REPORT

REGIONAL MUNICIPALITY OF DURHAM

DURHAM YORK ENERGY CENTRE: 2019 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT

RWDI #1604066

April 20, 2020

SUBMITTED TO

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April 20, 2020

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RE: 2019 Annual Groundwater and Surface Water Monitoring Report
Durham York Energy Centre
RFP-528-2016
RWDI Reference No. 1604066

Dear Mr. Anello,

RWDI AIR Inc. (RWDI) is pleased to provide this 2019 Annual Groundwater and Surface Water Monitoring Report for the Durham York Energy Centre (DYEC).

The 2019 Annual Groundwater and Surface Water Monitoring Report provides details of the monitoring program completed in 2019 for DYEC and an interpretation of the 2019 monitoring data, including our conclusions and recommendations. Relevant 2019 and historical technical data are appended.

In November 2010, the Ministry of the Environment (MOE) issued the Technical Guidance Document entitled "*Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water*" (MOE, 2010). Appended to this report is a completed Monitoring and Screening Checklist from the above Technical Guidance Document, which provides certification of the Competent Environmental Practitioner (CEP). The Monitoring and Screening Checklist is provided in **Appendix F**.

We trust that this 2019 Annual Groundwater and Surface Water Monitoring Report for DYEC provides sufficient information for your requirements. Should there be any questions or comments, please contact us.

Sincerely,

RWDI

Phil Janisse, B.Sc. P.Geo., QP_{ESA}
Senior Geoscience Specialist

Attach.

EXECUTIVE SUMMARY

The Regional Municipality of Durham (hereinafter "Region") and The Regional Municipality of York own the Durham York Energy Centre (DYEC), which is located in the Municipality of Clarington, Ontario. DYEC is located at municipal address 1835 Energy Drive in Courtice, Ontario (hereinafter the "Site").

DYEC is a thermal treatment energy from waste facility and is approved to process up to 140,000 tonnes of solid, non-hazardous, municipal waste per year. Covanta operates DYEC, which began operation in February 2015 when the first load of waste was received.

Operating requirements for DYEC are governed by the Ministry of Environment, Conservation and Parks (MECP) Environmental Assessment (EA) Notice of Approval (File No. 04-EA-02-08) (hereinafter "EA Approval") and the Multi-Media Environmental Compliance Approval (ECA) Number 7306-8FDKNX, issued on June 28, 2011, and amended to March 14, 2016 (Notice No. 5) (hereinafter "ECA").

The EA Approval, ECA, and the MECP-approved Groundwater and Surface Water Monitoring Plan, prepared by Stantec Consulting Ltd. and dated September 14, 2011, outline the groundwater and surface water monitoring and reporting requirements for DYEC. This 2019 Annual Groundwater and Surface Water Monitoring Report has been prepared in accordance with Condition 20.8 of the EA Approval, Condition 15 of the ECA, and the Groundwater and Surface Water Monitoring Plan to provide details of the monitoring program completed in 2019.

With MECP approval via letter dated May 17, 2016, the routine surface water monitoring program (i.e., placement and monitoring of sondes in Tooley Creek) for DYEC has been suspended due to construction activities for the Highway 401/Courtice Road interchange. The MECP approved the suspension of the sondes placement and monitoring until the interchange construction activities are complete. As the interchange construction activities appear to have been mostly completed in late 2019, the surface water monitoring program will be re-instated upon consultation and agreement with the MECP.

Based on the findings presented in this report, the following conclusions are provided.

- Based on the 2019 groundwater elevations, the shallow and deeper groundwater flow direction at the Site was interpreted to be toward the southwest, with interpreted flow alterations as a result of the influences from the trunk sewer.
- For the groundwater sampling program completed for DYEC in 2019, quality assurance and quality control (QA/QC) measures indicated that the detected constituent concentrations were accurate and reflected actual conditions at the time of sample collection.
- Groundwater levels at the location of monitoring well MW1 are interpreted to be directly influenced by the trunk sewer located less than 10 metres (m) west and adjacent to the western property boundary of DYEC. Coarse backfill material that surrounds the 2.1 m diameter trunk sewer was placed at a greater depth than the bottom of monitoring well MW1. As such, groundwater is interpreted to be induced to move toward the more porous media of the trunk sewer thereby lowering groundwater levels at monitoring well MW1.

- The concentrations of the salt-related parameters chloride and sodium within the groundwater at upgradient monitoring well MW2B and at internal assessment monitoring well MW5B have generally increased since 2014/2015. The beginning of the increasing trend of the salt-related parameter concentrations within MW2B and MW5B coincides with the approximate time of construction of Energy Drive north and west of the Site, as well as the on-site roadways and parking lot. As such, the increasing concentrations of the relevant parameters are interpreted to be attributed to the application of de-icing salt during the winter season to Energy Drive, Osborne Road, and/or the on-site roadways/parking lots. It is noted that although there is an apparent increasing concentration trend for both chloride and sodium within the groundwater at monitoring wells MW2B and MW5B, the 2019 and historical chloride and sodium concentrations at MW2B and MW5B have satisfied their respective Ontario Drinking Water Standards (ODWS) criterion.

- An evaluation of the salt-related parameter concentrations within the groundwater at the on-site monitoring wells was completed using the method proposed by *Panno et al*. (2005, 2006). The assessment suggests that the groundwater at the location of MW2B and MW4 is impacted by de-icing salt. Concentrations of chloride and sodium are increasing within the groundwater at monitoring well MW5B, but do not appear to currently represent road de-icing salt impacts as suggested by the method to assess for road salt impacts on groundwater proposed by *Panno et al*. (2005, 2006).

- An inspection of monitoring well MW4 determined that the surface seal was in good condition and that its location along the inner downslope of the East stormwater management pond (SWMP) is such that overland runoff from the adjacent roadway cannot directly enter the well. Given the capture area of the East SWMP and its interpreted design as an exfiltration pond, it is interpreted that stormwater entering the East SWMP is impacted by on-site road/parking lot de-icing practices during the winter months. The impacted stormwater is interpreted to exfiltrate into the shallow subsurface, which subsequently migrates downgradient toward MW4. The pattern of higher concentrations noted during November in comparison to April and August, indicates that there is a lag time for water to exfiltrate and migrate to MW4.

- For the 2019 monitoring events, the groundwater analytical results for the required parameters of analysis satisfied their respective ODWS, except for select salt-related parameters chloride and sodium within the groundwater at monitoring well MW4. In November 2019, the concentration of chloride and sodium were above their respective ODWS. Based on the interpreted groundwater flow direction and the analytical results for chloride and sodium at downgradient monitoring wells in closer proximity to the DYEC facility, there is no indication that the elevated 2019 concentrations of chloride and sodium within the groundwater at MW4 migrated downgradient as a result of DYEC waste treatment operations. As discussed, the elevated concentrations of chloride and sodium detected at MW4 in 2019 are interpreted to be attributed to the exfiltration of seasonally impacted salt-related runoff collected at the East SWMP. Therefore, no remedial actions are warranted to address the noted chloride and sodium concentrations.

- Overall, based on a review of 2019 and historical groundwater analytical results for the Site, the data suggests that DYEC waste treatment operations have not had an adverse effect on groundwater quality at the Site.

- The routine surface water monitoring program (i.e. placement and monitoring of sondes in Tooley Creek) for DYEC will continue to be suspended until further consultation with the MECP is held to determine if modifications to the monitoring plan are required.

Based on the findings of the 2019 monitoring program, the following recommendations are provided for your consideration.

- An evaluation for suitable placement of the sondes within Tooley Creek should be undertaken in 2020 in advance of consultation with the MECP. Monitoring plan modifications may be required such that the program is effective in monitoring on-site stormwater management controls.
- The chosen upstream and downstream locations should represent water quality that is from a background position that is not likely to be influenced by runoff from DYEC and from a position that is downstream from the DYEC discharge point into Tooley Creek.
- The concentrations of salt-related parameters chloride, sodium, calcium, magnesium, and potassium within the groundwater at the Site should continue to be evaluated on an ongoing basis to verify that the concentrations of these parameters continue to be attributable to the effects of roadway and parking lot de-icing practices and not to DYEC waste treatment operations. Part of the ongoing assessment of de-icing influences on groundwater at DYEC would require that the parameter bromide be incorporated into the groundwater quality evaluation parameter suite moving forward such that the proposed methodology to assess for road salt impacts on groundwater by *Panno et al*. (2005, 2006) may be utilized.
- Moving forward, groundwater quality monitoring will be completed at DYEC annually in the fall. Considering the limited groundwater quality dataset that will be collected at DYEC moving forward, the frequency of reporting for the water (i.e. groundwater and surface water) component of the monitoring plan, may be reduced to once every 2 years, or biennially.

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1 INTRODUCTION

The Regional Municipality of Durham (hereinafter "Region") and The Regional Municipality of York own the Durham York Energy Centre (DYEC), which is located in the Municipality of Clarington, Ontario. DYEC is a thermal treatment energy from waste facility and is operated by Covanta.

DYEC began operation in February 2015 when the first load of waste was received. DYEC is approved to process up to 140,000 tonnes of solid, non-hazardous, municipal waste per year.

Operating requirements for DYEC are governed by the Ministry of Environment, Conservation and Parks (MECP) Environmental Assessment (EA) Notice of Approval (File No. 04-EA-02-08) (hereinafter "EA Approval") and the Environmental Compliance Approval (ECA) Number 7306-8FDKNX, issued on June 28, 2011, and amended to March 14, 2016 (Notice No. 5) (hereinafter "ECA"). The EA Approval, as well as the ECA and its supporting documents, are posted on DYECs' website and can be accessed at the following link: www.durhamyorkwaste.ca. The DYEC Surface Water Monitoring Program Change Request Letter, dated April 29, 2016, as well as the MECP Approval Letter, dated May 17, 2016, are provided in **Appendix A-1**, **Appendix A**. The DYEC Groundwater Monitoring Program Change request as it pertains to reducing the frequency of groundwater monitoring, dated January 9, 2019, as well as the MECP Approval Letter to this request, dated May 7, 2019, are provided in **Appendix A-2**, **Appendix A**. Correspondence from the MECP as it relates to the comments on the 2017 and 2018 Annual Groundwater and Surface Water Monitoring Reports (2017 AMR and 2018 AMR, RWDI, 2018 & 2019) are provided in **Appendix A-3**, **Appendix A**. This 2019 AMR was prepared in consideration of the MECP comments on the 2017 and 2018 AMRs.

The EA Approval, ECA, and the MECP-approved *Durham-York Energy Centre Groundwater and Surface Water Monitoring Plan*, prepared by Stantec Consulting Ltd. and dated September 14, 2011, outline the groundwater and surface water monitoring and reporting requirements for DYEC. The groundwater and surface water monitoring programs for DYEC are outlined in the Groundwater and Surface Water Monitoring Plan (Stantec, 2011). The Groundwater and Surface Water Monitoring Plan was prepared in accordance with Condition 20 of the EA Approval and Condition 7(14) of the ECA.

This 2019 AMR has been prepared in accordance with Condition 20.8 of the EA Approval, Condition 15 of the ECA, and the Groundwater and Surface Water Monitoring Plan to provide details of the monitoring program completed in 2019.

RWDI AIR Inc. (RWDI) was retained by the Region to complete the groundwater monitoring and the 2019 Annual Groundwater and Surface Water Monitoring Report for DYEC. This report is organized in consideration of historical reporting frameworks including, but not limited to, site geologic details, to maintain a level of consistency and provide a familiarity to reviewers whereby historical reports can be easily referenced to this report.

1.1 Location

DYEC is located at municipal address 1835 Energy Drive in Courtice, Ontario (Site). The Site is situated in the southwest corner of the Energy Drive and Osborne Road intersection, southeast of the Courtice Road interchange of Highway 401. The area of the Site is approximately 12.1 hectares.

A Site Location Map that identifies the location of the Site and surrounding area features is provided in **Figure 1**. A Site Plan that identifies detailed information of the Site, such as monitoring locations, is provided in **Figure 2**.

1.2 Monitoring and Reporting Program Objectives and Requirements

1.2.1 Groundwater Monitoring Objective

The principal objectives of the 2019 monitoring and reporting programs for DYEC are as noted below.

- To evaluate groundwater and surface water quality at and nearby the Site and assess the potential for impacts to nearby water resources as a result of DYEC operations.
- To determine whether remedial actions are required in consideration of monitoring findings.
- To assess the adequacy of the existing monitoring program with respect to evaluating the potential for impacts at nearby water resources.
- To provide a report presenting the findings of the monitoring program to the Region, whereby the report will be provided to the MECP and posted on the DYEC website (www.durhamyorkwaste.ca).

The primary aspects of the environmental monitoring and reporting programs are data collection, analysis, and interpretation. This 2019 AMR documents the data collected as part of the 2019 monitoring program and the 2019 data was interpreted in consideration of historical data. In accordance with the Groundwater and Surface Water Monitoring Plan, groundwater results from 2019 were compared to the Ontario Drinking Water Standards (ODWS), per the *Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines* (MOE, 2006).

Unprocessed waste is stored indoors in a sealed concrete pit, set 5.5 m below grade, which does not allow leachate from the waste to come into contact with groundwater. Ash is transported to a dedicated storage building with concrete floors using fully enclosed conveyors, and subsequently removed for off-site disposal. The primary means by which groundwater could potentially be affected would be through an upset condition at the facility. The primary purpose of the groundwater monitoring program is to provide an early warning if a potential effect was to occur (Stantec, 2011).

1.2.1.1 Changes to the Groundwater Monitoring Plan

In a letter to the MECP dated January 9, 2019, the Regional Municipalities of Durham and York (hereinafter "Regions") requested a change to the Groundwater and Surface Water Monitoring Plan for DYEC. The DYEC facility design includes engineering controls and operating procedures for the protection of groundwater. As presented in the AMRs for DYEC since 2012, monitoring results to date have demonstrated the effectiveness of the groundwater protection measures and have shown no adverse impacts to groundwater from DYEC waste treatment operations. As such, the Regions requested that the Groundwater and Surface Water Monitoring Plan be amended to reduce the required groundwater monitoring frequency from three (3) times per year to once per year, commencing in 2019. Approval to reduce the groundwater monitoring frequency was received on May 7, 2019, which reduces the groundwater monitoring frequency from three (3) times annually to once annually during the fall. A copy of the Regions' request Letter and the MECP's Approval Letter are provided in **Appendix A-2, Appendix A**.

1.2.2 Surface Water Monitoring Objective

DYEC is a Zero Process Water Discharge Facility (Stantec, 2011). DYEC is designed such that there will be no discharge of water from inside the facility buildings other than sanitary sewer discharges from the washrooms. Stormwater drainage from outdoor surfaces, such as rooftops, driveways, and landscaped areas, are collected in two (2) stormwater management ponds (SWMPs). Discharge from the on-site SWMPs is conveyed westward via an existing swale within the CN Rail right-of-way prior to discharging into a small tributary of Tooley Creek approximately 700 m southwest of the Site. The primary purpose of the surface water monitoring program is to monitor the effectiveness of stormwater management controls in mitigating adverse impacts to Tooley Creek receiving waters (Stantec, 2011).

1.2.2.1 Changes to the Surface Water Monitoring Plan

In a letter to the MECP dated April 29, 2016, the Regions requested a change to the Groundwater and Surface Water Monitoring Plan for DYEC. The surface water monitoring program outlined in the Groundwater and Surface Water Monitoring Plan outlines that sondes are required to be placed in Tooley Creek upstream and downstream of the drainage swale that receives stormwater flow from DYEC to monitor select parameters. The section of Tooley Creek where the sondes should be placed was scheduled for realignment as part of construction by the Ministry of Transportation to improve the Highway 401/Courtice Road interchange. The construction activity and creek re-alignment was anticipated to cause significant disruption and prevent the placement of the sondes in the creek. As such, the Regions requested that the requirement to place the sondes in Tooley Creek be suspended until the interchange construction activities are complete. In a letter response dated May 17, 2016, from the MECP to the Regions, the MECP approved the suspension of the sondes placement and monitoring until the interchange construction activities are completed.

The MECP noted that surface water monitoring completed to-date has indicated that DYEC is not having an adverse effect on Tooley Creek. A copy of the letters from the Regions and the MECP are provided in **Appendix A-1**, **Appendix A**.

Of note, the Courtice Road and Highway 401 interchange was mostly complete by December 2019. As such, the surface water monitoring program needs to be reassessed and evaluated in consultation with the MECP as to its effectiveness in demonstrating that on-site stormwater management controls are appropriate. The placement of the surface water sondes within Tooley Creek will be assessed prior to deployment.

1.3 Assumptions and Limitations

Historical data collected by others has been relied upon by RWDI for the purposes of preparing this 2019 AMR. RWDI has assumed that the information provided was factual and accurate as presented.

2 PHYSICAL SETTING

2.1 Geology and Hydrogeology

The Site is in the physiographic region defined as the Iroquois Plain (Chapman and Putnam, 1984). Near the Site, the Iroquois Plain is comprised of silty lacustrine deposits and tills. Mapping by the Ontario Geological Survey indicates that the Site is underlain by Newmarket Till, which is described as a dense till comprised of clayey silt and sand till (Stantec, 2011). The layer of Newmarket Till is estimated to be between 20 and 25 metres in depth. The Newmarket Till is underlain by an approximately 5 metres thick layer of intertill sediment, including both the Thorncliffe and Scarborough formations, which is underlain by the Whitby shale bedrock (Stantec, 2011).

As part of a geotechnical investigation completed by Jacques Whitford at the Site in 2008, seventeen (17) boreholes were advanced (Stantec, 2011). The boreholes were advanced to depths ranging from 5 to 12 metres below ground surface (mBGS). The subsurface stratigraphy encountered at the boreholes generally included topsoil up to approximately 0.6 metres in depth, which was underlain by dense to very dense silty sand. Bedrock was not encountered during the advancement of the boreholes. As part of a geotechnical investigation conducted on the adjacent Courtice Water Pollution Control Plant (WPCP) property, which is located approximately 75 metres southwest of the Site, bedrock was encountered during borehole drilling at a depth of approximately 16 metres (Stantec, 2011).

Generally, ground surface elevations in the area of the Site gradually decrease from northeast to southwest toward Lake Ontario, which is located approximately 450 metres south of the Site. Near the Site, ground surface elevations generally range from approximately 95 metres above sea level (ASL) to 102 mASL.

Regionally, shallow groundwater flow near the Site is anticipated to reflect surface topography and generally flow in a northeast to southwest direction toward Lake Ontario. Shallow groundwater flow may be influenced by local features including, but not limited to, Tooley Creek and its tributaries, surface water ponds and ditches, and underground utilities. Deep groundwater flow near the Site is anticipated to reflect bedrock topography and flow in a southerly direction toward Lake Ontario.

2.2 Surface Water Features

The Site is located within the Tooley Creek watershed and is in the Central Lake Ontario Conservation Authority (CLOCA) jurisdiction. On-site surface water features include SWMPs in the southwest (West SWMP) and southeast (East SWMP) corners of the Site. The nearest natural surface water body to the Site is a tributary of Tooley Creek, located approximately 150 metres northwest of the Site. At its nearest point, Tooley Creek is located approximately 700 metres southwest of the Site. The Tooley Creek watershed has an approximate length of five (5) kilometres (km) from its headwaters near Highway 2 to its discharge point at Lake Ontario (Stantec, 2011). Lake Ontario is located approximately 450 metres south of the Site.

3 DESCRIPTION OF MONITORING PROGRAM

The 2019 groundwater and surface water monitoring program for DYEC included groundwater monitoring only. As noted in **Section 1.2.2.1**, the surface water monitoring program for DYEC (i.e., placement and monitoring of sondes in Tooley Creek) was suspended until the Highway 401/Courtice Road interchange construction activities are complete. Of note, the Courtice Road and Highway 401 interchange was mostly complete by December 2019. As such, the surface water monitoring program needs to be reassessed and evaluated in consultation with the MECP as to its effectiveness in demonstrating that on-site stormwater management controls are appropriate. The placement of the surface water sondes within Tooley Creek will be assessed prior to deployment.

The groundwater monitoring program generally consists of the measurement of groundwater levels and the collection of groundwater samples for the relevant monitoring locations. The required monitoring locations, sampling frequency, and parameters of analysis are outlined in the Groundwater and Surface Water Monitoring Plan. Monitoring locations for the Site are shown in **Figure 2**.

3.1 Monitoring Locations

3.1.1 Groundwater

A total of eight (8) groundwater monitoring wells are installed at five (5) monitoring locations at the Site. Construction details for the monitoring wells are presented in **Table B-1, Appendix B**. The locations for the monitoring wells are shown in **Figure 2**.

Two (2) monitoring wells, one (1) shallow and one (1) deep, are installed at different depths at locations MW2, MW3, and MW5. The shallow well is designated with the postscript "B" (e.g., MW2B) and the deeper well is designated with the postscript "A" (e.g., MW1A). It is noted that monitoring wells MW3A/B were decommissioned in September 2013 due to infrastructure construction activities in the area. MW3A/B were replaced in March 2014 in a nearby location and designated as MW3A-R and MW3B-R, respectively.

As discussed in **Section 4.2**, the groundwater elevations have changed as a result of the influence on the groundwater flow due to the presence of the trunk sewer installed to the west of the Site. As a result of the groundwater flow pattern change, the following summary details the monitoring wells' current assigned positions (e.g., downgradient) with respect to the DYEC facility.

- MW1 is located within the northwest corner of the Site and is cross gradient of DYEC.
- MW2A/B are located within the northeast corner of the Site and are upgradient of DYEC.
- MW3A-R/B-R are located within the southwest corner of the Site and are downgradient of DYEC.
- MW4 is located within the southeast corner of the Site and is downgradient of DYEC.
- MW5A/B are located within the central area of the Site and are internal assessment monitoring wells for DYEC.

Historically, groundwater monitoring location MW1 was noted to be upgradient of DYEC, and groundwater monitoring location MW5 was considered downgradient of the DYEC. As a result of the trunk sewer installation, which required the relocation of groundwater monitoring location MW3, groundwater monitoring locations MW1 and MW5 are now interpreted as presented above.

3.2 Monitoring Frequency

3.2.1 Groundwater

The Groundwater and Surface Water Monitoring Plan requires that groundwater monitoring events are completed three (3) times per year in the spring, summer, and fall. As discussed in Section 1.2.1.1, the MECP has amended the Groundwater and Surface Water Monitoring Plan to reduce the frequency of groundwater monitoring from three (3) times per year to once annually during the fall. MECP Approval was received May 7, 2019. Since approval was received following the previously established groundwater monitoring program with the first sampling event occurring in April, there were two (2) groundwater monitoring events completed in 2019; one being in April and the second in November.

The monitoring events were conducted between April 17 and 18, and between November 12 and 13, 2019. Each monitoring event included the measurement of groundwater levels and collection of groundwater samples at the relevant monitoring locations.

Moving forward, groundwater quality monitoring will be completed at DYEC annually in the fall. Considering the once annually groundwater quality monitoring dataset collected at DYEC moving forward, the frequency of reporting for the water (i.e. groundwater and surface water) component of the monitoring plan may be reduced to once every 2 years, or biennially.

3.3 Field and Laboratory Parameters and Analysis

3.3.1 Groundwater

In 2019, the field parameters temperature, pH, electrical conductivity (EC), and oxidation-reduction potential (ORP) were analyzed and recorded at the time of sample collection for each monitoring well and event.

Collected groundwater samples were submitted to Eurofins Scientific (Eurofins) in Ottawa, Ontario, for analysis of the required parameters noted in the summary below. Eurofins is a Canadian Association for Laboratory Accreditation (CALA) certified environmental laboratory. The required parameters for laboratory analysis are outlined in the Groundwater and Surface Water Monitoring Plan.

Parameter Group	Parameters
Major Anions	Carbonate, Bicarbonate, Chloride, Sulphate
Major Cations	Calcium, Magnesium, Potassium, Sodium
Metals	Boron, Cadmium, Cobalt, Lead, Mercury

3.4 Monitoring and Sampling Procedures

3.4.1 Groundwater

3.4.1.1 Groundwater Level Measurements

Groundwater levels were manually measured at the accessible monitoring wells at the Site during each monitoring event. The liquid levels for each monitoring well were measured using an electric contact meter with an accuracy of 10 millimetres (mm). The meter was decontaminated between monitoring wells with an anionic detergent and rinsed with distilled water to mitigate the potential for cross-contamination between sampling/monitoring points.

The groundwater levels measured in 2019 and historically are presented in **Table C-1, Appendix C,** and plotted in **Figures C-1** to **C-3**, **Appendix C**. Shallow groundwater flow contours are shown in **Figure 2**.

3.4.1.2 Groundwater Sampling

Groundwater samples were collected using dedicated inertial-lift pumps and tubing. Prior to monitoring well purging, the static groundwater level was measured and the groundwater volume within the well casing was calculated. The monitoring well was then purged with the dedicated inertial-lift pump until three (3) volumes were removed, or until a discontinuous flow of groundwater was observed.

The monitoring wells were each purged on the first day of each monitoring event in 2019. Sampling was completed after the removal of three (3) static volumes of groundwater or following a period of recovery (next day at a minimum) after producing discontinuous flow. At the time of sample collection, field indicator parameters temperature, pH, electrical conductivity (EC), and oxidation reduction potential (ORP) were recorded onto dedicated field forms. The 2019 groundwater field analytical results are presented in **Table D-1, Appendix D**.

The groundwater samples were collected directly into bottles provided by the laboratory. Groundwater sample aliquots collected for metals analysis were filtered in the field using 45 micrometre (µm) in-line disposable filters.

Collected samples were submitted to Eurofins for analysis. The 2019 groundwater analytical results are presented in **Table D-2**, **Appendix D**. It is noted that the dates presented in **Tables D-1** and **D-2**, **Appendix D**, represent the actual date of sample collection for the relevant monitoring well. Laboratory Certificates of Analysis are provided in **Appendix E**.

3.5 Quality Assurance and Quality Control for Sampling and Analysis

In accordance with the Groundwater and Surface Water Monitoring Plan, for each groundwater monitoring event completed in 2019, one (1) field-prepared duplicate sample was collected during the sample collection procedure for a select monitoring well as a quality assurance and quality control (QA/QC) measure.

The field duplicate samples and their respective original sample collected in 2019 are presented in the summary below.

Monitoring Event	Original Sample ID	Duplicate Sample ID
April 2019	MW5B	GW8003
November 2019	MW5B	GW8002

The selection of the groundwater well for the collection of field duplicates was based on volume availability at the time of sampling, as well as visual observations of colour and turbidity. The methodology used to collect the groundwater samples (inertial lift pumps) would produce turbulent flow through the well screen, increasing particulate in the sample aliquots, which would affect measurement results of these parameters. As such, for the purposes of QA/QC measures, the groundwater collected should be as transparent and free of suspended particulates as possible to accurately assess the adequacy of laboratory analytical equipment. Where possible, the collection of field duplicates is rotated between sampling wells.

4 MONITORING RESULTS AND EVALUATION

4.1 Quality Assurance and Quality Control

QA/QC measures for the groundwater monitoring program completed for DYEC in 2019 included field-prepared duplicate samples, laboratory duplicates, laboratory spiked samples, as well as percent recovery of analysis and data review.

The laboratory analyzed several control samples to verify that their analytical equipment was functioning properly and reporting results accurately at the time of analysis for the samples collected at the Site. The control samples had an expected target value, which was compared against pre-determined data quality objectives. For the laboratory control samples, the results were within acceptable laboratory data quality criteria.

For the field-prepared duplicate samples, the analytical results for the required parameters of analysis were evaluated for the relative percent difference (RPD) of parameter concentrations using the USEPA National Functional Guidelines (US EPA 540-R-10-011) as a general QA/QC RPD screening mechanism. The RPD screening mechanism is such that for concentrations greater than five (5) times the laboratory reportable detection limit (RDL), a concentration difference of less than or equal to 20% is deemed acceptable. For concentrations less than or equal to five (5) times the RDL, a concentration difference of equal to or less than the RDL is deemed acceptable. Where a calculated RPD is outside of the tolerance of the general QA/QC RPD screening mechanism, the results for the required parameters of analysis are evaluated against the applicable performance standards for sample duplicates noted in Tables 5.1 to 5.15 of the *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, prepared by the Ministry of the Environment (MOE), dated March 9, 2004, and amended July 1, 2011. For the results found to be outside of the tolerance of each QA/QC evaluation, a laboratory data quality review (DQR) of the results is requested such that the concentrations are accurate as presented and are within acceptable laboratory data quality criteria.

4.1.1 Groundwater QA/QC

For each of the 2019 monitoring events, QA/QC evaluations were completed for the analytical results of the original samples and their respective duplicate samples, as outlined in **Section 3.5**. The analytical results of the original and duplicate samples collected for each monitoring event satisfied the criteria of the QA/QC evaluations. Therefore, the results of the evaluations indicated that the concentrations for the original samples were accurate as presented and acceptable for interpretive purposes.

In summary, acceptable QA/QC data for the field-prepared duplicate samples, laboratory duplicates, laboratory spiked samples, as well as percent recovery of analysis indicated that the detected parameter concentrations were accurate and reflected actual conditions at the time of sample collection.

4.2 Groundwater Levels and Flow

Groundwater levels have been measured in the groundwater monitoring wells at the Site since December 2011. The 2019 and historical groundwater level data are summarized in **Table C-1, Appendix C**. Hydrographs of the groundwater elevations at the Site are plotted in **Figures C-1** to **C-3**, **Appendix C**. Monitoring well locations are shown in **Figure 2**. It is noted that, for the purposes of comparing groundwater levels and evaluating the groundwater flow direction at the Site, the top of each monitoring well riser pipe has been surveyed to an assumed Site datum.

The groundwater elevations measured at the Site have remained generally consistent since monitoring began at each monitoring well, with exceptions noted below for monitoring wells MW1 and MW4. Overall, the groundwater elevations for each monitoring well have been generally stable or have fluctuated, with no consistent increasing or decreasing trends over time. The fluctuating groundwater elevations are attributed to prolonged periods of precipitation (e.g., elevation increase in April due to a wet spring season) or lower than normal precipitation (e.g., elevation decrease in August due to a dry summer season).

