

REGIONAL MUNICIPALITY OF DURHAM

WHITBY, ONTARIO

DURHAM YORK ENERGY CENTRE: 2016 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT

RWDI #1604066, 8000

April 13, 2017

SUBMITTED TO

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**RE: 2016 Annual Groundwater and Surface Water Monitoring Report
Durham York Energy Centre
RFP-528-2016
RWDI Reference No. 1604066, 8000**

Dear Mr. Anello,

RWDI AIR Inc. (RWDI) is pleased to provide this 2016 Annual Groundwater and Surface Water Monitoring Report for the Durham York Energy Centre (DYEC).

The 2016 Annual Groundwater and Surface Water Monitoring Report provides details of the monitoring program completed in 2016 for DYEC and an interpretation of the 2016 monitoring data, including our conclusions and recommendations. Relevant technical data that were provided to RWDI are appended.

Appended to this report is the Monitoring and Screening Checklist from the *Ministry of Environment and Climate Change's Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water – Technical Guidance Document* (November 2010), which provides certification of the Competent Environmental Practitioner (CEP). The Monitoring and Screening Checklist is provided in **Appendix F**.

We trust that this 2016 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.

Yours very truly,

RWDI AIR Inc.



Philippe E. Janisse, B.Sc., P.Geo.
Project Manager | Senior Geoscience Specialist

Attach.

EXECUTIVE SUMMARY

The Regional Municipality of Durham (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 Dr. 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 and Climate Change (MOECC) Environmental Assessment (EA) Notice of Approval (File No. 04-EA-02-08) (EA Approval) and the Multi-Media Environmental Compliance Approval (ECA) Number 7306-8FDKNX, issued on June 28, 2011, with amendments to March 14, 2016 (Notice No. 5) (ECA).

The EA Approval, ECA, and the MOECC approved Groundwater and Surface Water Monitoring Plan (prepared by Stantec Consulting Ltd., 2011) outline the groundwater and surface water monitoring and reporting requirements for DYEC. This 2016 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 2016.

With MOECC 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 for at least three (3) years, beginning in 2016, due to construction activities for the Highway 401/Courtice Road interchange. As such, the routine surface water monitoring program for DYEC was not required to be completed in 2016.

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

- Based on the 2016 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 located immediately west of DYEC property.
- For the groundwater sampling program completed for DYEC in 2016, 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.
- For the 2016 monitoring events, the groundwater chemical results for the required parameters of analysis satisfied their respective Ontario Drinking Water Standard (ODWS). The historical groundwater chemical results for the Site have consistently satisfied their respective ODWS since monitoring began at each monitoring well. The groundwater chemical data suggests that DYEC operations have not had an adverse effect on groundwater quality at the Site.

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- Based on the 2016 and historical data, the concentrations of chloride within upgradient shallow monitoring well MW2B, as well as crossgradient shallow monitoring well MW1 and internal assessment shallow monitoring well MW5B have increased since 2014. The detected chloride concentrations at the aforementioned monitoring well locations are a result of road salt effects. It is noted that elevated chloride concentrations are common in groundwater where a monitoring well is situated in close proximity to roads that receive either deicing salt or brine for dust control. Therefore, the noted chloride effects at the aforementioned monitoring wells are the result of deicing salt effects and are expected to fluctuate and/or increase over time with continued deicing activities along roadways/driveways at/near DYEC. No action is required to address the noted chloride concentrations, beyond further monitoring.

Based on the findings of the 2016 monitoring program, the following recommendations are provided for your consideration.

- Groundwater monitoring at the Site should continue in 2017, in accordance with MOECC approved Durham York Energy Centre Groundwater and Surface Water Monitoring Plan. No alterations to the groundwater monitoring program are recommended.
- The routine surface water monitoring program for the Site (i.e., placement and monitoring of sondes in Tooley Creek) should not be completed in 2017 as the MOECC has approved the suspension of the program for at least three (3) years, beginning in 2016.
- The increasing chloride concentration trends within the groundwater at select monitoring well locations should continue to be evaluated on an ongoing basis.

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1 INTRODUCTION

The Regional Municipality of Durham (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 and Climate Change (MOECC) Environmental Assessment (EA) Notice of Approval (File No. 04-EA-02-08) (EA Approval) and the Environmental Compliance Approval (ECA) Number 7306-8FDKNX, issued on June 28, 2011, with amendments to March 14, 2016 (Notice No. 5) (ECA). The EA Approval along with the Multi-Media ECA and its supporting documents for DYEC are posted on the DYEC's website and can be accessed at the following link: www.durhamyorkwaste.ca. The Surface Water Monitoring Program Change Request (DYEC Letter of April 29, 2016), as well as the MOECC Approval Letter (May 17, 2016) are provided in **Appendix A-1, Appendix A**.

DYEC EA Approval, ECA and the approved Groundwater and Surface Water Monitoring Plan outline the monitoring and reporting requirements DYEC for groundwater and surface water. This 2016 Annual Groundwater and Surface Water Monitoring Report has been prepared in accordance with Condition 20.8 of the EA Approval and Condition 15 of the ECA to provide details of the monitoring program completed in 2016.

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

RWDI AIR Inc. (RWDI) was retained by the Region to complete the 2016 Annual Groundwater and Surface Water Monitoring Report for DYEC. WSP Canada Inc. (WSP) completed the required 2016 groundwater sampling for DYEC. This report is organized in consideration of historical reporting frameworks, including but not limited to, site geologic details, in order 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 Dr. in Courtice, Ontario. The Site is situated in the southwest corner of the Energy Dr. and Osborne Rd. intersection, southeast of the Courtice Rd. 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 2016 monitoring and reporting programs for DYEC are as follows.

- 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 MOECC 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 2016 Annual Groundwater and Surface Water Monitoring Report documents the data collected as part of the 2016 monitoring program and the 2016 data was interpreted in consideration of historical data. In accordance with the Groundwater and Surface Water Monitoring Plan, groundwater results from 2016 were compared to the Ontario Drinking Water Standards (ODWS).

Unprocessed waste is stored indoors in a sealed concrete pit, set 5.5 metres 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 become 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).

1.2.2 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 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 metres 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 MOECC dated April 29, 2016, the Regional Municipalities of Durham and York (Region's) 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 in order to monitor select parameters. The section of Tooley Creek where the sondes are placed was scheduled for realignment 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 is anticipated to cause significant disruption and prevent the placement of the sondes in the creek for up to three (3) years. As such, the Regions requested that the requirement to place the sondes in Tooley Creek be suspended until the interchange construction activities are completed (at least three years). In a letter response dated May 17, 2016, from the MOECC to the Regions, the MOECC approved the suspension of the sondes placement and monitoring until such time as the interchange construction activities are completed. The MOECC noted that surface water monitoring completed to-date has indicated that DYEC is not having an adverse effect on Tooley Creek. It is noted that remedial activities in accordance with the Monitoring Plan are still required to be completed for surface water, if required. A copy of the letters from the Regions and the MOECC are provided in **Appendix A-1, Appendix A.**

1.3 Assumptions and Limitations

WSP completed the required 2016 groundwater sampling for DYEC. Historical data (field and laboratory) were provided to RWDI by the Region, as provided to the Region by WSP. The relevant environmental monitoring data provided by WSP for the purposes of preparing this 2016 Annual Groundwater and Surface Water Monitoring Report has been relied upon by RWDI for our assessment. RWDI has assumed that the information provided was factual and accurate as presented.

2 PHYSICAL SETTING

2.1 Geology and Hydrogeology

The Site is located in the physiographic region defined as the Iroquois Plain (Chapman and Putnam, 1984). In the vicinity of 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 25 and 20 metres in depth. The Newmarket Till is underlain by an approximately 5 metres thick layer of intertill sediment, including both Thorncliffe and Scarborough formations, which is underlain by 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 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. In the vicinity of the Site, ground surface elevations generally range from approximately 95 metres above sea level (ASL) to 102 mASL.

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

2.2 Surface Water Features

The Site is located within the Tooley Creek watershed and is located 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 5 kilometres 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 2016 groundwater and surface water monitoring program for DYEC included groundwater monitoring only. As mentioned in **Section 1.2.2.1**, the surface water monitoring program for DYEC (i.e., placement and monitoring of sondes in Tooley Creek) has been suspended for at least three (3) years, beginning in 2016. 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 presented on **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**, as well as in the borehole logs provided in **Appendix B**. The locations for the monitoring wells are shown in **Figure 2**.

