.023	< 0.01	< 0.01
Dissolved Organic Carbon	mg/L	160	170	780	870
Hardness	mg/L	810	870	400	630
Iron	mg/L	15	4.3	3.7	3.5
Lead	mg/L	0.0037	0.0021	0.007	0.004
Magnesium	mg/L	89	120	64	120
Manganese	mg/L	0.68	0.32	0.04	0.048
Naphthalene	mg/L	0.0021	0.000076	0.011	0.24
Nickel	mg/L	0.073	0.1	0.2	0.32
Nitrate	mg/L	0.59	< 1	< 2	< 2
Nitrite	mg/L	< 0.05	< 0.1	< 0.2	< 0.2
N-nitrosodimethylamine	mg/L	0.000018	< 0.000008	< 0.000008	< 0.00008
pH (Lab)	Unitless	7.2	7.47	7.81	7.73
Phenols	mg/L	< 0.4	< 0.4	< 0.4	< 0.4
Phosphorus (total)	mg/L	2.8	2.2	6.1	5.1
Potassium	mg/L	140	200	410	700
Sodium	mg/L	570	870	1700	2400
Sulphate	mg/L	48	< 20	< 100	< 100
Total Dissolved Solids	mg/L	2570	3600	6580	9810
Total Kjeldahl Nitrogen	mg/L	330	440	1300	1200
Zinc	mg/L	0.098	0.032	< 0.05	< 0.05

Table 6: Leachate Chemistry Results - May 1, 2017

		North Chamber	South Chamber	LW-P1	LW-P2
Volatile Organic Compounds (VOCs)					
1,1,1,2-Tetrachloroethane	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,1,1-Trichloroethane	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
1,1,2,2-Tetrachloroethane	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,1,2-Trichloroethane	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,1-Dichloroethane	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
1,1-Dichloroethylene	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
1,2-Dichlorobenzene (o)	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,2-Dichloroethane	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,3,5-Trimethylbenzene	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,3-Dichlorobenzene (m)	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,4-Dichlorobenzene (p)	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
1,4-Dioxane	mg/L	0.042	0.028	0.36	0.33
Benzene	mg/L	< 0.02	0.0022	< 0.02	< 0.02
Chlorobenzene	mg/L	< 0.02	< 0.002	0.023	< 0.02
Chloroethane	mg/L	<0.04	<0.04	<0.004	<0.004
Chloromethane	mg/L	< 0.1	< 0.01	< 0.1	< 0.1
Cis-1,2-Dichloroethylene	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
Dichloromethane	mg/L	2.6	< 0.01	< 0.1	< 0.1
Ethylbenzene	mg/L	< 0.02	< 0.002	0.033	0.08
m+p-Xylene	mg/L	0.045	0.0047	0.06	0.16
o-Xylene	mg/L	< 0.02	0.0061	0.031	0.069
Styrene	mg/L	< 0.04	< 0.004	< 0.04	< 0.04
Tetrachloroethylene	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
Toluene	mg/L	< 0.04	< 0.004	< 0.04	0.22
Trans-1,2-dichloroethylene	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
Trichloroethylene	mg/L	< 0.02	< 0.002	< 0.02	< 0.02
Vinyl Chloride	mg/L	< 0.04	< 0.004	< 0.04	< 0.04

Table 7a: Surface Water Characteristics - May 1, 2017

Date	Parameter		Surface Water Station									
			S2	S3	S4R	S5	S6	S7	S8R	S18	S19	S20
1-May-17	Velocity:	m/s	NM	0.37	NM	0.19	0.29	0.48	0.31	NM	NM	0.15
	Depth:	m	NM	2.51	NM	0.19	0.45	0.28	0.13	NM	NM	0.19
	Width:	m	NM	0.58	NM	1.00	1.30	0.80	0.71	NM	NM	2.03
	Estimated Flow Rate:	m^3/s	NM	0.54	NM	0.04	0.17	0.11	0.03	NM	NM	0.06

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

Table 7b: Surface Water Quality Results – May 1, 2017

			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	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017
Reading Name	Units	PWQO										
Inorganic and General Parameters												
Alkalinity	mg/L		160	170	170	170	160	210	160	150	200	170
Ammonia	mg/L		2.26	0.31	< 0.15	0.24	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
Ammonia (unionized)	mg/L	0.02	*0.021*	0.0022	< 0.0017	0.0027	< 0.002	< 0.0015	< 0.0043	< 0.0018	< 0.0032	< 0.0027
Biochemical Oxygen Demand	mg/L		2	2	2	2	< 2	< 2	2	< 2	< 2	< 2
Chemical Oxygen Demand	mg/L		39	24	35	31	29	25	7.7	20	14	18
Chloride	mg/L		11	18	17	19	2.4	< 1	16	2.3	19	8.1
Conductivity	µS/cm		390	380	370	390	320	380	370	300	440	340
Hardness	mg/L		170	170	180	170	160	200	160	150	190	160
Nitrate	mg/L		4.92	< 0.1	< 0.1	< 0.1	0.22	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nitrite	mg/L		0.093	0.023	< 0.01	0.012	0.015	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nitrate + Nitrite	mg/L		5.01	0.11	< 0.1	< 0.1	0.24	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenols	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Phosphorus (total)	mg/L	0.03	*0.071*	< 0.03	*0.033*	< 0.03	*0.036*	*0.063*	< 0.03	*0.031*	< 0.03	< 0.03
Sulphate	mg/L		< 1	< 1	< 1	< 1	< 1	< 1	20	< 1	< 1	1.5
Total Dissolved Solids	mg/L		234	236	230	314	188	222	182	186	250	200
Total Suspended Solids	mg/L		< 10	11	< 10	< 10	< 10	17	< 10	< 10	< 10	< 10
Metals												
Boron	mg/L	0.2	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.029	< 0.02	0.054	< 0.02
Cadmium	mg/L		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Calcium	mg/L		54	57	59	57	52	70	48	58	64	58
Chromium (III)	mg/L	0.0089	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chromium (VI)	mg/L	0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chromium (Total)	mg/L		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	mg/L	0.0009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Copper	mg/L	0.005	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Iron	mg/L	0.3	*0.7*	*0.86*	*0.47*	*0.41*	0.13	< 0.1	0.14	0.18	< 0.1	< 0.1
Lead	mg/L	0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Magnesium	mg/L		8	8.6	8.6	8.6	8.3	6.8	12	2.8	9.1	6.3
Nickel	mg/L	0.025	0.001	0.002	0.001	0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001
Potassium	mg/L		2.5	2.3	2.1	2.2	1.7	0.68	2.4	1.9	2	0.76
Sodium	mg/L		9.2	12	11	13	3.1	2.4	15	2.1	15	6.1
Zinc	mg/L	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Volatile Organic Compounds (VOCs)												
1,4-dioxane	mg/L	0.02	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	mg/L	0.007	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Field Measurements												
pH (Field)	unitless	6.5-8.5	7.68	7.56	7.71	7.13	7.75	7.70	8.07	7.72	7.92	7.91
Conductivity (Field)	µS/cm		94	0.094	86	0.088	81	9.1	83	86	84	87
Dissoved Oxygen (Field)	mg/L		5.94	9.15	7.66	8.64	6.44	8.96	9.55	3.54	7.65	10.76
Temperature (Field)	°C		8.4	8.3	9.4	9.0	10.4	8.2	11.1	10.1	11.7	9.9