At cross gradient monitoring well MW1, the groundwater elevation decreased by more than 5 metres between the July 2013 and April 2014 monitoring events. The decrease in groundwater levels at MW1 is attributed to the installation of a trunk sewer to the west of the Site with construction interpreted to have begun around the same time and extended to 2018. Based on construction drawings obtained from the Region, approximately 11 to 12 metres of the native soil was excavated along the western boundary of the Site. A 2.1 metre diameter trunk sewer was installed and backfilled with 19 millimetre (mm) crusher run limestone from approximately 0.1 metre below the designed depth of the trunk install to at least 0.3 metre above the top of the trunk sewer. Thus, there is an interpreted minimum of 2.5 metre of porous media within the trunk sewer trench from approximately 11 metres below ground surface (mBGS) to 8.5 mBGS. The bottom of the screened interval for MW1 is approximately 7.6 mBGS. Monitoring MW1 is also located approximately 8 to 10 metre laterally from the trunk sewer trench. Thus, the replacement of native clayey silt to silty clay soil with a more porous stone and sandy backfill material to a depth that is greater than the nearby monitoring well MW1 is expected to induce groundwater to flow towards the trunk sewer trench. Given the proximity of monitoring well MW1 to the trunk sewer coupled with the presence of more porous subsurface conditions surrounding the trunk sewer pipe, groundwater levels at the location of MW1 are expectedly influenced by the presence of the trunk sewer trench.

Between April 2014 and April 2015 following the installation of the trunk sewer, the groundwater elevation at MW1 recovered by approximately 2.6 metre. Since April 2015, the groundwater elevation at MW1 has generally fluctuated with no consistent increasing or decreasing trend over time. The fluctuating groundwater level trend noted at MW1 suggests that the influence from the nearby trunk sewer is such that levels can fluctuate by over 1 m between monitoring events.

Groundwater monitoring wells MW3A/A-R and MW3B/B-R also show fluctuating groundwater level trends though at lesser magnitude compared to levels at monitoring well MW1. This difference may be due to the fact that monitoring well nest MW3 is located at a greater distance (nearly 40 metres) from the trunk sewer trench than that of MW1 (<10 metres).

At downgradient monitoring well MW4, the groundwater elevation decreased by approximately 2 metres between the March and November 2012 monitoring events. This decrease is interpreted to be attributed to the construction of the East SWMP at that time. Since November 2012, groundwater levels at MW4 fluctuate and remain slightly higher than the base elevation of the East SWMP.

Based on the 2019 groundwater elevations, the shallow groundwater flow direction at the Site was interpreted to be towards the southwest. Contour mapping of the shallow groundwater elevations and the interpreted groundwater flow direction, based on the April 2019 groundwater elevations, is presented in **Figure 2**. The interpreted groundwater flow regime presented in **Figure 2** is consistent with historical observations. The deep groundwater monitoring network at the Site is not sufficient to map groundwater contours across the Site, however, the deeper groundwater flow direction at the Site in 2019 was also interpreted to be toward the southwest.

Each of the monitoring wells at the Site are positioned in overburden. For the nested groundwater monitoring wells at the Site, the midpoints of the screen intervals for the deep monitoring wells (MW2A, MW3A-R, and MW5A) are approximately 2.6 to 3.1 metres deeper than the midpoints of the screen intervals for their respective shallow monitoring well counterpart. For the nested monitoring well locations, the vertical hydraulic gradients were calculated for the 2019 and historical data. The calculated vertical hydraulic gradients are presented in **Table C-2**, **Appendix C**.

The hydraulic gradients calculated for the 2019 groundwater elevations were generally consistent with historical results. In 2019, downward gradients were observed between the shallow and deep monitoring wells at monitoring nests MW2 and MW3 in April and November. Between the shallow and deep monitoring wells at monitoring nest MW5, there is no dominant upward or downward gradient noted. The vertical gradients in 2019 ranged between 0.02 metres per metre (m/m) (or lateral to vertical movement) in an upward direction at MW5 (April) and 0.49 metre per metre in a downward direction at MW2 (November). Groundwater movement through the overburden at the Site has historically been generally downward at monitoring nests MW2 and MW3 with occasional upward gradients. At monitoring nest MW5, the vertical hydraulic gradient has historically been even (i.e., 0.0 metre per metre) and fluctuates between slight upward and slight downward gradients.

4.3 Groundwater Quality

The 2019 groundwater field analytical results are tabulated in **Table D-1**, **Appendix D**. The 2019 and historical groundwater laboratory analytical results are tabulated in **Table D-2**, **Appendix D.** Laboratory Certificates of Analysis are provided in **Appendix E**.

4.3.1 Concentration Trends

Concentration vs. time plots for chloride, sodium, sulphate, calcium, magnesium, potassium, boron, and bicarbonate are presented in **Figures D-1** to **D-8**, **Appendix D**, respectively. As shown in **Figures D-1** to **D-8**, the concentrations of each relevant parameter have remained generally stable or have fluctuated since monitoring began at each monitoring well, with exceptions noted below.

- As shown in **Figure D-1** and **D-2**, the concentrations of salt-related parameters chloride and sodium, respectively, within the groundwater at upgradient monitoring well MW2B have generally increased since 2014. It is noted that although they remain elevated, the concentrations of chloride and sodium within the groundwater at MW2B has remained relatively stable since reaching their respective historical upper limit concentrations in April 2018. The concentrations of chloride and sodium within the groundwater at internal assessment shallow monitoring well MW5B have also generally increased since 2014. The beginning of the increasing trend of chloride and sodium concentrations within the groundwater at MW2B, and MW5B coincides with the approximate time of construction of Energy Drive north and west of the Site, as well as the on-site roadways and parking lots. As such, the increasing concentrations of the salt -related parameters are interpreted to be attributed to the application of de-icing salt during the winter season to Energy Drive, Osborne Road, and/or the on-site roadways/parking lots. It is noted that the 2019 and historical concentrations of chloride and sodium within the groundwater at MW2B, and MW5B have satisfied their respective ODWS criterion.

- As requested by the MECP, an evaluation of salt-related parameters within the groundwater was completed using the method proposed by *Panno et al*. (2005, 2006). The method for determining whether groundwater may be impacted by de-icing salts is to calculate the ratio of chloride to bromide such that any ratios greater than 1,000 would suggest that the groundwater quality is affected by de-icing salts or road salts. Though the list of parameters analyzed in the groundwater at DYEC does not currently include bromide, the laboratory is able to review the analytical results and extrapolate the bromide results from the chromatograph. As such, the laboratory was requested to update the Certificates of Analyses to include groundwater bromide concentrations such that this evaluation method can be completed. For this undertaking, the ratio of chloride to bromide within the groundwater at monitoring wells MW2B and MW4 suggests that the groundwater is impacted by de-icing salt either both in April and November (MW2B) or in November (MW4). Although the ratio of chloride to bromide within monitoring well MW5B suggests that the observed salt-related parameters are attributed to other sources, concentrations of chloride and sodium have been increasing since 2014. As such, salt-related parameters within MW5B will continue to be monitored to assess for potential sources that may be contributing to the increase in chloride and sodium concentrations within the groundwater.

- As shown in **Figure D-1**, the concentration of the salt-related parameter chloride within the groundwater at downgradient monitoring well MW4 was generally stable since monitoring began until distinctly increasing in November 2016. Elevated concentrations of chloride were observed during one or more monitoring events since 2017. As shown in **Figures D-2, D-4, D-5,** and **D-6**, the concentrations of additional salt-related parameters sodium, calcium, magnesium, and potassium, respectively, within the groundwater at monitoring well MW4, were also generally stable until distinctly increasing in November 2017. For the salt-related parameters, only chloride and sodium have an ODWS. In November 2019, the concentrations of chloride (785 milligrams per litre (mg/L)) and sodium (220 mg/L), were greater than their respective ODWS of 250 mg/L for chloride and 200 mg/L for sodium. Based on the method for determining de-icing salt impacts in groundwater by *Panno et al.* (2005, 2006), the ratio of chloride to bromide within MW4 during the November 2019 monitoring event suggests that the groundwater is influenced by de-icing salt. Further details describing the salt-related impacts within the groundwater at monitoring well MW4 is provided in **Section 4.3.2**.

- The internal assessment and downgradient monitoring locations MW3 and MW5, respectively, are in closer proximity to the DYEC facility than MW4. As shown in **Figures D-1, D-2, D-4, D-5,** and **D-6**, the concentrations of the salt-related parameters have been consistently lower within the groundwater at monitoring nests MW3 and MW5 compared to that of the groundwater at monitoring location MW4. As such, there is no indication that the noted concentrations of the salt-related parameters detected within MW4 have migrated downgradient within the shallow groundwater as a result of DYEC waste treatment operations.

In summary, since groundwater monitoring began at the Site in 2011, concentrations of most required parameters of analysis in the shallow and deeper groundwater monitoring wells have generally fluctuated or been stable with no apparent increasing or decreasing trend, exclusive of those trends outlined above. The concentrations of the salt-related parameters chloride, sodium, calcium, magnesium, and potassium detected within the groundwater, each cross gradient and downgradient of DYEC, are not attributable to DYEC waste treatment operations, but are the result of the application of de-icing salt to Energy Drive, Osborne Road, the nearby off-site roadway to the Courtice WPCP, and/or the on-site roadways/parking lots.

It is noted that elevated chloride concentrations, as well as the concentrations of the other salt-related parameters sodium, calcium, potassium and magnesium, are commonly elevated in groundwater where a monitoring well is situated near roads or parking lots that are surface treated with brine or salt for dust control or de-icing. It is expected that the concentrations of the salt-related parameters will continue to fluctuate and/or increase over time with the continued practice of roadway and/or parking lot de-icing. As only salt-related parameters show elevated concentrations compared to concentrations for metal parameters within the groundwater, no remedial action is warranted to address the noted concentrations for the salt-related parameters.

The rapid increase of the concentrations of salt-related parameters within the groundwater at MW4 was previously interpreted to be attributed to stormwater and/or shallow groundwater influenced by de-icing salt that may be entering the well casing directly. The results of monitoring well MW4's inspection is detailed in the following section.

4.3.2 Monitoring Well Condition Assessment at MW4

Based on a recommendation in the 2018 AMR, monitoring well MW4 was inspected with a down-well closed-circuit television (CCTV) camera on September 12, 2019, to visually assess the integrity of the monitoring well and to determine if the monitoring well installation may be compromised such that surface water infiltration could be occurring. A visual inspection of the above-grade portion of MW4 was completed as part of the inspection. Based on the visual inspection, the riser pipe, steel protective casing, and surface seal appeared competent. There were no indications of surface depressions or surface seal cracks that could otherwise contribute to surface water infiltration into the well. Based on the CCTV camera inspection, no visible compromises or damage was observed within the inspected interval of the monitoring well riser pipe and screened interval. Liquid was not observed to enter the well through the pipe joint at the time of the CCTV camera inspection. Overall, MW4 appeared to be competent and constructed according to O. Reg. 903. As such, there was no indication that the rapid increase of the concentrations of salt-related parameters within the groundwater at MW4 was due to stormwater runoff influenced by de-icing salt directly entering the well casing from surface as previously interpreted.

Monitoring well MW4 is located along the inside downslope of the East SWMP. Since the construction of the East SWMP, the groundwater elevations at MW4 have been interpreted to be near the base elevation of the East SWMP. As such, the surface water elevation within the East SWMP is interpreted to be higher than the groundwater elevation at MW4. Based on the interpreted shallow groundwater flow direction at the Site and the position of MW4 in relation to the East SWMP, it is interpreted that MW4 would be downgradient of shallow groundwater flow from the East SWMP.

The East SWMP receives stormwater runoff from on-site drainage ditches. It is interpreted that runoff that is impacted by de-icing practices during the winter months enters the East SWMP whereby it will, by design, exfiltrate into the shallow subsurface and subsequently migrate to monitoring well MW4.

4.3.3 Spatial and Temporal Variability in Groundwater Quality

As requested by the MECP, Piper plots were prepared to evaluate the overall water chemistry for groundwater at the Site. Piper plots were prepared for each of the April and November monitoring events and are presented in **Figures D-9** and **D-10**, **Appendix D**, respectively.

Overall, the groundwater quality monitored at the Site in 2019 appeared to cluster into two distinct water types: magnesium bicarbonate enriched groundwater and mixed type groundwater. Groundwater collected from deeper groundwater wells (MW2A, MW3A, MW5A) fall into the magnesium bicarbonate rich type groundwater and represented little spatial variability. Deeper downgradient groundwater monitoring well MW3A displayed temporal variability where groundwater collected during the November sampling event showed a slight mixing of magnesium bicarbonate and sodium bicarbonate enriched waters.

Groundwater collected from shallow groundwater monitoring wells typically displayed greater spatial variability, where on-site upgradient and cross-gradient groundwater monitoring wells MW2A, MW5B, and MW1, displayed mixing of magnesium bicarbonate and calcium chloride enriched groundwater. At downgradient monitoring well MW3B-R, the groundwater favoured a more magnesium bicarbonate enriched type of groundwater.

There was a more significant temporal variability in water quality for groundwater at the location of shallow groundwater monitoring well MW4 than other monitoring wells at the Site. Groundwater quality noted for the April monitoring event favoured a more magnesium bicarbonate enriched type of groundwater compared to a more calcium chloride enriched type of groundwater for November. This is likely attributed to seasonal flushing cycles within the well of highly mobile cations from the soil and unsaturated zone (*Wallick*, 1984).

4.4 Regulatory Criteria

In accordance with the Groundwater and Surface Water Monitoring Plan for DYEC, groundwater quality at the Site is required to be evaluated by comparing the groundwater quality data to the respective criteria provided in the *Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines* (MOE, 2006). These standards are collectively referred to as the ODWS. For the required parameters of analysis, their respective ODWS are presented in **Table D-2**, **Appendix D**.

It is noted that the aesthetic objective for sodium is 200 milligrams per litre (mg/L). However, as indicated in the ODWS (MOE, 2006), the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use in notifying patients on sodium restricted diets. Groundwater is not used as a drinking water source at or downgradient of DYEC and therefore, the aesthetic objective of 200 mg/L for sodium is utilized to assess the overall groundwater quality.

For the 2019 monitoring events, the groundwater analytical results for the required parameters of analysis satisfied their respective ODWS, except for the results summarized below.

Monitoring Well	Monitoring Event	Parameter	ODWS (mg/L)	Analytical Result (mg/L)
MW4	November 12, 2019	Chloride	250	**785**
		Sodium	200	**220**

Note: 1) mg/L denotes milligrams per litre.

As discussed in **Section 4.3**, based on the interpreted groundwater flow direction and the analytical results for chloride and sodium at downgradient monitoring wells in closer proximity to the DYEC facility, there is no indication that the elevated 2019 concentrations of chloride and sodium within the groundwater at MW4 migrated downgradient as a result of DYEC waste treatment operations. The elevated concentrations of chloride and sodium detected at MW4 in 2019 are interpreted to be attributed to the exfiltration of salt-impacted stormwater runoff from the East SWMP. Therefore, no immediate remedial actions are warranted to address groundwater quality at monitoring well MW4.

Based on a review of 2019 and historical groundwater analytical results for the Site, the data suggests that DYEC waste treatment operations have not had an adverse effect on groundwater quality at the Site. For the remaining monitoring wells and parameters, there are not any trends of concern that would suggest an impending exceedance of an ODWS within the downgradient groundwater quality at the Site as a result of DYEC waste treatment operations.

5 CONTINGENCY MEASURES

In accordance with Condition 17 of the EA Approval, a Spill Contingency and Emergency Response Plan has been developed for the Site. The Spill Contingency and Emergency Response Plan documents remedial actions that are required in the event of a spill or upset condition (Stantec, 2011). It is the understanding of RWDI that a spill or upset condition requiring remedial action did not occur at the Site in 2019.

6 2020 MONITORING PROGRAM

The proposed 2020 monitoring program considers the findings of this report and the MECP approved Groundwater and Surface Water Monitoring Plan for the Site. Details of the monitoring programs for the Site, including analytes, are summarized in **Section 3** of this report. The groundwater monitoring locations for the Site are shown in **Figure 2**.

As discussed in **Section 1.2.1.1**, the Regions have requested that the Groundwater and Surface Water Monitoring Plan be amended to reduce the frequency of groundwater monitoring from three (3) times per year to once annually in the fall. The MECP approved the reduction of groundwater monitoring frequency on May 7, 2019.

As discussed in **Section 1.2.2.1**, with MECP approval, the routine surface water monitoring program for DYEC (i.e. placement and monitoring of sondes in Tooley Creek) has been suspended until the Highway 401/Courtice Road interchange construction activities are complete. Based on the construction status of the Highway 401/Courtice Road interchange as of the date of this report, construction is now complete, and the surface water monitoring program is expected to be re-instated upon consultation and agreement with the MECP.

An annual monitoring report that details the findings of the 2020 monitoring period will be prepared and submitted to the MECP by April 30, 2021. The annual report should be prepared in consideration of historical report submissions while acknowledging the purpose and objectives of the monitoring program, which are summarized in **Section 1.2** of this report.

7 CONCLUSIONS

Based on the findings presented in this report, the following conclusions are provided.

- Based on the 2019 groundwater elevations, the shallow and deeper groundwater flow direction at the Site was interpreted to be toward the southwest, with interpreted flow alterations as a result of the influences from the trunk sewer.
- For the groundwater sampling program completed for DYEC in 2019, QA/QC measures indicated that the detected constituent concentrations were accurate and reflected actual conditions at the time of sample collection.
- Groundwater levels at the location of monitoring well MW1 are interpreted to be directly influenced by the trunk sewer located less than 10 metres west and adjacent to the western property boundary of DYEC. Coarse backfill material that surrounds the 2.1 metre diameter trunk sewer was placed at a greater depth than the bottom of monitoring well MW1. As such, groundwater is interpreted to be induced to move toward the more porous media of the trunk sewer thereby lowering groundwater levels at monitoring well MW1.

- The concentrations of the salt-related parameters chloride and sodium within the groundwater at upgradient monitoring well MW2B and at internal assessment monitoring well MW5B have generally increased since 2014/2015. The beginning of the increasing trend of the salt-related parameter concentrations within MW2B, and MW5B coincides with the approximate time of construction of Energy Drive north and west of the Site, as well as the on-site roadways and parking lot. As such, the increasing concentrations of the relevant parameters are interpreted to be attributed to the application of de-icing salt during the winter season to Energy Drive, Osborne Road, and/or the on-site roadways/parking lots. It is noted that although there is an apparent increasing concentration trend for both chloride and sodium within the groundwater at monitoring wells MW2B and MW5B, the 2019 and historical chloride and sodium concentrations at MW2B, and MW5B have satisfied their respective ODWS criterion.

- An evaluation of the salt-related parameter concentrations within the groundwater at the on-site monitoring wells was completed using the method proposed by *Panno et al*. (2005, 2006). The assessment suggests that the groundwater at the location of MW2B and MW4 is impacted by de-icing salt. Concentrations of chloride and sodium are increasing within the groundwater at monitoring well MW5B, but do not appear to currently represent road de-icing salt impacts as suggested by the determination method proposed by *Panno et al*. (2005, 2006).

- An inspection of monitoring well MW4 determined that the surface seal was in good condition and that its location along the inner downslope of the East stormwater management pond (SWMP) is such that overland runoff from the adjacent roadway cannot directly enter the well. Given the capture area of the East SWMP and its interpreted design as an exfiltration pond, it is interpreted that stormwater entering the East SWMP is impacted by on-site road/parking lot de-icing practices during the winter months. The impacted stormwater is interpreted to exfiltrate into the shallow subsurface, which subsequently migrates downgradient toward MW4. The pattern of higher concentrations noted during November in comparison to April and August, indicates that there is a lag time for water to exfiltrate and migrated to MW4.

- For the 2019 monitoring events, the groundwater analytical results for the required parameters of analysis satisfied their respective ODWS, except for select salt-related parameters chloride and sodium within the groundwater at monitoring well MW4. In November 2019, the concentration of chloride (785 mg/L) and sodium (220 mg/L) were above their respective ODWS. Based on the interpreted groundwater flow direction and the analytical results for chloride and sodium at downgradient monitoring wells in closer proximity to the DYEC facility, there is no indication that the elevated 2019 concentrations of chloride and sodium within the groundwater at MW4 migrated downgradient as a result of DYEC waste treatment operations. As discussed, the elevated concentrations of chloride and sodium detected at MW4 in 2019 are interpreted to be attributed to the exfiltration of seasonally salt-related parameter impacted surface water from the East SWMP. Therefore, no remedial actions are warranted to address the noted chloride and sodium concentrations.

- Overall, based on a review of 2019 and historical groundwater analytical results for the Site, the data suggests that DYEC waste treatment operations have not had an adverse effect on groundwater quality at the Site.

- The routine surface water monitoring program (i.e. placement and monitoring of sondes in Tooley Creek) for DYEC is expected to remain in suspension until an assessment and evaluation, in consultation with the MECP, as to its effectiveness in demonstrating that on-site stormwater management controls are appropriate given the construction and creek realignment activities.

8 RECOMMENDATIONS

Based on the findings of the 2019 monitoring program, the following recommendations are provided for consideration.

- An evaluation for suitable placement of the sondes within Tooley Creek should be undertaken prior to reinstating the surface water monitoring program. The chosen upstream and downstream locations should represent water quality that is from a background position that is not likely to be influenced by runoff from DYEC and from a position that is downstream from the DYEC discharge point into Tooley Creek.

- The concentrations of salt-related parameters chloride, sodium, calcium, magnesium, and potassium within the groundwater at the Site should continue to be evaluated on an ongoing basis to verify that the concentrations of these parameters continue to be attributable to the effects of roadway and parking lot de-icing practices and not to DYEC waste treatment operations. Part of the ongoing assessment of de-icing influences on groundwater at DYEC would require that the parameter bromide be incorporated into the groundwater quality evaluation parameter suite moving forward such that the proposed methodology to assess for road salt impacts in groundwater by *Panno et al*. (2005, 2006) may be utilized.

- Moving forward, groundwater quality monitoring will be completed at DYEC annually in the fall. Considering the limited groundwater quality dataset that will be collected at DYEC moving forward, the frequency of reporting for the water (i.e. groundwater and surface water) component of the monitoring plan, may be reduced to once every 2 years, or biennially.

9 STUDY LIMITATIONS AND USE OF REPORT

This report was prepared using scientific principles and professional judgment in assessing available facts and presenting subjective interpretations. The professional judgments presented within this document are based on available facts within the limits of the existing information, budgeted scope of work, and schedule. It is RWDI's intent that the professional judgment and interpretive conclusions be utilized as guidance and not be necessarily construed as a firm course of action, unless explicitly stated otherwise. We make no warranties, expressed or implied, including without limitation, or warranties as to merchantability or fitness of the property for a particular purpose. The information presented in this report is not to be construed as legal advice.

RWDI relied on information obtained from Site representatives, independent sources, and other historical documentation as referenced in this report. The accuracy and completeness of third-party sources was not verified. It is noted that regulatory guidelines, standards, and related documents as they may be referenced in this report are subject to interpretation and may change over time.

This report was prepared for the exclusive use of the Regional Municipality of Durham, The Regional Municipality of York, and the Ministry of the Environment, Conservation and Parks. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. RWDI accepts no responsibility for damages, if any, suffered by any third party as result of decisions made or actions based on this report.

10 CLOSURE

We trust that this 2019 Annual Groundwater and Surface Water Monitoring Report, prepared in accordance with Condition 20.8 of the Environmental Assessment Notice of Approval and Condition 15 of the Environmental Compliance Approval Number 7306-8FDKNX for the Durham York Energy Centre in the Municipality of Clarington, Ontario, is satisfactory for your requirements. Should there be any questions or comments, please contact us.

Sincerely,

RWDI

Report Prepared By:

Jessica Vu, M.Sc., G.I.T.
Scientist

Phil Janisse, B.Sc., P.Geo., QP_{ESA}
Senior Geoscience Specialist

Attach.

11 REFERENCES

Chapman, L.J. and Putnam, D. 1984. The Physiography of Southern Ontario, Third Edition. Ontario Geological Survey, Special Volume 2, 270pp.

Ministry of the Environment. 2003. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines. Revised June 2006.

Ministry of the Environment. 2010. Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water – Technical Guidance Document, November 2010.

Ministry of the Environment. 2012. Landfill Standards – A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites. January 2012.

Panno, S.V., Hackley, K.C., Hwang, H.H., Greenberg, S.E., Krapac, I.G., Landsberger, S., O'Kelly, D.J. Database for the Characterization and Identification of the Sources of Sodium and Chloride in Natural Waters of Illinois. Illinois State Geological Survey, Department of Natural Resources, Open File Series 2005-1.

Panno, S.V., Hackley, K.C., Hwang, H.H., Greenberg, S.E., Krapac, I.G., Landsberger, S., O'Kelly, D.J. Characterization and Identification of Na-Cl Sources in Ground Water. Groundwater, 44 (2), 176-187.

RWDI AIR Inc. 2017. Durham York Energy Centre: 2016 Groundwater and Surface Water Monitoring Report, Regional Municipality of Durham. Project 1604066, 8000, April 21, 2017.

RWDI AIR Inc. 2018. Durham York Energy Centre: 2017 Groundwater and Surface Water Monitoring Report, Regional Municipality of Durham. Project 1604066, 8001, April 27, 2018.

RWDI AIR Inc. 2019. Durham York Energy Centre: 2018 Groundwater and Surface Water Monitoring Report, Regional Municipality of Durham. Project 1604066, 8002, April 24, 2019.

Stantec Consulting Ltd. 2011. Durham-York Energy Centre, Groundwater and Surface Water Monitoring Plan. Regional Municipality of Durham. Project No. 160930024, September 14, 2011.

Wallick, E. 1984. Spatial and Temporal Variations in Groundwater Chemistry of Shallow Aquifers in the Sand River Area, Alberta. Earth Sciences Report, 1984-08.

WSP Canada Inc. 2016. 2015 Groundwater and Surface Water Monitoring Report, Regional Municipality of Durham. Project No. 111-26648-00-100-0414016, April 2016.

FIGURES

Note:
1. BASEMAP FROM ONTARIO BASE MAPPING (2006).
2. SITE DETAILS FROM WSP (2015).

0 400 800m
1:20 000

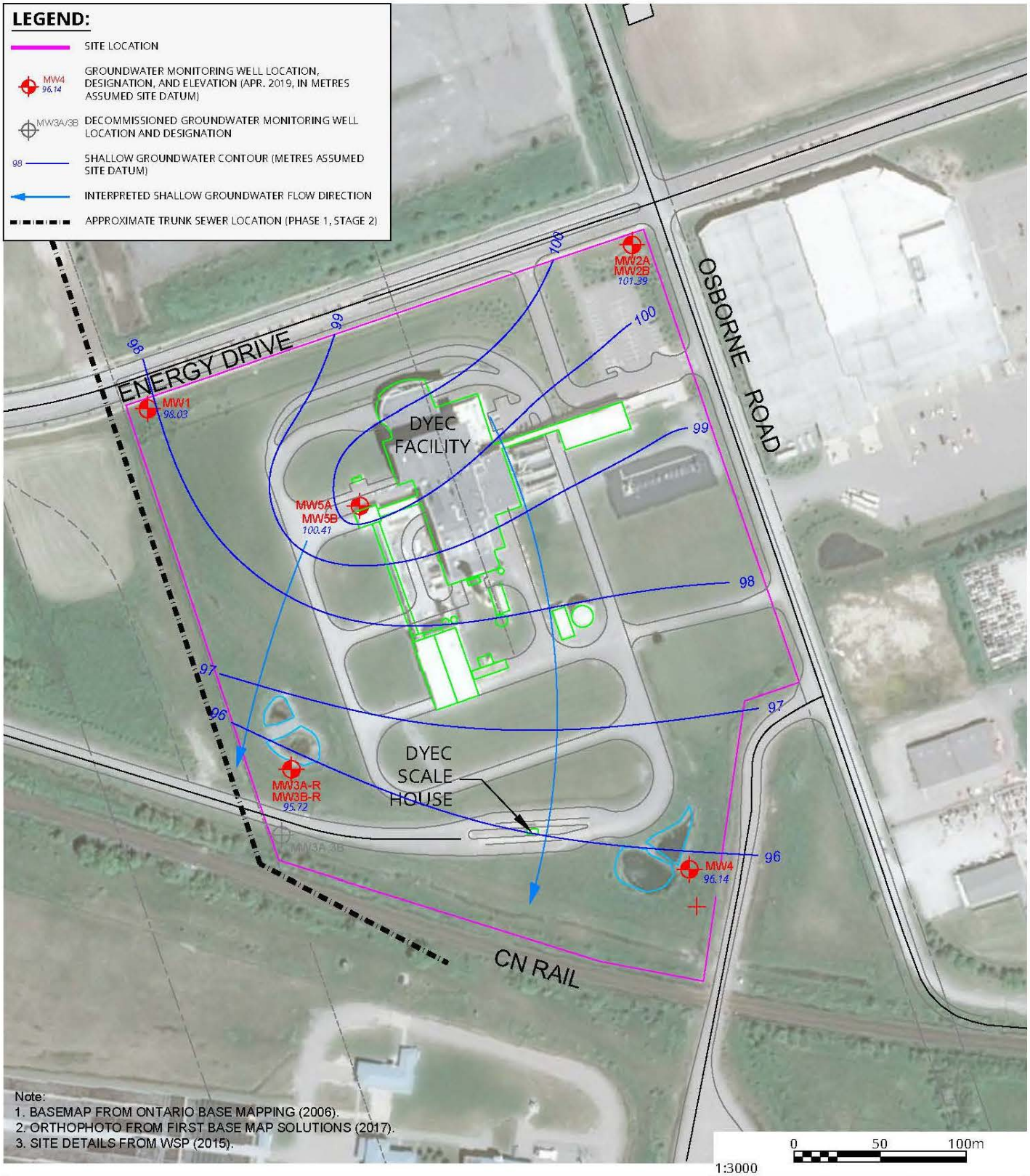
SITE LOCATION MAP
DURHAM YORK ENERGY CENTRE
2019 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT

THE REGIONAL MUNICIPALITY OF DURHAM

Project # 1604066

True North

Drawn by: JW	Figure: 1
Approx. Scale:	1:20,000
Date Revised:	Dec 3, 2019



SITE PLAN
DURHAM YORK ENERGY CENTRE
2019 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT

THE REGIONAL MUNICIPALITY OF DURHAM

Project # 1604066

True North

Drawn by:	JW	Figure: 2
Approx. Scale:	1:3,000	
Date Revised:	Jan 3, 2020	

APPENDIX A

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October 25, 2019

Ms. Lyndsay Waller
Operations Technician
Regional Municipality of Durham
Works Department
1835 Energy Drive
Courtice, ON L1E 2R2

Re: **Inspection of Groundwater Monitoring Well MW4**
Durham-York Energy Centre
Regional Municipality of Durham
RWDI Reference No. 1604066

Dear Ms. Waller,

RWDI AIR Inc. (RWDI) is pleased to provide this letter to the Regional Municipality of Durham (Region) regarding an inspection of groundwater monitoring well MW4 for the Durham-York Energy Centre (DYEC).