Of note, the top-of-pipe (TOP) elevations noted in Table A-1 of the 2015 Annual Report for groundwater monitoring nests MW3 and MW5 were reversed and thus, the TOP values for these groundwater monitoring locations were corrected in **Table B-1** of this report for the purposes of assessing groundwater level elevations at the Site.

Two 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 aforementioned historical monitoring wells' positions, with respect to DYEC 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 is provided that details the monitoring wells' current assigned positions (e.g., downgradient) with respect to DYEC facility.

- MW1 is located within the northeast corner of the Site and is crossgradient of DYEC.
- MW2A/B are located within the northwest 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, the aforementioned groundwater monitoring locations MW1 and MW5 are now interpreted as discussed above.

3.2 Monitoring Frequency

3.2.1 Groundwater

The Groundwater and Surface Water Monitoring Plan requires that groundwater monitoring events are completed once in each the spring, summer and fall seasons for DYEC. In 2016, WSP completed the monitoring events on April 29, August 10, and November 23. Each monitoring event included the measurement of groundwater levels and collection of groundwater samples at the relevant monitoring locations.

As an insufficient volume of water was available within the monitoring well at the time of the monitoring event, a groundwater sample for laboratory analysis could not be collected from monitoring well MW1 during the August and November monitoring events.

3.3 Field and Laboratory Parameters and Analysis

3.3.1 Groundwater

In 2016, the field parameters temperature, pH, electrical conductivity (EC), and turbidity were analyzed and recorded at the time of sample collection for each monitoring well and event.

Collected groundwater samples were submitted to AGAT Laboratories (AGAT) in Mississauga, Ontario, which is a Canadian Association for Laboratory Accreditation (CALA) certified laboratory, for analysis of the required parameters noted in the summary below. 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

WSP completed the field component of the groundwater monitoring program for DYEC in 2016. Details presented below regarding the monitoring and sampling procedures followed in 2016, are based on information provided to RWDI for the purpose of preparing this report.

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 groundwater levels measured in 2016 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 presented in **Figure 2**.

3.4.1.2 Groundwater Sampling

The 2016 monitoring program included the collection of groundwater samples from each of the relevant monitoring wells during the monitoring events in April, August, and November 2016.

Groundwater samples were collected using dedicated inertial-lift pumps and tubing. Each monitoring well was purged with the dedicated inertial lift pump until three (3) well casing volumes were removed, or until a discontinuous flow of water was observed. Sampling was completed after the removal of three (3) well casing volumes or following a period of recovery after producing discontinuous flow. At the time of sample collection, field indicator parameters temperature, pH, EC, and turbidity were recorded onto dedicated field forms. The 2016 groundwater field chemical results are presented in **Table D-1, Appendix D**.

It is understood that, per industry standards, the groundwater samples were collected by WSP directly into bottles provided by the laboratory. The groundwater samples were collected directly into bottles provided by the laboratory. Additionally, it is understood that the groundwater sample aliquots collected for metals analysis were filtered in the field using 45 micrometre in-line disposable filters.

Collected samples were submitted to AGAT for analysis. The 2016 groundwater chemical results are presented in **Table D-2, Appendix D**. 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 2016 one (1) field duplicate sample was collected during the sample collection procedure for a select monitoring well as a QA/QC measure.

The field duplicate samples and their respective original sample collected in 2016 are presented in the summary below.

Monitoring Event	Duplicate Sample ID	Original Sample ID
April 29, 2016	Duplicate	MW2A
August 10, 2016	Duplicate	MW2A
November 23, 2016	Duplicate	MW2A

4 MONITORING RESULTS AND EVALUATION

4.1 Quality Assurance and Quality Control

QA/QC measures for the groundwater monitoring program completed for DYEC in 2016 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 the 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 chemical results for the required parameters of analysis were evaluated by RWDI in 2017 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 MOECC's Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, dated March 8, 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 monitoring events completed in 2016, the above-noted QA/QC evaluation was completed by RWDI for the chemical results of the original sample and its respective duplicate sample collected from groundwater monitoring well MW2A. The tested parameters for the original and duplicate samples collected for each monitoring event satisfied the criteria of the QA/QC evaluations.

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 constituent concentrations were accurate and reflected actual conditions at the time of sample collection.

4.2 Groundwater Levels and Flow

Groundwater levels have been monitored in the groundwater monitoring wells at the Site since December 2011. The 2016 groundwater level data are summarized in **Table C-1, Appendix C**, along with the historical data. Hydrographs of the groundwater elevations at the Site are plotted in **Figures C-1 to C-3, Appendix C**. Monitoring well locations are shown on **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.

As discussed in **Section 3.1.1**, the TOP elevations noted in Table A-1 of the 2015 Annual Report for groundwater monitoring nests MW3 and MW5 were reversed and thus, the TOP values for these groundwater monitoring locations were also corrected in **Table C-1** of this report for the purposes of assessing groundwater level elevation trends at the Site. Although the TOP elevations were noted to be reversed, the difference in measuring point elevations between the 2015 Annual Report and this report for groundwater monitoring nest locations MW3 and MW5 did not significantly impact the resultant interpreted groundwater flow direction at the Site for 2016.

The groundwater elevations measured at the Site have remained generally consistent since monitoring began at each monitoring well. In 2016, the groundwater elevation measured in April at each monitoring well was consistent with the respective recent historical elevations (i.e., 2014 and 2015). The groundwater elevation measured in August and November at each monitoring well decreased slightly relative to the respective recent historical elevations. The decrease in groundwater elevations observed in August and November is attributed to lower than normal precipitation over the summer and fall seasons of 2016. Ongoing monitoring will evaluate this trend over time.

At monitoring well MW4, the groundwater elevation decreased by approximately 2 metres between the March and November 2012 monitoring events. This decrease is attributed to the construction of the East SWMP during the aforementioned period. The groundwater elevation at MW4 since November 2012 has remained similar to, but slightly higher than, the base elevation of the East SWMP (WSP, 2016).

At monitoring well MW1, the groundwater elevation decreased more than 5 metres between the July 2013 and April 2014 monitoring events. This decrease is attributed to the presence of a trunk sewer to the west of the Site, where the groundwater preferentially flows towards the more porous backfill material used around the trunk sewer (i.e., behaves like a French Drain). Between April 2014 and April 2016 the groundwater elevation at MW1 appeared to be recovering following the installation of the trunk sewer, however, consistent with the remaining groundwater elevations at the Site, the groundwater elevation at MW1 decreased in August and November 2016.

Based on the 2016 groundwater elevations, the shallow groundwater flow direction at the Site was interpreted to be toward the southwest. Contour mapping of the interpreted shallow groundwater flow at the Site based on the November 2016 groundwater elevations is presented in **Figure 2**. 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 2016 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 deep monitoring wells (MW2A, MW3A-R, and MW5A) have midpoint screen elevations approximately 2.6 to 3.1 metres deeper than the midpoint screen elevations of their respective shallow monitoring well counterpart in the overburden. For the nested monitoring well locations, the vertical hydraulic gradients were calculated for the 2016 and historical data. The calculated vertical hydraulic gradients are presented in **Table C-2, Appendix C**. The hydraulic gradients calculated for the 2016 groundwater elevations were generally consistent with historical results. In 2016, downward gradients were observed at MW2 in April and August, at MW3 in April, August, and November, and at MW5 in August between the shallow and deep monitoring wells. The vertical gradients in 2016 ranged between 0.17 metre per metre in an upward direction at MW5 in November 2016 and 0.23 metre per metre in a downward direction at MW3 in April 2016. Groundwater movement through the overburden at the Site has historically been generally downward with occasional upward gradients observed at MW2 and MW5.

4.3 Groundwater Quality

The 2016 groundwater field chemical results are tabulated in **Table D-1, Appendix D-1**. The 2016 and historical groundwater laboratory chemical results are tabulated in **Table D-2, Appendix D**. Laboratory Certificates of Analysis are provided in **Appendix E**.

As discussed in **Section 3.1**, 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, the following summary is provided that details the monitoring wells current assigned positions (e.g., downgradient) with respect to DYEC facility.

- MW1 is located within the northeast corner of the Site and is crossgradient of DYEC.
- MW2A/B are located within the northwest 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.