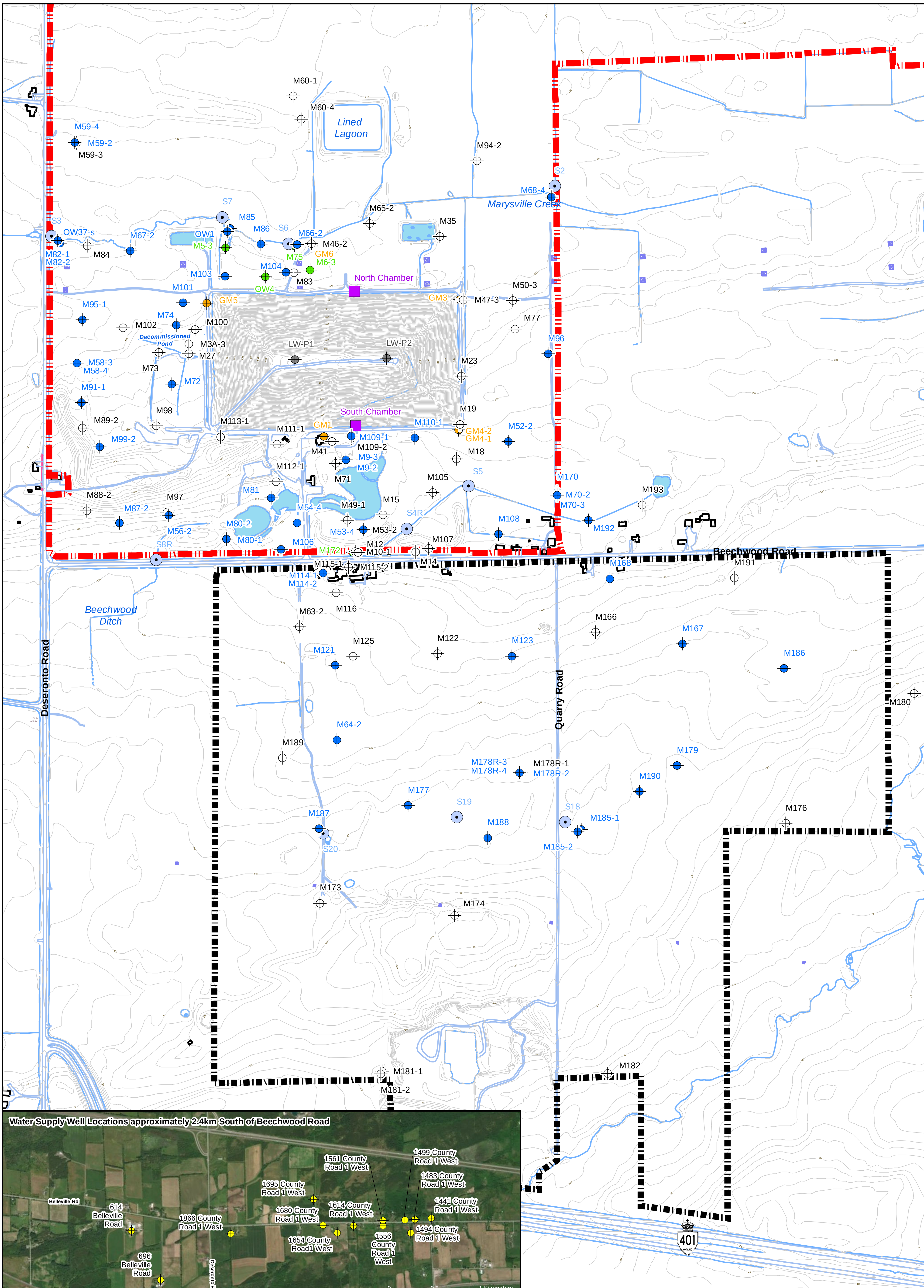
Exceeds PWQO

BluMetric™ Environmental

Table 8: Subsurface Gas Monitoring Results - May 4, 2017

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

FIGURES



LEGEND

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

REFERENCES

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

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

BluMetric™ Environmental

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Kingston, Ontario K7K 1Z7
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FAX: (613) 531-1852
Email: info@blumetric.ca
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WM

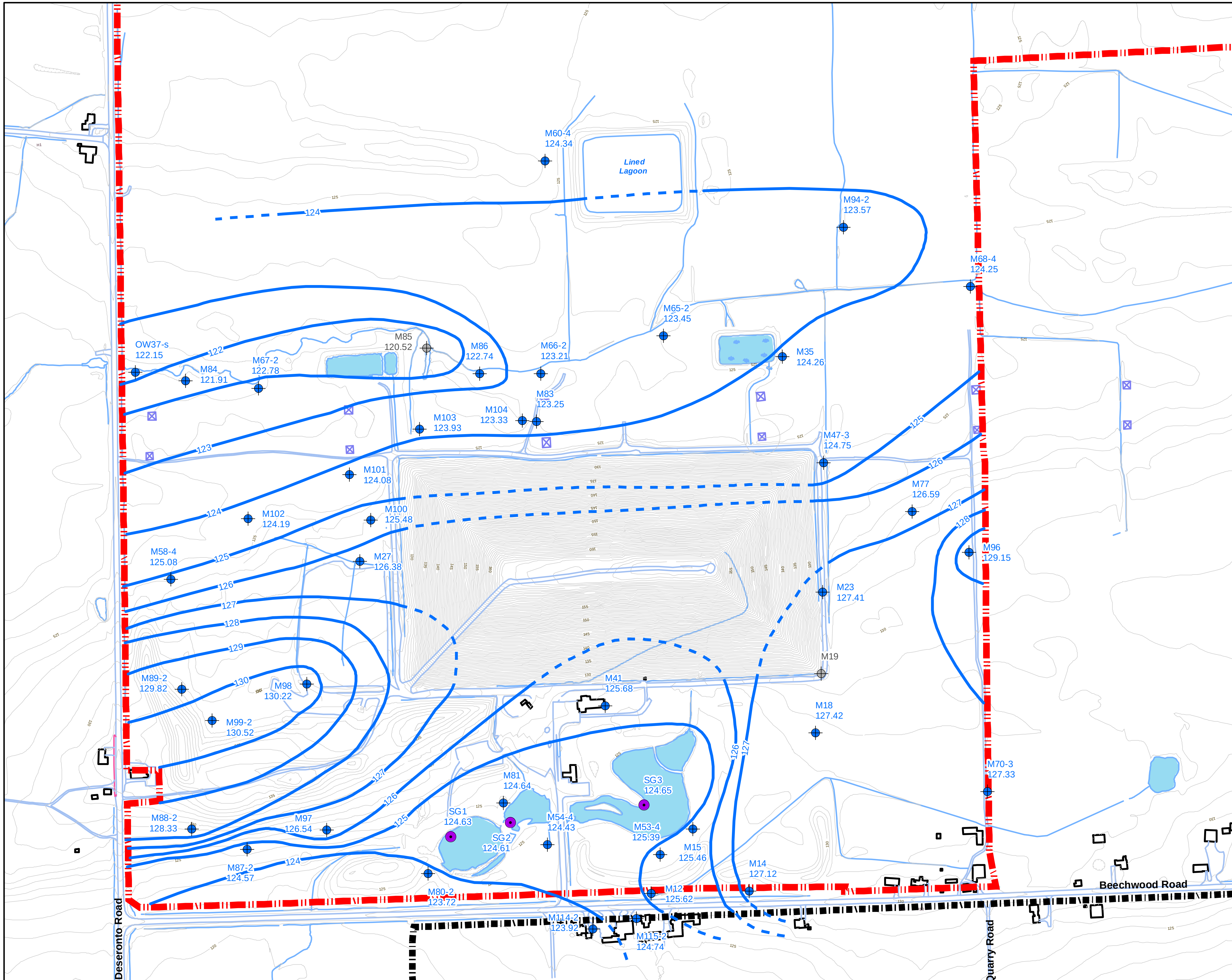
PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL
SPRING 2017 SEMI-ANNUAL REPORT

TITLE

Site Plan and Monitoring Locations

PROJECT #		DATE	
170194-02		July, 2017	
DRAWN	CHECKED	FIG NO.	REV
YL	FR	01	0



REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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CLIENT

WASTE MANAGEMENT

PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL SPRING 2017 SEMI-ANNUAL REPORT

TITLE

Shallow Groundwater Flow Zone Potentiometric Surface – April 28, 2017

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PROJECT #	DATE
170194-02	July, 2017

DRAWN	CHECKED	FIG NO.	REV
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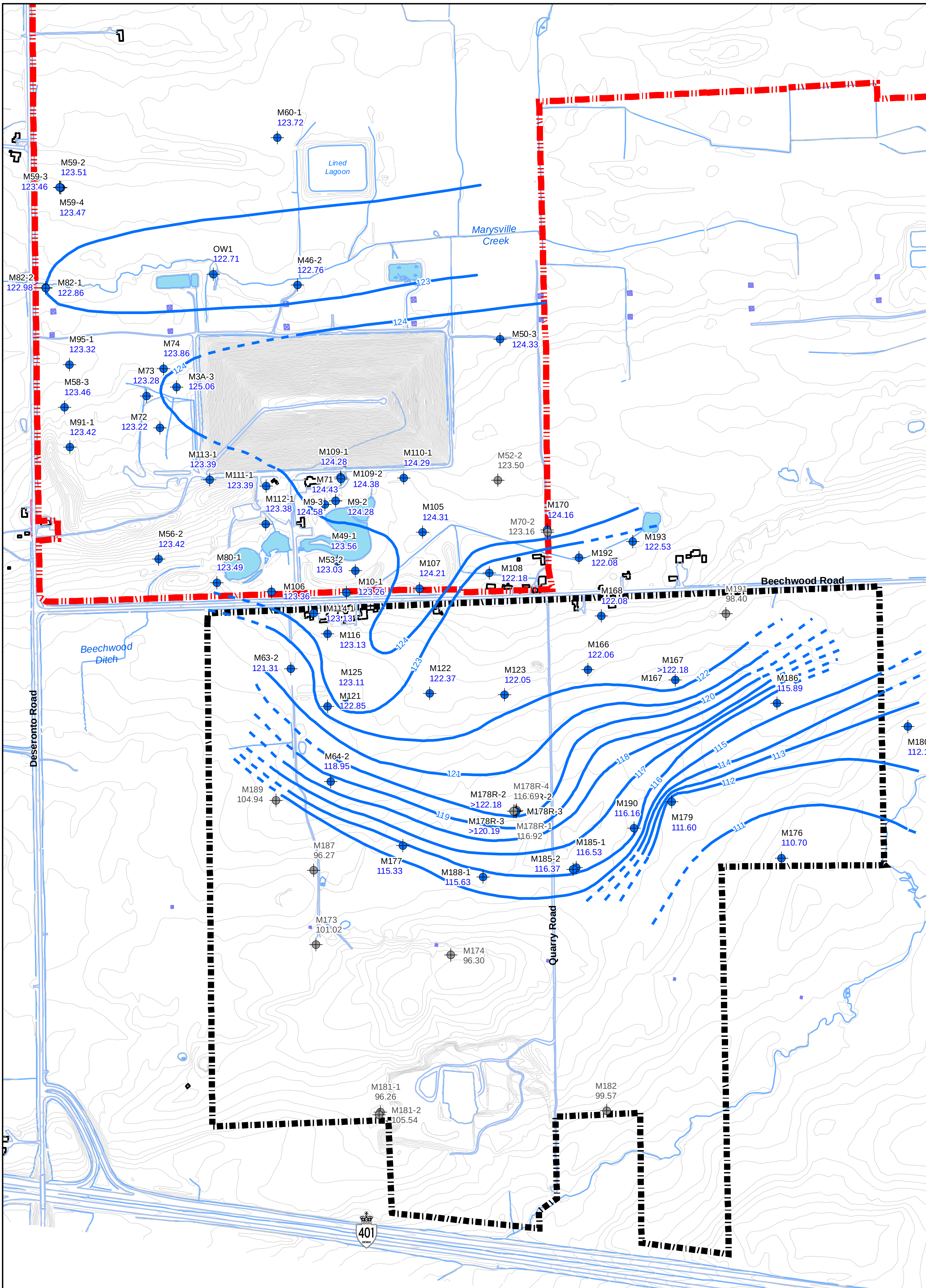