BACKGROUND

As presented in the *2018 Annual Groundwater and Surface Water Monitoring Report* for DYEC, prepared by RWDI and dated April 24, 2019 (2018 Annual Report), concentrations of salt-related parameters chloride, sodium, calcium, magnesium, and potassium were generally stable since monitoring began at MW4 until distinctly increasing in 2016. For each of the above-noted parameters, their respective concentrations detected in November 2018 represented their respective maximum concentrations detected within the groundwater at MW4 at the time.

The detected salt-related parameter concentrations within the groundwater at MW4 were interpreted to be attributed to the application of de-icing salt to Energy Dr., Osborne Rd., the nearby off-Site roadway to the Courtice Water Pollution Control Plant (WPCP), and/or the on-Site roadways/parking lot. However, the rapid increase of the concentrations of salt-related parameters within the groundwater at MW4 suggested that stormwater and/or shallow groundwater influenced by de-icing salt may be entering the well casing directly.

Based on the above information, it was recommended in the 2018 Annual Report that MW4 be inspected with a down-well closed-circuit television (CCTV) camera to visually assess the integrity of the monitoring well and to determine if the monitoring well installation may be compromised.

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MONITORING WELL MW4

As outlined in the *Durham-York Energy Centre Groundwater and Surface Water Monitoring Plan*, as prepared by Stantec Consulting Ltd. and dated September 14, 2011, monitoring well MW4 is positioned in the southeast corner of the DYEC property, near the east stormwater management pond (East SWMP), and is positioned to monitor downgradient groundwater quality. The location of MW4 is shown in the Site Plan (Figure 2 of the 2018 Annual Report), which is provided as **Attachment 1**.

Monitoring well MW4 is located along the inside of the south sideslope of the East SWMP (i.e., the East SWMP side of the berm). The ground surface around MW4 slopes downward toward the surface water within the East SWMP. The elevation of the outlet structure for the East SWMP is below the ground surface elevation at MW4.

As outlined in the *Durham York Energy Centre 2012 Groundwater Monitoring Report, April 2013*, as prepared by Genivar Inc. and dated April 30, 2013, in 2012 the riser for monitoring well MW4 was shortened in response to the construction of the East SWMP. The monitor shortening involved the removal of 2.6 metres (m) of riser and re-installation of the steel protective casing, in accordance with Ontario Regulation 903 (O. Reg. 903). A summary of the monitoring well construction details prior to and after the monitor shortening are presented below. A borehole for monitoring well MW4 is provided as **Attachment 2**, which shows the approximate monitoring well construction details at the time of its initial construction.

Time Period	Well Depth (mBGS)	Well Depth (mBTOP)	Stick-up (m)	Screened-Unit
Pre-Shortening	6.1	Unknown	Unknown	Sandy Silt Till
Post-Shortening	3.8	4.8	1.0	Sandy Silt Till

Notes: 1) mBGS denotes metres below ground surface.
2) mBTOP denotes metres below top-of-pipe.
3) Stick-up denotes the length of riser pipe above ground surface.

The pre-shortening monitoring well construction details presented in the above summary are based on information available in the borehole log for MW4. The post-shortening monitoring well construction details are based on measurements collected during the inspection of MW4 completed on September 12, 2019. As discussed, it was reported that approximately 2.6 m of riser were removed from monitoring well MW4. Based on the measurements presented in the above summary, it appears that approximately 2.3 m (6.1 m – 3.8 m) of riser were removed from the below-ground portion of the original monitoring well construction. It is interpreted that the remaining 0.3 m of riser (2.6 m – 2.3 m) accounts for the above ground portion of the original monitoring well and/or is attributed to minor differences between the reported and actual original monitoring well construction details and length of riser removed.

As presented in the above summary, monitoring well MW4 is screened within a sandy silt till unit, which, based on available information, is generally consistent with the other monitoring wells at the Site. Generally, the shallow and deep monitoring wells at the Site are approximately 6 mBGS and 9 mBGS, respectively. Based on depth below ground surface, monitoring well MW4 can be deemed as a shallow monitoring well. Based on a comparison of groundwater quality at MW4 to the shallow and deep groundwater quality at the remaining monitoring wells, for the non-salt related parameters the groundwater quality at MW4 is generally more comparable to the shallow groundwater quality than deep groundwater quality, particularly when compared to the other downgradient groundwater at monitoring location MW3.

Overall, based on the available information, it appears that groundwater quality at monitoring well MW4 reflects that of the shallow groundwater setting at the Site rather than the deeper groundwater setting.

INSPECTION FINDINGS

Monitoring well MW4 was inspected to determine if there was any visual indication that the integrity of the monitoring well installation was compromised. The inspection was completed on September 12, 2019. Select photos taken during the inspection are provided as **Attachment 3**.

A visual inspection of the above-grade portion of monitoring well MW4 was completed as part of the inspection. Based on the visual inspection, the riser pipe, steel protective casing, and surface seal for monitoring well MW4 appeared competent.

The ground surface around monitoring well MW4 slopes downward toward the surface water within the East SWMP. Standing water was not observed near the wellhead at the time of the visual inspection and there was no apparent depression around the wellhead where water would have the potential to pond. Based on conditions observed during the inspection, runoff generated from precipitation should flow downslope unobstructed by MW4 and enter the East SWMP. There are also no locations near MW4 where potentially salt-impacted stormwater runoff from roadways and/or parking lots would have the potential to flow past MW4. Moreover, runoff generated from the nearby off-Site roadway to the Courtice WPCP could not physically flow past MW4 as there is an earthen berm along the roadway that would prevent direct runoff from the roadway toward MW4.

On September 12, 2019, a down-well CCTV camera inspection was completed for monitoring well MW4 to inspect the condition of the monitoring well below grade. The groundwater level measured prior to the inspection was 3.58 metres below top of pipe (mBTOP). The top of the monitoring well screen was at approximately 3.2 mBTOP. The depth of MW4 was approximately 4.8 mBTOP. The groundwater within MW4 was purged using the dedicated inertial-lift pump assemblage to expose as much of the monitoring well's riser and screened interval as possible to maximize the length of the riser/screen assessed during the CCTV camera inspection.

Based on the CCTV camera inspection, no visible compromises or damage were observed within the inspected interval of the monitoring well riser pipe and screened interval (top of well riser pipe to approximately 3.4 mBTOP). A pipe joint was observed at approximately 3.1 mBTOP, which was the joint between the solid riser pipe and screened interval. Liquid was not observed to enter the well through the pipe joint at the time of the CCTV camera inspection.

Overall, based on the visual and CCTV camera inspections completed for monitoring well MW4, the monitoring well appeared to be competent and constructed according to O. Reg. 903. As such, based on the inspection findings there was no indication that the rapid increase of the concentrations of salt-related parameters within the groundwater at MW4 has been due to stormwater runoff influenced by de-icing salt directly entering the well casing.

As discussed in the 2018 Annual Report, since the construction of the East SWMP, the groundwater elevations at monitoring well MW4 have been interpreted to be slightly higher than the base elevation of the East SWMP. As such, the surface water elevation within the East SWMP is interpreted to be generally higher than the groundwater elevation at MW4. Based on the interpreted shallow groundwater flow direction at the Site and the position of MW4 in relation to the East SWMP, it is interpreted that MW4 would be downgradient of shallow groundwater flow from the East SWMP.

The East SWMP receives stormwater flow from on-Site drainage ditches that would collect and convey salt-impacted stormwater runoff from roadways and parking lots. As such, the surface water within the East SWMP is likely impacted by salt-related parameters. A sample of the water from within the East SWMP was not collected at the time of this assessment but may be considered during the next monitoring event to assess its quality as it relates to salt-related chemical constituents. Based on conditions observed during the inspection, there were no locations near MW4 where potentially salt-impacted stormwater from roadways and/or parking lots would have the potential to flow past MW4 and enter the well casing. As such, it is interpreted that the rapid increase of salt related parameter concentrations within the groundwater at MW4 is likely attributed to the exfiltration of salt-impacted surface water from the East SWMP into the subsurface and migrating downgradient toward MW4.

Salt-related parameter concentrations within the groundwater at monitoring well MW4 have been greater during the summer and fall monitoring events since 2016 than during the spring monitoring events. The concentrations detected during the summer and fall monitoring events have also exhibited an increasing trend since 2016. The increase in salt-related parameter concentrations during the summer and fall monitoring events may be due to the spring snowmelt and precipitation diluting the concentrations present within the groundwater at MW4. Then, following the drier summer months, the salt-related parameter concentrations are less dilute and the concentrations increase. This impact may be occurring in conjunction with the migration time of the elevated concentrations from the surface water of the East SWMP to the groundwater at MW4.

The concentrations of the salt-related parameters within the surface water of the East SWMP are likely greatest in the spring following the winter season and the elevated concentrations detected within the groundwater at MW4 in the summer and fall may be, in part, attributed to the time required for the elevated concentrations within the East SWMP to exfiltrate into the subsurface and migrate toward MW4. The increasing trend of the concentrations detected during the summer and fall monitoring events is likely associated with a build-up of the salt-related parameters within the subsurface over time in the area of MW4.

CONCLUSIONS AND RECOMMENDATIONS

At DYEC, the concentrations of salt-related parameters chloride, sodium, calcium, magnesium, and potassium have exhibited an increasing trend within the groundwater at monitoring well MW4, most notably during the summer and fall monitoring events. The increasing concentrations are likely attributed to the application of de-icing salt to nearby roadways/parking lots. In September 2019, the integrity of monitoring well MW4 was assessed to determine if the monitoring well installation may be compromised, allowing stormwater and/or shallow groundwater influenced by de-icing salt to enter the well casing directly.

Based on the visual and CCTV camera inspections completed for monitoring well MW4, the monitoring well appeared to be competent. As such, based on the inspection findings there was no indication that the rapid increase of salt related parameter concentrations within the groundwater at MW4 has been due to stormwater runoff influenced by de-icing salt directly entering the well casing from surface.

Based on the interpreted shallow groundwater flow direction at the Site and the position of MW4 in relation to the East SWMP, it is interpreted that MW4 would be downgradient of shallow groundwater flow from the East SWMP. The East SWMP receives stormwater flow from on-Site drainage ditches that would collect and convey salt-impacted stormwater runoff from roadways and parking lots. As such, the surface water within the East SWMP is likely impacted by salt-related parameters. Therefore, it is interpreted that the rapid increase of the concentrations of salt related parameters within the groundwater at MW4 is likely attributed to the subsurface exfiltration of salt-impacted stormwater from the East SWMP, which migrates downgradient toward MW4.

The salt-related parameter concentrations have likely increased during the summer and fall monitoring events as the groundwater near MW4 would be less dilute following the drier summer months, which would result in increased parameter concentrations. The increased parameter concentrations during the summer and fall monitoring events may also be associated with the time required for the elevated concentrations within the surface water of the East SWMP following the winter season to exfiltrate into the subsurface and migrate toward MW4.

Based on the findings of the inspection and the historical groundwater quality at monitoring well MW4, potential options are presented below for the Region's consideration regarding groundwater monitoring location MW4.

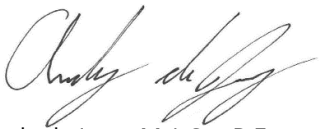
- Based on the findings of the September 12, 2019, inspection, monitoring well MW4 appeared to be competent with no identifiable surface entry pathways directly to the well. The monitoring well could remain in its current state and location with the understanding that the elevated salt-related parameter concentrations are likely attributed to the application of de-icing salt to upgradient roadways/parking lots.
- A deeper monitoring well could be installed adjacent to monitoring well MW4 to further assess the downward migration potential of salt-related parameters.
- Monitoring location MW4 could be relocated so that it remains in a hydraulically downgradient position to the DYEC facility but is not directly downgradient from the East SWMP. The existing monitoring well MW4 could temporarily remain in place to be sampled as part of a bridging program for comparing the groundwater quality for the existing and new downgradient monitoring location. A monitoring well nest (i.e., shallow and deep monitoring wells) could also be installed at the new downgradient monitoring location for comparing shallow and deep groundwater quality to monitoring locations MW2, MW3, and MW5.

With consideration of the above-noted options, as the objective of the groundwater monitoring program for DYEC is to assess the potential for impacts to nearby water resources as a result of DYEC waste treatment operations, it is recommended that monitoring well location MW4 is relocated such that it is in a location to primarily evaluate downgradient groundwater quality from the DYEC facility that will not be influenced by exfiltrating stormwater from the East SWMP.

CLOSURE

We trust that this letter regarding an inspection of groundwater monitoring well MW4 for the Durham-York Energy Centre is satisfactory for your current requirements. Should there be any questions or comments, please contact us.

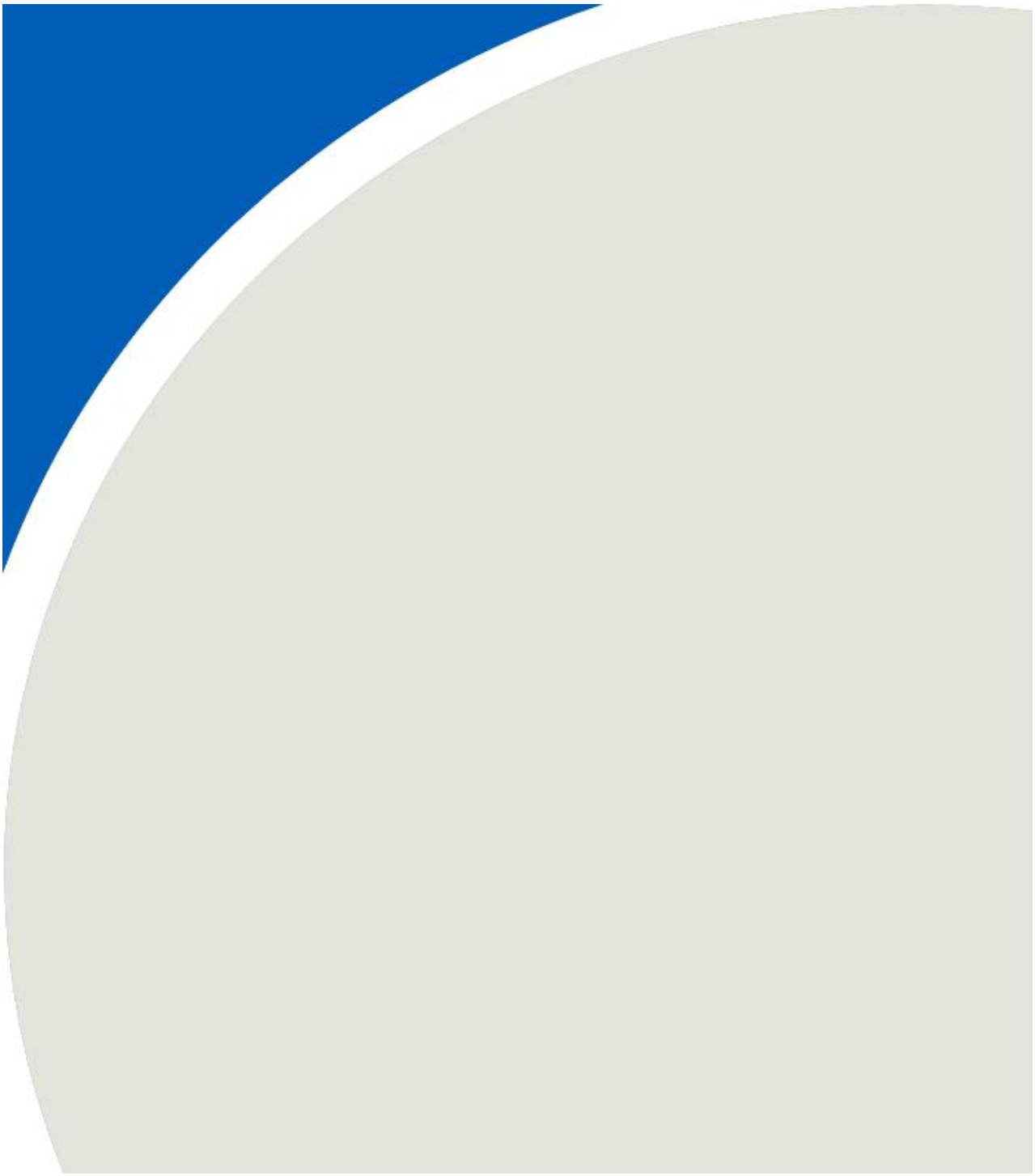
RWDI AIR Inc.

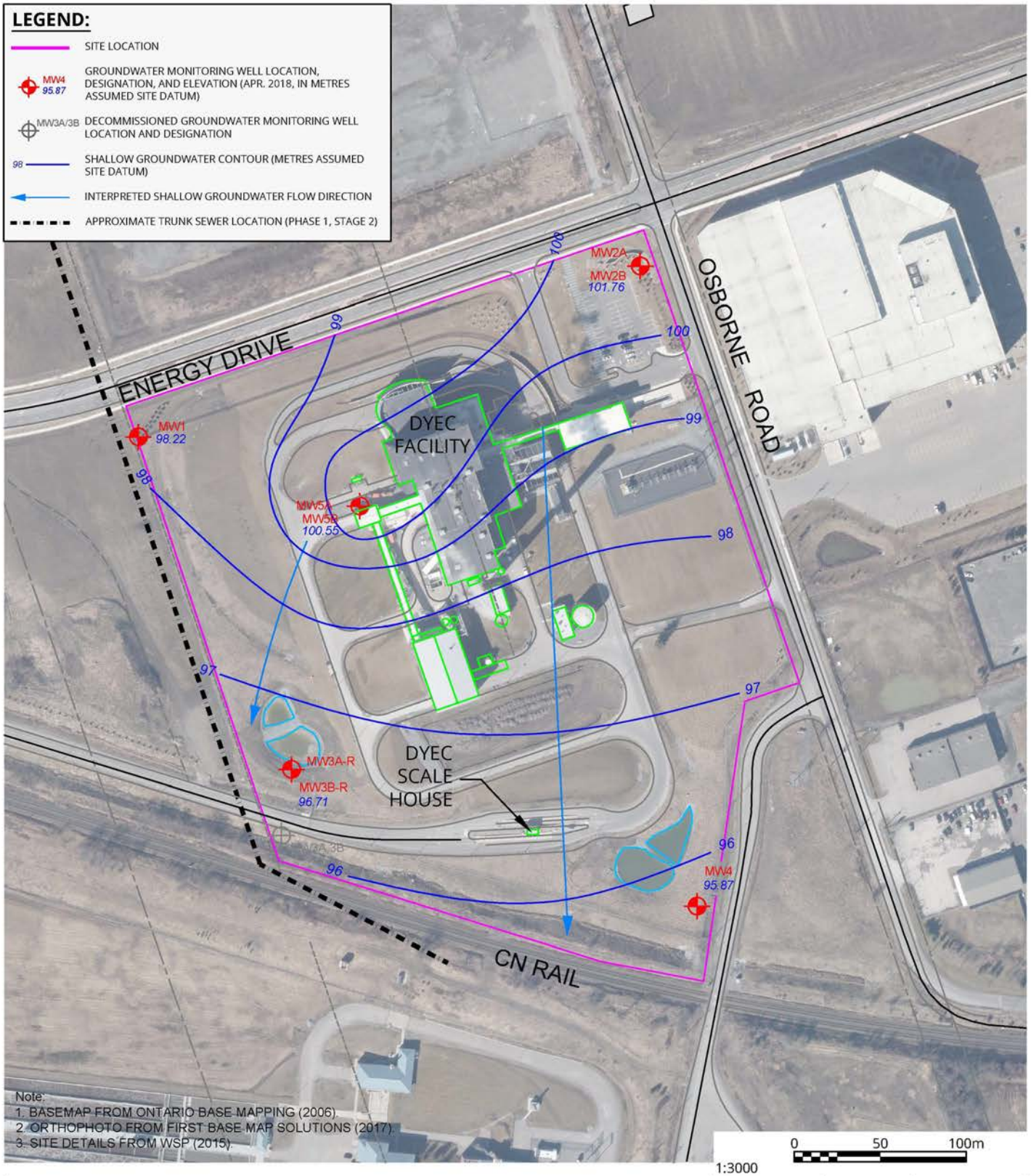


Andy de Jong, M.A.Sc., P.Eng.
Project Manager | Senior Engineer

Philippe E. Janisse, B.Sc., P.Geo.
Sr. Geoscience Specialist

ATTACHMENT 1





SITE PLAN
DURHAM YORK ENERGY CENTRE
2018 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT

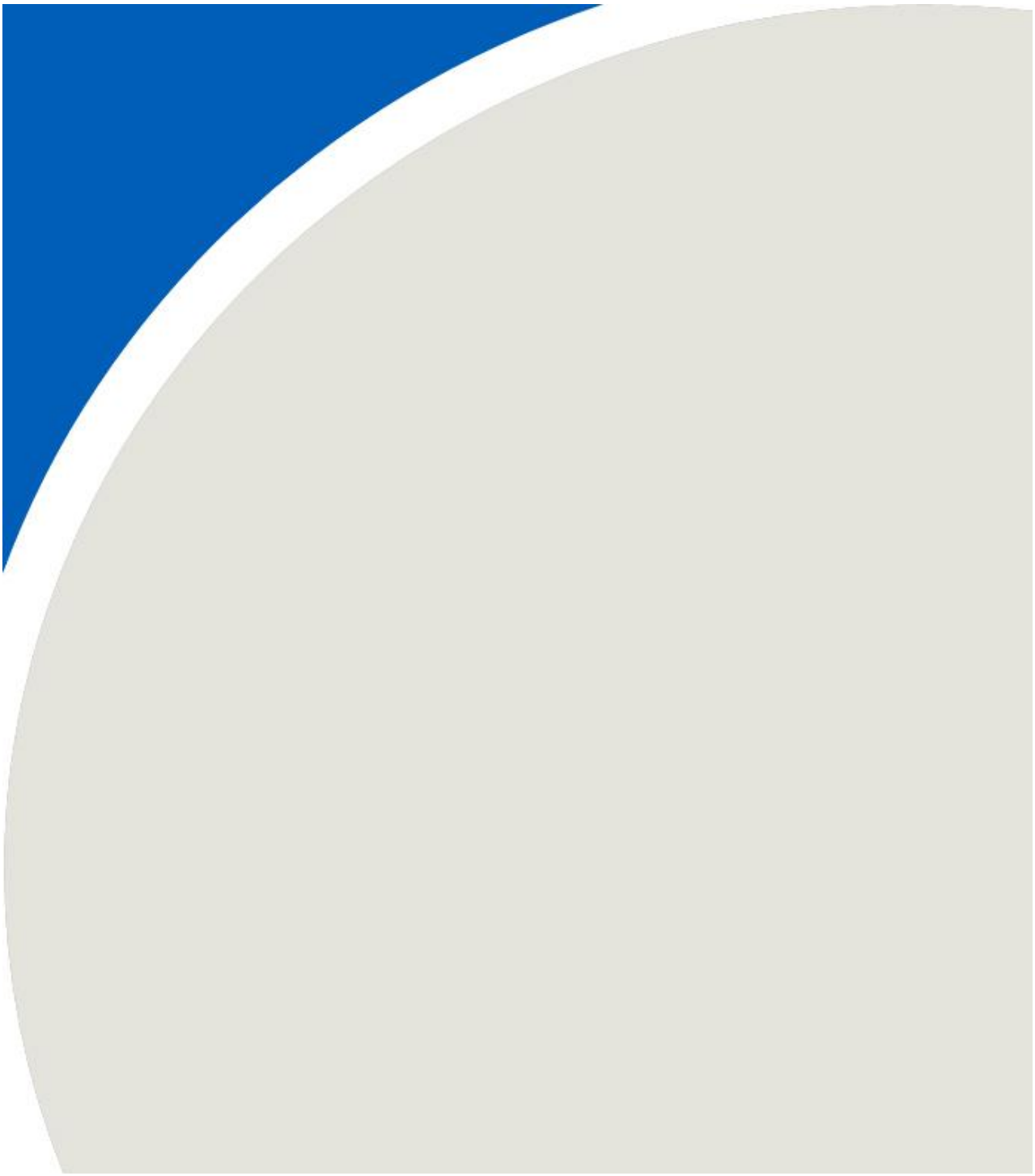
THE REGIONAL MUNICIPALITY OF DURHAM

Project # 1604066

True North

Drawn by:	YL	Figure: 2	
Approx. Scale:	1:3,000		
Date Revised:	Jan. 15, 2019		

ATTACHMENT 2



BOREHOLE NO. MW4

PROJECT NAME: DURHAM-YORK ENERGY CENTRE
PROJECT NO.: 111-26648-00
CLIENT: REGIONAL MUNICIPALITY OF DURHAM
DATE COMPLETED: Dec 21, 2011
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: EWT
GROUND ELEVATION: 99.8 m (Assumed Datum)
REVIEWER: SJT

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											**UTM CO-ORDINATES** UTM Zone: 17 NAD: 83 Easting: 680661 Northing: 4860179
0.2	TOPSOIL: DARK BROWN, SANDY SILT, MOIST, LOOSE.										
	SILT AND SAND TILL: DARK BROWN, SANDY SILT TO SILT AND SAND, SOME GRAVEL, TRACE CLAY, MOIST, COMPACT.			SS1	26		38				
1.0				SS2	27		85				
1.5	SANDY SILT: DARK GREY TO LIGHT GREY, SOME TO TRACE CLAY, TRACE FINE TO MEDIUM GRAVEL, MOIST, COMPACT.			SS3	19		100				
2.0											
2.3	SANDY SILT TILL: GREY BECOMING DARK GREY AT 4.6 m, SOME GRAVEL, SOME TO TRACE CLAY, MOIST BECOMING MOIST TO WET AT 6.1 m, VERY DENSE.			SS4	69		100				
3.0				SS5	67		100				SS5 N VALUE: 67 FOR 150 mm
4.0				SS6	70		100				SS6 N VALUE: 70 FOR 150 mm
				SS7	95		100				SS7 N VALUE: 45 FOR 150 mm, 50 FOR 25 mm
5.0				SS8	89		100				SS8 N VALUE: 39 FOR 150 mm, 50 FOR 125 mm
6.0				SS9	105		100				SS9 N VALUE: 55 FOR 150 mm, 50 FOR 125 mm
6.4	BOREHOLE TERMINATED AT 6.4 m IN SANDY SILT TILL.										
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOLOGIC B/W (M) WITH UTM 111-26648-00 100-3.GPJ JAGGER HIMS BASIC.GDT 4/30/13

GENIVAR

ATTACHMENT 3

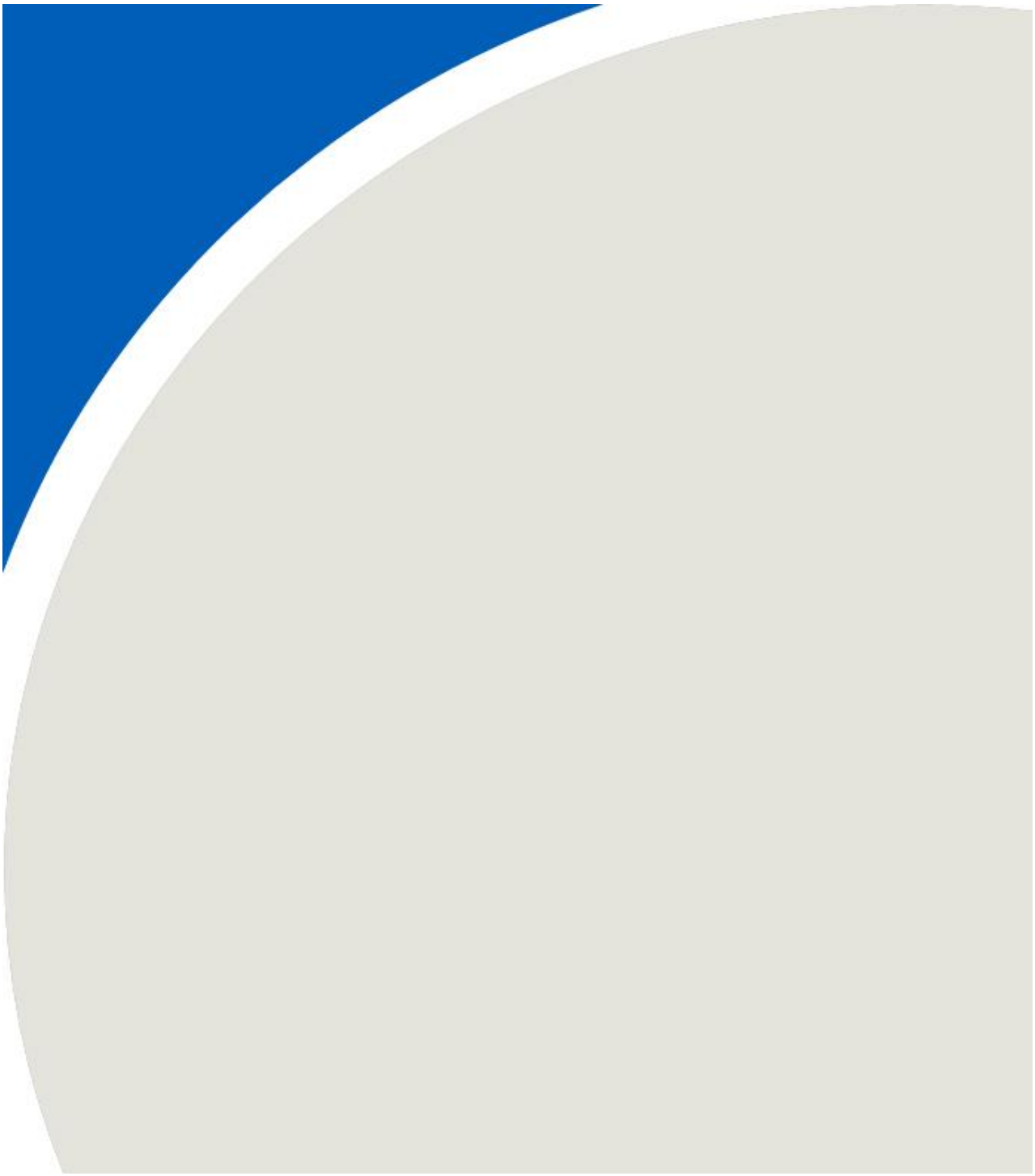


Photo 1: View to the area around monitoring well MW4 (centre of photo), including the East SWMP.