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**, the concentrations of chloride within upgradient monitoring well MW2B distinctly increased between 2014 and 2015 and have since continued to gradually increase. The concentrations of chloride within crossgradient monitoring well MW1 and internal assessment monitoring well MW5B have gradually increased since 2014. Within downgradient monitoring well MW4, the concentration of chloride was generally stable since monitoring began at this monitoring well until April 2016 and distinctly increased between April and November 2016. The detected chloride

concentrations at the aforementioned monitoring well locations are a result of road salt effects.

It is noted that elevated chloride concentrations are common in groundwater where a monitoring well is situated in close proximity to roads that receive either deicing salt or brine for dust control. Therefore, the noted chloride effects at the aforementioned monitoring wells are the result of deicing salt effects and are expected to fluctuate and/or increase over time with continued deicing activities along roadways/driveways at/near DYEC. No action is required to address the noted chloride concentrations, beyond further monitoring.

- As monitoring well MW2B is upgradient of DYEC and the increasing trend observed within MW1, MW2B, and MW5B began prior to the commencement of DYEC operations, the increasing concentrations of chloride are not attributed to DYEC operations. The beginning of the increasing trend of chloride concentrations within MW1, MW2B, and MW5B coincides with the approximate time of construction of Energy Dr. north and west of the Site, as well as the on-Site roadways. As such, the increasing chloride concentrations are attributed to the application of deicing salt during the winter season to Energy Dr., Osborne Rd., and/or the on-Site roadways. The chloride concentration within MW4 in 2016 is not consistent with historical results and may also be attributed to the application of deicing salt to the nearby off-Site roadway to the Courtice WPCP and/or the downgradient migration of chloride from areas closer to Energy Dr. and Osborne Rd. or from the East SWMP. It is noted that the 2016 and historical concentrations of chloride within the groundwater at the Site have satisfied the respective ODWS and the noted concentrations are attributable to deicing influences. Thus, no corrective action(s) are required to address the noted chloride concentrations.
- As shown in **Figure D-2**, the concentrations of sodium within upgradient monitoring wells MW2A and MW2B, as well as crossgradient monitoring wells MW1 and MW5B, have increased since early 2014. The concentrations of sodium within MW2A and MW2B decreased slightly in November 2016, however, they remained greater than the respective concentrations detected prior to the increasing trend. As monitoring wells MW2A and MW2B are upgradient of DYEC and the increasing trend began prior to the commencement of DYEC operations, the increasing concentrations of sodium are not attributed to DYEC operations. Similar to chloride concentrations, the increasing sodium concentrations may be attributed to the application of deicing salt during the winter season, as discussed above. It is noted that the 2016 and historical concentrations of sodium within the groundwater at the Site have satisfied the respective ODWS and the noted concentrations are attributable to deicing influences. Thus, no corrective action(s) are required to address the noted sodium concentrations.
- As shown in **Figure D-3**, the concentration of sulphate within MW3B-R has slightly decreased since monitoring began at this monitoring well. The decreasing sulphate concentrations with time at this location are not a concern and the concentration trends will continue to be evaluated in an ongoing manner.
- As shown in **Figure D-5**, the concentrations of magnesium within upgradient monitoring MW2B, as well as downgradient monitoring well MW4 and internal assessment well MW5B, have slightly increased since monitoring began at each monitoring well. As monitoring well MW2B is upgradient of DYEC and the increasing trend began prior to the commencement of DYEC operations, the increasing concentrations of magnesium are not attributed to DYEC operations. It is noted that there is no ODWS for magnesium. The increasing magnesium concentrations with time at these locations are not a concern and no corrective action(s) are required.
- As shown in **Figure D-6**, the concentrations of potassium within MW1, MW3A-R, MW3B-R, MW5A, and MW5B have decreased since 2014 and appear to be stabilizing at each monitoring well.

In summary, since groundwater monitoring began at the Site in 2011, concentrations of most required parameters of analysis in the shallow and deep groundwater monitoring wells have generally fluctuated or been stable with no apparent increasing or decreasing trend, exclusive of those trends outlined above. The concentration of chloride within downgradient monitoring well MW4, which is not attributed to DYEC, should continue to be monitored to evaluate the chemical trend over-time. The chemical data available to-date suggests that the noted increasing concentration of chloride is not attributed to DYEC operations.

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 Ontario Drinking Water Standards (ODWS). For the required parameters of analysis, their respective ODWS are presented in **Table D-2, Appendix D**.

For the 2016 monitoring events, the groundwater chemical results for the required parameters of analysis satisfied their respective ODWS. The historical groundwater chemical results for the Site have consistently satisfied their respective ODWS since monitoring began at each monitoring well. For the required parameters of analysis, there are not any trends of concern that would suggest an impending exceedance of an ODWS within the downgradient groundwater quality at the Site.

Based on a review of 2016 and historical groundwater chemical results for the Site, the groundwater quality downgradient of DYEC is of acceptable quality. The groundwater chemical data suggests that DYEC operations have not had an adverse effect on groundwater quality at the Site. As discussed, the increased concentration of chloride at monitoring well MW4 in 2016 is not consistent with historical results and is likely a result of source other than DYEC operations (i.e., application of deicing salt). The concentration of chloride at MW4 should continue to be monitored during subsequent monitoring events to assess the repeatability of the 2016 results and evaluate the chemical trend over time.

5 CONTINGENCY MEASURES

In accordance with Condition 17 of the EA Approval, a Spill Contingency and Emergency Response Plan (Contingency Plan) has been developed for the Site. The Contingency 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 2016

6 2017 MONITORING PROGRAM

The proposed 2017 monitoring program considers the findings of this report and the MOECC 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, with MOECC approval, the routine surface water monitoring program for DYEC (i.e., placement and monitoring of sondes in Tooley Creek) has been suspended for at least three (3) years, beginning in 2016. As such, the routine surface water monitoring program for DYEC outlined in the Groundwater and Surface Water Monitoring Plan is not required to be completed in 2017.

An annual monitoring report that details the findings of the 2017 monitoring period will be prepared and submitted to the MOECC by April 31, 2018. 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 2016 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.
- For the groundwater sampling program completed for DYEC in 2016, QA/QC measures indicated that the detected constituent concentrations were accurate and reflected actual conditions at the time of sample collection.
- For the 2016 monitoring events, the groundwater chemical results for the required parameters of analysis satisfied their respective ODWS. The historical groundwater chemical results for the Site have consistently satisfied their respective ODWS since monitoring began at each monitoring well. The groundwater chemical data suggests that DYEC operations have not had an adverse effect on groundwater quality at the Site.
- Based on the 2016 and historical data, the concentrations of chloride within upgradient monitoring well MW2B, as well as crossgradient monitoring well MW1 and internal assessment monitoring well MW5B have increased since 2014. The detected chloride concentrations at the aforementioned monitoring well locations are a result of road salt effects. It is noted that elevated chloride concentrations are common in groundwater where a monitoring well is situated in close proximity to roads that receive either deicing salt or brine for dust control. Therefore, the noted chloride effects at the aforementioned monitoring wells are the result of deicing salt effects and are expected to fluctuate and/or increase over time with continued deicing activities along roadways/driveways at/near DYEC. No action is required to address the noted chloride concentrations, beyond further monitoring.
- With MOECC approval, the routine surface water monitoring program (i.e., placement and monitoring of sondes in Tooley Creek) for DYEC has been suspended for at least three (3) years, beginning in 2016. As such, the routine surface water monitoring program for DYEC outlined in the Groundwater and Surface Water Monitoring Plan was not required to be completed in 2016.

8 RECOMMENDATIONS

Based on the findings of the 2016 monitoring program, the following recommendations are provided for your consideration.

- Groundwater monitoring at the Site should continue in 2017, in accordance with MOECC approved Groundwater and Surface Water Monitoring Plan. No deviations from the groundwater monitoring program are recommended.
- The routine surface water monitoring program for the Site (i.e., placement and monitoring of sondes in Tooley Creek) should not be completed in 2017 as the MOECC has approved the suspension of the program for at least three (3) years, beginning in 2016.
- The increasing chloride concentration trends within the groundwater at select monitoring well locations should continue to be evaluated on an ongoing basis.

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 and the Ministry of the Environment and Climate Change. 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 2016 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.

Yours very truly,

RWDI AIR Inc.

Report Prepared By:



Brent J. Langille, B.Sc., P.Geo.
Senior Consultant | Principal



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



Philippe E. Janisse, B.Sc., P.Geo.
Project Manager | 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 and Climate Change. 2003. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines. Revised June 2006.