LEGEND

- Potentiometric Surface (masl)
- Topographic Contour Lines
- 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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WM WASTE MANAGEMENT

PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL
SPRING 2017 SEMI-ANNUAL REPORT

TITLE

INTERMEDIATE BEDROCK GROUNDWATER FLOW ZONE POTENTIOMETRIC SURFACE - APRIL 28, 2017

PROJECT #		DATE	
170194-02		July, 2017	
DRAWN	CHECKED	FIG NO.	REV
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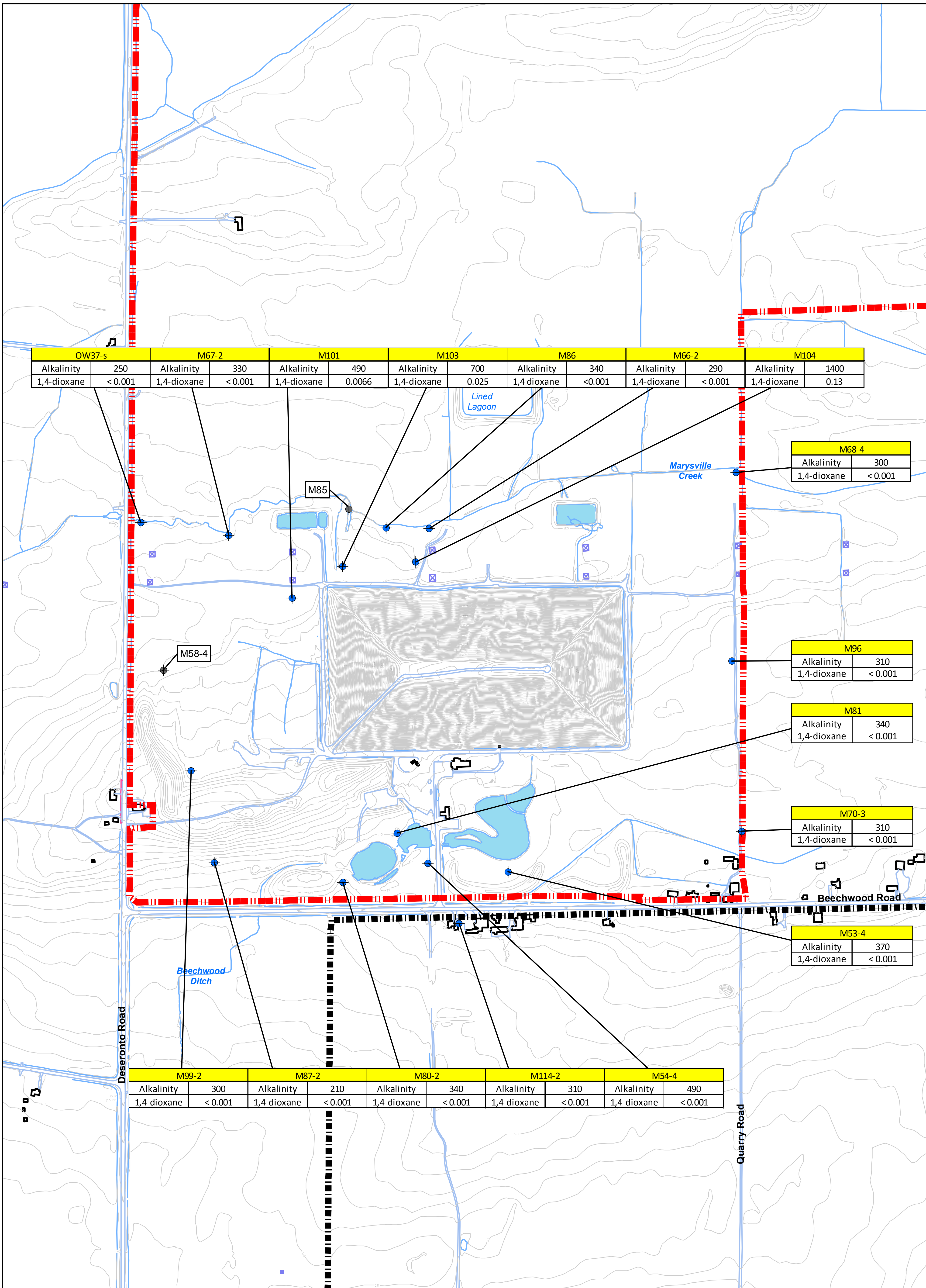

LEGEND

- 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)

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

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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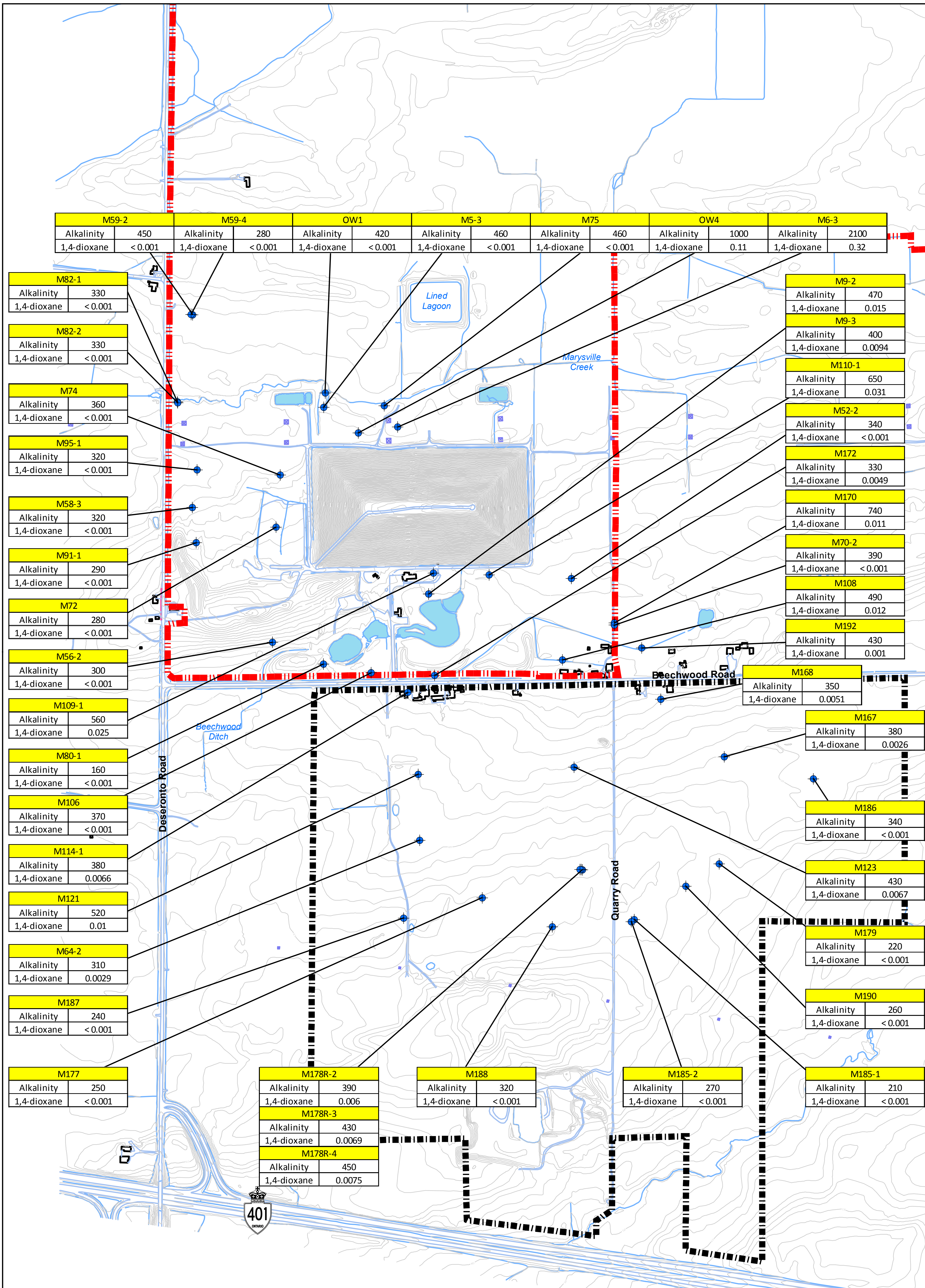
CLIENT
WM WASTE MANAGEMENT