Photo 2: Monitoring well MW4.

If this information is required in an accessible format, please contact The Regional Municipality of Durham at 1-800-372-1102 extension 3560.

April 29, 2016

Dolly Goyette, Director, Central Region
Ministry of the Environment and Climate Change
Place Nouveau
5775 Yonge Street, Floor 8
North York, ON M2M 4J1

Dear Ms. Goyette:

RE: Durham York Energy Centre (DYEC)
Groundwater and Surface Water Monitoring Plan
MOECC File No.: EA-08-02

In accordance with Condition 20.5 of the Notice of Approval to Proceed with the Undertaking (Environmental Assessment (EA) Approval) and Condition 7(14) of the Environmental Compliance Approval (ECA), the Regional Municipality of Durham and the Regional Municipality of York (Regions) are requesting a change to the Groundwater and Surface Water Monitoring Plan for the Durham York Energy Centre (DYEC).

Section 3.4.2 of the Groundwater and Surface Water Monitoring Plan requires the placement of multi-meter sondes at two locations in Tooley Creek, and the consideration of additional monitoring and sampling that may be conducted at the facility in the event of a spill or other process upset that has the potential to affect surface water quality.

The sondes are placed in the creek each spring to monitor temperature, pH, turbidity and electrical conductivity upstream and downstream of the drainage swale that receives stormwater flow from the facility.

The section of Tooley Creek where the sondes are to be placed will be re-aligned beginning early 2016 as part of construction by the Ministry of Transportation to improve the Highway 401/Courtice Road interchange. The construction activity and creek re-alignment will cause significant disruption and prevent the placement of the sondes in the creek for up to three years.

The Regions are requesting that the requirement in the surface water monitoring program to place the sondes in the creek be suspended until the interchange construction activities are completed. All previous surface water monitoring demonstrates that the DYEC is not having an adverse effect on Tooley Creek. The remaining monitoring and reporting requirements in the EA Approval and ECA will continue to ensure that the potential for any off-site impact to surface water is minimized.

The Regions and Covanta Durham York Renewable Energy (Covanta) will follow the remaining requirement in Section 3.4.2 of the monitoring plan regarding additional monitoring and sampling that may be conducted in the event of a spill or other process upset that has the potential to affect surface water quality.

The Regions and Covanta will also continue the inspection schedule for the facility and stormwater management system, and the implementation of the Spill Contingency and Emergency Response Plan.

We are available to discuss this issue further with the Ministry of the Environment and Climate Change (MOECC) and await your decision in this matter. If you require any further information, please contact Mr. Gioseph Anello, Manager of Waste Planning and Technical Services, at 905-668-7711 extension 3445.

Sincerely,

for

Mirka Januszkiewicz, P.Eng.
Director, Waste Management

The Regional Municipality of Durham
905.668.4113 ext. 3464
Mirka.Januszkiewicz@durham.ca

Laura McDowell, P.Eng.
Director, Environmental Promotion and Protection
The Regional Municipality of York
905.830.4444 ext. 5077
Laura.McDowell@york.ca

c. K. Hedley, Director, Environmental Approvals Branch, MOECC
C. Dugas, Manager, York Durham District Office, MOECC
R. Lashbrook, Manager, Technical Support Section, MOECC
T. Belayneh, Group Leader, Surface Water, MOECC
S. Thomas, Issues Project Coordinator, York Durham District Office, MOECC
P. Dunn, Senior Environmental Officer, York Durham District Office, MOECC
P. Martin, Supervisor (Acting), Air, Pesticides, and Environmental Planning, MOECC
E. O'Leary, Environmental Resource Planner & EA Coordinator, Air, Pesticides, and Environmental Planning, MOECC
G. Battarino, Project Officer, Project Coordination, MOECC

Ministry
of the Environment
and Climate Change
Central Region Office
5775 Yonge Street
8th Floor
North York ON M2M 4J1
Tel.: 416 326-6700
Fax: 416-325-5345

Ministère
de l'Environment et de l'Action
en matière de changement climatique
Région Central
5775, rue Yonge
8 ième étage
North York (Ontario) M2M 4J1
Tél: (416) 326-6700
Téléc: (416) 326-6345

Ontario

May 17, 2016

Mirka Januszkiewicz, P. Eng
Director, Waste Management
The Regional Municipality of Durham
605 Rossland Road East
Whitby ON L1N 6A3

Laura McDowell, P.Eng
Director, Environmental Promotion and Protection
The Regional Municipality of York
17250 Yonge Street
Newmarket ON L3Y 6Z1

Dear Ms. Januszkiewicz and Ms. McDowell,

RE: Durham York Energy Centre (DYEC)
Requested change to Surface Water Monitoring Program

In your letter dated April 29, 2016, the Regional Municipalities of Durham and York (Regions) requested that the requirement in the DYEC Groundwater and Surface Water Monitoring Plan to place continuous surface water monitoring equipment (sondes) in Tooley Creek be suspended until Hwy 401/Courtice Road interchange construction is completed.

Ministry staff have confirmed with the Ministry of Transportation that the section of Tooley Creek where the sondes are placed each spring will be significantly disturbed (re-aligned) and access will be restricted for at least 3 years during the interchange construction. The construction will prevent the placement of the sondes and affect the reliability of any surface water monitoring in the creek downstream of the construction.

The ministry's review of surface water monitoring results, to date, indicates that the DYEC is not having an adverse effect on Tooley Creek. The remaining monitoring, inspection and spill contingency and emergency response requirements for the facility will continue to ensure that the potential for any off-site impact to surface water is controlled.

In accordance with Condition 20.5 of the Notice to Proceed with the Undertaking and Condition 7(14) of the Environmental Compliance Approval, I am granting your request to suspend the placement of the sondes in Tooley Creek until such time as the interchange construction activities are completed.

Sincerely,

Dolly Goyette
Director, Central Region
Ministry of the Environment and Climate Change

c. Ross Lashbrook, Manager, Technical Support Section, Central Region MOECC
Celeste Dugas, Manager, York Durham District Office
Sandra Thomas, Issues Project Coordinator, York Durham District Office

If you require this information in an accessible format, please contact The Regional Municipality of Durham at 1-800-372-1102 ext. 3560.

January 9, 2019

Lisa Trevisan, Director, Central Region
Ministry of the Environment, Conservation and Parks
Place Nouveau
5775 Yonge Street, Floor 8
North York, ON M2M 4J1

Dear Ms. Trevisan:

RE: Durham York Energy Centre
Groundwater and Surface Water Monitoring Plan
Request to Amend Groundwater Monitoring Frequency
Environmental Compliance Approval 7(14)
MECP File #: EA-08-02

In accordance with Condition 20.4 of the Notice of Approval to Proceed with the Undertaking (Environmental Assessment (EA) Approval) and Condition 7(14) of the Environmental Compliance Approval (ECA), the Regional Municipality of Durham and the Regional Municipality of York (the Regions) have undertaken groundwater monitoring at the Durham York Energy Centre (DYEC) in accordance with the approved Groundwater and Surface Water Monitoring Plan (the Monitoring Plan). Sampling commenced in December 2011, prior to the start of facility construction, and has continued through facility construction and more than three years of DYEC operations. Sampling occurs three times per year in the spring, summer, and fall, and the results of the monitoring program are summarized in annual reports to the Ministry of Environment, Conservation and Parks (MECP).

As summarized in these annual reports, the groundwater monitoring program has shown no adverse impacts from DYEC operations. The Regions therefore propose that the Monitoring Plan be amended to reduce the required groundwater monitoring frequency from three times per year to once per year commencing in 2019. In accordance with Condition 20.5 of the EA Approval, amendments to the Monitoring Plan may be approved by the Director of the MECP Central Region Office. The Regions' rationale for requesting this change is summarized in the following sections.

Summary of Groundwater Monitoring Results

Groundwater is monitored at eight monitoring wells installed in five locations. The locations of the monitoring wells (MW) are shown on Figure 1 below. Based on observed water elevations in these wells, the direction of groundwater flow is interpreted to be toward the southwest. Borehole logs for the monitoring wells confirm that the facility is constructed on silty glacial till soils. Rising head tests performed at the time of monitoring well installation showed hydraulic conductivities ranging from a low of 1.6 by 10^{-8} m/s at MW3A to a high of 9.0 by 10^{-7} m/s at MW2A. Based on these hydraulic conductivities and the horizontal hydraulic gradients observed on the site, it is anticipated that groundwater will travel at a rate of approximately one metre per year or less. In the event that a groundwater contamination issue was to develop at the site, the low rate of groundwater flow would limit the rate of contaminant dispersion and provide the Regions with ample opportunity to undertake remediation.

Figure 1: DYEC Monitoring Well Locations

Analytical results for the required groundwater monitoring parameters have shown no significant trends since monitoring began in December 2011 with the exception of some de-icing salt influence observed at MW1, MW2B, MW4, and MW5B. Each of these wells are located directly adjacent to and downgradient from paved surfaces where road salt has been applied during winter months. The highest impacts have been observed at MW4, which reported a chloride concentration of 765 mg/L and a sodium concentration of 148 mg/L in August 2018. However, it should be noted that, while concentrations of salt-related constituents are elevated, concentrations of heavy metals and other contaminants typically associated with waste processing are not elevated. Further, it should be noted that MW3A and MW3B, which are located closer to the waste processing area than MW4, and more directly downgradient, do not currently report elevated concentrations of any monitoring parameter.

Groundwater analytical results to date show no significant seasonal trends and suggest that DYEC operations have not had an adverse effect on groundwater quality at the site. Graphs showing a seasonal comparison of parameter concentrations at each monitoring well are enclosed for reference.

Groundwater Protection Measures

Many design features were incorporated into the DYEC to protect groundwater. These features include the following:

- The DYEC is a zero-process water discharge facility.
- The refuse pit is constructed using one metre thick concrete conforming to Canadian Standards Association (CSA) A23.1 Class C-1 performance standards, which applies to structurally reinforced concrete that is exposed to chlorides at a wide range of temperature conditions.
- The refuse pit is lined on the exterior with a sodium bentonite waterproofing membrane to prevent leakage of water into or out of the pit.
- Refuse pit construction includes PVC water stops in the construction joints which form a continuous, watertight barrier that prevents the passage of fluid.
- Diesel tanks are of double-walled construction with leak detection system and are checked daily per the DYEC Containment Protocol.
- A containment dyke surrounds the ammonia tank. Daily general inspection of the ammonia tank for leaks and annual calibrations of the ammonia alarm are safeguards included in the DYEC Containment Protocol.

The DYEC also has an approved Spill Contingency and Emergency Response Plan in place which details the actions to be taken and the measures in place to mitigate on-site spills.

In conclusion, the DYEC facility design includes rigorous engineering controls and operating procedures to ensure groundwater protection. Monitoring results to date have demonstrated the effectiveness of these groundwater protection measures and have confirmed the absence of any impacts to groundwater resulting from waste processing operations. The Regions consider the risk associated with reducing the frequency of groundwater monitoring to once per year to be low.

Subject to MECP approval, the Regions would continue to sample groundwater once per year in the fall, commencing in 2019. There would be no other changes to groundwater monitoring parameters or procedures and the Regions would continue to provide an annual report by April 30 of each year for the monitoring results in the previous calendar year.

If you require any further information, please contact Mr. Gioseph Anello, Manager of Waste Planning and Technical Services, at 905-668-7711 extension 3445.

Sincerely,

Mirka Januszkiewicz, P.Eng.
Director, Waste Management Services

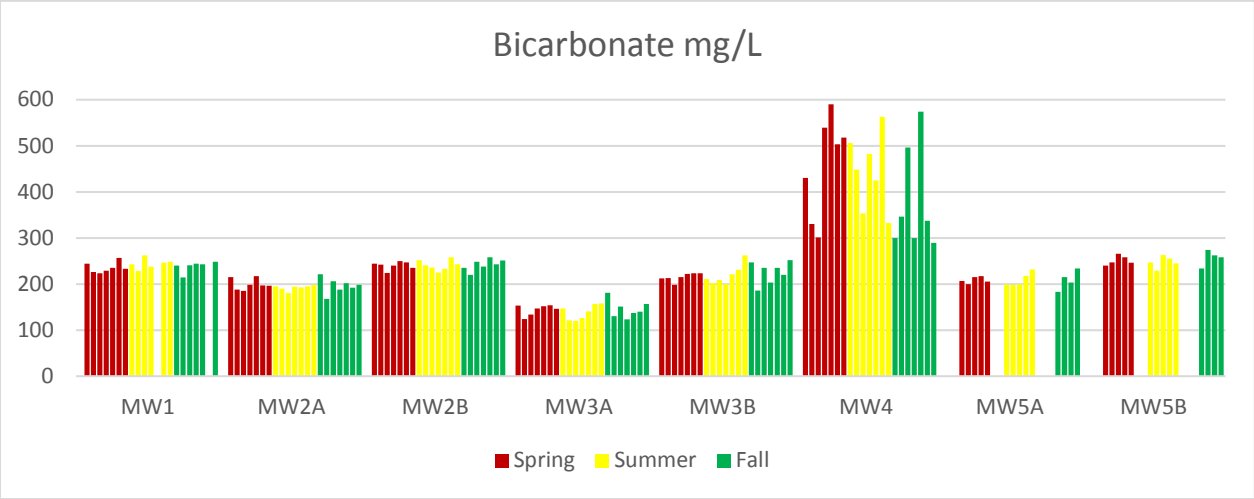
The Regional Municipality of Durham
905-668-7711 extension 3464
Mirka.Januszkiewicz@durham.ca

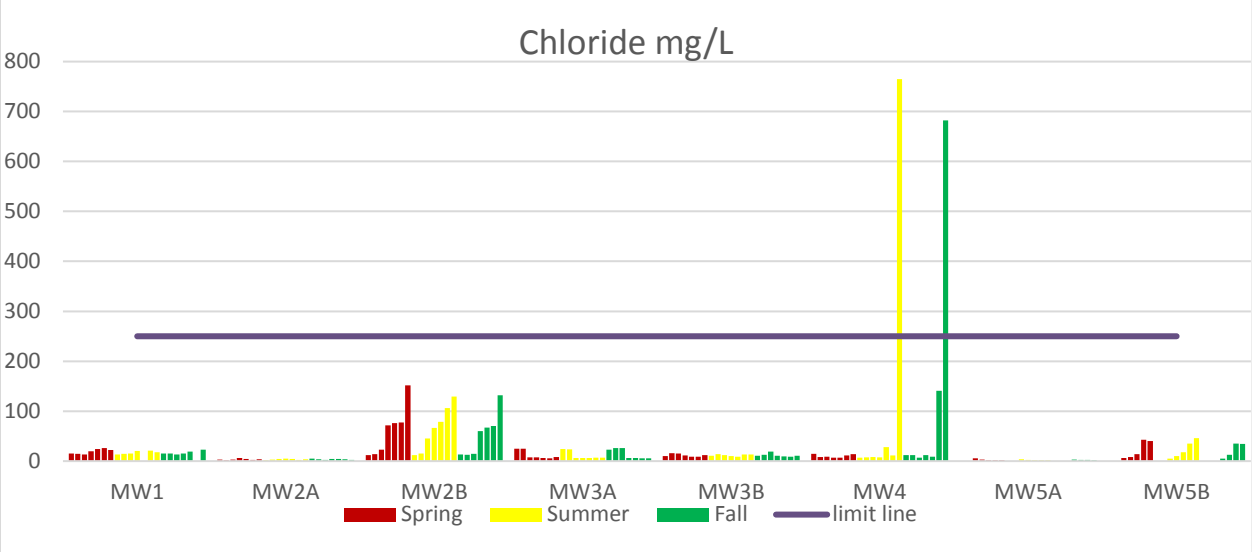
Laura McDowell, P.Eng.
Director, Environmental Promotion and Protection
The Regional Municipality of York
905-830-4444 extension 75077
Laura.McDowell@york.ca

c. M. Mahmood, Manager, Environmental Approvals, MECP
A. Cross, Manager, Environmental Assessments, MECP
C. Dugas, Manager, York Durham District Office, MECP
L. Hussain, Manager, Technical Support Section, MECP
T. Belayneh, Senior Water Scientist, Surface Water Unit, MECP
P. Dunn, Senior Environmental Officer, MECP
P. Martin, Supervisor, Air, Pesticides and Environmental Planning, MECP
G. Battarino, Special Project Officer, Project Coordination, MECP
E. O'Leary, Environmental Resource Planner and EA Coordinator, Air, Pesticides and Environmental Planning, MECP
A. Huxter, Environmental Specialist, Covanta
Energy from Waste Advisory Committee (EFWAC)
C. Raynor, Regional Clerk, The Regional Municipality of York
R. Walton, Regional Clerk, The Regional Municipality of Durham

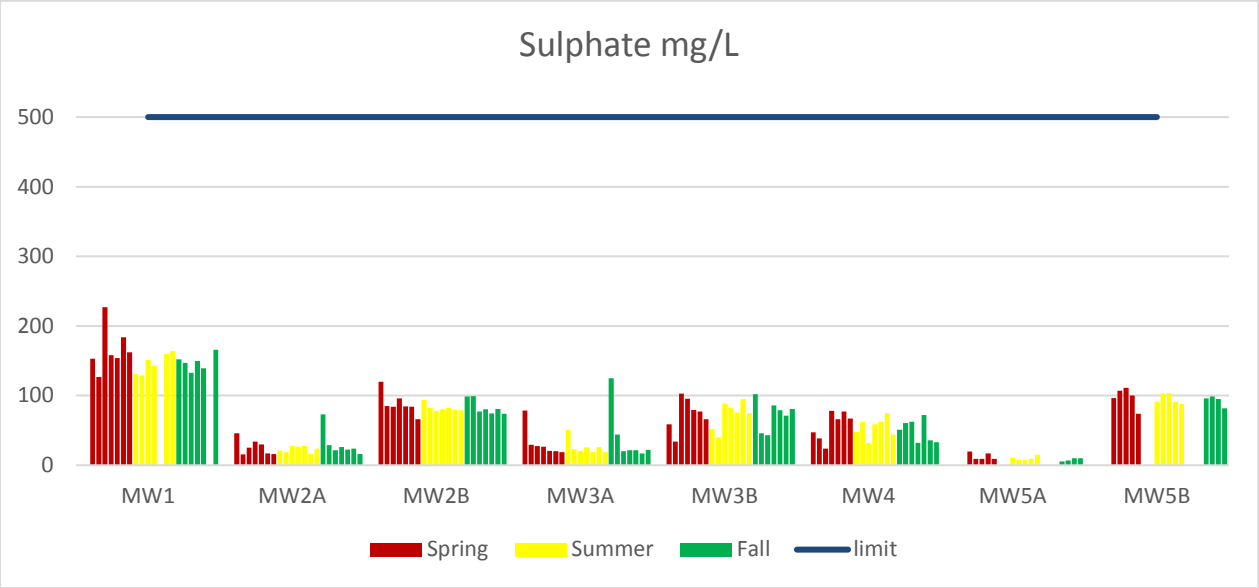
Enclosure

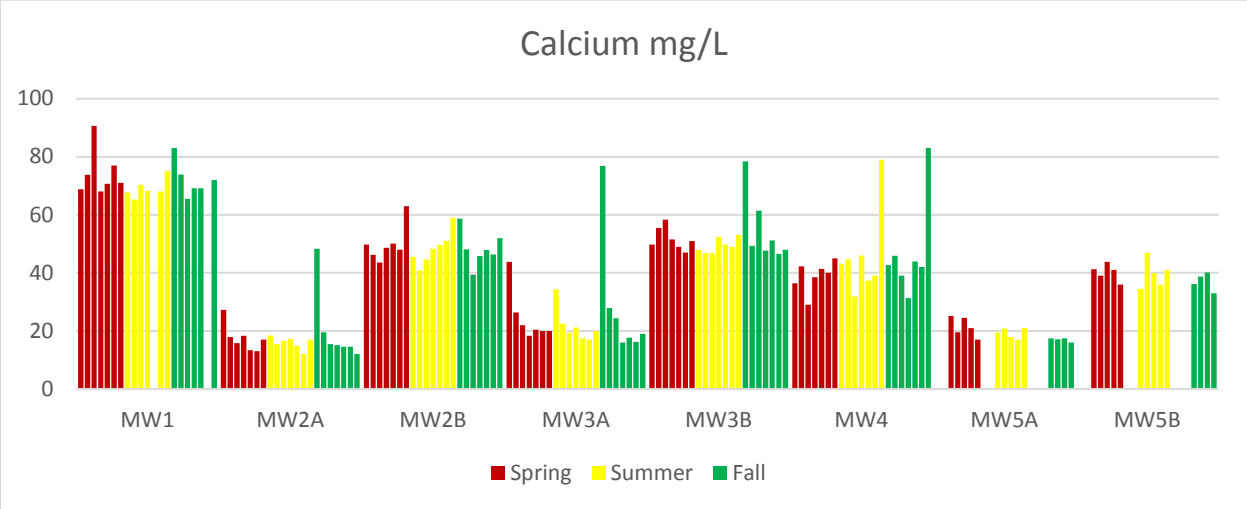
Seasonal Comparisons of Parameter Concentrations at Monitoring Wells: MW1, MW2A, MW2B, MW3A, MW3B, MW4, MW5A, and MW5B for the Durham York Energy Centre



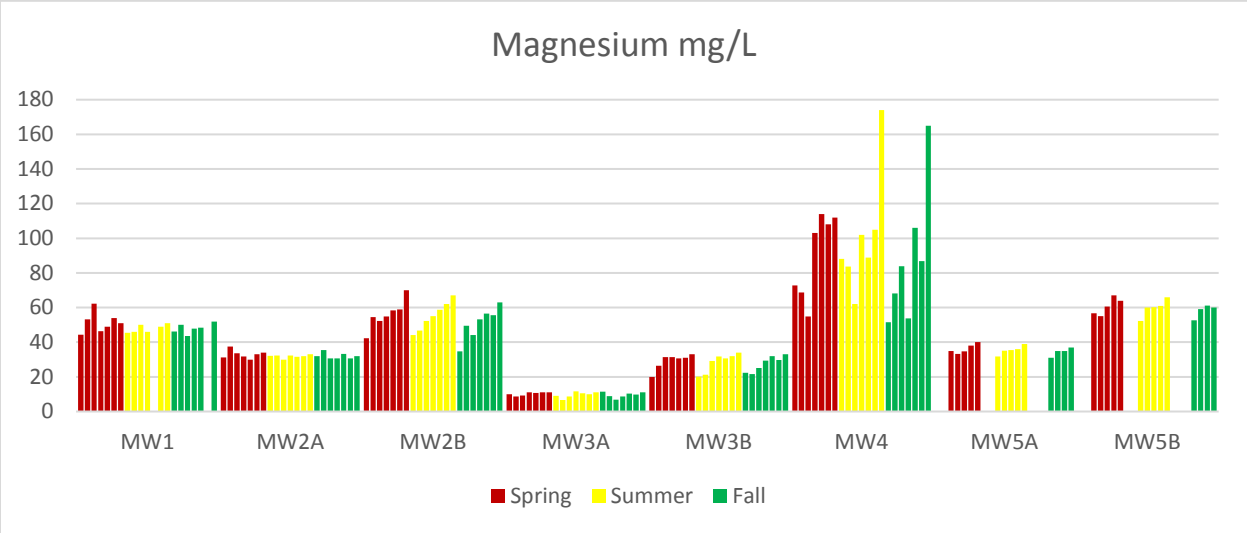


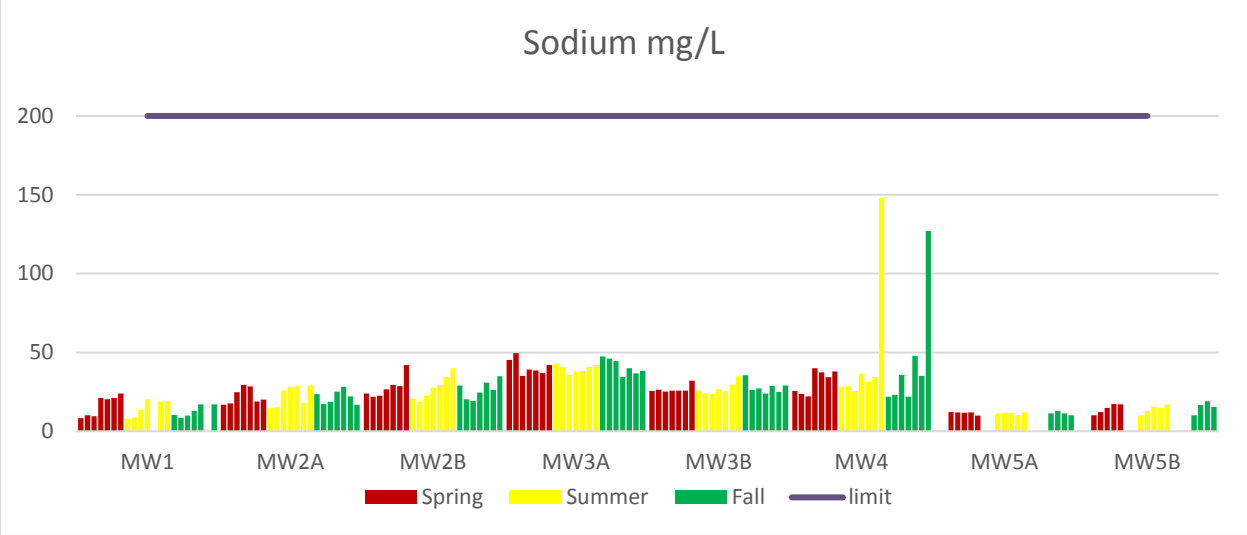
Seasonal Comparisons of Parameter Concentrations at Monitoring Wells: MW1, MW2A, MW2B, MW3A, MW3B, MW4, MW5A, and MW5B for the Durham York Energy Centre





Seasonal Comparisons of Parameter Concentrations at Monitoring Wells: MW1, MW2A, MW2B, MW3A, MW3B, MW4, MW5A, and MW5B for the Durham York Energy Centre





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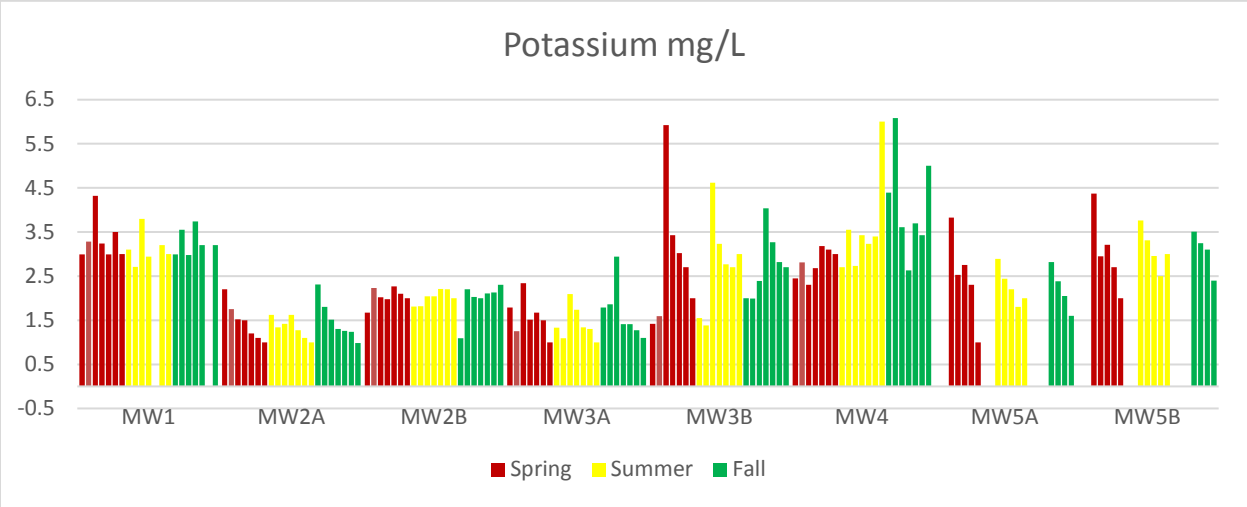

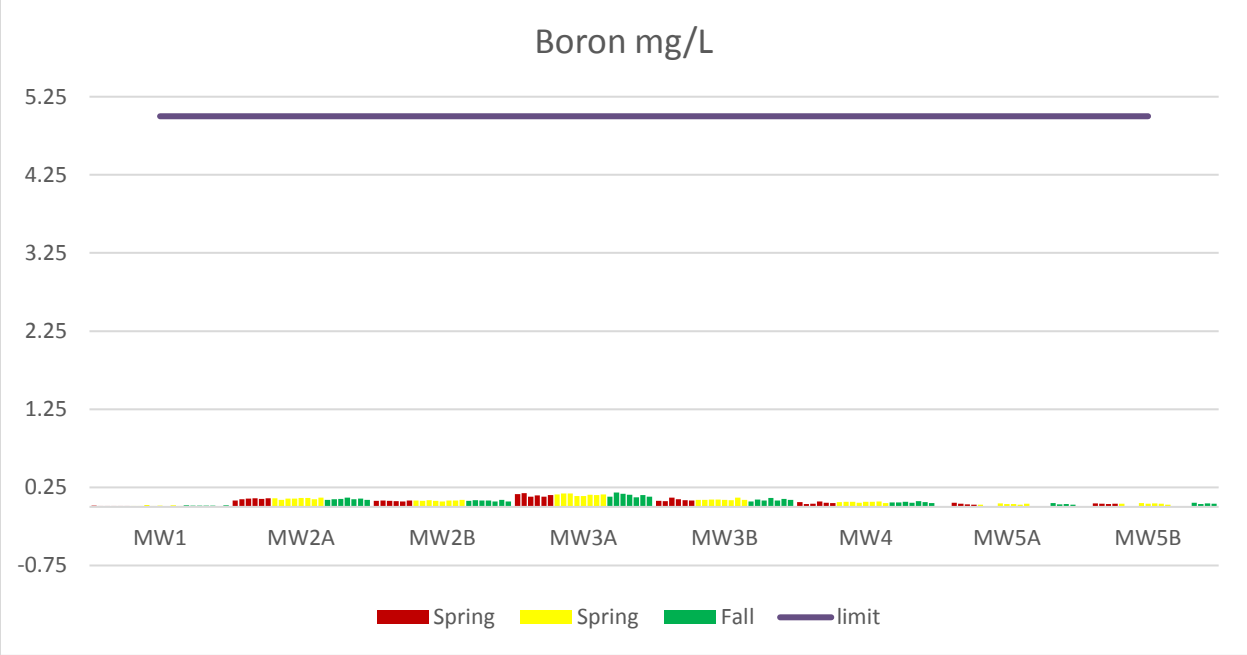

Ministry of the Environment, Conservation and Parks

Central Region

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Ministère de l'Environnement, de la Protection de la nature et des Parcs

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Ontario

May 7, 2019

EAAB File No.: EA-08-02
CR File No.: EA-05-09

Mirka Januszkiewicz, P. Eng
Director, Waste Management Services
The Regional Municipality of Durham
605 Rossland Road East
Whitby ON L1N 6A3

Laura McDowell, P. Eng
Director, Environmental Promotion and Protection
The Regional Municipality of York
17250 Yonge Street
Newmarket ON L3Y 6Z1

Re: Durham/York Energy from Waste Project (Durham York Energy Centre)
Groundwater and Surface Water Monitoring Plan
Request to Amend Groundwater Monitoring Frequency
Environmental Assessment Condition 20
Environmental Compliance Approval Condition 7(14)

Dear Ms. Januszkiewicz and Ms. McDowell,

Thank you for the submission dated January 9, 2019 in support of Durham and York Regions' request to amend the Groundwater and Surface Water Monitoring Plan. RWDI Air Inc., on behalf of the Regions, reviewed the submission and provided a letter of concurrence dated March 25, 2019 to the ministry.