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

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

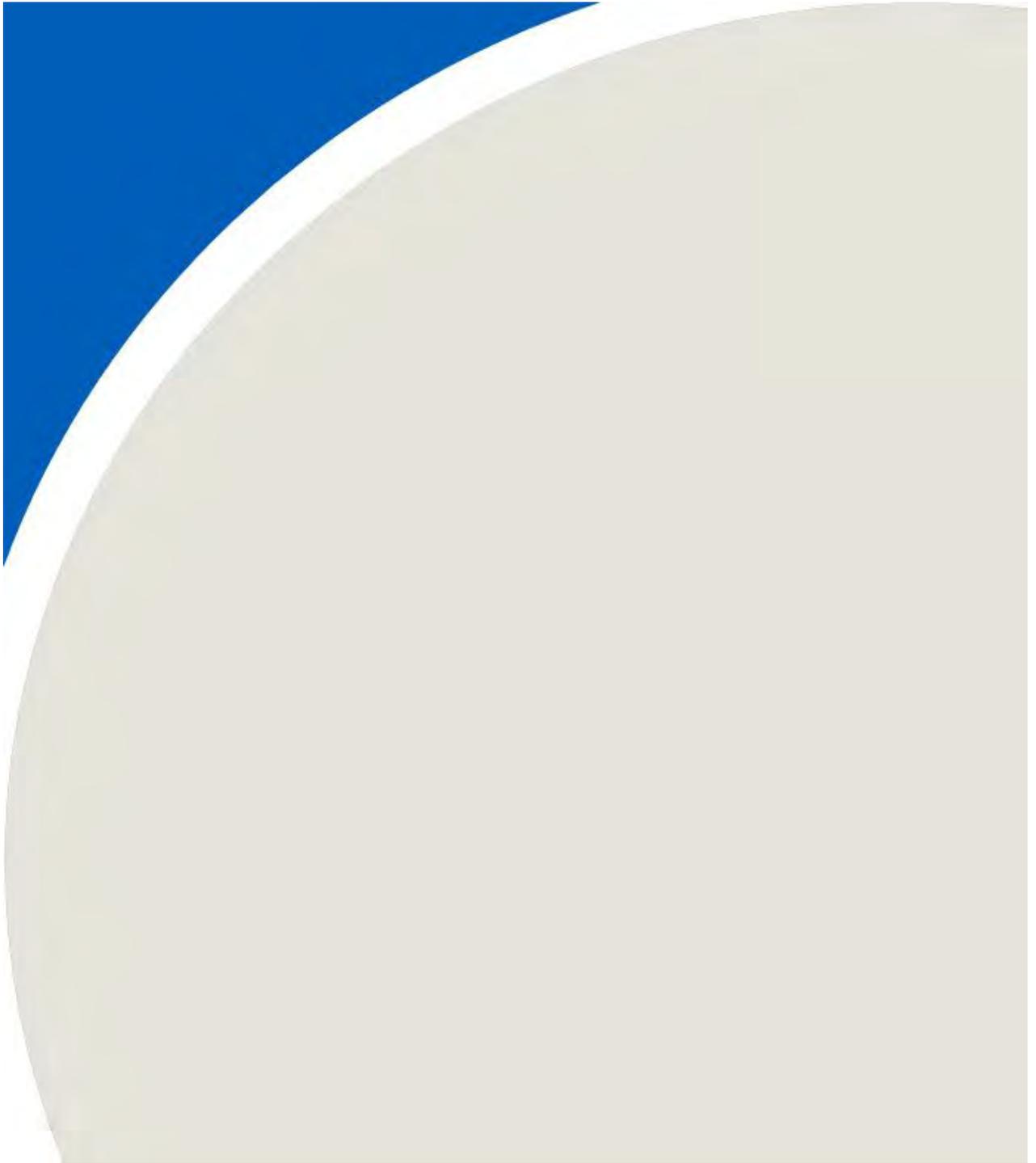
**DURHAM YORK ENERGY CENTRE: 2016 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT
REGIONAL MUNICIPALITY OF DURHAM**

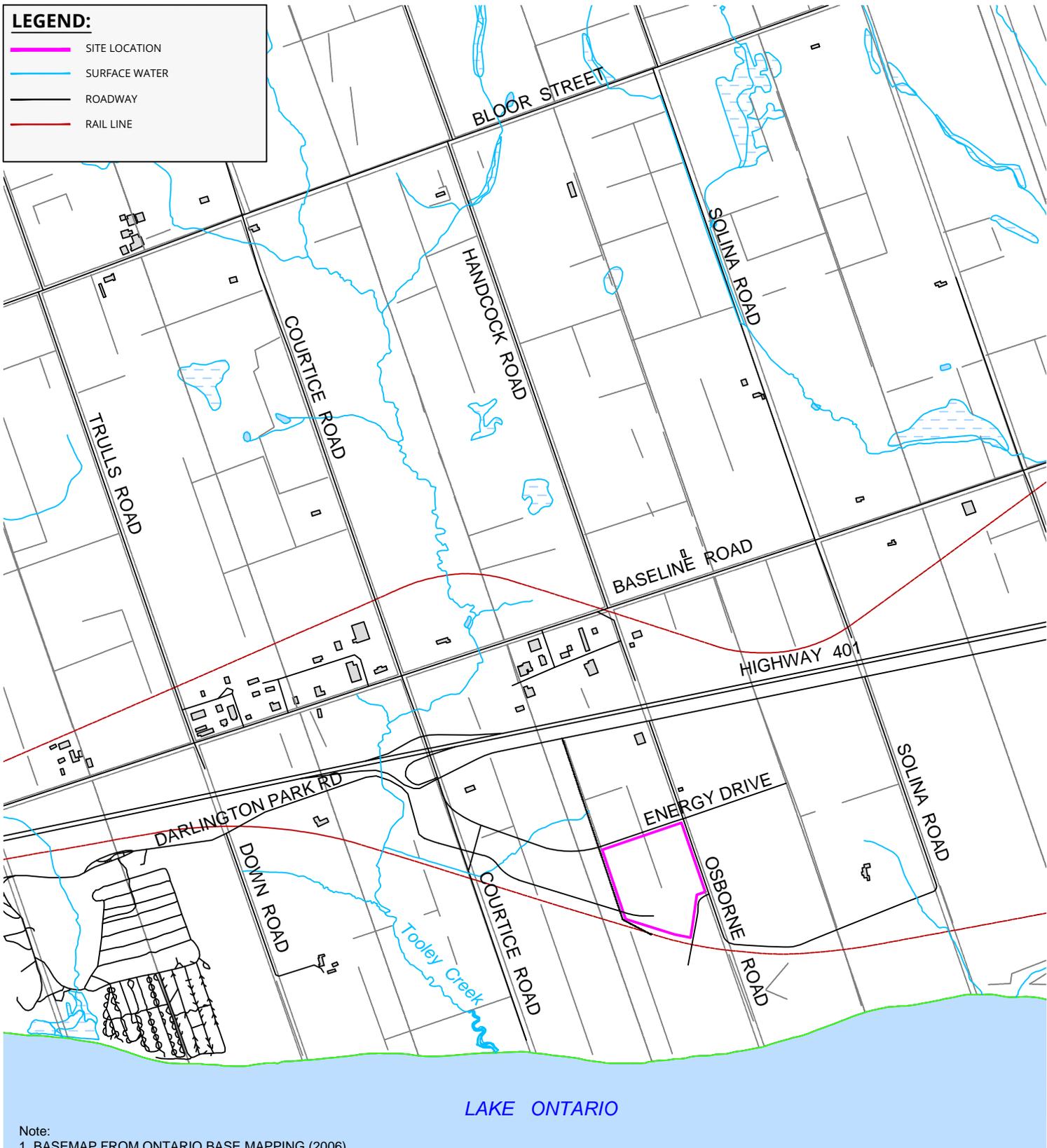
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April 13, 2017

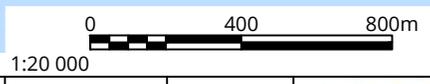
RWDI aims to accommodate. If you require this document in a different format in order to aid accessibility, please contact the sender of this document, email solutions@rwdi.com or call +1.519.823.1311