PROJECT
WASTE MANAGEMENT RICHMOND LANDFILL SPRING 2017 SEMI-ANNUAL REPORT

TITLE
Shallow Flow Zone Concentrations

PROJECT #	DATE		
170194-02	July, 2017		
DRAWN	CHECKED	FIG NO.	REV
IB	FR	04	0



LEGEND

- Topographic Contour Lines
- Surface Water
- Property Boundary
- Proposed CAZ Boundary
- M9-2 Intermediate Monitoring Well Sampled for Chemistry

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

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
1:9,100

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PROJECT

WASTE MANAGEMENT RICHMOND LANDFILL
SPRING 2017 SEMI-ANNUAL REPORT

TITLE

Intermediate Flow Zone Concentrations

PROJECT #		DATE	
170194-02		July, 2017	
DRAWN	CHECKED	FIG NO.	REV
IB	FR	05	0

APPENDIX A

Monitoring Well Inventory

Appendix A: Monitoring Well Inventory

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
M48-3	334839	4902565

Monitoring Well	Easting	Northing
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
M66-1	335154	4903218
M66-2	335155	4903219

Monitoring Well	Easting	Northing
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
M100	334994	4902965
M101	334949	4903015
M102	334836	4902919

Appendix A: Monitoring Well Inventory

Monitoring Well	Easting	Northing
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
M179	336338	4902357
M180	336801	4902677
M181-1	335912	4901492
M181-2	335912	4901492
M182	336402	4901643
M183	336953	4901770
M184	336176	4901998
M185-1	336170	4902151
M185-2	336170	4902151
M186	336509	4902627
M187	335607	4901972

Appendix A: Monitoring Well Inventory

Monitoring Well	Easting	Northing
M188	335979	4902069
M189	335479	4902099
M190	336274	4902275
M191	336332	4902802
M192	335976	4902826
M193	336082	4902896
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

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

Location	Parameter	Unit	Regular Sample	Field Duplicate	RPD (%)	MDL[2]	Comment
S3	Ammonia	mg/L	< 0.15	0.31	70	0.15	Less than 5x MDL
S3	Ammonia (unionized)	mg/L	< 0.0011	0.0022	67	0.0011	Less than 5x MDL
M110-1	Benzene	mg/L	0.00089	0.00041	74	0.0001	Less than 5x MDL
M110-1	m+p-Xylene	mg/L	0.00056	0.00027	70	0.0001	Less than 5x MDL

[1] RPD (%) = 100 * ABS (Regular Sample - Duplicate Sample) / ([Regular Sample + Duplicate Sample] / 2)
[2] MDL = Laboratory Method Detection Limit

Detailed Results from Field Duplicate vs. Regular Samples

Reading Name	Units	M106 2017-05-01 Regular Sample	M106 2017-05-01 Field Duplicate	RPD (%)
General/Inorganic Parameters				
Alkalinity	mg/L	370	370	0.00
Ammonia	mg/L	2.43	2.41	0.83
Boron	mg/L	1.9	1.9	0.00
Calcium	mg/L	100	110	9.52
Chloride	mg/L	1500	1500	0.00
Conductivity	µS/cm	5300	5300	0.00
Dissolved Organic Carbon	mg/L	1.1	1.1	0.00
Iron	mg/L	< 0.1	< 0.1	0.00
Magnesium	mg/L	70	71	1.42
Manganese	mg/L	< 0.002	< 0.002	0.00
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Potassium	mg/L	21	22	4.65
Sodium	mg/L	830	850	2.38
Sulphate	mg/L	< 1	< 1	0.00
Total Dissolved Solids	mg/L	2800	2720	2.90
Volatile Organic Compounds (VOCs)				
1,1,1,2-Tetrachloroethane	mg/L	< 0.004	< 0.004	0.00
1,1,1-Trichloroethane	mg/L	< 0.002	< 0.002	0.00
1,1,2,2-Tetrachloroethane	mg/L	< 0.004	< 0.004	0.00
1,1,2-Trichloroethane	mg/L	< 0.004	< 0.004	0.00
1,1-Dichloroethane	mg/L	< 0.002	< 0.002	0.00
1,1-Dichloroethylene	mg/L	< 0.002	< 0.002	0.00
1,2-Dichlorobenzene (o)	mg/L	< 0.004	< 0.004	0.00
1,2-Dichloroethane	mg/L	< 0.004	< 0.004	0.00
1,3,5-Trimethylbenzene	mg/L	< 0.004	< 0.004	0.00
1,3-Dichlorobenzene (m)	mg/L	< 0.004	< 0.004	0.00
1,4-Dichlorobenzene (p)	mg/L	< 0.004	< 0.004	0.00
1,4-Dioxane	mg/L	< 0.001	< 0.001	0.00
Benzene	mg/L	< 0.002	< 0.002	0.00
Chlorobenzene	mg/L	< 0.002	< 0.002	0.00
Chloroethane	mg/L	< 0.004	< 0.004	0.00
Chloromethane	mg/L	< 0.01	< 0.01	0.00
Cis-1,2-Dichloroethylene	mg/L	< 0.002	< 0.002	0.00
Dichloromethane	mg/L	< 0.01	< 0.01	0.00
Ethylbenzene	mg/L	< 0.002	< 0.002	0.00
m+p-Xylene	mg/L	< 0.002	< 0.002	0.00
o-Xylene	mg/L	< 0.002	< 0.002	0.00
Styrene	mg/L	< 0.004	< 0.004	0.00
Tetrachloroethylene	mg/L	< 0.002	< 0.002	0.00
Toluene	mg/L	< 0.004	< 0.004	0.00
Trans-1,2-dichloroethylene	mg/L	< 0.002	< 0.002	0.00
Trichloroethylene	mg/L	< 0.002	< 0.002	0.00
Vinyl Chloride	mg/L	< 0.004	< 0.004	0.00

Detailed Results from Field Duplicate vs. Regular Samples

Reading Name	Units	M110-1 2017-05-02 Regular Sample	M110-1 2017-05-02 Field Duplicate	RPD (%)
General/Inorganic Parameters				
Alkalinity	mg/L	650	660	1.53
Ammonia	mg/L	0.52	0.51	1.94
Boron	mg/L	0.46	0.45	2.20
Calcium	mg/L	150	150	0.00
Chloride	mg/L	160	160	0.00
Conductivity	μS/cm	1700	1700	0.00
Dissolved Organic Carbon	mg/L	8.4	8.5	1.18
Iron	mg/L	< 0.1	< 0.1	0.00
Magnesium	mg/L	52	50	3.92
Manganese	mg/L	0.013	0.013	0.00
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Potassium	mg/L	7.3	7	4.20
Sodium	mg/L	130	120	8.00
Sulphate	mg/L	< 1	< 1	0.00
Total Dissolved Solids	mg/L	918	912	0.66
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	0.00014	0.00014	0.00
1,1-Dichloroethylene	mg/L	< 0.0001	< 0.0001	0.00
1,2-Dichlorobenzene (o)	mg/L	< 0.0002	< 0.0002	0.00
1,2-Dichloroethane	mg/L	< 0.0002	< 0.0002	0.00
1,3,5-Trimethylbenzene	mg/L	< 0.0002	< 0.0002	0.00
1,3-Dichlorobenzene (m)	mg/L	< 0.0002	< 0.0002	0.00
1,4-Dichlorobenzene (p)	mg/L	< 0.0002	< 0.0002	0.00
1,4-Dioxane	mg/L	0.031	0.031	0.00
Benzene	mg/L	0.00089	0.00041	73.85
Chlorobenzene	mg/L	< 0.0001	< 0.0001	0.00
Chloroethane	mg/L	0.019	0.019	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	0.00056	0.00027	69.88
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
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	0.00028	0.00028	0.00