The Regions are requesting to reduce the required groundwater sampling frequency from three times per year to once per year in the fall, commencing in 2019. There would be no other changes to groundwater monitoring parameters or procedures, and the Regions would continue to provide an annual report by April 30 of each year for the monitoring results in the previous calendar year.

In accordance with Condition 20.5 of the Environmental Assessment Notice of Approval, I am approving the requested change to the Groundwater and Surface Water Monitoring Plan. The proponent may implement the plan in accordance with the change.

Should you have any questions, please contact Emilee O'Leary, Regional Environmental Assessment Coordinator, at 416-326-3469 or emilee.oleary@ontario.ca.

Sincerely,

Lisa Trevisan
Director
Central Region

cc: Lubna Hussain, Manager, Technical Support Section, Central Region, MECP
Paul Martin, APEP Supervisor, Technical Support Section, Central Region, MECP
Emilee O'Leary, Regional Environmental Assessment Coordinator, Technical Support Section, Central Region, MECP
Celeste Dugas, District Manager, York-Durham District Office, MECP
Phil Dunn, Senior Environmental Officer, York-Durham District Office, MECP
Kristen Sones, Issues Manager (A), York-Durham District Office, MECP
Gavin Battarino, Project Officer, Environmental Assessment and Permissions Branch, MECP
Gioseph Anello, Manager of Waste Planning and Technical Services, Durham Region

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July 12, 2019

Mirka Januszkiewicz, P. Eng
Director, Waste Management
The Regional Municipality of Durham
605 Rossland Road East
Whitby ON L1N 6A3

Laura McDowell, P.Eng
Director, Environmental Promotion and Protection
The Regional Municipality of York
17250 Yonge Street
Newmarket ON L3Y 6Z1

Re: Durham/York Energy from Waste Project
2017 and 2018 Annual Groundwater and Surface Water Monitoring Report
Minister's Notice of Approval Condition 20.8
Environmental Compliance Approval Condition 7(14)

Dear Ms. Januszkiewicz and Ms. McDowell,

Thank you for the above-noted submissions. This letter serves as a confirmation of receipt of the 2017 Annual Groundwater and Surface Water Monitoring Report dated April 27, 2018 and the 2018 Annual Groundwater and Surface Water Monitoring Report dated April 24, 2019. The reports were submitted in accordance with Condition 20.8 of the Environmental Assessment (EA) Notice of Approval and Condition 7(14) of the Environment Compliance Approval for this project.

Staff have reviewed the reports and offer the following comments:

2017 and 2018 Reports

1. Please use Piper Trilinear plots and/or Durhov plots in future annual reports to present analytical data for spatial and temporal comparisons.

2018 Report

2. The conclusions state "Based on the 2018 groundwater elevations, the shallow and deeper groundwater flow direction at the Site was interpreted to be toward the southwest, with minor flow alterations as a result of the influences from the trunk sewer." We note that one map of the shallow groundwater flow direction was provided in the report (Figure 2 of RWDI, 2019). No map was provided for the deeper flow direction. A

comparison of the depth of the trunk sewer and of the shallow groundwater would need to be provided to infer the impact of the trunk sewer.

3. The conclusions state "For the groundwater sampling program completed for DYEC in 2018, QA/QC measures indicated that the detected constituent concentrations were accurate and reflected actual conditions at the time of sample collection." We note that it appears that only one field duplicate sample was collected per sampling period. It is common for travel blanks to also be collected. The collection of field duplicates should be rotated between sampling wells.

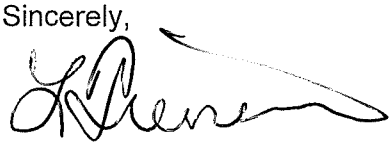
4. The conclusions discuss elevated concentrations of salt related parameters at multiple groundwater monitoring wells which are interpreted to be attributed to the application of de-icing salt. Please confirm the origin of salt detected in the on-site monitoring wells using the method of Panno et al. (2005 and 2006).

5. The recommendations state "The rapid increase of the concentrations of salt related parameters within the groundwater at MW4 suggests that stormwater and/or shallow groundwater influenced by de-icing salt may be entering the well casing directly. As such, it is recommended that MW4 is inspected with a down-well CCTV camera to visually assess the integrity of the monitoring well and to determine if the monitoring well installation may be compromised." Please determine as soon as possible whether monitoring well MW4 is providing a conduit for road salt to enter the surficial aquifer. If MW4 is a conduit, the well should be decommissioned and a replacement should be installed.

An annual meeting is required in accordance with EA Condition 20.3(d). This meeting can coincide with the next regularly scheduled quarterly meeting between the Region and the MECP Regional Director, as an agenda item.

Thank you for the opportunity to comment on this project. If you have any questions, please contact Emilee O'Leary, Regional Environmental Assessment Coordinator at 416-326-3469 or by email at emilee.oleary@ontario.ca.

Sincerely,



Lisa Trevisan
Director, Central Region

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July 12, 2019

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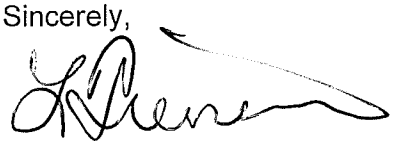

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Phil Dunn, Senior Environmental Officer, York Durham District Office, MECP
Gavin Battarino, Project Officer, Environmental Assessment and Permissions Branch, MECP

APPENDIX B

Table B-1 - Monitoring Well Construction Detail Summary

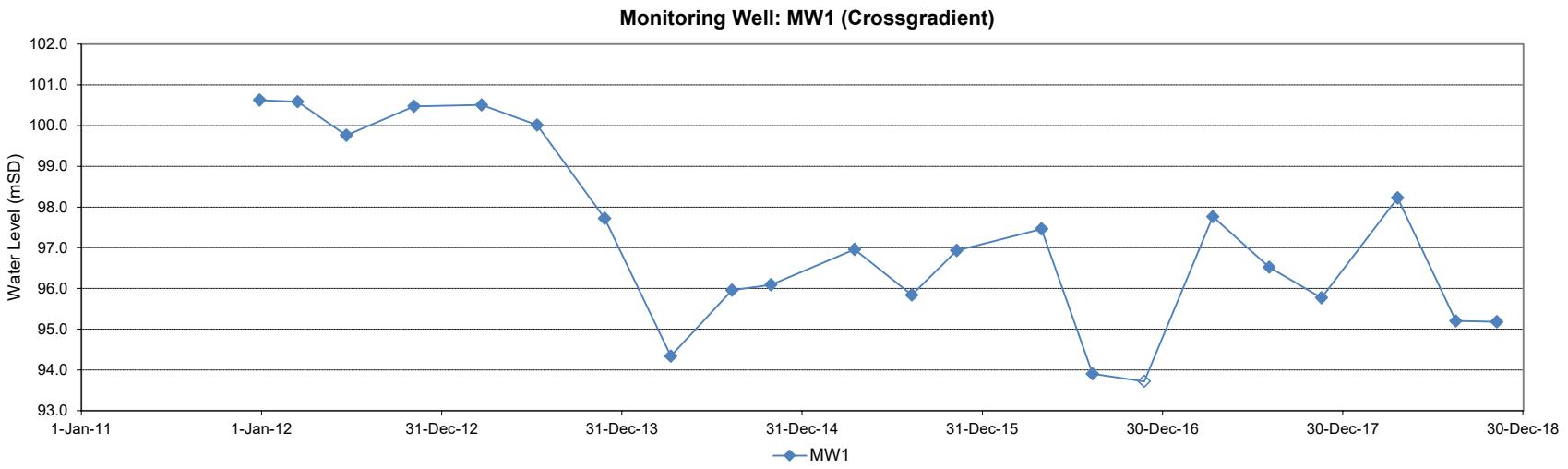
Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

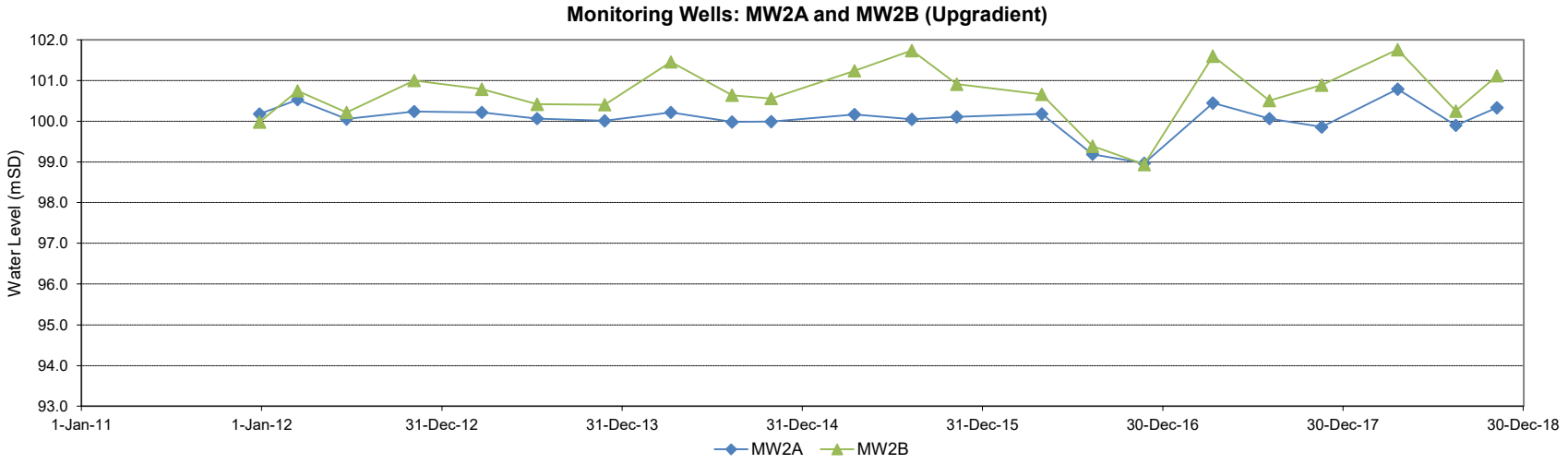
Monitoring Well ID	Monitor Type	Monitor Diameter	Measuring Point Elevation	Ground Surface Elevation	Monitor Stick-Up	Screen Interval			Filter Pack Interval			Bentonite Seal Interval			Surface Seal Interval		
		mm	mSD	mSD	m	mSD		mSD	mSD		mSD	mSD		mSD	mSD		mSD
MW1	**Standpipe**	51	102.32	101.29	1.03	95.19	-	93.67	95.50	-	93.67	101.29	-	95.50		-	
MW2A	**Piezometer**	51	103.03	102.01	1.02	94.39	-	92.87	94.69	-	92.82	102.01	-	94.69		-	
MW2B	**Standpipe**	51	103.08	102.01	1.07	97.46	-	95.94	97.77	-	95.94	102.01	-	97.77		-	
MW3A	**Piezometer**	51	96.22	95.17	1.05	87.63	-	86.10	87.93	-	86.10	93.95	-	87.93	95.17	-	93.95
MW3A-R	**Piezometer**	51	99.16	98.36	1.05	90.74	-	89.22	91.35	-	89.22	98.36	-	91.35		-	
MW3B	**Standpipe**	51	96.31	95.28	1.03	90.76	-	89.23	91.06	-	89.23	95.28	-	91.06		-	
MW3B-R	**Standpipe**	51	99.11	98.31	1.03	93.81	-	91.86	94.06	-	91.86	98.31	-	94.06		-	
MW4	**Standpipe**	51	98.49	97.53	0.96	95.25	-	93.72	95.55	-	93.72	97.17	-	95.55		-	
MW5A	**Piezometer**	51	102.79	101.96	1.05	94.81	-	93.36	95.16	-	93.36	101.96	-	95.16		-	
MW5B	**Standpipe**	51	102.75	101.97	1.03	97.47	-	95.97	97.77	-	95.87	101.97	-	97.77		-	

Notes:

1) mSD denotes metres relative to the assumed site datum.
2) Measuring Point denotes the top of the monitoring well riser pipe [i.e., top-of-pipe (TOP)].
3) Blank denotes data not available.
4) MW4 TOP measurement was adjusted based on the September 12, 2019, well inspection. The measuring point elevation increased by 0.22 metres.

APPENDIX C





NOTES:

1. Unfilled markers denote that the monitoring well was dry at the time of the monitoring event (i.e., groundwater level was below the total depth of the monitor).

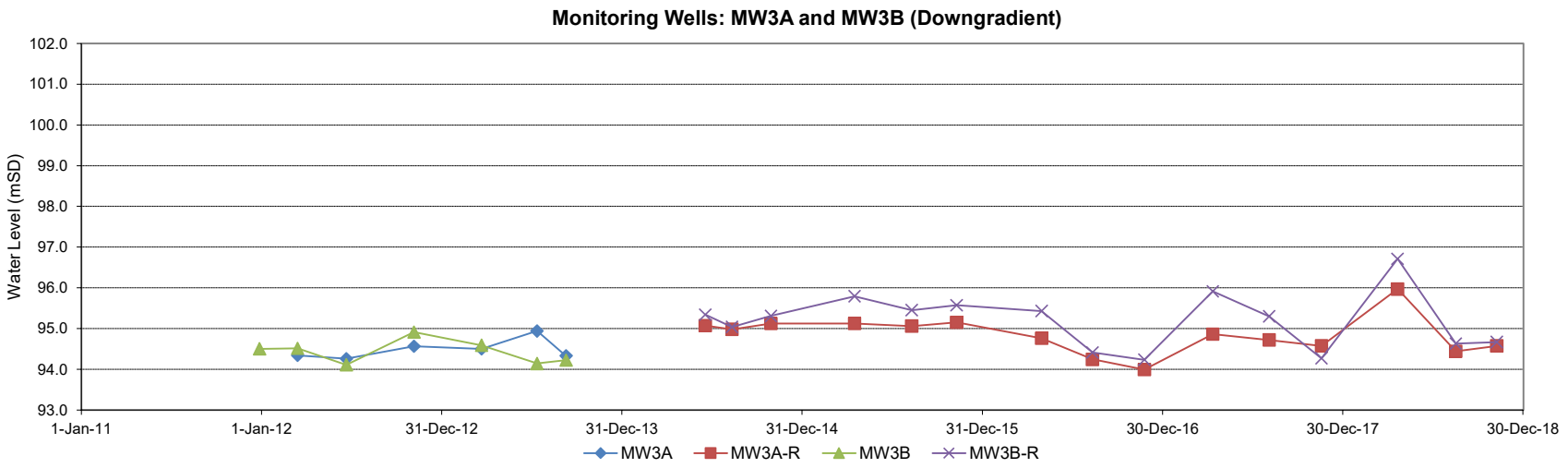
GROUNDWATER HYDROGRAPHS

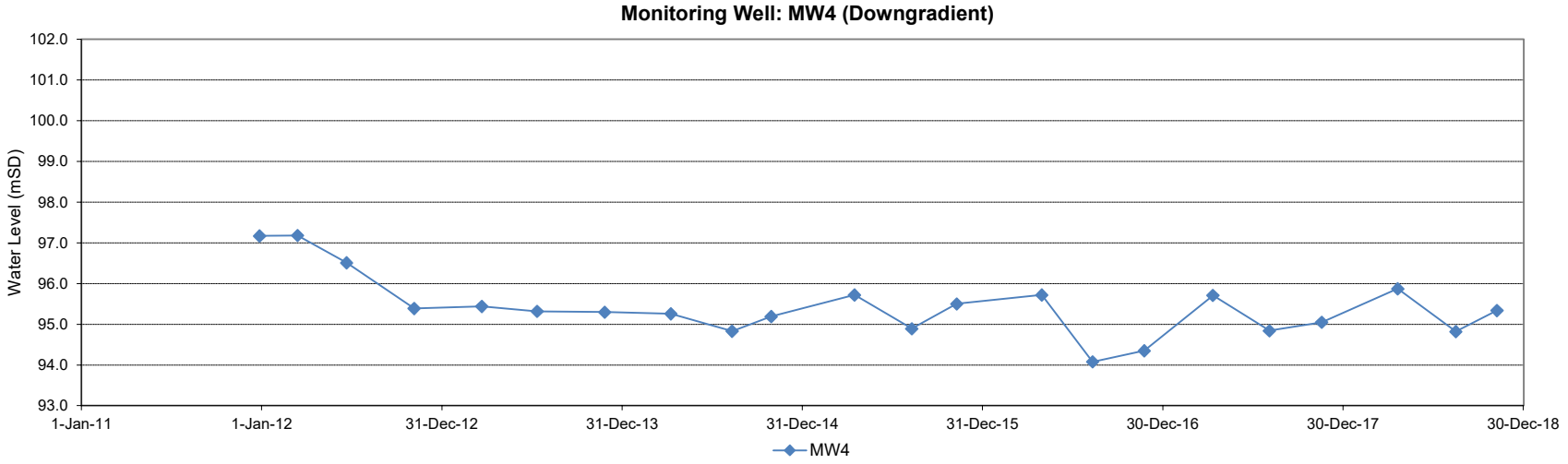
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
C-1	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**13/12/2018**

DATE PLOTTED: February 21, 2019





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GROUNDWATER HYDROGRAPHS

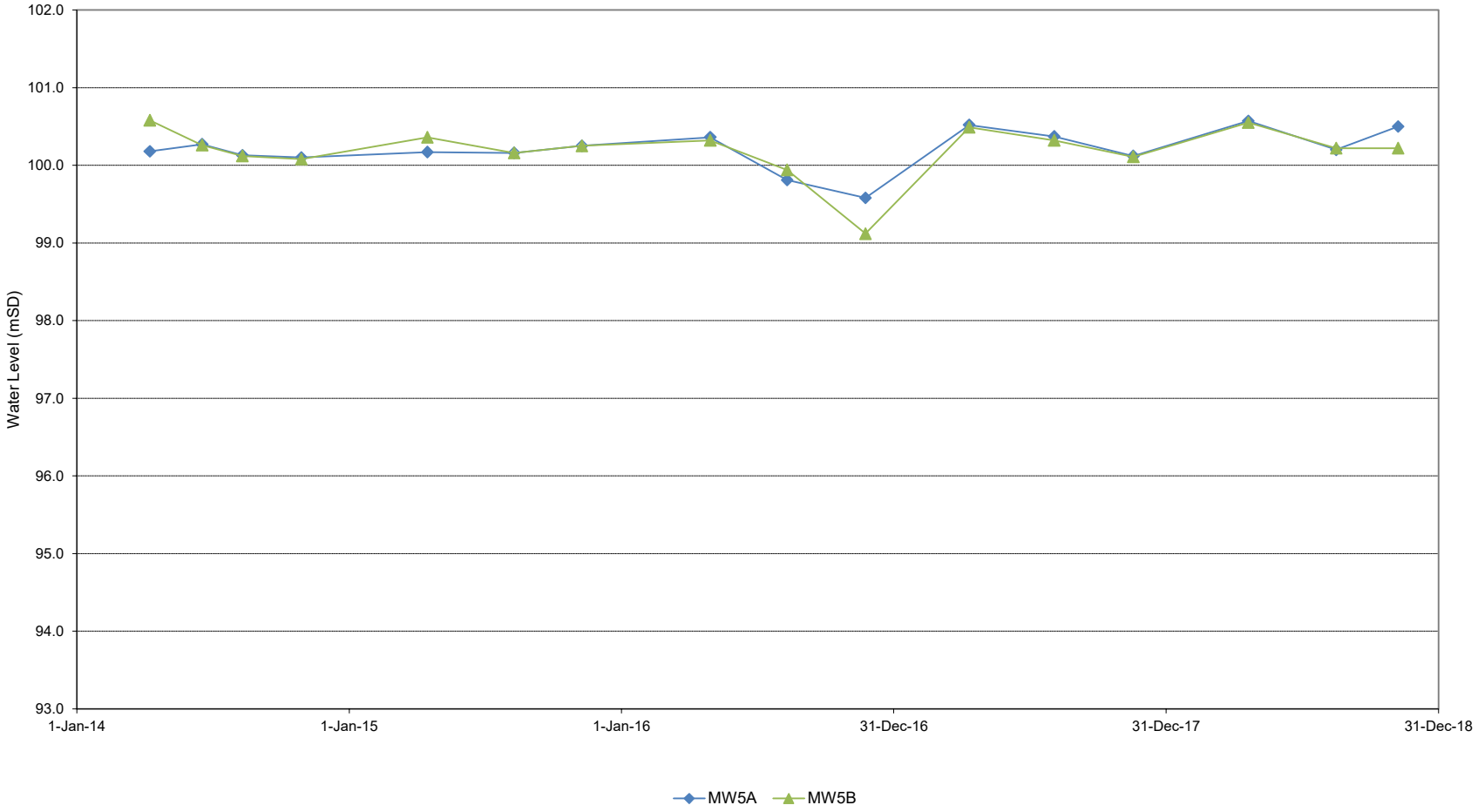
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
C-2	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**13/12/2018**

DATE PLOTTED: February 21, 2019

Monitoring Wells: MW5A and MW5B (Internal Assessment Wells)



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GROUNDWATER HYDROGRAPHS

2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
C-3	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**13/12/2018**

DATE PLOTTED: February 21, 2019

Table C-1 - Groundwater Elevations

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Monitor ID	Groundwater Elevations											
	MW1		MW2A		MW2B		MW3A		MW3A-R		MW3B	
Measuring Point Elevation (mSD)	102.32		103.03		103.08		96.22		99.16		96.31	
Units	mBTOP	mSD	mBTOP	mSD	mBTOP	mSD	mBTOP	mSD	mBTOP	mSD	mBTOP	mSD
28-Dec-11		100.62		100.18		99.98		**89.20**				94.50
14-Mar-12		100.58		100.53		100.75		94.34				94.51
21-Jun-12		99.76		100.06		100.22		94.26				94.11
5-Nov-12		100.47		100.24		101.00		94.56				94.91
22-Mar-13		100.50		100.22		100.79		94.50				94.59
12-Jul-13		100.01		100.07		100.42		94.94				94.14
9-Sep-13								94.33				94.22
26-Nov-13		97.72		100.01		100.41						
9-Apr-14		94.34		100.22		101.46				**93.52**		
18-Jun-14										95.07		
11-Aug-14		95.96		99.98		100.64				94.98		
29-Oct-14		96.09		99.99		100.56				95.12		
16-Apr-15		96.96		100.17		101.24				95.12		
10-Aug-15		95.84		100.05		101.74				95.06		
9-Nov-15		96.93		100.11		100.91				95.15		
29-Apr-16	4.86	97.46	2.85	100.18	2.42	100.66			4.40	94.76		
10-Aug-16	8.42	93.90	3.84	99.19	3.69	99.39			4.92	94.24		
23-Nov-16	Dry (< 8.60)		4.06	98.97	4.14	98.94			5.17	93.99		
11-Apr-17	4.56	97.76	2.58	100.45	1.48	101.60			4.30	94.86		
3-Aug-17	5.80	96.52	2.96	100.07	2.57	100.51			4.44	94.72		
17-Nov-17	6.55	95.77	3.17	99.86	2.19	100.89			4.59	94.57		
20-Apr-18	4.10	98.22	2.24	100.79	1.32	101.76			3.19	95.97		
16-Aug-18	7.12	95.20	3.13	99.90	2.83	100.25			4.72	94.44		
7-Nov-18	7.14	95.18	2.70	100.33	1.96	101.12			4.59	94.57		
17-Apr-19	4.29	98.03	2.53	100.50	1.69	101.39			4.30	94.86		
12-Nov-19	5.84	96.48	2.93	100.10	2.49	100.59			4.50	94.66		

Notes:

1) mSD denotes metres relative to the assumed site datum.
2) mBTOP denotes metres below the monitoring well riser top-of-pipe (TOP).
3) Bold denotes that water level elevation is assumed to be anomalous (anomalous data are not plotted in the relevant hydrographs).
4) Blank denotes data not available.
5) The measuring point elevations noted within this table for MW3A-R and MW3B-R do not match the respective top of pipe (TOP) elevations noted within Table B-1 (Monitor Construction Details) and therefore, the calculated groundwater elevations for these monitoring wells should be interpreted with caution.

Table C-1 - Groundwater Elevations

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Monitor ID	Groundwater Elevations							
	MW3B-R		MW4 *		MW5A		MW5B	
Measuring Point Elevation (mSD)	99.11		98.49		102.75		102.79	
Units	mBTOP	mSD	mBTOP	mSD	mBTOP	mSD	mBTOP	mSD
28-Dec-11				97.17				
14-Mar-12				97.18				
21-Jun-12				96.51				
5-Nov-12				95.39				
22-Mar-13				95.44				
12-Jul-13				95.32				
9-Sep-13								
26-Nov-13				95.30				
9-Apr-14		**92.40**		95.26		100.18		100.58
18-Jun-14		95.34				100.27		100.26
11-Aug-14		95.04		94.83		100.13		100.12
29-Oct-14		95.31		95.19		100.10		100.08
16-Apr-15		95.79		95.72		100.17		100.36
10-Aug-15		95.45		94.89		100.16		100.16
9-Nov-15		95.57		95.50		100.25		100.25
29-Apr-16	3.68	95.43	2.55	95.94	2.39	100.36	2.47	100.32
10-Aug-16	4.70	94.41	4.19	94.30	2.94	99.81	2.85	99.94
23-Nov-16	4.88	94.23	3.92	94.57	3.17	99.58	3.67	99.12
11-Apr-17	3.20	95.91	2.56	95.93	2.23	100.52	2.30	100.49
3-Aug-17	3.81	95.30	3.43	95.06	2.38	100.37	2.47	100.32
17-Nov-17	4.84	94.27	3.22	95.27	2.63	100.12	2.68	100.11
20-Apr-18	2.40	96.71	2.40	96.09	2.18	100.57	2.24	100.55
16-Aug-18	4.48	94.63	3.45	95.04	2.55	100.20	2.57	100.22
7-Nov-18	4.44	94.67	2.93	95.56	2.25	100.50	2.23	100.56
17-Apr-19	3.39	95.72	2.35	96.14	2.38	100.37	2.38	100.41
12-Nov-19	4.12	94.99	2.86	95.63	2.51	100.24	2.61	100.18

Notes:

1) mSD denotes metres relative to the assumed site datum.
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4) Blank denotes data not available.
5) The measuring point elevations noted within this table for MW3A-R and MW3B-R do not match the respective top of pipe (TOP) elevations noted within Table B-1 (Monitor Construction Details) and therefore, the calculated groundwater elevations for these monitoring wells should be interpreted with caution.
6) MW4 TOP measurement adjusted based on September 12, 2019 field measurements. TOP was increased by 0.22 metres.