FIGURES

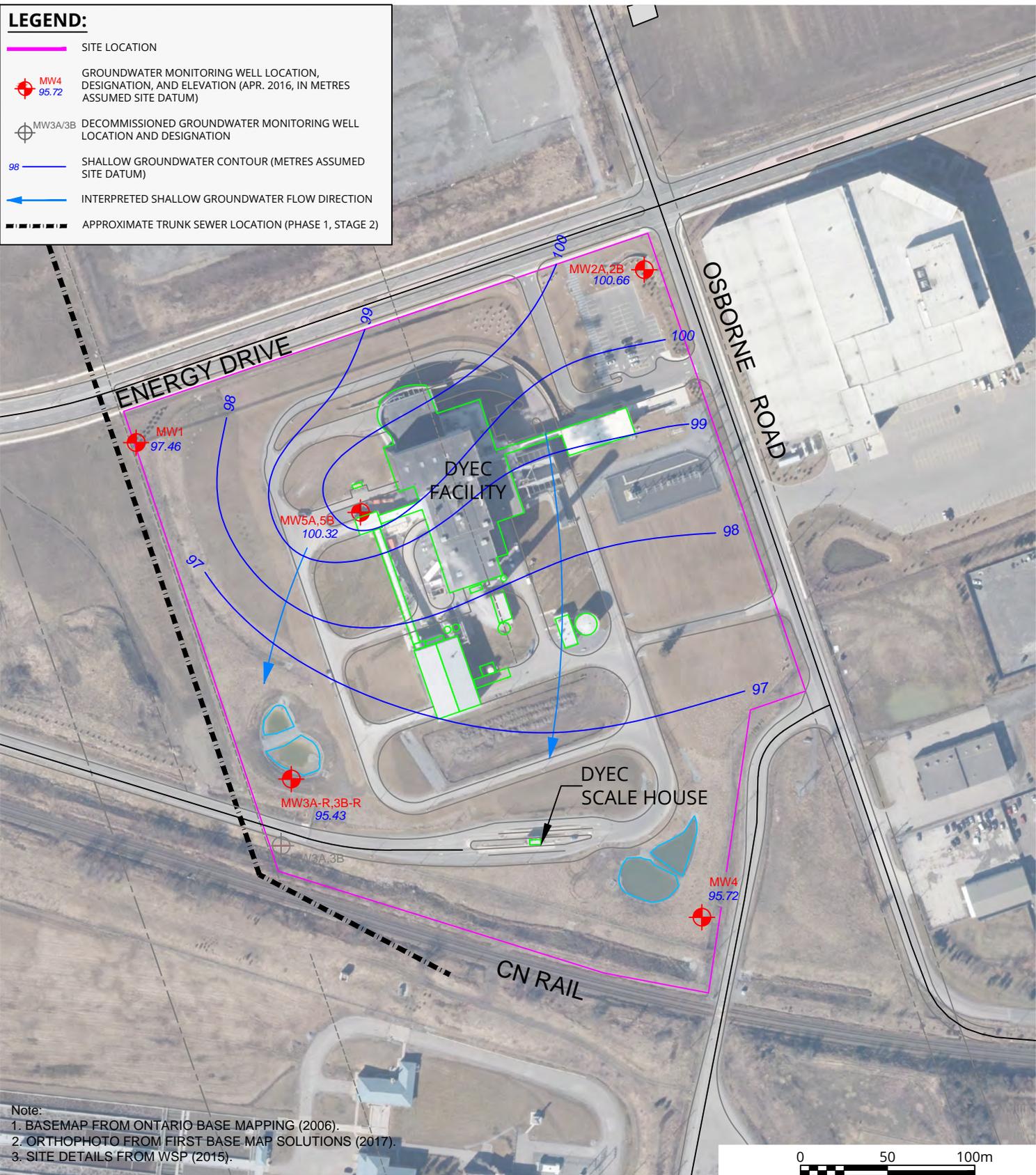




Note:
 1. BASEMAP FROM ONTARIO BASE MAPPING (2006).
 2. SITE DETAILS FROM WSP (2015).



SITE LOCATION MAP DURHAM YORK ENERGY CENTRE 2016 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT THE REGIONAL MUNICIPALITY OF DURHAM	True North 	Drawn by: SSL Figure: 1	
		Approx. Scale: 1:20,000	
		Date Revised: Feb. 14, 2017	



LEGEND:

- SITE LOCATION
- **MW4**
95.72 GROUNDWATER MONITORING WELL LOCATION, DESIGNATION, AND ELEVATION (APR. 2016, IN METRES ASSUMED SITE DATUM)
- ⊕ MW3A/3B DECOMMISSIONED GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- 98 SHALLOW GROUNDWATER CONTOUR (METRES ASSUMED SITE DATUM)
- INTERPRETED SHALLOW GROUNDWATER FLOW DIRECTION
- - - APPROXIMATE TRUNK SEWER LOCATION (PHASE 1, STAGE 2)

Note:
 1. BASEMAP FROM ONTARIO BASE MAPPING (2006).
 2. ORTHOPHOTO FROM FIRST BASE MAP SOLUTIONS (2017).
 3. SITE DETAILS FROM WSP (2015).

0 50 100m
 1:3000

SITE PLAN
 DURHAM YORK ENERGY CENTRE
 2016 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT

THE REGIONAL MUNICIPALITY OF DURHAM

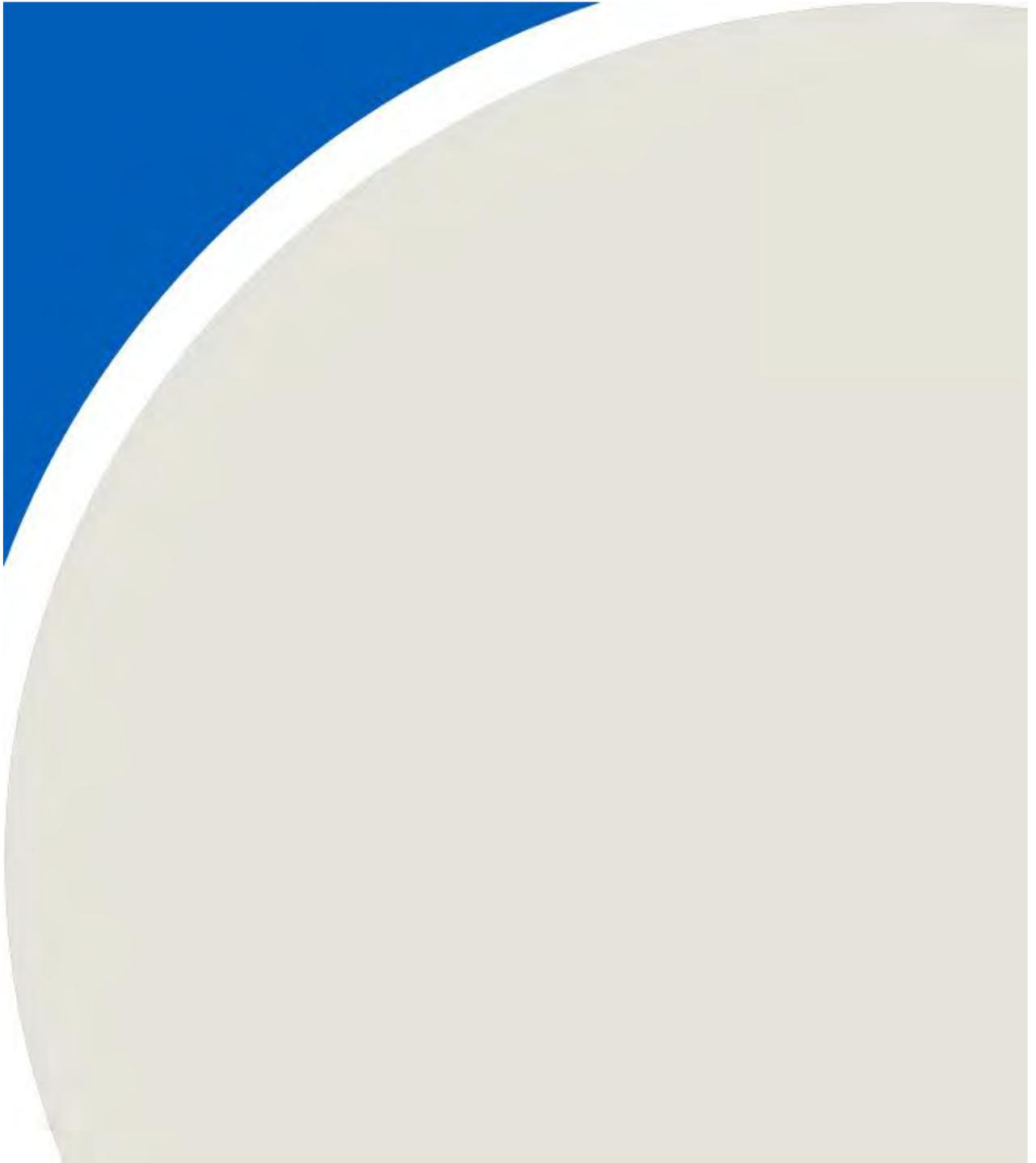
True North


Drawn by: SSL	Figure: 1
Approx. Scale: 1:3,000	
Date Revised: Feb. 15, 2017	

Project # 1604066



APPENDIX A



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: 416-325-6345

Ministère
de l'Environnement et de l'Action
en matière de changement climatique
Région Central
5775, rue Yonge
8^{ème} étage
North York (Ontario) M2M 4J1
Tél: (416) 326-6700
Télé: (416) 326-6345



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,

A handwritten signature in black ink, appearing to read "Dolly Goyette".