Detailed Results from Field Duplicate vs. Regular Samples

Reading Name	Units	M82-2 2017-05-03 Regular Sample	M82-2 2017-05-03 Field Duplicate	RPD (%)
General/Inorganic Parameters				
Alkalinity	mg/L	330	340	2.99
Ammonia	mg/L	0.2	0.22	9.52
Boron	mg/L	0.14	0.15	6.90
Calcium	mg/L	100	100	0.00
Chloride	mg/L	24	23	4.26
Conductivity	µS/cm	790	790	0.00
Dissolved Organic Carbon	mg/L	2.4	2.5	4.08
Iron	mg/L	< 0.1	< 0.1	0.00
Magnesium	mg/L	30	30	0.00
Manganese	mg/L	0.018	0.018	0.00
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	< 0.01	< 0.01	0.00
Potassium	mg/L	3.8	3.9	2.60
Sodium	mg/L	17	17	0.00
Sulphate	mg/L	63	60	4.88
Total Dissolved Solids	mg/L	500	498	0.40
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	< 0.001	< 0.001	0.00
Benzene	mg/L	< 0.0005	< 0.0005	0.00
Chlorobenzene	mg/L	< 0.0005	< 0.0005	0.00
Chloroethane	mg/L	< 0.001	< 0.001	0.00
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
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	S3 2017-05-01 Field Duplicate	S3 2017-05-01 Regular Sample	RPD (%)
1,4-Dioxane	mg/L	< 0.001	< 0.001	0.00
Alkalinity	mg/L	170	170	0.00
Ammonia	mg/L	< 0.15	0.31	0.00
Ammonia (unionized)	mg/L	< 0.0011	0.0022	0.00
Biochemical Oxygen Demand	mg/L	< 2	2	0.00
Boron	mg/L	< 0.02	0.02	0.00
Cadmium	mg/L	< 0.0001	< 0.0001	0.00
Calcium	mg/L	55	57	3.57
Chemical Oxygen Demand	mg/L	26	24	8.00
Chloride	mg/L	18	18	0.00
Chromium (III)	mg/L	< 0.005	< 0.005	0.00
Chromium (Total)	mg/L	< 0.005	< 0.005	0.00
Chromium (VI)	mg/L	< 0.0005	< 0.0005	0.00
Cobalt	mg/L	< 0.0005	< 0.0005	0.00
Conductivity	μS/cm	380	380	0.00
Copper	mg/L	< 0.002	< 0.002	0.00
Field Temperature	°C	8.3	8.3	0.00
Hardness	mg/L	170	170	0.00
Iron	mg/L	0.84	0.86	2.35
Lead	mg/L	< 0.0005	< 0.0005	0.00
Magnesium	mg/L	8.5	8.6	1.17
Naphthalene	mg/L	< 0.00005	< 0.00005	0.00
Nickel	mg/L	0.002	0.002	0.00
Nitrate	mg/L	< 0.1	< 0.1	0.00
Nitrite	mg/L	0.02	0.023	13.95
Phenols	mg/L	< 0.001	< 0.001	0.00
Phosphorus (total)	mg/L	0.034	< 0.03	0.00
Potassium	mg/L	2.2	2.3	4.44
Sodium	mg/L	11	12	8.70
Sulphate	mg/L	< 1	< 1	0.00
Total Dissolved Solids	mg/L	234	236	0.85
Total Suspended Solids	mg/L	< 10	11	0.00
Zinc	mg/L	< 0.01	< 0.01	0.00

Detailed Results from Blank Samples - Spring 2017

Reading Name	Units	2017-05-01 Field Blank	2017-05-02 Field Blank	2017-05-04 Field Blank	2017-05-04 Field Blank	2017-05-01 Trip Blank	2017-05-02 Trip Blank	2017-05-03 Trip Blank	2017-05-04 Trip Blank
General/Inorganic Parameters									
Alkalinity	mg/L	2	3.6	2.1	2.1				
Ammonia	mg/L	< 0.15	< 0.15	< 0.15	< 0.15				
Boron	mg/L	< 0.02	< 0.02	< 0.02	< 0.02				
Calcium	mg/L	< 0.2	< 0.2	< 0.2	< 0.2				
Chloride	mg/L	< 1	< 1	< 1	< 1				
Conductivity	µS/cm	1.2	1.2	2	2				
Dissolved Organic Carbon	mg/L	0.3	< 0.2	0.4	0.4				
Iron	mg/L	< 0.1	< 0.1	< 0.1	< 0.1				
Magnesium	mg/L	< 0.05	< 0.05	< 0.05	< 0.05				
Manganese	mg/L	< 0.002	< 0.002	< 0.002	< 0.002				
Nitrate	mg/L	< 0.1	< 0.1	< 0.1	< 0.1				
Nitrite	mg/L	< 0.01	< 0.01	< 0.01	< 0.01				
Nitrite + Nitrate	mg/L	< 0.1	< 0.1	< 0.1	< 0.1				
Potassium	mg/L	< 0.2	< 0.2	< 0.2	< 0.2				
Sodium	mg/L	< 0.1	< 0.1	< 0.1	< 0.1				
Sulphate	mg/L	< 1	< 1	< 1	< 1				
Total Dissolved Solids	mg/L	< 10	< 10	< 10	< 10				
Volatile Organic Compounds (VOCs)									
1,1,1,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,1,1-Trichloroethane	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,1,2,2-Tetrachloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,1,2-Trichloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,1-Dichloroethane	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,1-Dichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,2-Dichlorobenzene (o)	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,2-Dichloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,3,5-Trimethylbenzene	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,3-Dichlorobenzene (m)	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,4-Dichlorobenzene (p)	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
1,4-Dioxane	mg/L	< 0.001	< 0.001	< 0.001	< 0.001				
Benzene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlorobenzene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chloroethane	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chloromethane	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Cis-1,2-Dichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dichloromethane	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Ethylbenzene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
m+p-Xylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
o-Xylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Styrene	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toluene	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Xylenes	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Trans-1,2-dichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Trichloroethylene	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Vinyl Chloride	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002

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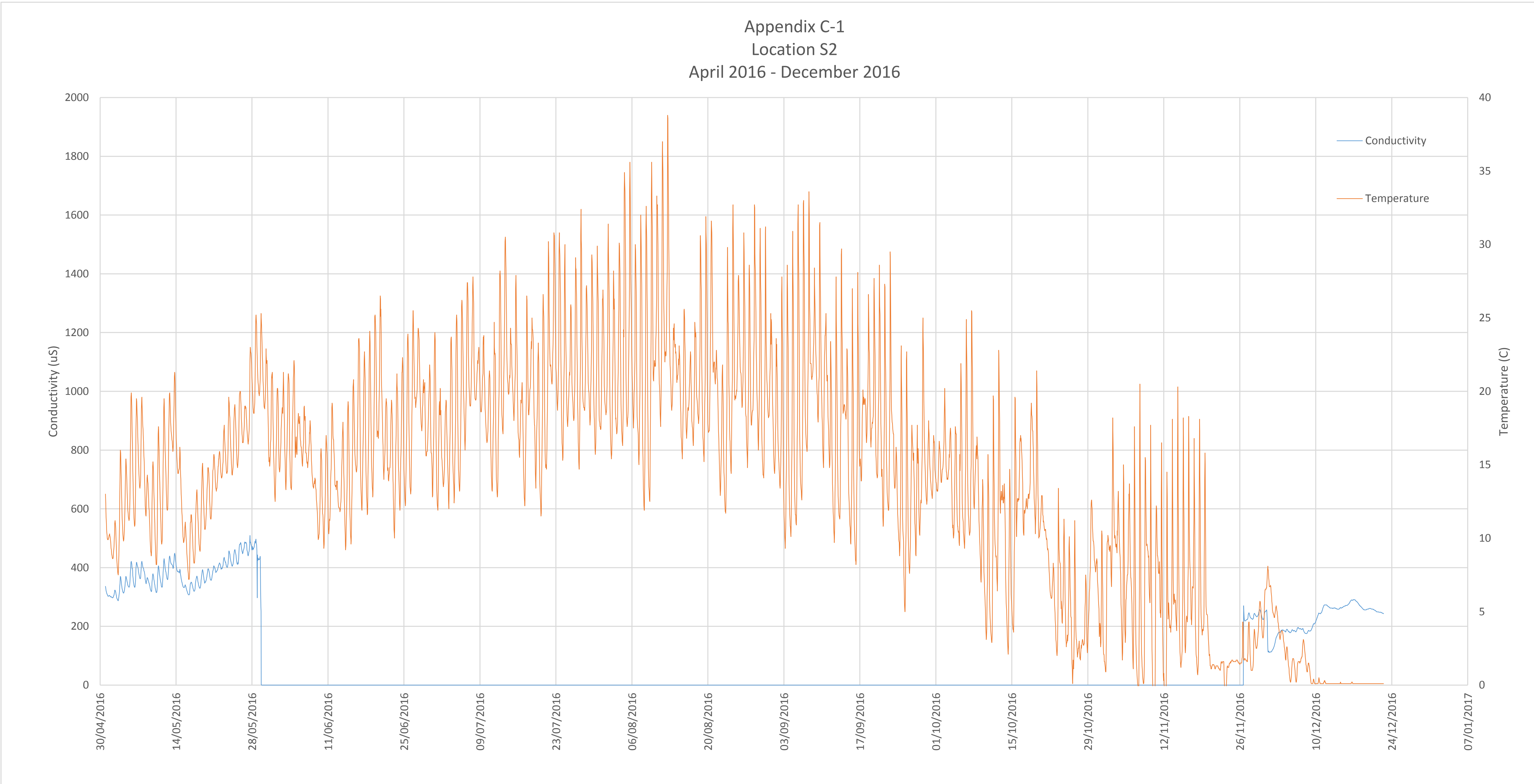
APPENDIX C