Table C-2 - Hydraulic Gradients

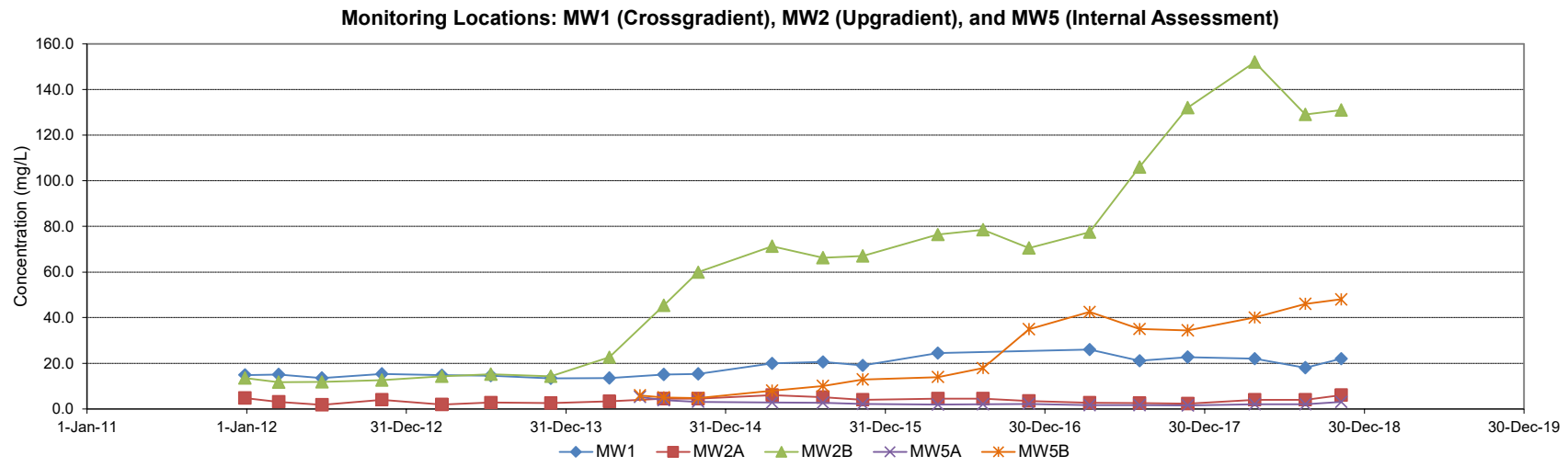
Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

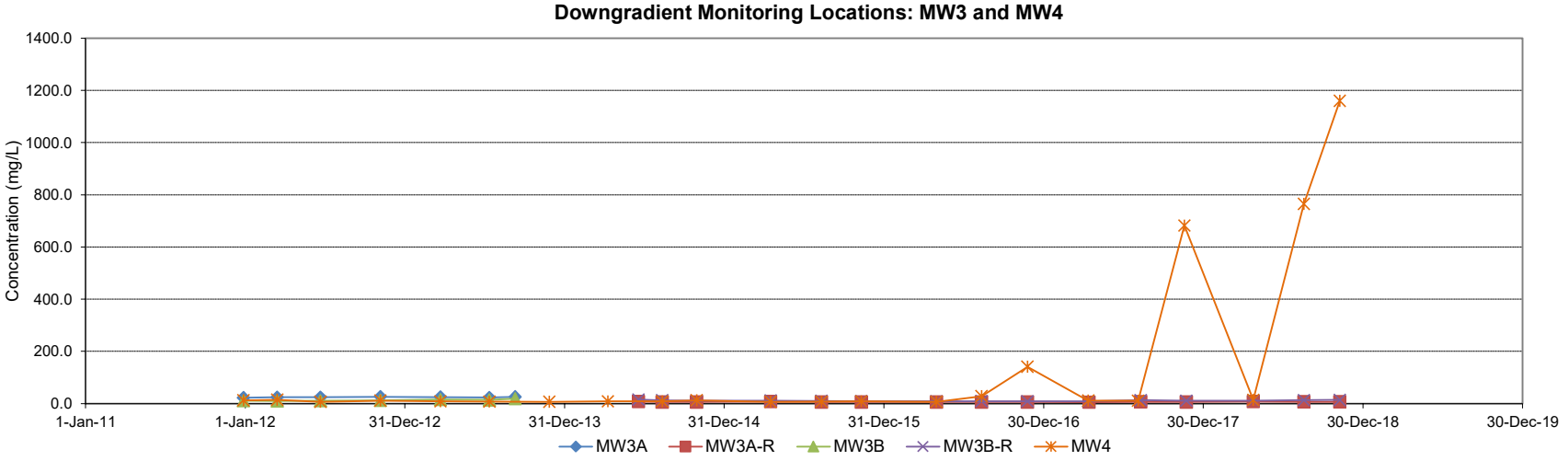
Monitoring Well	MW2B	MW2A	Hydraulic Gradient (m/m)	MW3B-R	MW3A R	Hydraulic Gradient (m/m)	MW5B	MW5A	Hydraulic Gradient (m/m)
Measuring Point Elevation (mSD)	103.08	103.03		99.11	99.16		102.79	102.75	
Top of Screen (mSD)	97.46	94.39		93.81	90.74		97.47	94.81	
Bottom of Screen (mSD)	95.94	92.87		91.86	89.22		95.97	93.36	
Screen Midpoint (mSD)	96.70	93.63		92.84	89.98		96.72	94.09	
Date	Water Levels (mSD)			Water Levels (mSD)			Water Levels (mSD)		
28-Dec-11	**99.98**	**100.18**	-0.07						
14-Mar-12	**100.75**	**100.53**	0.07						
21-Jun-12	**100.22**	**100.06**	0.05						
5-Nov-12	**101.00**	**100.24**	0.25						
22-Mar-13	**100.79**	**100.22**	0.19						
12-Jul-13	**100.42**	**100.07**	0.11						
9-Sep-13									
26-Nov-13	**100.41**	**100.01**	0.13						
9-Apr-14	**101.46**	**100.22**	0.40				**100.58**	**100.18**	0.15
18-Jun-14				**95.34**	**95.07**	0.09	**100.26**	**100.27**	0.00
11-Aug-14	**100.64**	**99.98**	0.21	**95.04**	**94.98**	0.02	**100.12**	**100.13**	0.00
29-Oct-14	**100.56**	**99.99**	0.19	**95.31**	**95.12**	0.07	**100.08**	**100.10**	-0.01
16-Apr-15	**101.24**	**100.17**	0.35	**95.79**	**95.12**	0.23	**100.36**	**100.17**	0.07
10-Aug-15	**101.74**	**100.05**	0.55	**95.45**	**95.06**	0.14	**100.16**	**100.16**	0.00
9-Nov-15	**100.91**	**100.11**	0.26	**95.57**	**95.15**	0.15	**100.25**	**100.25**	0.00
29-Apr-16	**100.66**	**100.18**	0.16	**95.43**	**94.76**	0.23	**100.32**	**100.36**	-0.02
10-Aug-16	**99.39**	**99.19**	0.07	**94.41**	**94.24**	0.06	**99.94**	**99.81**	0.05
23-Nov-16	**98.94**	**98.97**	-0.01	**94.23**	**93.99**	0.08	**99.12**	**99.58**	-0.17
11-Apr-17	**101.60**	**100.45**	0.37	**95.91**	**94.86**	0.37	**100.49**	**100.52**	-0.01
3-Aug-17	**100.51**	**100.07**	0.14	**95.30**	**94.72**	0.20	**100.32**	**100.37**	-0.02
17-Nov-17	**100.89**	**99.86**	0.34	**94.27**	**94.57**	-0.11	**100.11**	**100.12**	0.00
20-Apr-18	**101.76**	**100.79**	0.32	**96.71**	**95.97**	0.26	**100.55**	**100.57**	-0.01
16-Aug-18	**100.25**	**99.90**	0.11	**94.63**	**94.44**	0.07	**100.22**	**100.20**	0.01
7-Nov-18	**101.12**	**100.33**	0.26	**94.67**	**94.57**	0.04	**100.56**	**100.50**	0.02
17-Apr-19	**101.39**	**100.50**	0.29	**95.72**	**94.86**	0.30	**100.41**	**100.37**	0.02
12-Nov-19	**101.59**	**100.10**	0.49	**94.99**	**94.66**	0.12	**100.18**	**100.24**	-0.02

Notes:

1) mSD denotes metres relative to an assumed site datum.
2) Bold denotes that the water level is above the top of the well screen (i.e., the well screen is fully submerged).
3) The hydraulic gradient is calculated as the difference in water level elevation between the shallow and deep monitoring wells, divided by the difference in the screen midpoint elevation. Where a water level within the well screen, the difference between the water level and bottom of the well screen is used to calculate the screen midpoint.
4) A positive hydraulic gradient indicates downward groundwater movement, while a negative hydraulic gradient indicates upward groundwater movement.
5) MW3A and MW3B were decommissioned in September 2013 and replaced in March 2014 as MW3A-R and MW3B-R, respectively.
6) Blank denotes data not available.

APPENDIX D





NOTES:

1. mg/L denotes milligrams per litre.

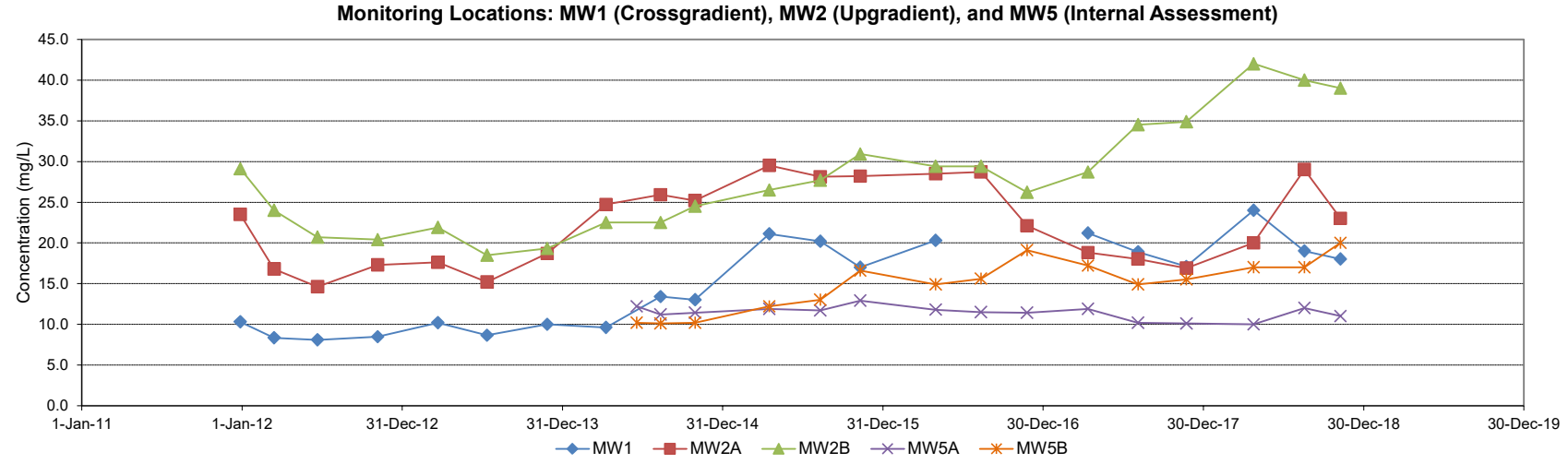
CONCENTRATION VS. TIME PLOT
CHLORIDE

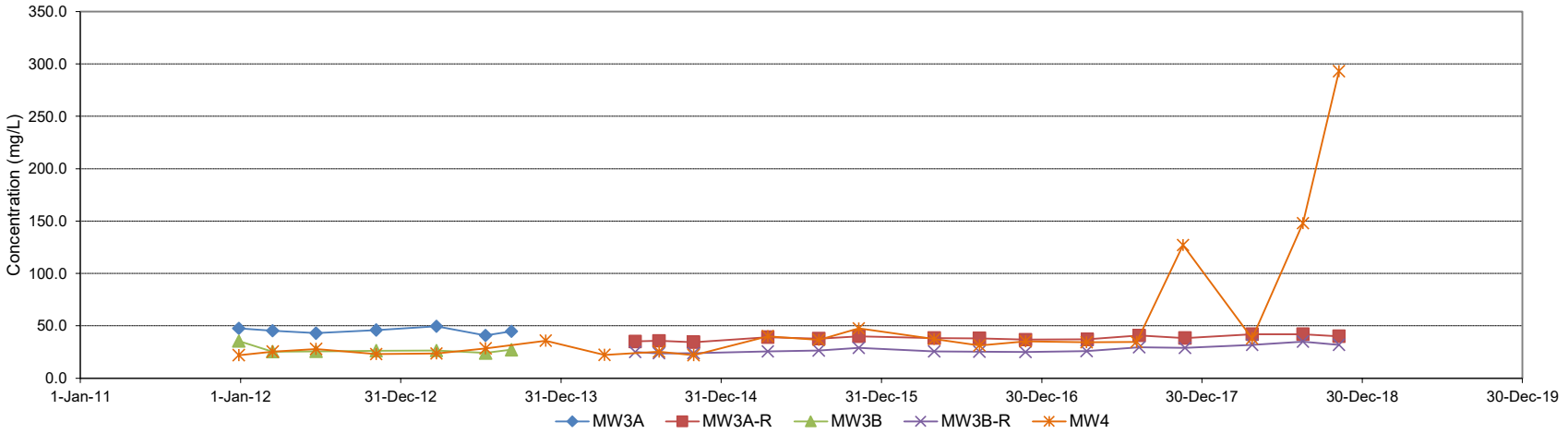
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-1	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019





NOTES:

1. mg/L denotes milligrams per litre.

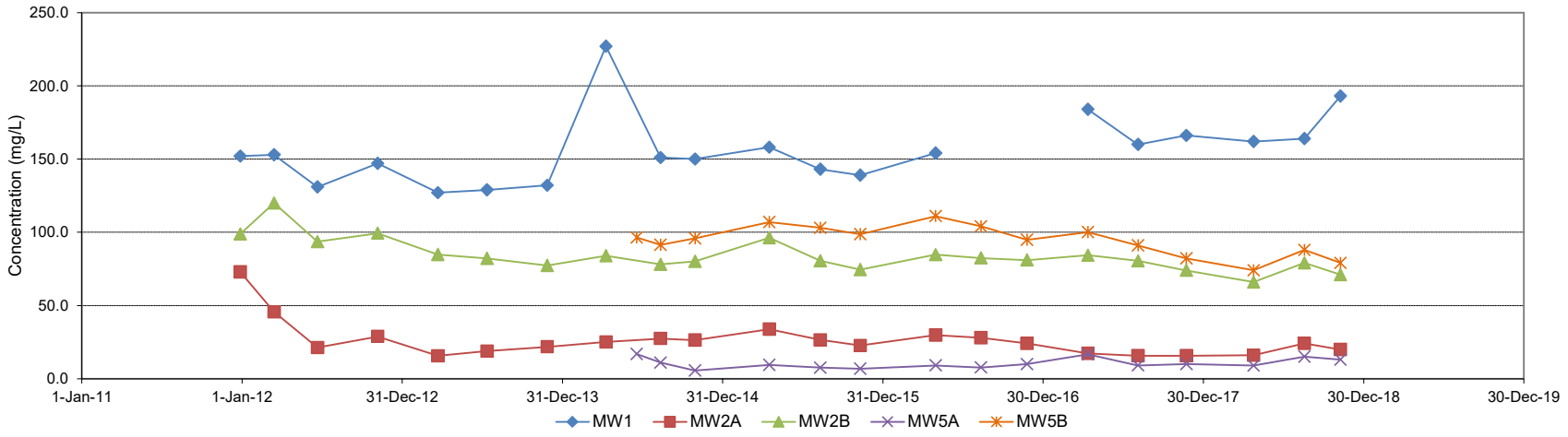
CONCENTRATION VS. TIME PLOT
SODIUM

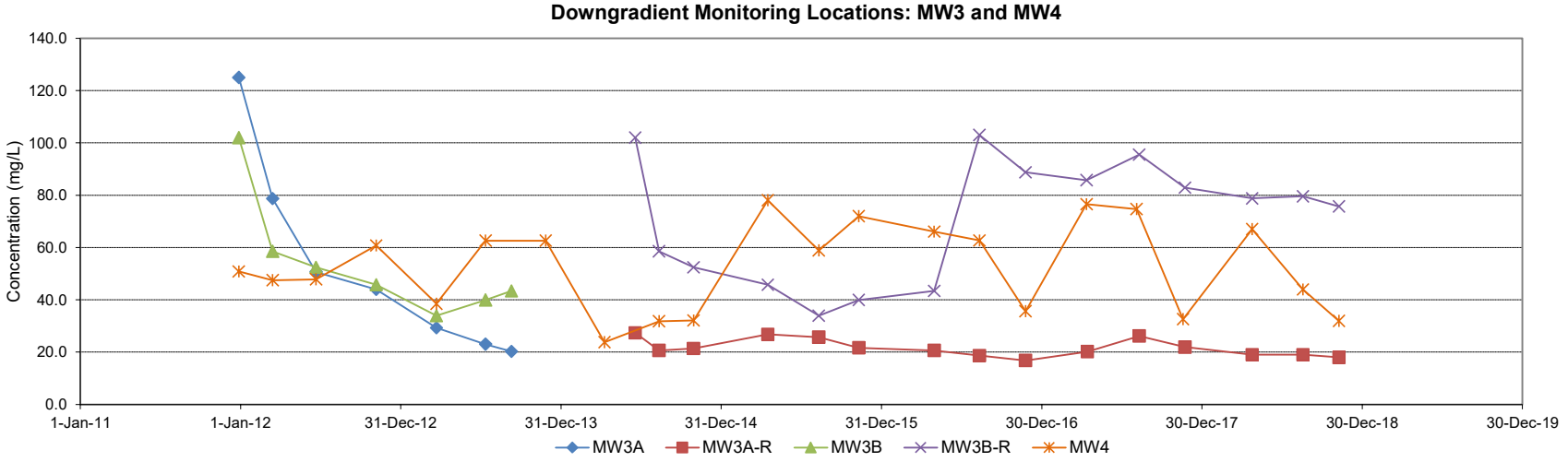
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-2	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019





NOTES:

1. mg/L denotes milligrams per litre.

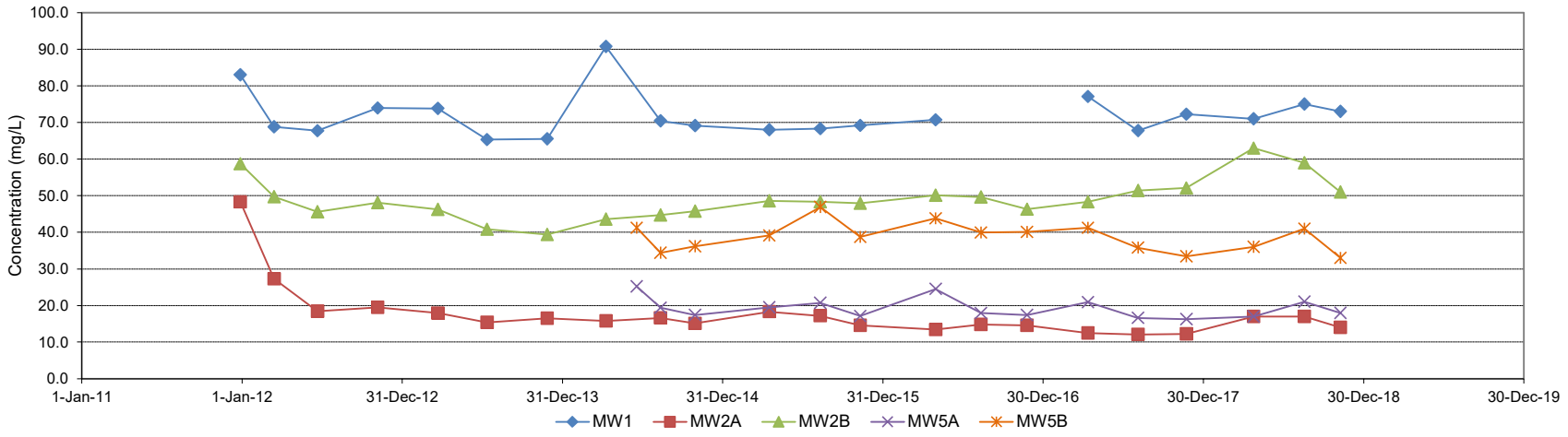
CONCENTRATION VS. TIME PLOT
SULPHATE

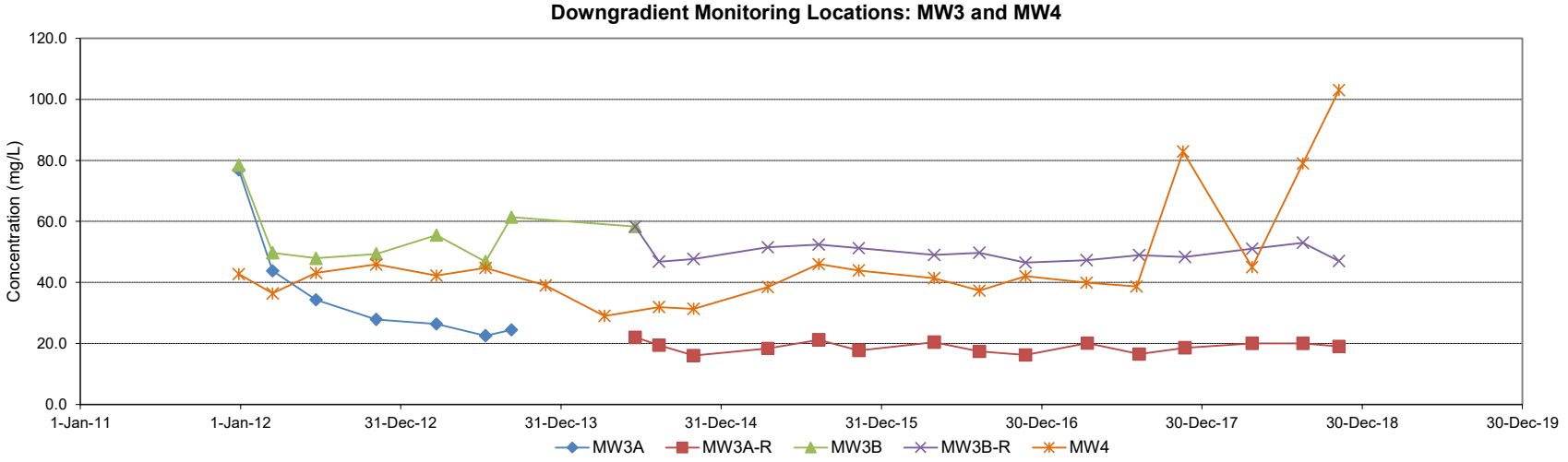
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-3	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019





NOTES:

1. mg/L denotes milligrams per litre.

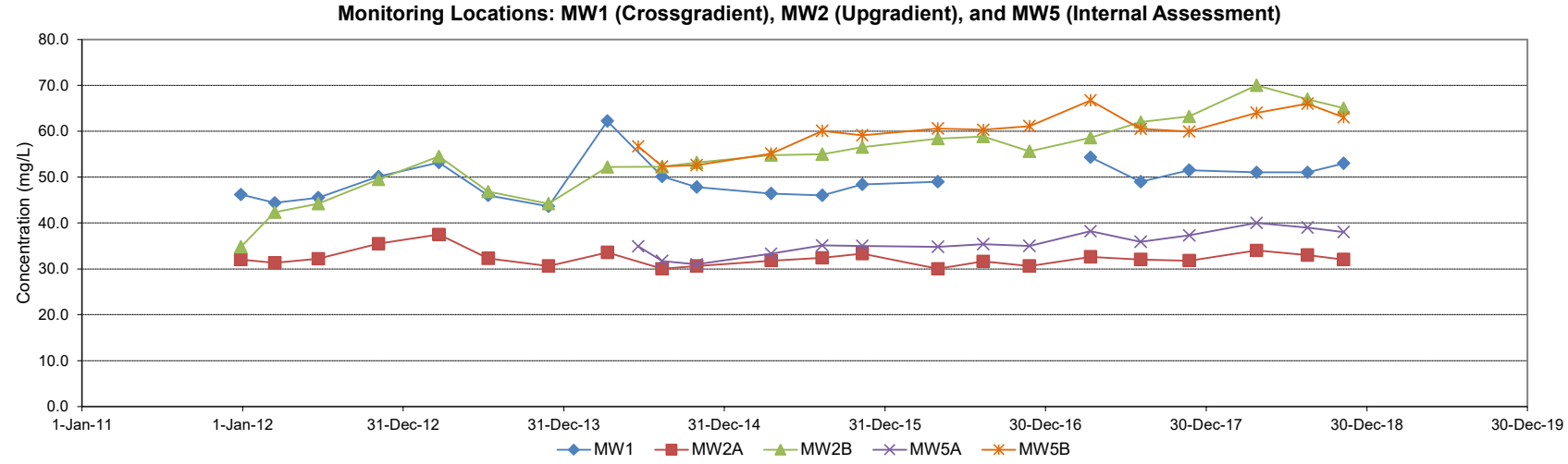
CONCENTRATION VS. TIME PLOT
CALCIUM

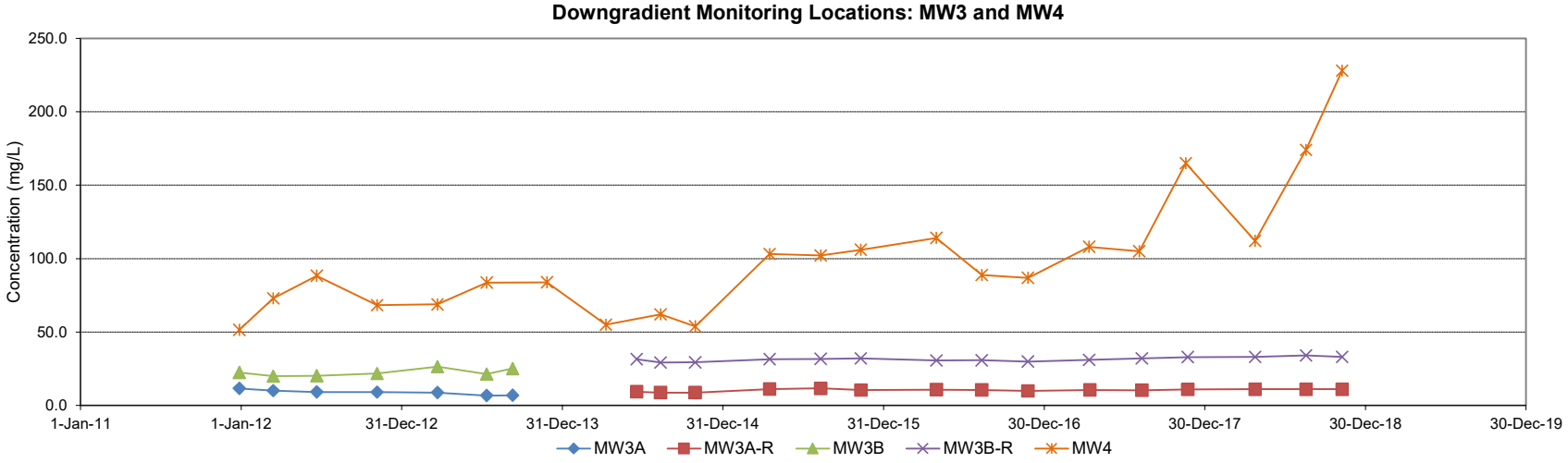
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-4	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019





NOTES:

1. mg/L denotes milligrams per litre.

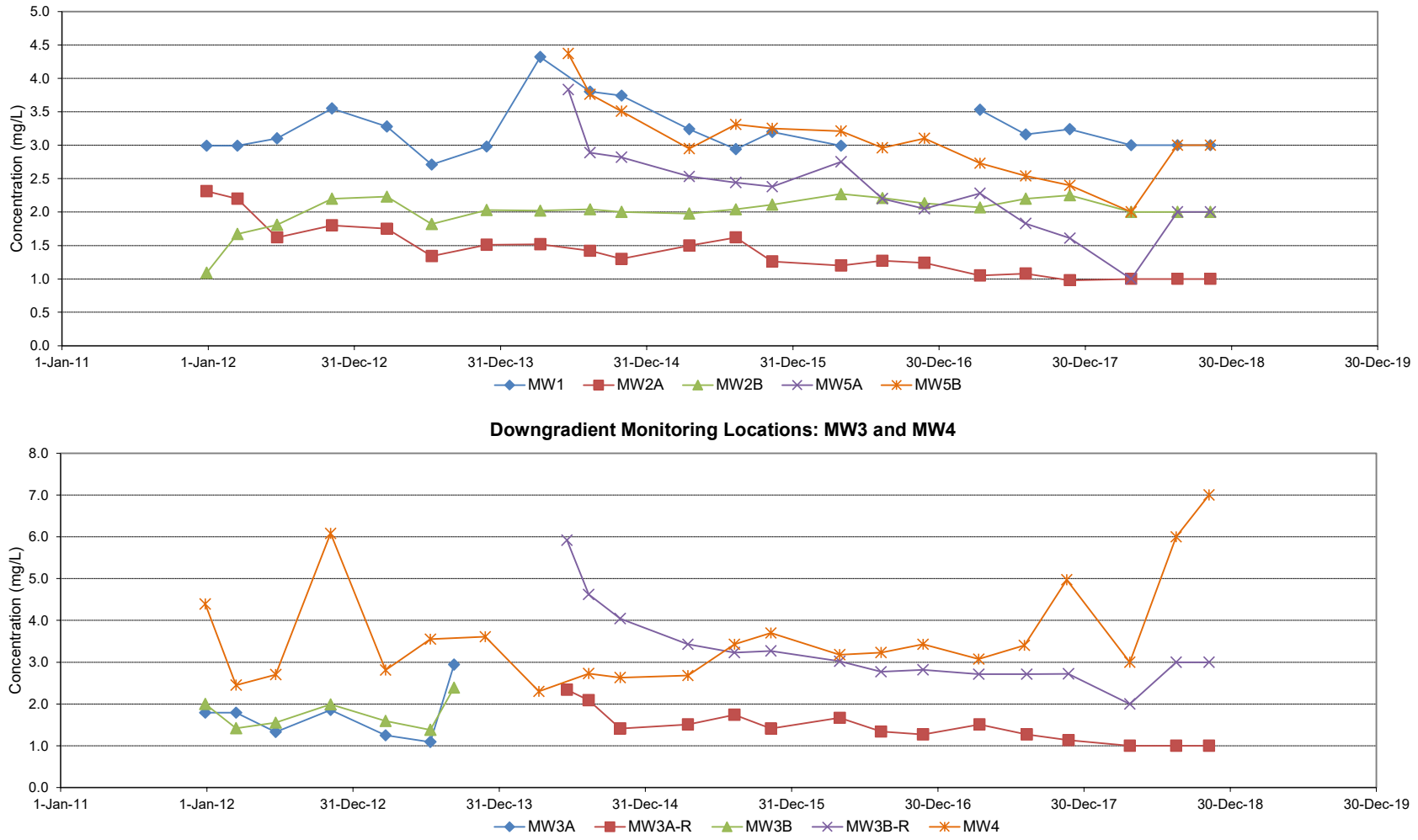
CONCENTRATION VS. TIME PLOT
MAGNESIUM

2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-5	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019



NOTES:

1. mg/L denotes milligrams per litre.