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

APPENDIX B

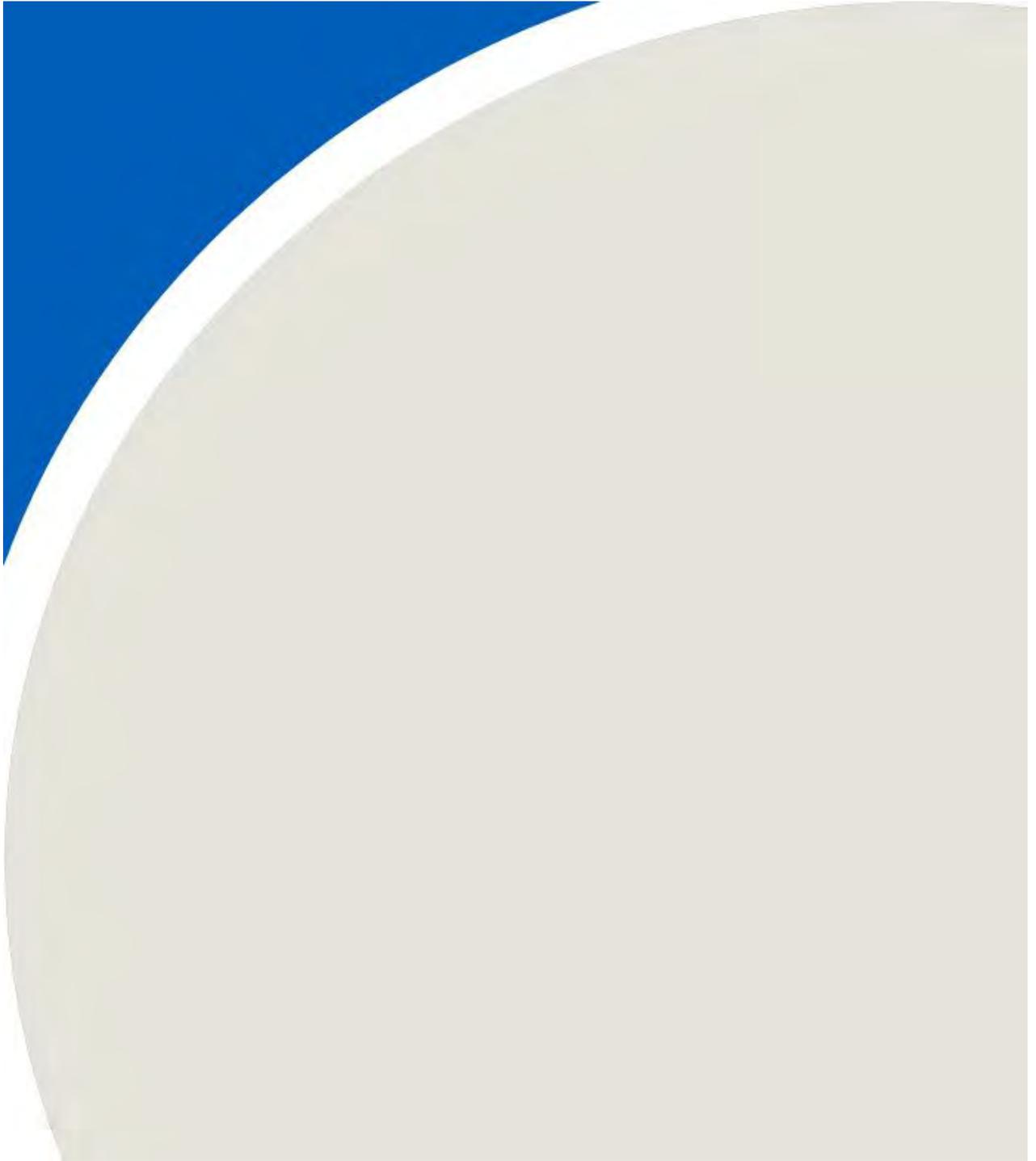


Table B-1 - Monitoring Well Construction Detail Summary

Durham York Energy Centre - 2016 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	98.27	97.17	1.10	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 Site Datum.

2) Monitoring Point denotes the top of the monitor riser pipe (i.e., top-of-pipe [T.O.P.]).

3) Blank denotes data not available.

APPENDIX C

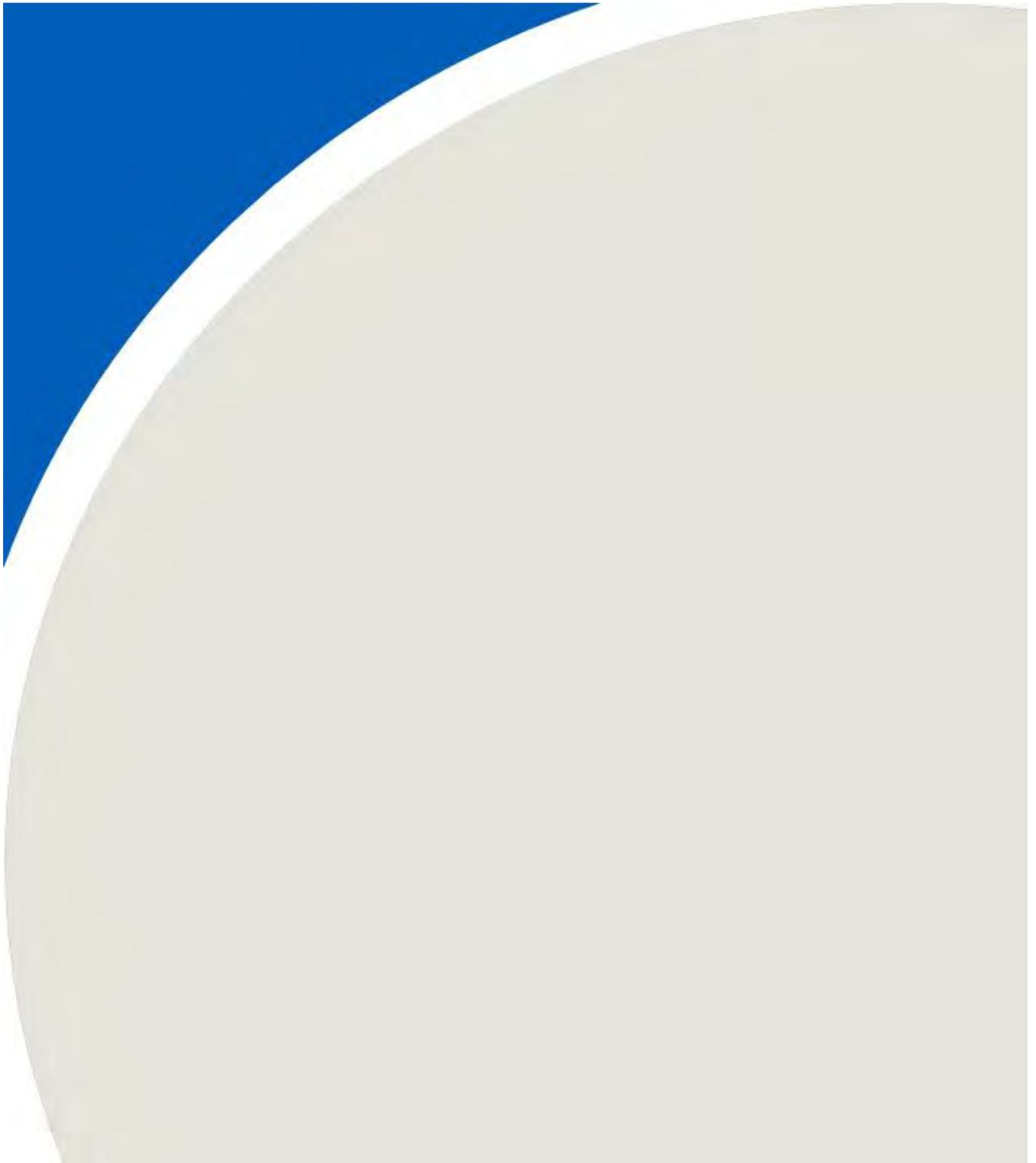


Table C-1 - Groundwater Elevations

Durham York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Monitor ID	Groundwater Elevations											
	MW1		MW2A		MW2B		MW3A		MW3A-R		MW3B	
Measuring Point Elevation	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		

Notes:

- 1) mSD denotes metres Site Datum.
- 2) mBTOP denotes metres below top-of-pipe.
- 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 [T.O.P.] elevations noted within Table B-1 (Monitor Construction Details) and thus, the calculated groundwater elevations for these monitoring wells should be interpreted with caution.