Results from Marysville Creek Conductivity Study



Appendix C-1
Location S2
April 2016 - December 2016
Conductivity (uS)
Temperature (C)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
40
35
30
25
20
15
10
5
0
Conductivity
Temperature
30/04/2016
14/05/2016
28/05/2016
11/06/2016
25/06/2016
09/07/2016
23/07/2016
06/08/2016
20/08/2016
03/09/2016
17/09/2016
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12/11/2016
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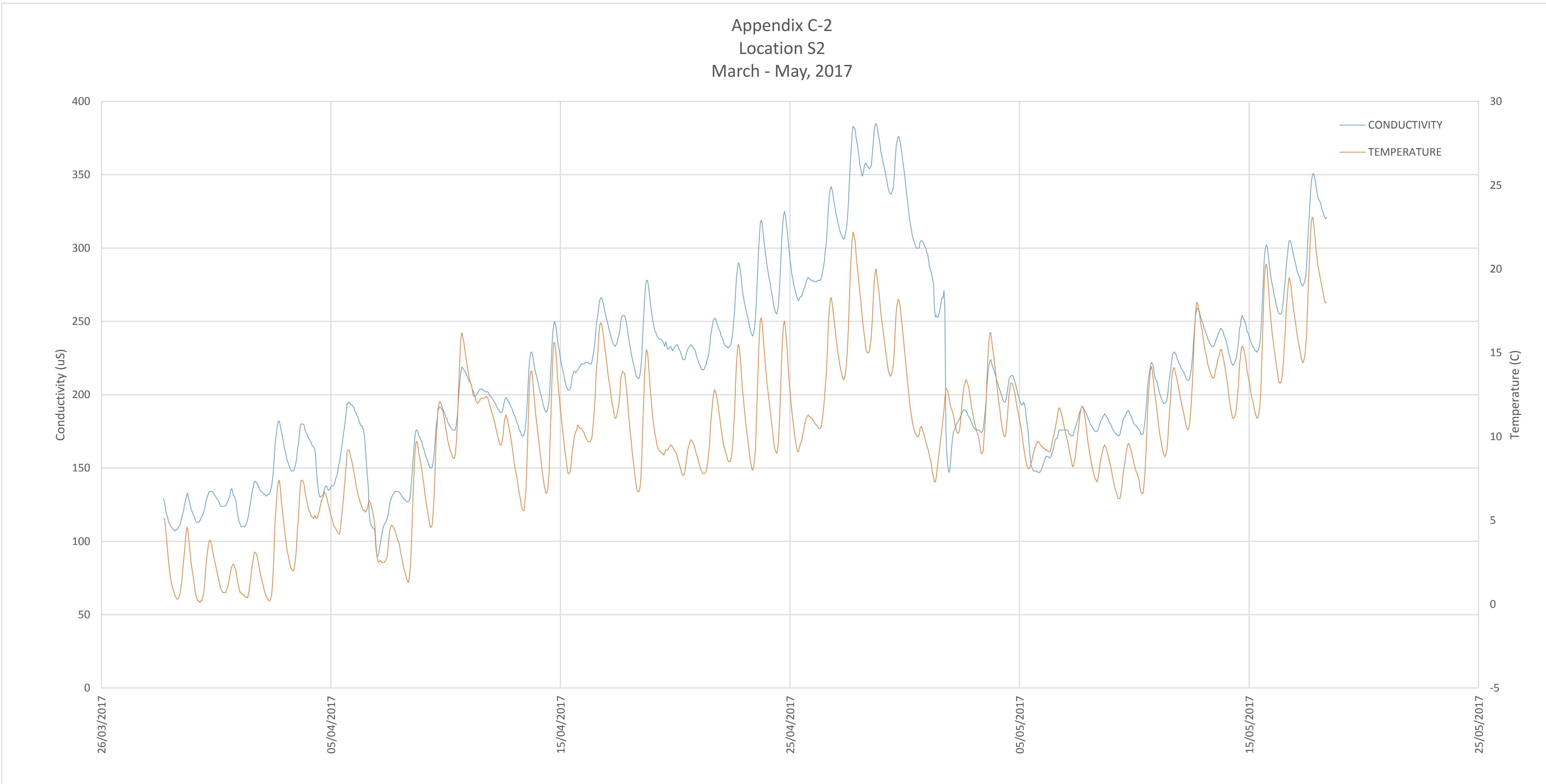
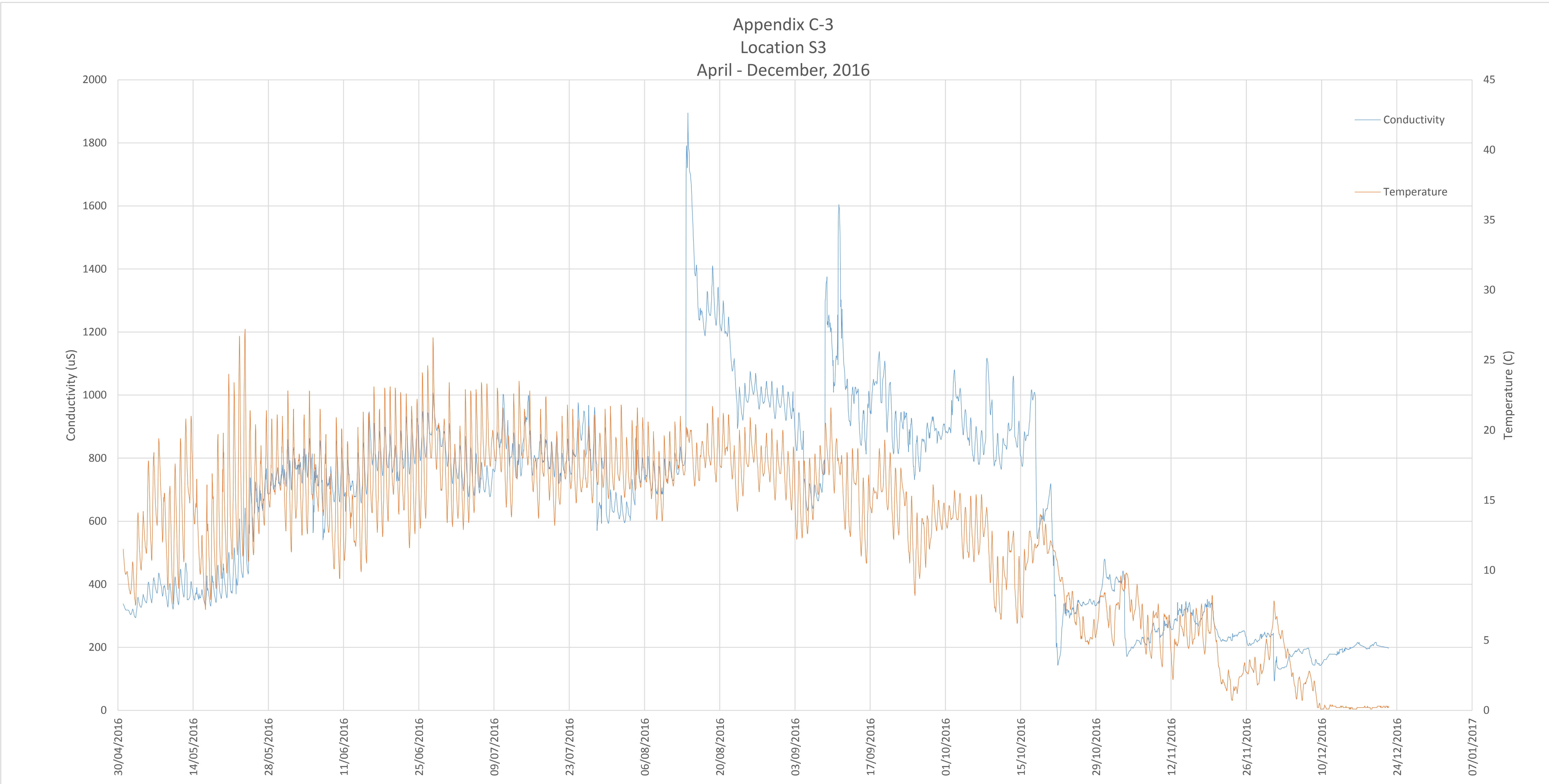
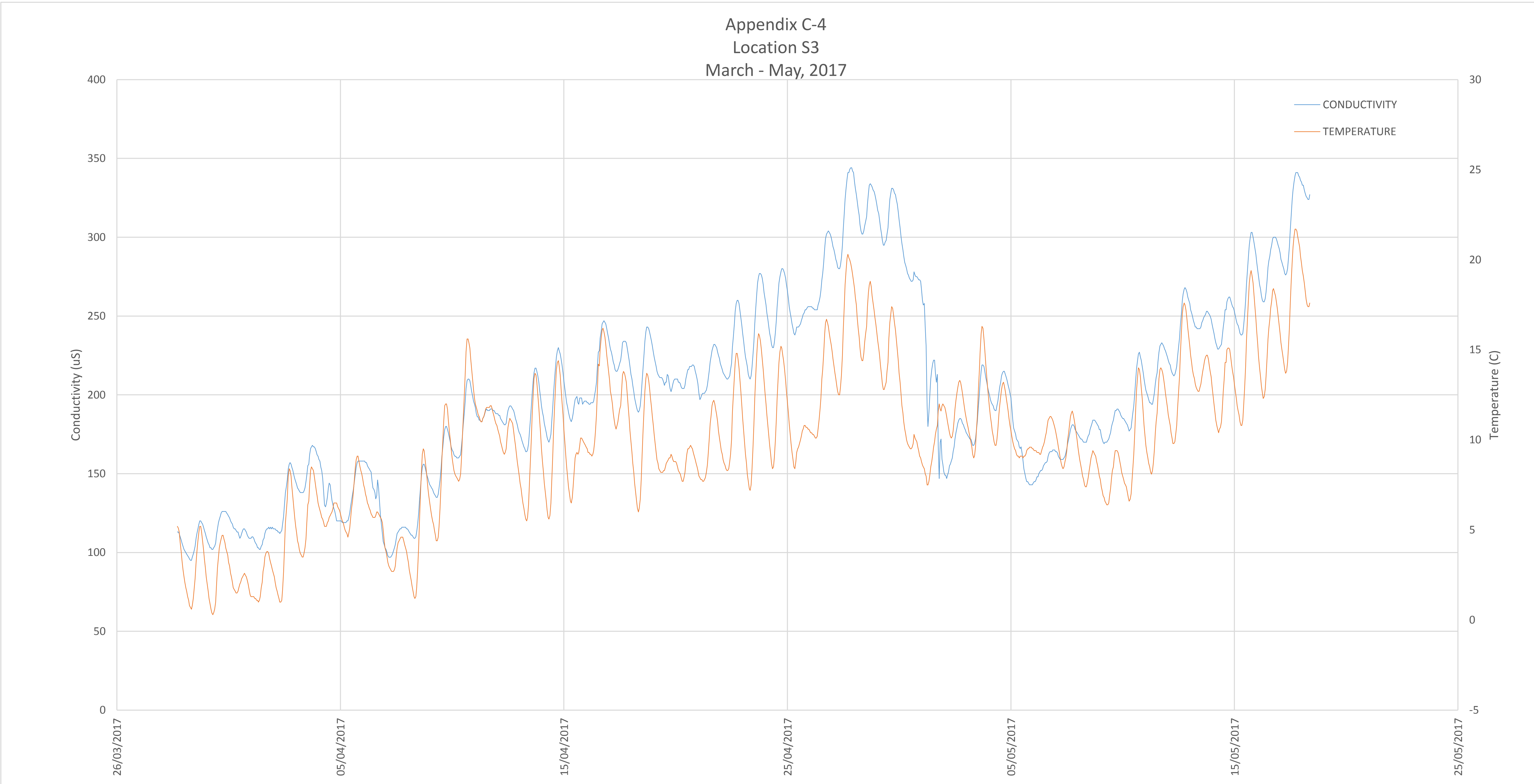
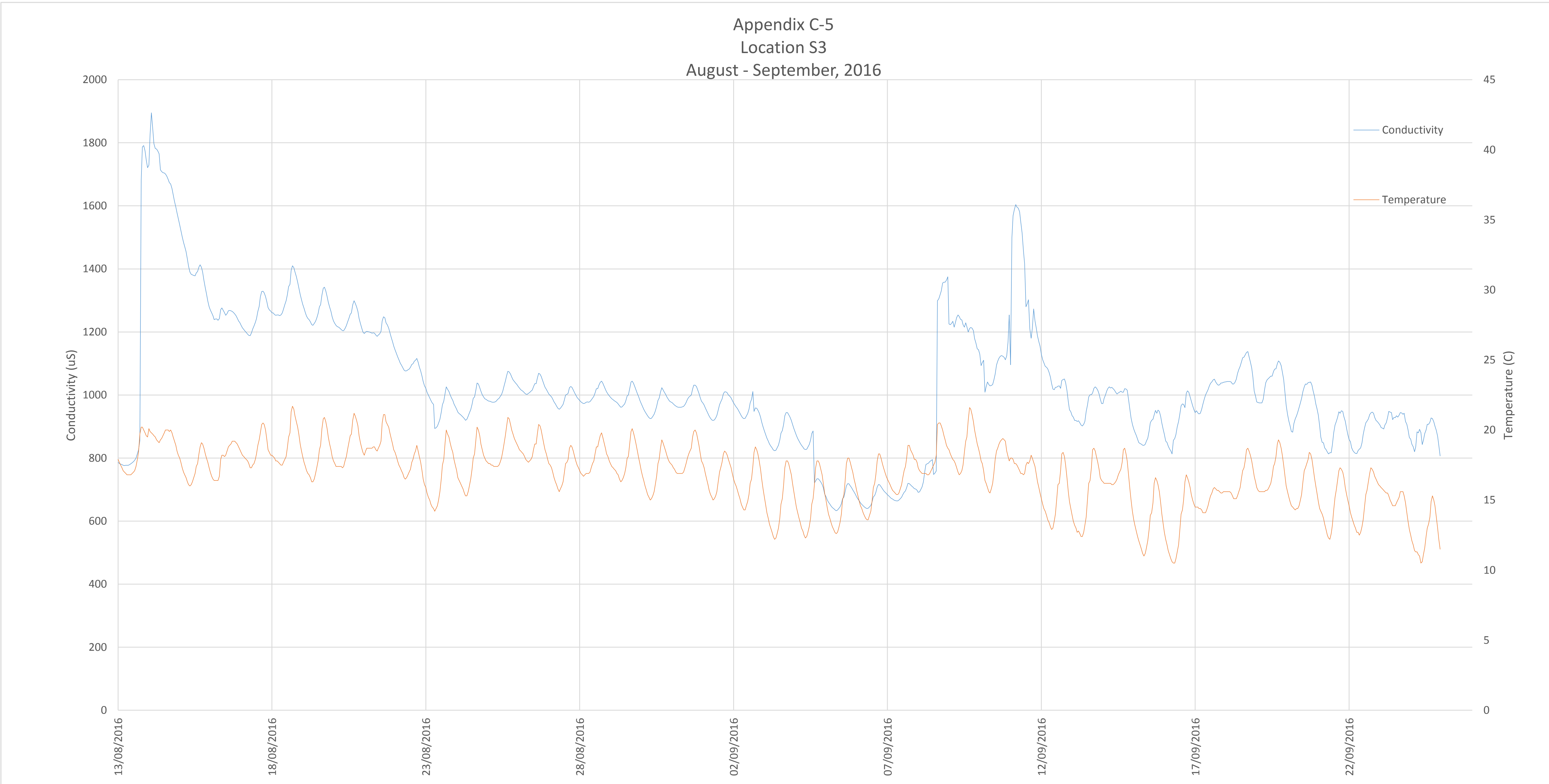
10/12/2016
24/12/2016
07/01/2017