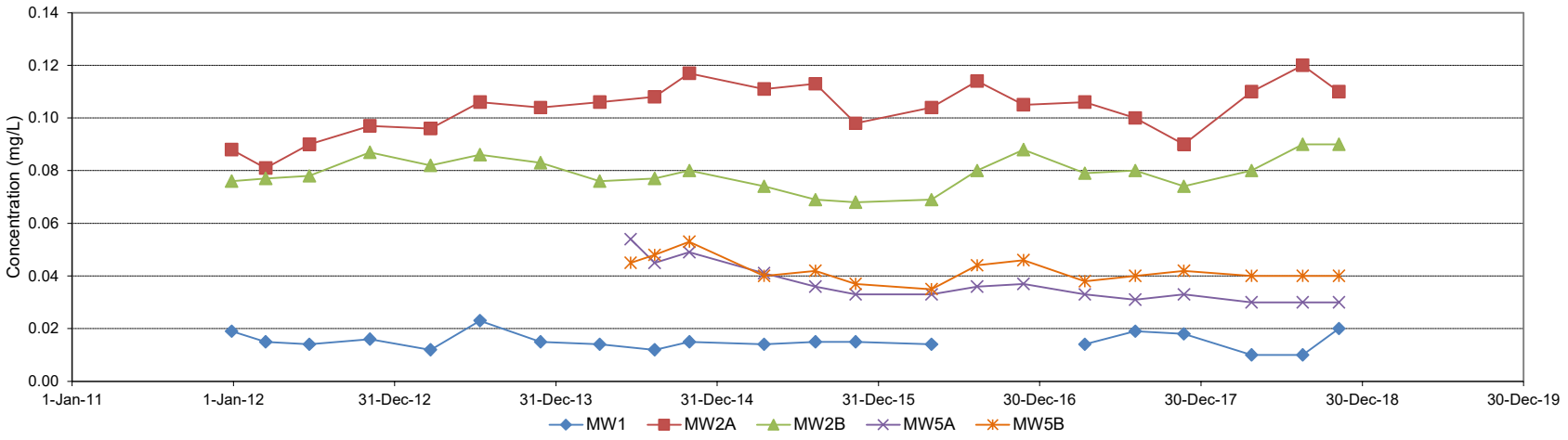
CONCENTRATION VS. TIME PLOT
POTASSIUM

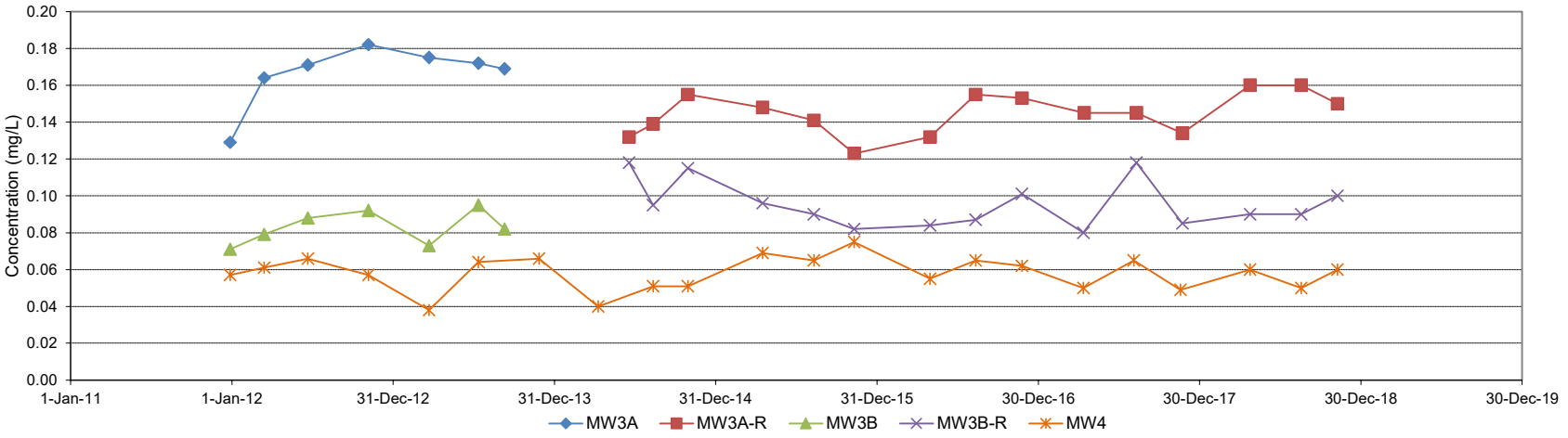
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-6	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019





NOTES:

1. mg/L denotes milligrams per litre.

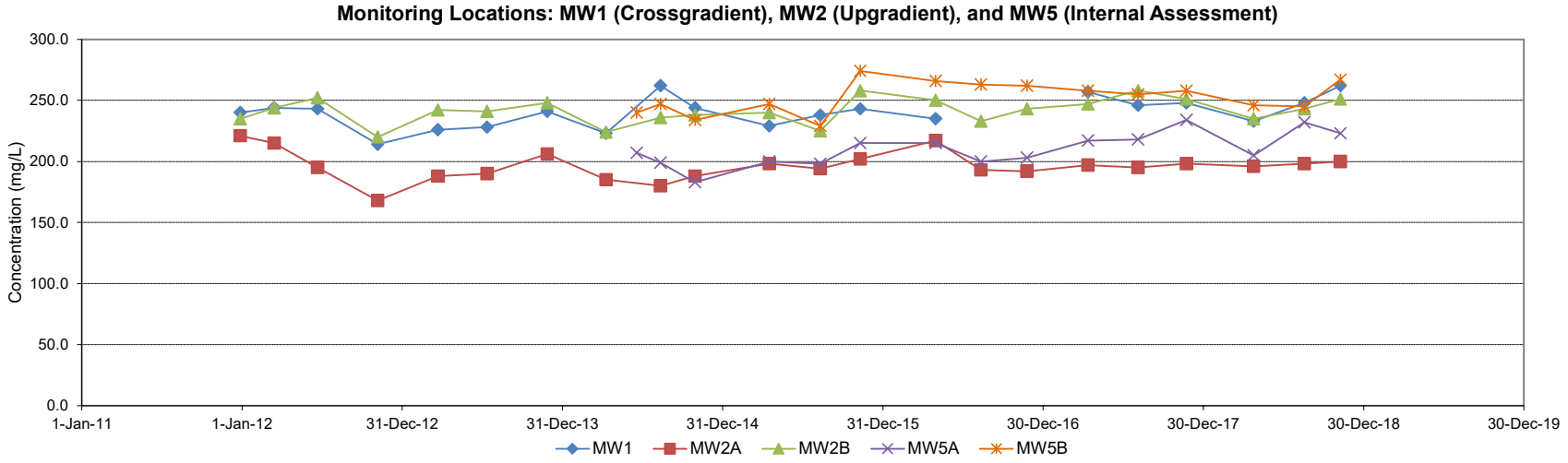
CONCENTRATION VS. TIME PLOT
BORON

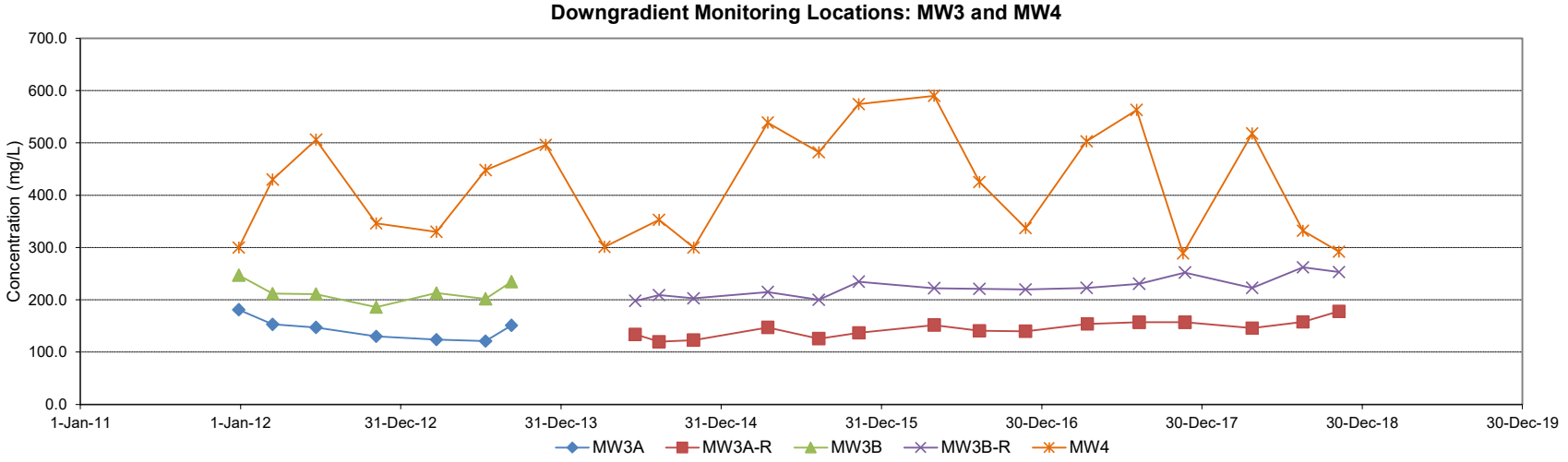
2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-7	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019





NOTES:

1. mg/L denotes milligrams per litre.

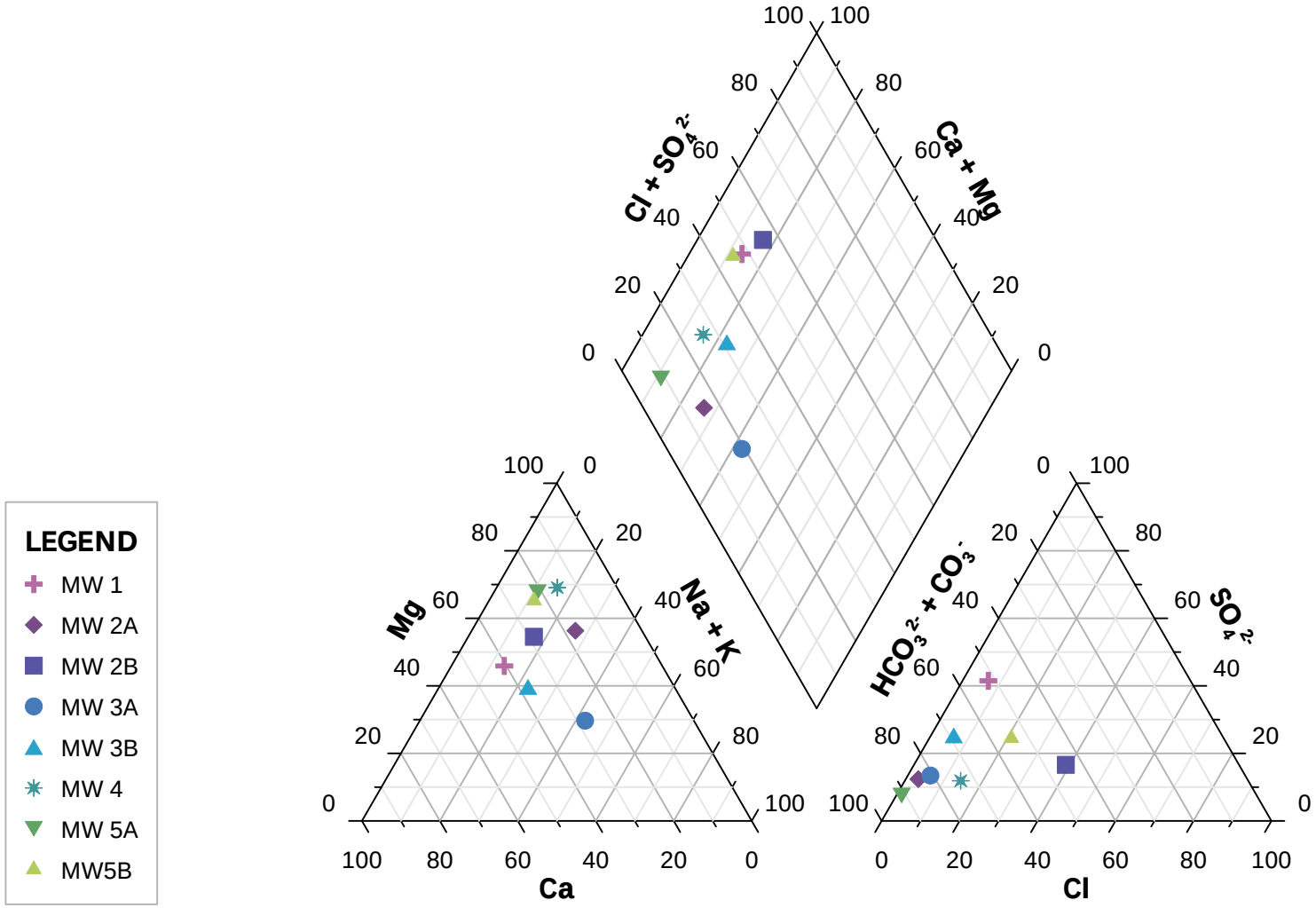
CONCENTRATION VS. TIME PLOT
BICARBONATE

2018 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-8	**1604066**
APPROX. SCALE	DATE REVISED
NTS	**15/01/2019**

DATE PLOTTED: February 21, 2019



NOTES:

1. Data obtained from the April 2019 monitoring event.

PIPER PLOT

2019 ANNUAL MONITORING REPORT

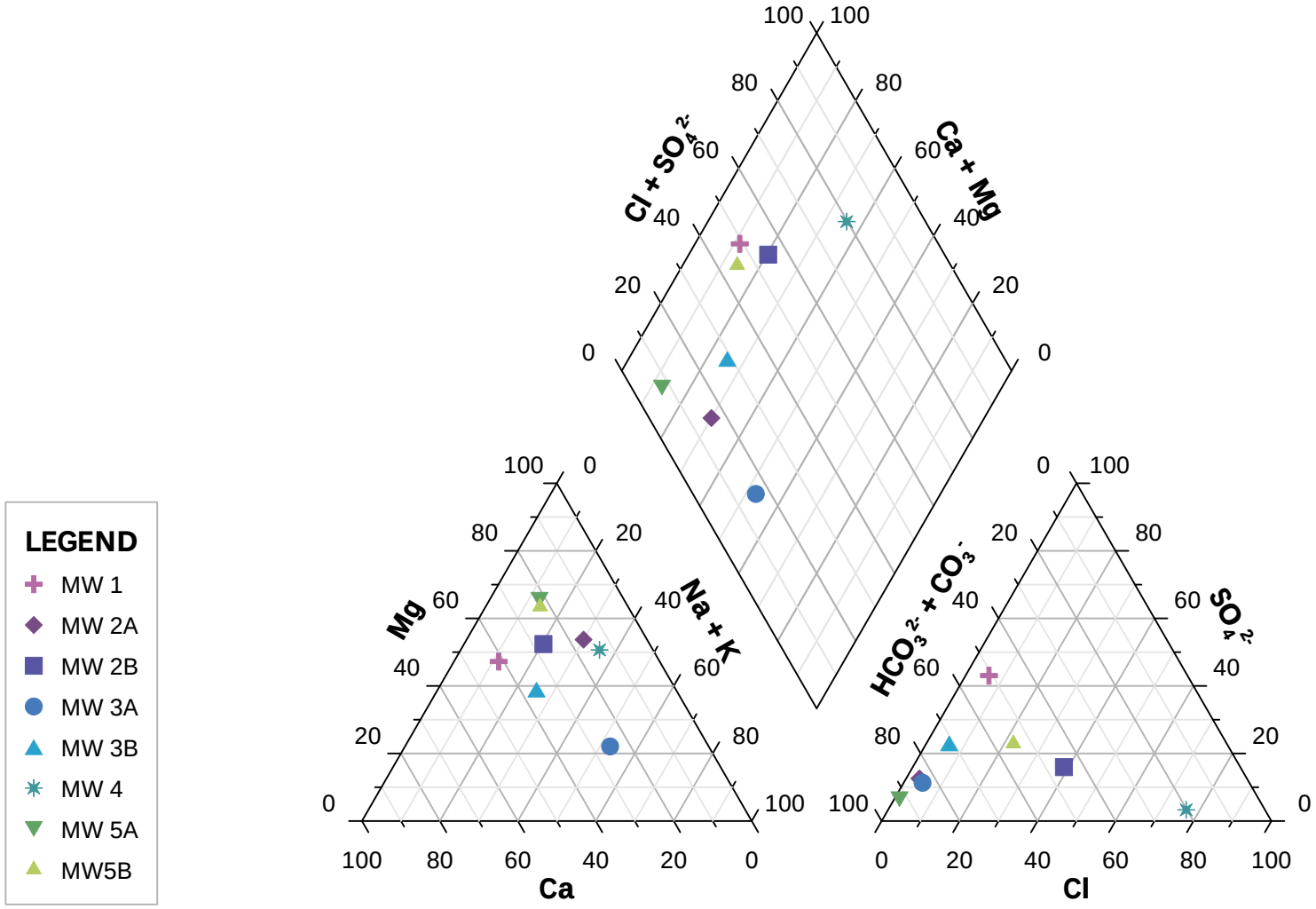
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER
D-9

APPROX. SCALE
-

PROJECT NUMBER
1604066

DATE REVISED
Jan 16, 2020



NOTES:

1. Data obtained from the November 2019 monitoring event.

PIPER PLOT

2019 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER
D-10

APPROX. SCALE
-

PROJECT NUMBER
1604066

DATE REVISED
Jan 16, 2020

Table D-1 - Groundwater Field Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Monitor ID	Date	Temperature	pH	Conductivity	ORP
		°C	pH units	µS/cm	Unitless
MW1	18-Apr-19	10.1	7.68	790	107
	13-Nov-19	9.8	7.73	750	5
MW2A	18-Apr-19	10.7	8.08	390	51
	13-Nov-19	9.9	8.14	410	27
MW2B	18-Apr-19	11.0	7.60	920	24
	13-Nov-19	10.0	7.63	950	-1
MW3A-R	18-Apr-19	10.7	7.90	360	-77
	13-Nov-19	9.6	7.65	320	-73
MW3B-R	18-Apr-19	10.5	7.72	610	-11
	13-Nov-19	8.9	7.89	610	9
MW4	18-Apr-19	7.6	7.38	1130	109
	13-Nov-19	10.2	7.54	2570	119
MW5A	18-Apr-19	9.7	8.01	410	22
	13-Nov-19	9.4	7.98	430	58
MW5B	18-Apr-19	9.2	8.00	770	53
	13-Nov-19	10.1	7.94	341	11

Notes:

1) µS/cm denotes micro-Siemens per centimetre.
2) ORP denotes oxidation-reduction potential.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1
			28-Dec-11	14-Mar-12	21-Jun-12	5-Nov-12	22-Mar-13	12-Jul-13	26-Nov-13	9-Apr-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		240	244	243	214	226	228	241	223	262	244	229	238
Carbonate	mg/L		<5	<5	<5	6	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	14.9	15	13.5	15.3	14.8	14.6	13.4	13.5	15	15.3	19.9	20.5
Sulphate	mg/L	500 (AO)	152	153	131	147	127	129	132	227	151	150	158	143
Calcium	mg/L		83	68.8	67.7	73.9	73.8	65.3	65.5	90.7	70.4	69.1	68	68.3
Magnesium	mg/L		46.2	44.4	45.5	50.1	53.2	46	43.6	62.2	50.1	47.8	46.4	46
Sodium	mg/L	200 (AO) *	10.3	8.34	8.09	8.46	10.2	8.64	10	9.6	13.4	13	21.1	20.2
Potassium	mg/L		2.99	2.99	3.1	3.55	3.28	2.71	2.98	4.32	3.8	3.74	3.24	2.94
Boron	mg/L	5 (IMAC)	0.019	0.015	0.014	0.016	0.012	0.023	0.015	0.014	0.012	0.015	0.014	0.015
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Cobalt	mg/L		0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1
			9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	3-Aug-17	21-Nov-17	23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	18-Apr-19
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		243	235			257	246	248	233	248	262	243	243
Carbonate	mg/L		8	<5	INS	INS	<5	<5	<5	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH
Chloride	mg/L	250 (AO)	19	24.4			26	21.1	22.7	22	18	22	18	18
Sulphate	mg/L	500 (AO)	139	154			184	160	166	162	164	193	153	153
Calcium	mg/L		69.2	70.7			77.1	67.8	72.2	71	75	73	67	67
Magnesium	mg/L		48.4	49			54.3	49	51.5	51	51	53	46	46
Sodium	mg/L	200 (AO) *	17	20.3			21.2	18.9	17.1	24	19	18	24	24
Potassium	mg/L		3.2	2.99			3.53	3.16	3.24	3	3	3	3	3
Boron	mg/L	5 (IMAC)	0.015	0.014			0.014	0.019	0.018	0.01	0.01	0.02	0.02	0.02
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001			<0.002	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.001	<0.001			<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.002	<0.002			<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
2) OG = Operational Guideline; AO = Aesthetic Objective; MAC = Maximum Acceptable Concentration; and IMAC = Interim Maximum Acceptable Concentration.
3) < denotes analyte concentration is below the laboratory reportable detection limit (RDL) or the method reporting limit (MRL).
4) Bold and Shaded denotes exceedance of the ODWS.
5) * denotes that the aesthetic objective for sodium in drinking water is 200 mg/L, per the ODWS. As noted in the ODWS, the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW1
			13-Nov-19
Laboratory			Eurofins
Bicarbonate	mg/L		248
Carbonate	mg/L		N/A-PH
Chloride	mg/L	250 (AO)	17
Sulphate	mg/L	500 (AO)	165
Calcium	mg/L		62
Magnesium	mg/L		43
Sodium	mg/L	200 (AO) *	18
Potassium	mg/L		3
Boron	mg/L	5 (IMAC)	0.04
Cadmium	mg/L	0.005 (MAC)	<0.0001
Cobalt	mg/L		<0.0002
Lead	mg/L	0.01 (MAC)	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
2) OG = Operational Guideline; AO = Aesthetic Objective; MAC = Maximum Acceptable Concentration; and IMAC = Interim Maximum Acceptable Concentration.
3) < denotes analyte concentration is below the laboratory reportable detection limit (RDL) or the method reporting limit (MRL).
4) Bold and Shaded denotes exceedance of the ODWS.
5) * denotes that the aesthetic objective for sodium in drinking water is 200 mg/L, per the ODWS. As noted in the ODWS, the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A
			28-Dec-11	14-Mar-12	21-Jun-12	5-Nov-12	22-Mar-13	12-Jul-13	26-Nov-13	9-Apr-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		221	215	195	168	188	190	206	185	180	188	198	194
Carbonate	mg/L		<5	<5	<5	7	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	4.72	3.17	1.81	4	1.92	2.74	2.52	3.32	4.46	4.47	6.08	5.14
Sulphate	mg/L	500 (AO)	72.9	45.7	21.2	28.8	15.6	18.9	21.8	25.1	27.5	26.3	33.8	26.5
Calcium	mg/L		48.3	27.3	18.4	19.5	17.9	15.4	16.5	15.8	16.6	15.1	18.3	17.2
Magnesium	mg/L		32	31.3	32.2	35.5	37.5	32.3	30.6	33.6	30	30.6	31.8	32.4
Sodium	mg/L	200 (AO) *	23.5	16.8	14.6	17.3	17.6	15.2	18.7	24.7	25.9	25.2	29.5	28.1
Potassium	mg/L		2.31	2.2	1.62	1.8	1.75	1.34	1.51	1.52	1.42	1.3	1.5	1.62
Boron	mg/L	5 (IMAC)	0.088	0.081	0.09	0.097	0.096	0.106	0.104	0.106	0.108	0.117	0.111	0.113
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Cobalt	mg/L		0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A	MW2A
			9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	3-Aug-17	21-Nov-17	23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		202	217	193	192	197	195	198	196	198	200	215	212
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	N/A-PH	N/A-PH	N/A-PH	5	N/A-PH
Chloride	mg/L	250 (AO)	4.02	4.48	4.49	3.46	2.71	2.51	2.36	4	4	6	5	5
Sulphate	mg/L	500 (AO)	22.7	29.9	28	24	17.3	15.7	15.7	16	24	20	26	25
Calcium	mg/L		14.6	13.4	14.8	14.6	12.5	12.1	12.2	17	17	14	16	14
Magnesium	mg/L		33.3	30	31.6	30.6	32.6	32	31.8	34	33	32	32	28
Sodium	mg/L	200 (AO) *	28.2	28.5	28.7	22.1	18.8	18	16.9	20	29	23	28	29
Potassium	mg/L		1.26	1.2	1.27	1.24	1.05	1.08	0.98	1	1	1	1	1
Boron	mg/L	5 (IMAC)	0.098	0.104	0.114	0.105	0.106	0.1	0.09	0.11	0.12	0.11	0.11	0.12
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
2) OG = Operational Guideline; AO = Aesthetic Objective; MAC = Maximum Acceptable Concentration; and IMAC = Interim Maximum Acceptable Concentration.
3) < denotes analyte concentration is below the laboratory reportable detection limit (RDL) or the method reporting limit (MRL).
4) Bold and Shaded denotes exceedance of the ODWS.
5) * denotes that the aesthetic objective for sodium in drinking water is 200 mg/L, per the ODWS. As noted in the ODWS, the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B
			28-Dec-11	14-Mar-12	21-Jun-12	5-Nov-12	22-Mar-13	12-Jul-13	26-Nov-13	9-Apr-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		235	244	252	220	242	241	248	224	236	238	240	225
Carbonate	mg/L		<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	13.5	11.7	11.8	12.6	14.2	15.2	14.3	22.6	45.4	59.9	71.3	66.3
Sulphate	mg/L	500 (AO)	98.8	120	93.6	99.4	84.9	82.2	77.3	84	78.1	80.2	96.2	80.4
Calcium	mg/L		58.7	49.7	45.6	48.1	46.2	40.8	39.4	43.6	44.7	45.8	48.6	48.3
Magnesium	mg/L		34.8	42.3	44.2	49.5	54.5	46.8	44.2	52.2	52.3	53.2	54.8	55
Sodium	mg/L	200 (AO) *	29.1	24	20.7	20.4	21.9	18.5	19.3	22.5	22.5	24.5	26.5	27.7
Potassium	mg/L		1.09	1.67	1.81	2.2	2.23	1.82	2.03	2.02	2.04	2	1.98	2.04
Boron	mg/L	5 (IMAC)	0.076	0.077	0.078	0.087	0.082	0.086	0.083	0.076	0.077	0.08	0.074	0.069
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Cobalt	mg/L		0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B	MW2B
			9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	3-Aug-17	21-Nov-17	23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		258	250	233	243	247	258	251	235	243	251	265	263
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH
Chloride	mg/L	250 (AO)	67	76.4	78.5	70.5	77.4	106	132	152	129	131	135	131
Sulphate	mg/L	500 (AO)	74.6	84.7	82.5	81	84.2	80.4	74	66	79	71	78	73
Calcium	mg/L		47.9	50.1	49.6	46.3	48.3	51.4	52.1	63	59	51	58	48
Magnesium	mg/L		56.5	58.4	58.8	55.6	58.6	62	63.2	70	67	65	67	56
Sodium	mg/L	200 (AO) *	30.9	29.4	29.4	26.2	28.7	34.5	34.9	42	40	39	38	40
Potassium	mg/L		2.11	2.27	2.21	2.13	2.07	2.2	2.25	2	2	2	2	2
Boron	mg/L	5 (IMAC)	0.068	0.069	0.08	0.088	0.079	0.08	0.074	0.08	0.09	0.09	0.08	0.09
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
2) OG = Operational Guideline; AO = Aesthetic Objective; MAC = Maximum Acceptable Concentration; and IMAC = Interim Maximum Acceptable Concentration.
3) < denotes analyte concentration is below the laboratory reportable detection limit (RDL) or the method reporting limit (MRL).
4) Bold and Shaded denotes exceedance of the ODWS.
5) * denotes that the aesthetic objective for sodium in drinking water is 200 mg/L, per the ODWS. As noted in the ODWS, the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW3A	MW3A	MW3A	MW3A	MW3A	MW3A	MW3A	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R
			28-Dec-11	14-Mar-12	21-Jun-12	5-Nov-12	22-Mar-13	12-Jul-13	9-Sep-13	18-Jun-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		181	153	147	130	124	121	151	134	120	123	147	126
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	22.7	24.6	24.4	26.3	25.1	23.8	26.2	7.53	6.52	6.24	7.7	6.52
Sulphate	mg/L	500 (AO)	125	78.7	50.7	44	29.3	23	20.3	27.4	20.7	21.4	26.8	25.7
Calcium	mg/L		76.9	43.8	34.3	27.9	26.4	22.5	24.4	22	19.4	16	18.3	21.2
Magnesium	mg/L		11.5	9.92	9.13	8.95	8.76	6.68	6.91	9.27	8.73	8.74	11.1	11.6
Sodium	mg/L	200 (AO) *	47.5	45.3	43	46	49.6	40.8	44.7	35.1	35.7	34.5	39.2	37.9
Potassium	mg/L		1.79	1.79	1.33	1.86	1.25	1.09	2.94	2.34	2.09	1.41	1.51	1.74
Boron	mg/L	5 (IMAC)	0.129	0.164	0.171	0.182	0.175	0.172	0.169	0.132	0.139	0.155	0.148	0.141
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Cobalt	mg/L		0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R	MW3A-R
			9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	13-Apr-17	9-Aug-17	21-Nov-17	23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		137	152	141	140	154	157	157	146	158	178	168	179
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH
Chloride	mg/L	250 (AO)	6.19	6.29	6.38	5.85	5.71	6.92	5.9	8	7	7	7	6
Sulphate	mg/L	500 (AO)	21.7	20.7	18.7	16.8	20.2	26.2	21.9	19	19	18	22	19
Calcium	mg/L		17.7	20.4	17.4	16.2	20.1	16.5	18.6	20	20	19	31	17
Magnesium	mg/L		10.4	10.7	10.5	9.8	10.5	10.2	10.8	11	11	11	20	9
Sodium	mg/L	200 (AO) *	40	38.5	38.1	36.8	37	40.8	38.4	42	42	40	47	40
Potassium	mg/L		1.41	1.67	1.34	1.27	1.51	1.27	1.13	1	1	1	12	1
Boron	mg/L	5 (IMAC)	0.123	0.132	0.155	0.153	0.145	0.145	0.134	0.16	0.16	0.15	0.16	0.15
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
2) OG = Operational Guideline; AO = Aesthetic Objective; MAC = Maximum Acceptable Concentration; and IMAC = Interim Maximum Acceptable Concentration.
3) < denotes analyte concentration is below the laboratory reportable detection limit (RDL) or the method reporting limit (MRL).
4) Bold and Shaded denotes exceedance of the ODWS.
5) * denotes that the aesthetic objective for sodium in drinking water is 200 mg/L, per the ODWS. As noted in the ODWS, the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW3B	MW3B	MW3B	MW3B	MW3B	MW3B	MW3B	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R
			28-Dec-11	14-Mar-12	21-Jun-12	5-Nov-12	22-Mar-13	12-Jul-13	9-Sep-13	18-Jun-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		247	212	211	186	213	202	235	198	209	203	215	200
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	10.8	10.2	10.7	12.5	15.6	13.9	18.8	15.4	12.3	10.7	11.6	10.3
Sulphate	mg/L	500 (AO)	102	58.6	52.4	45.8	33.9	39.9	43.4	103	88.7	85.7	95.5	82.9
Calcium	mg/L		78.4	49.7	47.9	49.3	55.5	46.8	61.4	58.3	46.8	47.7	51.5	52.4
Magnesium	mg/L		22.4	19.9	20.2	21.7	26.4	21.2	25.1	31.4	29.2	29.3	31.4	31.7
Sodium	mg/L	200 (AO) *	35.5	25.5	25.7	26.2	26.4	24.1	27.1	25.1	23.8	23.9	25.7	26.6
Potassium	mg/L		2	1.42	1.55	1.99	1.59	1.38	2.39	5.92	4.62	4.04	3.43	3.23
Boron	mg/L	5 (IMAC)	0.071	0.079	0.088	0.092	0.073	0.095	0.082	0.118	0.095	0.115	0.096	0.09
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R	MW3B-R
			9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	9-Aug-17	21-Nov-17	23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		235	222	221	220	223	231	252	223	262	253	263	272
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	N/A-PH	N/A-PH	N/A-PH	N/A-PH	N/A-PH
Chloride	mg/L	250 (AO)	9.23	8.7	9	8.79	8.75	13.1	10.9	12	13	14	13	13
Sulphate	mg/L	500 (AO)	78.8	79.6	75.7	71.3	77	95	81	66	75	72	76	69
Calcium	mg/L		51.2	49	49.7	46.5	47.3	48.9	48.4	51	53	47	50	44
Magnesium	mg/L		32	30.6	30.7	29.8	31	32	32.8	33	34	33	32	29
Sodium	mg/L	200 (AO) *	28.9	25.7	25.4	25	25.8	29.6	29	32	35	32	33	34
Potassium	mg/L		3.27	3.02	2.77	2.82	2.71	2.71	2.72	2	3	3	3	3
Boron	mg/L	5 (IMAC)	0.082	0.084	0.087	0.101	0.08	0.118	0.085	0.09	0.09	0.1	0.09	0.1
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.0001	0.0005	0.0003	<0.0001	<0.0001
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
2) OG = Operational Guideline; AO = Aesthetic Objective; MAC = Maximum Acceptable Concentration; and IMAC = Interim Maximum Acceptable Concentration.
3) < denotes analyte concentration is below the laboratory reportable detection limit (RDL) or the method reporting limit (MRL).
4) Bold and Shaded denotes exceedance of the ODWS.
5) * denotes that the aesthetic objective for sodium in drinking water is 200 mg/L, per the ODWS. As noted in the ODWS, the local Medical Officer of Health should be notified when the sodium concentration (in drinking water) exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4
			28-Dec-11	14-Mar-12	21-Jun-12	5-Nov-12	22-Mar-13	12-Jul-13	26-Nov-13	9-Apr-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		300	430	506	346	330	448	496	301	353	300	539	482
Carbonate	mg/L		<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	12.3	14.5	7.11	12	8.21	7.47	6.79	8.64	8.46	12.2	6.98	7.55
Sulphate	mg/L	500 (AO)	50.8	47.5	47.8	60.8	38.5	62.6	62.6	23.8	31.8	32.1	78.1	58.9
Calcium	mg/L		42.7	36.4	43.1	45.9	42.2	44.7	39	29	31.9	31.3	38.5	46
Magnesium	mg/L		51.5	72.8	88.2	68.2	68.8	83.6	83.9	54.9	62	53.8	103	102
Sodium	mg/L	200 (AO) *	22	25.5	28	23.1	23.7	28.6	35.8	22.2	25.5	22	40	36.6
Potassium	mg/L		4.39	2.45	2.7	6.08	2.81	3.55	3.61	2.3	2.73	2.63	2.68	3.43
Boron	mg/L	5 (IMAC)	0.057	0.061	0.066	0.057	0.038	0.064	0.066	0.04	0.051	0.051	0.069	0.065
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002
Cobalt	mg/L		0.002	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4
			9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	3-Aug-17	17-Nov-17	23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		574	590	425	337	503	563	289	518	332	292	553	357
Carbonate	mg/L		<5	15	<5	<5	31	<5	<5	N/A-PH	N/A-PH	N/A-PH	11	N/A-PH
Chloride	mg/L	250 (AO)	8.69	6.58	28.3	141	11.5	11.2	**682**	14	**765**	**1160**	65	**785**
Sulphate	mg/L	500 (AO)	72	66.1	62.7	35.7	76.6	74.7	32.6	67	44	32	73	46
Calcium	mg/L		43.9	41.4	37.3	42	39.9	38.6	82.9	45	79	103	41	75
Magnesium	mg/L		106	114	88.8	86.8	108	105	165	112	174	228	112	168
Sodium	mg/L	200 (AO) *	47.6	37.4	31.4	35.2	34.3	34.6	127	38	148	**293**	46	**220**
Potassium	mg/L		3.7	3.18	3.23	3.43	3.07	3.4	4.97	3	6	7	3	6
Boron	mg/L	5 (IMAC)	0.075	0.055	0.065	0.062	0.05	0.065	0.049	0.06	0.05	0.06	0.04	0.06
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	0.0011	0.0013	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