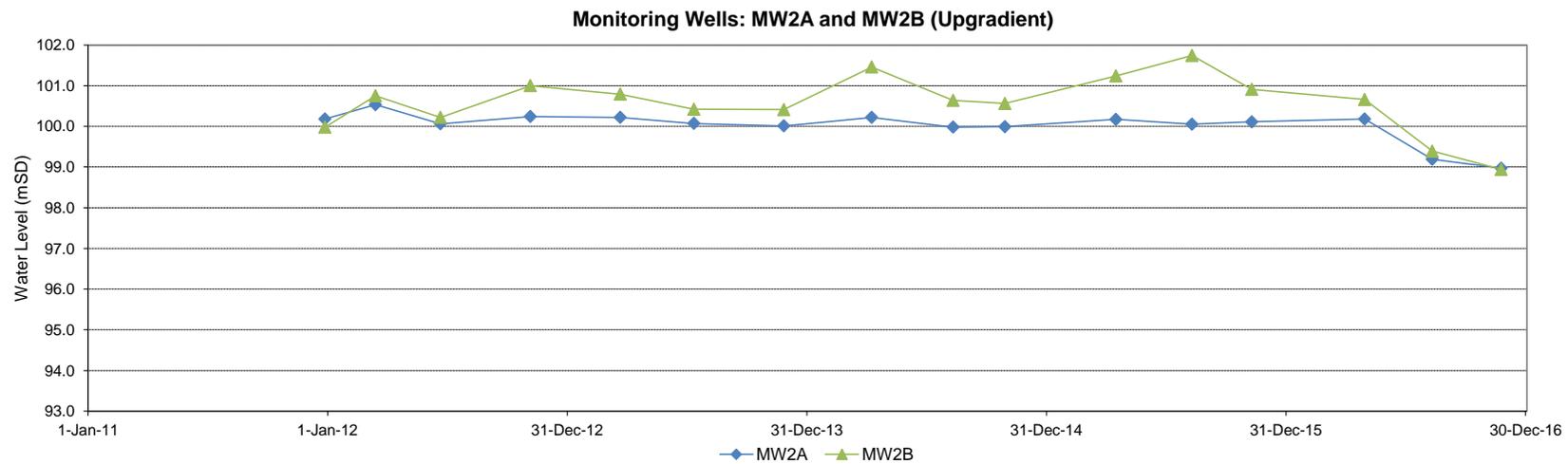
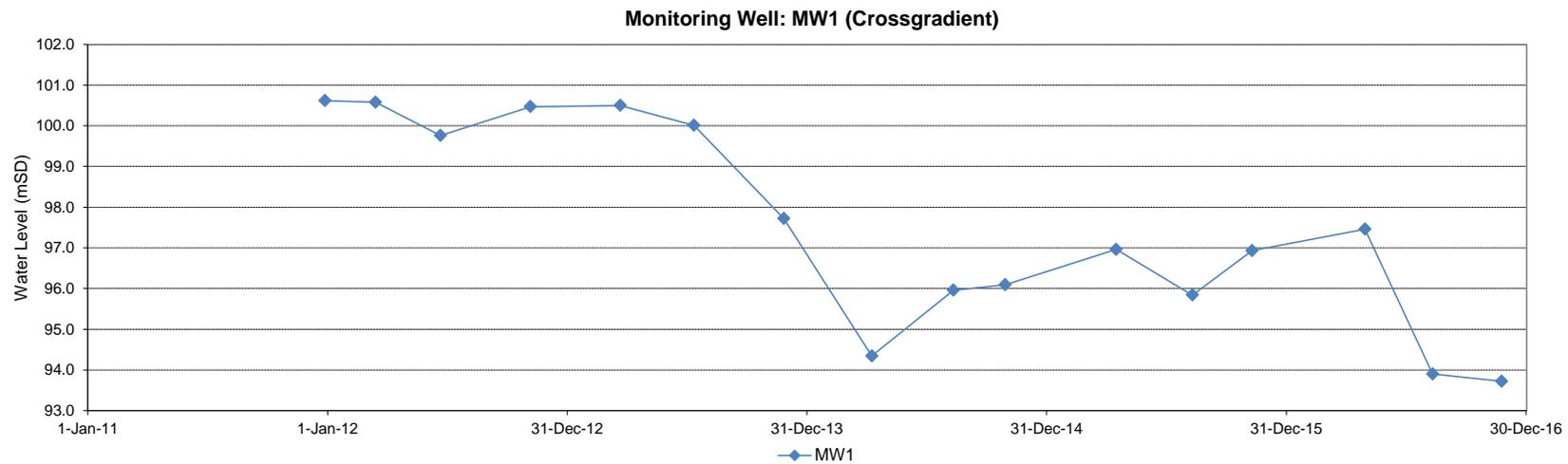
Table C-1 - Groundwater Elevations

Durham York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Monitor ID	Groundwater Elevations							
	MW3B-R		MW4		MW5A		MW5B	
Measuring Point Elevation	99.11		98.27		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	95.72	2.39	100.36	2.47	100.32
10-Aug-16	4.70	94.41	4.19	94.08	2.94	99.81	2.85	99.94
23-Nov-16	4.88	94.23	3.92	94.35	3.17	99.58	3.67	99.12

Notes:

- 1) mSD denotes metres Site Datum.
- 2) mBTOP denotes metres below top-of-pipe.
- 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 [T.O.P.] elevations noted within Table B-1 (Monitor Construction Details) and thus, the calculated groundwater elevations for these monitoring wells should be interpreted with caution.