Appendix C-2
Location S2
March - May, 2017
Conductivity (uS)
Temperature (C)
CONDUCTIVITY
TEMPERATURE
400
350
300
250
200
150
100
50
0
30
25
20
15
10
5
0
-5
26/03/2017
05/04/2017
15/04/2017
25/04/2017
05/05/2017
15/05/2017
25/05/2017



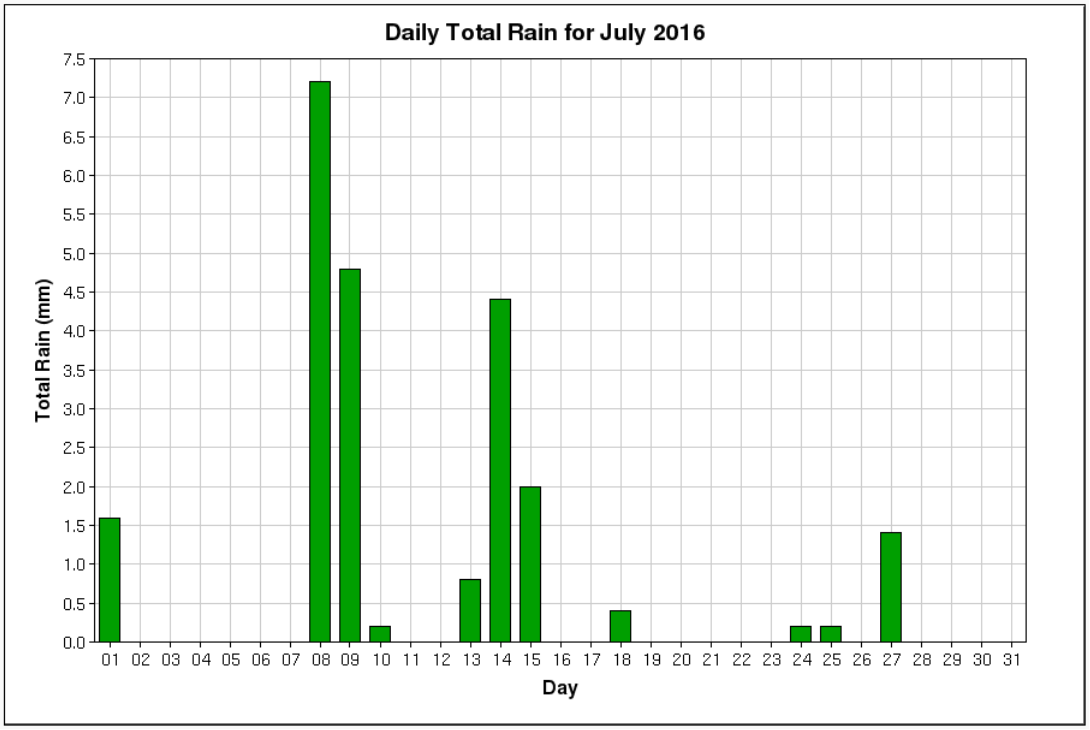
Appendix C-3
Location S3
April - December, 2016
Conductivity (uS)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Temperature (C)
45
40
35
30
25
20
15
10
5
0
Conductivity
Temperature
30/04/2016
14/05/2016
28/05/2016
11/06/2016
25/06/2016
09/07/2016
23/07/2016
06/08/2016
20/08/2016
03/09/2016
17/09/2016
01/10/2016
15/10/2016
29/10/2016
12/11/2016
26/11/2016
10/12/2016
24/12/2016
07/01/2017

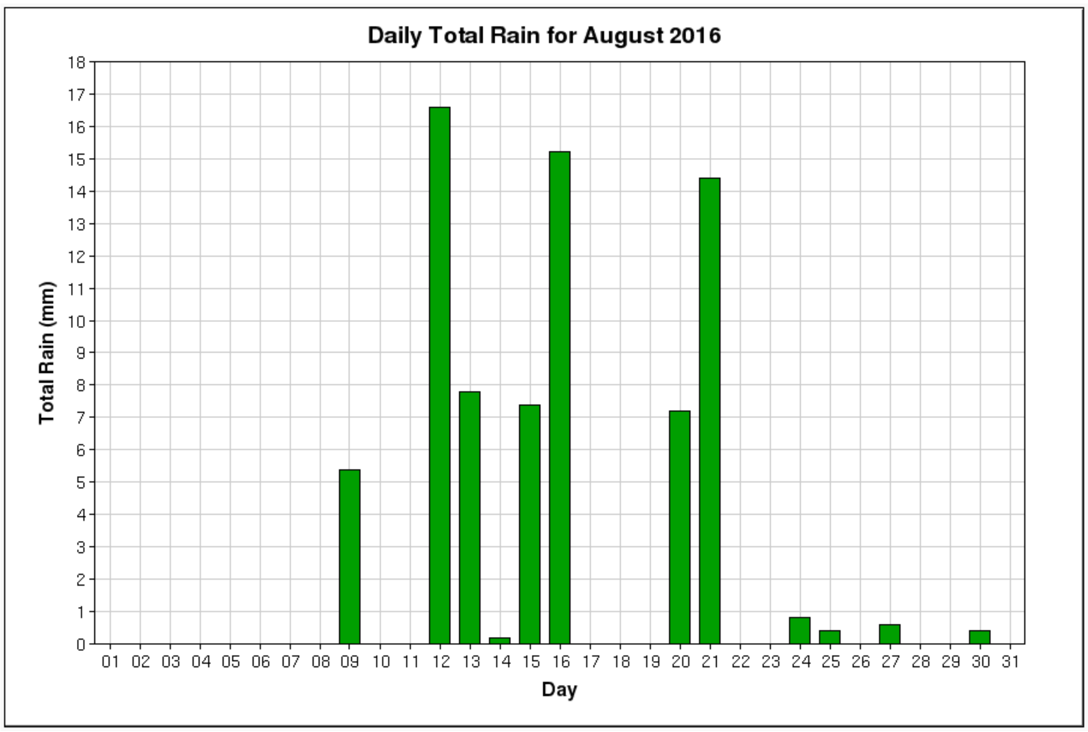

Appendix C-4
Location S3
March - May, 2017
Conductivity (uS)
Temperature (C)
CONDUCTIVITY
TEMPERATURE
400
350
300
250
200
150
100
50
0
30
25
20
15
10
5
0
-5
26/03/2017
05/04/2017
15/04/2017
25/04/2017
05/05/2017
15/05/2017
25/05/2017



Appendix C-5
Location S3
August - September, 2016
Conductivity (uS)
Temperature (C)
Conductivity
Temperature
2000
1800
1600
1400
1200
1000
800
600
400
200
0
45
40
35
30
25
20
15
10
5
0
13/08/2016
18/08/2016
23/08/2016
28/08/2016
02/09/2016
07/09/2016
12/09/2016
17/09/2016
22/09/2016

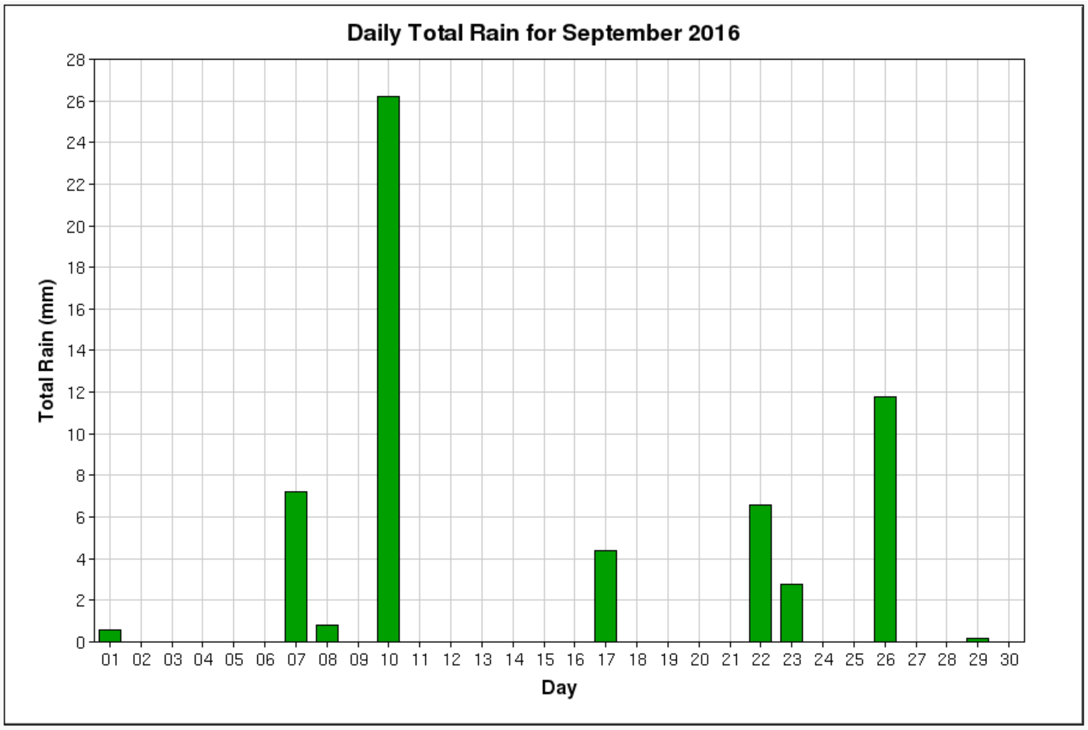
Appendix C-6
Environment Canada Centreville Station Rainfall Data[1]
July – September 2016





[1] http://climate.weather.gc.ca/climate_data/daily_data_e.html?hlyRange=%7C&dlyRange=1985-12-01%7C2017-06-26&mlyRange=1986-01-01%7C2006-12-01&StationID=4898&Prov=ON&urlExtension=_e.html&searchType=stnName&optLimit=yearRange&StartYear=1840&EndYear=2017&selRowPerPage=25&Line=1&searchMethod=contains&txtStationName=centreville&timeframe=2&Day=29&Year=2016&Month=7#

Appendix C-6
Environment Canada Centreville Station Rainfall Data
July – September 2016



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