1) ODWS denotes Ontario Drinking Water Standards, per the Technical Support Document for Ontario Drinking Water, Standards, Objectives, and Guidelines (MOE, 2006).
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6) mg/L denotes milligrams per litre.
7) INS denotes insufficient volume available for sample collection.
8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A	MW5A
			18-Jun-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	3-Aug-17	21-Nov-17
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		207	199	183	200	198	215	215	200	203	217	218	234
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5
Chloride	mg/L	250 (AO)	5.29	3.87	3.16	2.83	2.7	2.15	1.89	2.03	2.19	1.65	1.64	1.48
Sulphate	mg/L	500 (AO)	16.9	11	5.56	9.37	7.56	6.9	9.11	7.73	9.92	16.8	9.17	9.97
Calcium	mg/L		25.2	19.4	17.4	19.5	20.7	17.1	24.5	17.9	17.4	20.9	16.6	16.3
Magnesium	mg/L		34.9	31.7	31	33.3	35.1	35	34.8	35.4	35	38.2	35.9	37.3
Sodium	mg/L	200 (AO) *	12.2	11.2	11.4	11.9	11.7	12.9	11.8	11.5	11.4	11.9	10.2	10.1
Potassium	mg/L		3.83	2.89	2.82	2.53	2.44	2.38	2.75	2.2	2.05	2.28	1.83	1.61
Boron	mg/L	5 (IMAC)	0.054	0.045	0.049	0.041	0.036	0.033	0.033	0.036	0.037	0.033	0.031	0.033
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002
Cobalt	mg/L		<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW5A	MW5A	MW5A	MW5A	MW5A
			23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		205	232	223	220	235
Carbonate	mg/L		N/A-PH	N/A-PH	N/A-PH	5	N/A-PH
Chloride	mg/L	250 (AO)	2	2	3	2	2
Sulphate	mg/L	500 (AO)	9	15	13	15	13
Calcium	mg/L		17	21	18	20	18
Magnesium	mg/L		40	39	38	39	33
Sodium	mg/L	200 (AO) *	10	12	11	11	11
Potassium	mg/L		1	2	2	2	2
Boron	mg/L	5 (IMAC)	0.03	0.03	0.03	0.03	0.03
Cadmium	mg/L	0.005 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

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8) Blank denotes data not available.
9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

Table D-2 - Groundwater Laboratory Analytical Results

Durham York Energy Centre - 2019 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Parameter	Unit	ODWS	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B	MW5B
			18-Jun-14	11-Aug-14	29-Oct-14	16-Apr-15	10-Aug-15	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16	11-Apr-17	3-Aug-17	21-Nov-17
Laboratory			AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Bicarbonate	mg/L		240	247	234	247	229	274	266	263	262	258	255	258
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5
Chloride	mg/L	250 (AO)	5.93	5.01	4.78	7.97	10.1	12.9	14	17.8	34.9	42.5	35	34.4
Sulphate	mg/L	500 (AO)	96.4	91.4	95.9	107	103	98.7	111	104	94.9	100	91	82.1
Calcium	mg/L		41.2	34.4	36.2	39.1	46.9	38.7	43.8	39.9	40.1	41.2	35.8	33.4
Magnesium	mg/L		56.7	52.3	52.6	55.1	60.1	59.1	60.6	60.3	61.1	66.7	60.5	59.9
Sodium	mg/L	200 (AO) *	10.2	10.1	10.2	12.2	13	16.6	14.9	15.6	19.1	17.2	14.9	15.5
Potassium	mg/L		4.37	3.76	3.51	2.95	3.31	3.25	3.21	2.96	3.1	2.73	2.54	2.4
Boron	mg/L	5 (IMAC)	0.045	0.048	0.053	0.04	0.042	0.037	0.035	0.044	0.046	0.038	0.04	0.042
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002
Cobalt	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Unit	ODWS	MW5B	MW5B	MW5B	MW5B	MW5B
			23-Apr-18	17-Aug-18	7-Nov-18	18-Apr-19	13-Nov-19
Laboratory			Eurofins	Eurofins	Eurofins	Eurofins	Eurofins
Bicarbonate	mg/L		246	245	267	244	270
Carbonate	mg/L		N/A-PH	N/A-PH	N/A-PH	5	N/A-PH
Chloride	mg/L	250 (AO)	40	46	48	57	64
Sulphate	mg/L	500 (AO)	74	88	79	90	89
Calcium	mg/L		36	41	33	37	34
Magnesium	mg/L		64	66	63	63	58
Sodium	mg/L	200 (AO) *	17	17	20	20	23
Potassium	mg/L		2	3	3	2	2
Boron	mg/L	5 (IMAC)	0.04	0.04	0.04	0.04	0.04
Cadmium	mg/L	0.005 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	mg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Lead	mg/L	0.01 (MAC)	<0.001	<0.001	<0.001	0.001	<0.001
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

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9) N/A-PH denotes that the carbonate value is not available due to the fact the pH is below 8.3 for all samples, per the laboratory.

APPENDIX E

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Certificate of Analysis

Client: RWDI Air Inc (c/o Region of Durham)
4510 Rhodes Drive, Unit 530
Windsor, ON
N8W 5K5
Attention: Mr. Andy De Jong
PO#:
Invoice to: The Regional Municipality of Durham

Report Number: 1905883
Date Submitted: 2019-04-23
Date Reported: 2019-12-17
Project: 1604066-4003
COC #: 196758

Dear Andy De Jong:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Revision 1. This is an amendment and supersedes the version of this report issued on 2019-04-30. Bromide added to report.

Sarah Horner 2019.12.17 16:07:51 -05'00'

APPROVAL: _____

Sarah Horner, Inorganics Technician

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: http://www.cala.ca/scopes/2602.pdf.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

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Certificate of Analysis

Client: RWDI Air Inc (c/o Region of Durham)
4510 Rhodes Drive, Unit 530
Windsor, ON
N8W 5K5
Attention: Mr. Andy De Jong
PO#:
Invoice to: The Regional Municipality of Durham

Report Number: 1905883
Date Submitted: 2019-04-23
Date Reported: 2019-12-17
Project: 1604066-4003
COC #: 196758

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1421977 GW 2019-04-18 MW1	1421978 GW 2019-04-18 MW2A	1421979 GW 2019-04-18 MW2B	1421980 GW 2019-04-18 MW3A-R
Anions	Br	0.25	mg/L			<0.25	<0.25	<0.25	<0.25
	Cl	1	mg/L	AO 250		18	5	135	7
	SO4	1	mg/L	AO 500		153	26	78	22
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500		243	220	265	168
	CO3 as CaCO3	1	mg/L			N/A-PH	5	N/A-PH	N/A-PH
	HCO3 as CaCO3	1	mg/L			243	215	265	168
	pH	1.00		6.5-8.5		8.09	8.41	8.27	8.26
Metals	B	0.01	mg/L	IMAC 5.0		0.02	0.11	0.08	0.16
	Ca	1	mg/L			67	16	58	31
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L			<0.0002	<0.0002	<0.0002	<0.0002
	Hg	0.0001	mg/L	MAC 0.001		<0.0001	<0.0001	<0.0001	<0.0001
	K	1	mg/L			3	1	2	12
	Mg	1	mg/L			46	32	67	20
	Na	2	mg/L	AO 200		24	28	38	47
	Pb	0.001	mg/L	MAC 0.010		<0.001	<0.001	<0.001	<0.001

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Certificate of Analysis

Client: RWDI Air Inc (c/o Region of Durham)
4510 Rhodes Drive, Unit 530
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Attention: Mr. Andy De Jong
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Invoice to: The Regional Municipality of Durham

Report Number: 1905883
Date Submitted: 2019-04-23
Date Reported: 2019-12-17
Project: 1604066-4003
COC #: 196758

Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.			
					1421981 GW 2019-04-18 MW3B-R	1421982 GW 2019-04-18 MW4	1421983 GW 2019-04-18 MW5A	1421984 GW 2019-04-18 MW5B
Anions	Br	0.25	mg/L		<0.25	<0.25	<0.25	<0.25
	Cl	1	mg/L	AO 250	13	65	2	57
	SO4	1	mg/L	AO 500	76	73	15	90
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500	263	564*	226	249
	CO3 as CaCO3	1	mg/L		N/A-PH	11	5	5
	HCO3 as CaCO3	1	mg/L		263	553	220	244
	pH	1.00		6.5-8.5	8.26	8.34	8.42	8.35
Metals	B	0.01	mg/L	IMAC 5.0	0.09	0.04	0.03	0.04
	Ca	1	mg/L		50	41	20	37
	Cd	0.0001	mg/L	MAC 0.005	<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L		<0.0002	<0.0002	<0.0002	<0.0002
	Hg	0.0001	mg/L	MAC 0.001	<0.0001	<0.0001	<0.0001	<0.0001
	K	1	mg/L		3	3	2	2
	Mg	1	mg/L		32	112	39	63
	Na	2	mg/L	AO 200	33	46	11	20
	Pb	0.001	mg/L	MAC 0.010	0.001	<0.001	<0.001	0.001

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Certificate of Analysis

Client: RWDI Air Inc (c/o Region of Durham)
4510 Rhodes Drive, Unit 530
Windsor, ON
N8W 5K5
Attention: Mr. Andy De Jong
PO#:
Invoice to: The Regional Municipality of Durham

Report Number: 1905883
Date Submitted: 2019-04-23
Date Reported: 2019-12-17
Project: 1604066-4003
COC #: 196758

Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.
					1421985 / GW / / 2019-04-18 / GW 8003
Anions	Br	0.25	mg/L		<0.25
	Cl	1	mg/L	AO 250	57
	SO4	1	mg/L	AO 500	89
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500	249
	CO3 as CaCO3	1	mg/L		5
	HCO3 as CaCO3	1	mg/L		244
	pH	1.00		6.5-8.5	8.37
Metals	B	0.01	mg/L	IMAC 5.0	0.04
	Ca	1	mg/L		37
	Cd	0.0001	mg/L	MAC 0.005	<0.0001
	Co	0.0002	mg/L		<0.0002
	Hg	0.0001	mg/L	MAC 0.001	<0.0001
	K	1	mg/L		2
	Mg	1	mg/L		64
	Na	2	mg/L	AO 200	20
	Pb	0.001	mg/L	MAC 0.010	0.001

Guideline = ODWSOG *** = Guideline Exceedence**

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Date Submitted: 2019-04-23
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COC #: 196758

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 364446 **Analysis/Extraction Date** 2019-04-26 **Analyst** AET **Method** SM 4110			
Br	<0.25 mg/L	99	90-110
Chloride	<1 mg/L	100	90-110
SO4	<1 mg/L	100	90-110
Run No 364469 **Analysis/Extraction Date** 2019-04-28 **Analyst** SKH **Method** EPA 200.8			
Boron (total)	<0.01 mg/L	99	84.9-115
Cadmium	<0.0001 mg/L	101	93.5-106.4
Cobalt	<0.0002 mg/L	104	92.7-107.2
Mercury	<0.0001 mg/L	108	80-120
Lead	<0.001 mg/L	104	90-110
Run No 364483 **Analysis/Extraction Date** 2019-04-29 **Analyst** Z S **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	99	90-110
pH		98	90-110
Run No 364541 **Analysis/Extraction Date** 2019-04-29 **Analyst** AET **Method** SM 2320B			
CO3 as CaCO3			

Guideline = ODWSOG *** = Guideline Exceedence**

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Invoice to: The Regional Municipality of Durham

Report Number: 1905883
Date Submitted: 2019-04-23
Date Reported: 2019-12-17
Project: 1604066-4003
COC #: 196758

QC Summary

Analyte	Blank	QC % Rec	QC Limits
HCO3 as CaCO3			
Run No 364603 **Analysis/Extraction Date** 2019-04-29 **Analyst** SKH **Method** M SM3120B-3500C			
Calcium	<1 mg/L	106	90-110
Potassium	<1 mg/L	103	87-113
Magnesium	<1 mg/L	102	76-124
Sodium	<2 mg/L	101	82-118
Run No 364644 **Analysis/Extraction Date** 2019-04-30 **Analyst** SKH **Method** M SM3120B-3500C			
Calcium	<1 mg/L	108	90-110
Potassium	<1 mg/L	99	87-113
Magnesium	<1 mg/L	104	76-124
Sodium	<2 mg/L	92	82-118

Guideline = ODWSOG *** = Guideline Exceedence**

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Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Certificate of Analysis

Client: RWDI Air Inc (c/o Region of Durham)
4510 Rhodes Drive, Unit 530
Windsor, ON
N8W 5K5

Attention: Mr. Philippe Janisse
PO#:
Invoice to: The Regional Municipality of Durham

Report Number: 1921039
Date Submitted: 2019-11-15
Date Reported: 2019-11-22
Project: 1604066-8003-800 (DYEC)
COC #: 205197

Dear Philippe Janisse:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Sarah Horner 2019.11.22 16:22:58 -05'00'

APPROVAL: _____
Sarah Horner, Inorganics Technician

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: http://www.cala.ca/scopes/2602.pdf.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

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Certificate of Analysis

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Attention: Mr. Philippe Janisse
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Report Number: 1921039
Date Submitted: 2019-11-15
Date Reported: 2019-11-22
Project: 1604066-8003-800 (DYEC)
COC #: 205197

Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.			
					1466738 GW 2019-11-13 MW1	1466739 GW 2019-11-13 MW2A	1466740 GW 2019-11-13 MW2B	1466741 GW 2019-11-13 MW3A-R
Anions	Cl	1	mg/L	AO 250	17	5	131	6
	SO4	1	mg/L	AO 500	165	25	73	19
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500	248	212	263	179
	CO3 as CaCO3	1	mg/L		N/A-PH	N/A-PH	N/A-PH	N/A-PH
	HCO3 as CaCO3	1	mg/L		248	212	263	179
	pH	1.00		6.5-8.5	8.02	8.23	8.05	8.13
Metals	B	0.01	mg/L	IMAC 5.0	0.04	0.12	0.09	0.15
	Ca	1	mg/L		62	14	48	17
	Cd	0.0001	mg/L	MAC 0.005	<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L		<0.0002	<0.0002	<0.0002	<0.0002
	Hg	0.0001	mg/L	MAC 0.001	<0.0001	<0.0001	<0.0001	<0.0001
	K	1	mg/L		3	1	2	1
	Mg	1	mg/L		43	28	56	9
	Na	2	mg/L	AO 200	18	29	40	40
	Pb	0.001	mg/L	MAC 0.010	<0.001	<0.001	<0.001	<0.001

Guideline = ODWSOG *** = Guideline Exceedence**

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Methods references and/or additional QA/QC information available on request.

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Project: 1604066-8003-800 (DYEC)
COC #: 205197

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1466742 GW 2019-11-13 MW3B-R	1466743 GW 2019-11-13 MW4	1466744 GW 2019-11-13 MW5A	1466745 GW 2019-11-13 MW5B
Anions	Cl	1	mg/L	AO 250		13	785*	2	64
	SO4	1	mg/L	AO 500		69	46	13	89
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500		272	357	235	270
	CO3 as CaCO3	1	mg/L			N/A-PH	N/A-PH	N/A-PH	N/A-PH
	HCO3 as CaCO3	1	mg/L			272	357	235	270
	pH	1.00		6.5-8.5		8.13	8.01	8.16	8.16
Metals	B	0.01	mg/L	IMAC 5.0		0.10	0.06	0.03	0.04
	Ca	1	mg/L			44	75	18	34
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L			<0.0002	<0.0002	<0.0002	<0.0002
	Hg	0.0001	mg/L	MAC 0.001		<0.0001	<0.0001	<0.0001	<0.0001
	K	1	mg/L			3	6	2	2
	Mg	1	mg/L			29	168	33	58
	Na	2	mg/L	AO 200		34	220*	11	23
	Pb	0.001	mg/L	MAC 0.010		<0.001	<0.001	<0.001	<0.001

Guideline = ODWSOG *** = Guideline Exceedence**

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Methods references and/or additional QA/QC information available on request.

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Project: 1604066-8003-800 (DYEC)
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Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.
					1466746 / GW / / 2019-11-13 / MW8003
Anions	Cl	1	mg/L	AO 250	65
	SO4	1	mg/L	AO 500	90
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500	256
	CO3 as CaCO3	1	mg/L		N/A-PH
	HCO3 as CaCO3	1	mg/L		256
	pH	1.00		6.5-8.5	8.14
Metals	B	0.01	mg/L	IMAC 5.0	0.04
	Ca	1	mg/L		35
	Cd	0.0001	mg/L	MAC 0.005	<0.0001
	Co	0.0002	mg/L		<0.0002
	Hg	0.0001	mg/L	MAC 0.001	<0.0001
	K	1	mg/L		3
	Mg	1	mg/L		59
	Na	2	mg/L	AO 200	23
	Pb	0.001	mg/L	MAC 0.010	<0.001

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
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MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Attention: Mr. Philippe Janisse
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Invoice to: The Regional Municipality of Durham

Report Number: 1921039
Date Submitted: 2019-11-15
Date Reported: 2019-11-22
Project: 1604066-8003-800 (DYEC)
COC #: 205197

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 376177 **Analysis/Extraction Date** 2019-11-19 **Analyst** K J **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	98	90-110
pH		97	90-110
Run No 376179 **Analysis/Extraction Date** 2019-11-19 **Analyst** H D **Method** M SM3120B-3500C			
Calcium	<1 mg/L	98	90-110
Potassium	<1 mg/L	94	87-113
Magnesium	<1 mg/L	99	76-124
Sodium	<2 mg/L	101	82-118
Run No 376269 **Analysis/Extraction Date** 2019-11-19 **Analyst** H_D **Method** EPA 200.8			
Boron (total)	<0.01 mg/L	99	84.9-115
Cadmium	<0.0001 mg/L	100	93.5-106.4
Cobalt	<0.0002 mg/L	99	92.7-107.2
Mercury	<0.0001 mg/L	92	80-120
Lead	<0.001 mg/L	100	90-110
Run No 376369 **Analysis/Extraction Date** 2019-11-21 **Analyst** SKH **Method** SM 4110			

Guideline = ODWSOG *** = Guideline Exceedence**

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Methods references and/or additional QA/QC information available on request.

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Report Number: 1921039
Date Submitted: 2019-11-15
Date Reported: 2019-11-22
Project: 1604066-8003-800 (DYEC)
COC #: 205197

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Chloride	<1 mg/L	100	90-110
SO4	<1 mg/L	105	90-110
Run No 376397 **Analysis/Extraction Date** 2019-11-22 **Analyst** AET **Method** SM 2320B			
CO3 as CaCO3			
HCO3 as CaCO3			
Run No 376453 **Analysis/Extraction Date** 2019-11-22 **Analyst** SKH **Method** SM 4110			
Chloride	<1 mg/L	100	90-110
SO4	<1 mg/L	100	90-110

Guideline = ODWSOG *** = Guideline Exceedence**

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APPENDIX F

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	Durham York Energy Centre
Location (e.g. street address, lot, concession)	1835 Energy Dr., Courtice, Ontario
GPS Location (taken within the property boundary at front gate/ front entry)	NAD 83: Zone 17, 680660E, 4860490N
Municipality	Municipality of Clarington
Client and/or Site Owner	Regional Municipalities of Durham and York
Monitoring Period (Year)	2019
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	7306-8FDKNX
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	◉ **Annual** ○ **Other**	Specify (Type Here):
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:	Type Here	
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)	○ Yes ◉ No	

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	◉ **Yes** ○ **No**	
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**

3) a) Some or all groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	○ **Yes** ○ **No** ◉ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	◉ **Yes** ○ **No**		
6) The site meets compliance and assessment criteria.	○ **Yes** ◉ **No**	Refer to Section 4.4 of the 2019 Annual Groundwater and Surface Water Monitoring Report for additional details. There were ODWS exceedances in 2019 (chloride and sodium) at MW4, which are attributed to the application of de-icing salt.	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	◉ **Yes** ○ **No**	Refer to Section 4.3 of the 2019 Annual Groundwater and Surface Water Monitoring Report for additional details with respect to groundwater quality. Section 4.2 details the findings of the groundwater level assessment.	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ **Yes** ○ **No**	**Note which practice(s):**	☐ **(a)** ☒ **(b)** ☐ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**		

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

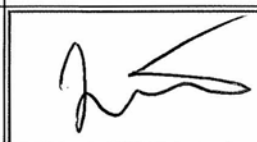
If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

30-Jan-2020

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

○ **No changes to the monitoring program are recommended** ◉ **The following change(s) to the monitoring program is/are recommended:**	The MECP has approved the reduction of groundwater monitoring from three times per year to once annually in the fall, as stated in a letter dated May 7, 2019. The surface water monitoring program, which was suspended until construction for the Courtice Road and Highway 401 Interchange is complete, is expected to be re-instated into the monitoring program in 2020. The locations for the upstream and downstream sondes installation will be evaluated based on the end result of construction activities (i.e. changes in topography, surface drainage, etc.) in that area.
◉ **No Changes to site design and operation are recommended** ○ **The following change(s) to the site design and operation is/ are recommended:**	

Name:	Philippe Janisse		
Seal:	Add Image 		
Signature:		**Date:** April 20, 2020	Select Date
CEP Contact Information:	Philippe Janisse		
Company:	RWDI AIR Inc.		
Address:	4510 Rhodes Drive, Unit 530, Windsor, ON N8W 5K5		
Telephone No.:	(519) 823-1311	Fax No. :	(519) 823-1316
E-mail Address:	Philippe.Janisse@rwdi.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	Tooley Creek and tributaries.
Distance(s)	The nearest natural surface water body to the Site is a tributary of Tooley Creek, located approximately 150 m northwest of the Site.

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	○ Yes ◉ No	With MECP approval, the routine surface water monitoring program (i.e., placement and monitoring of sondes in Tooley Creek) for DYEC was suspended due to construction activities for the Highway 401/Courtice Road interchange. Construction appears to be complete, thus, the routine surface water monitoring program is expected to be re-instated into the monitoring program for 2020.
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	○ Yes ◉ No ○ **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
Tooley Creek	The surface water monitoring program was suspended pending the completion of construction activities at the Courtice Rd/Highway 401 Interchange since 2016.	1-Apr-2016

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	○ **Yes** ○ **No** ◉ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/ outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	Not applicable.

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	(●) **Yes** ( ) **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	(●) **Yes** ( ) **No**	Not applicable.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	◉ **Yes** ○ **No**	Not applicable.
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	◉ Yes ○ No ○ Not Known ○ Not Applicable	Groundwater quality naturally exceeds select PWQOs. Please refer to the 2019 Annual Groundwater and Surface Water Monitoring Report.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**	

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

30-Jan-2020

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

○ **No Changes to the monitoring program are recommended**	
◉ **The following change(s) to the monitoring program is/are recommended:**	The surface water monitoring program is expected to be re-instated into the routine monitoring program for 2020.
◉ **No changes to the site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/are recommended:**	

CEP Signature	
Relevant Discipline	Environmental Geology
Date:	
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Company:	RWDI AIR Inc.
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