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

2016 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER

C-1

APPROX. SCALE

NTS

PROJECT NUMBER

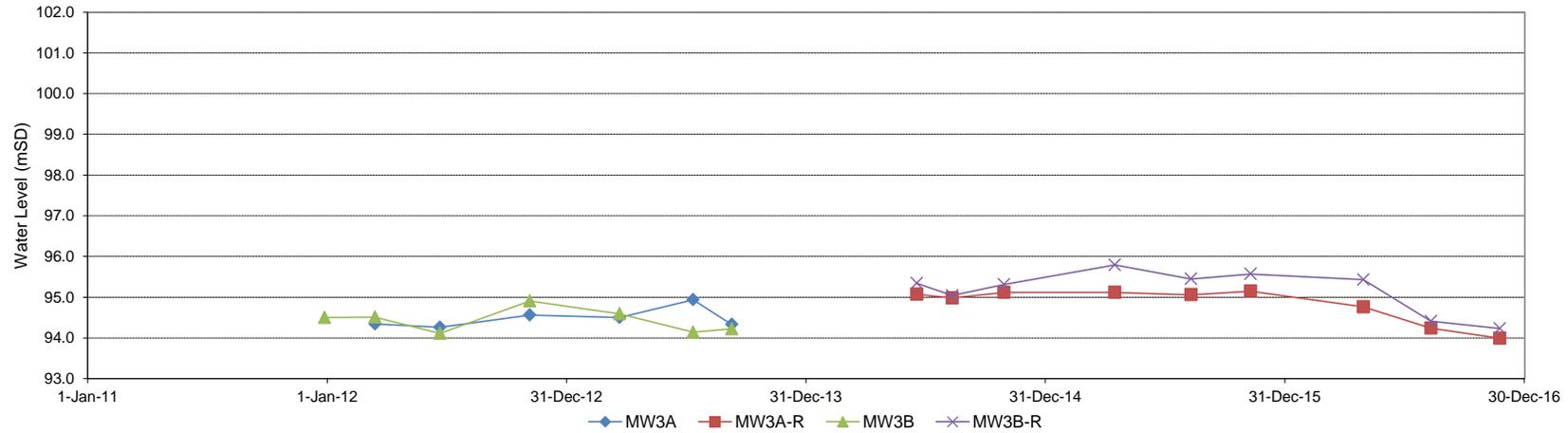
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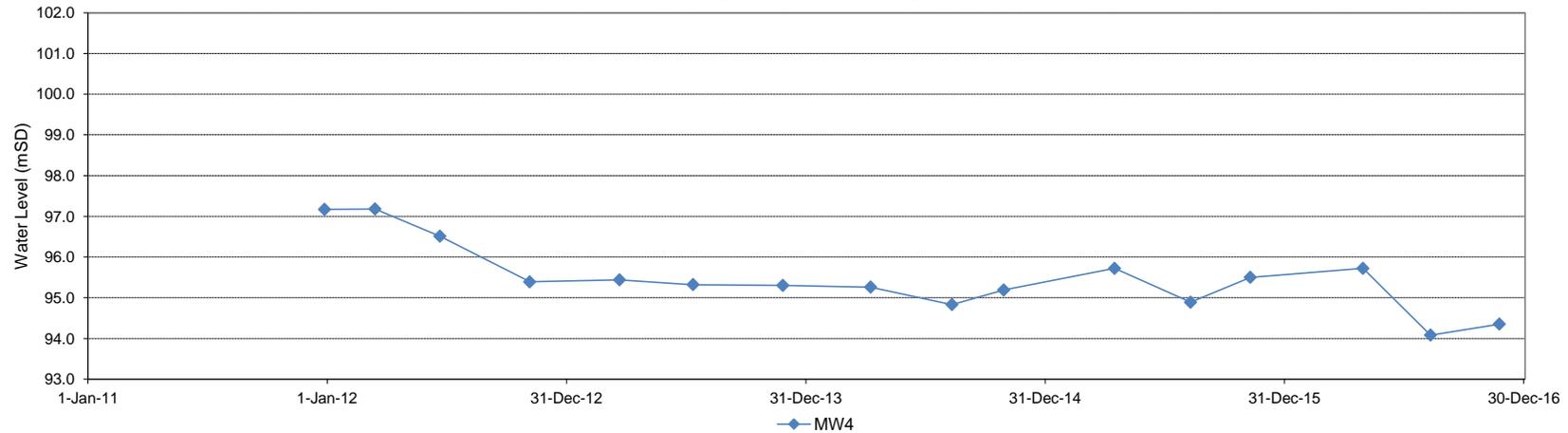
01/02/2017



Monitoring Wells: MW3A and MW3B (Downgradient)



Monitoring Well: MW4 (Downgradient)



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

2016 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER

C-2

APPROX. SCALE

NTS

PROJECT NUMBER

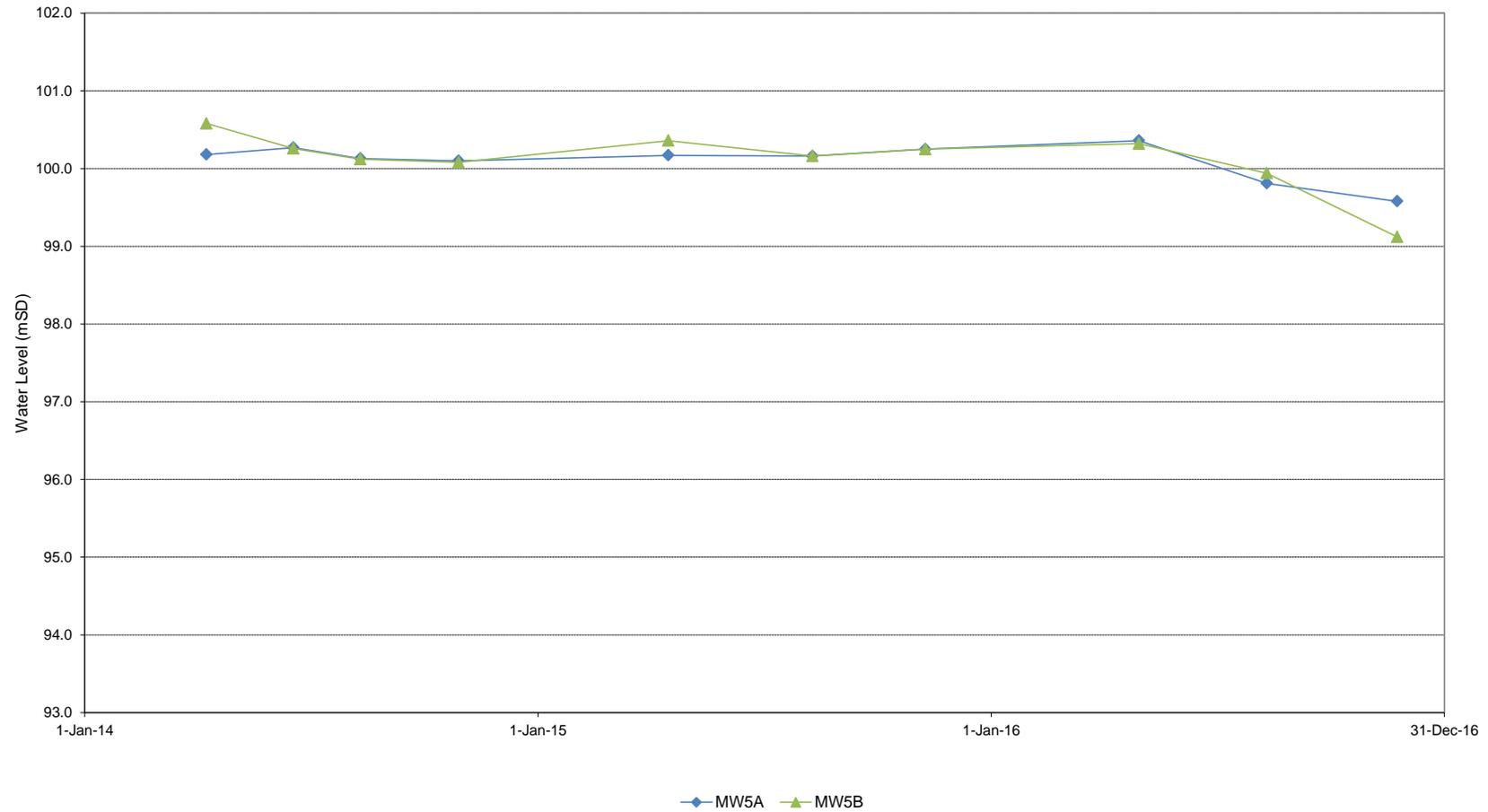
1604066

DATE REVISED

01/02/2017



Monitoring Wells: MW5A and MW5B (Internal Assessment Wells)



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

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

C-3

APPROX. SCALE

NTS

PROJECT NUMBER

1604066

DATE REVISED

01/02/2017



Table C-2 - Hydraulic Gradients

Durham York Energy Centre - 2016 Monitoring Program
Regional Municipality of Durham
Project No. 1604066

Monitoring Well	MW2B	MW2A	Hydraulic Gradient (m/m)	MW3B	MW3A	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		96.31	96.22		99.11	99.16		102.79	102.75	
Top of Screen (mSD)	97.46	94.39		90.76	87.63		93.81	90.74		97.47	94.81	
Bottom of Screen (mSD)	95.94	92.87		89.23	86.10		91.86	89.22		95.97	93.36	
Screen Midpoint (mSD)	96.70	93.63		90.00	86.87		92.84	89.98		96.72	94.09	
Date	Water Levels (mSD)		Water Levels (mSD)		Water Levels (mSD)		Water Levels (mSD)					
28-Dec-11	99.98	100.18	-0.07	94.50								
14-Mar-12	100.75	100.53	0.07	94.51	94.34	0.05						
21-Jun-12	100.22	100.06	0.05	94.11	94.26	-0.05						
5-Nov-12	101.00	100.24	0.25	94.91	94.56	0.11						
22-Mar-13	100.79	100.22	0.19	94.59	94.50	0.03						
12-Jul-13	100.42	100.07	0.11	94.14	94.94	-0.26						
9-Sep-13				94.22	94.33	-0.04						
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

Notes: 1) mSD denotes metres 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

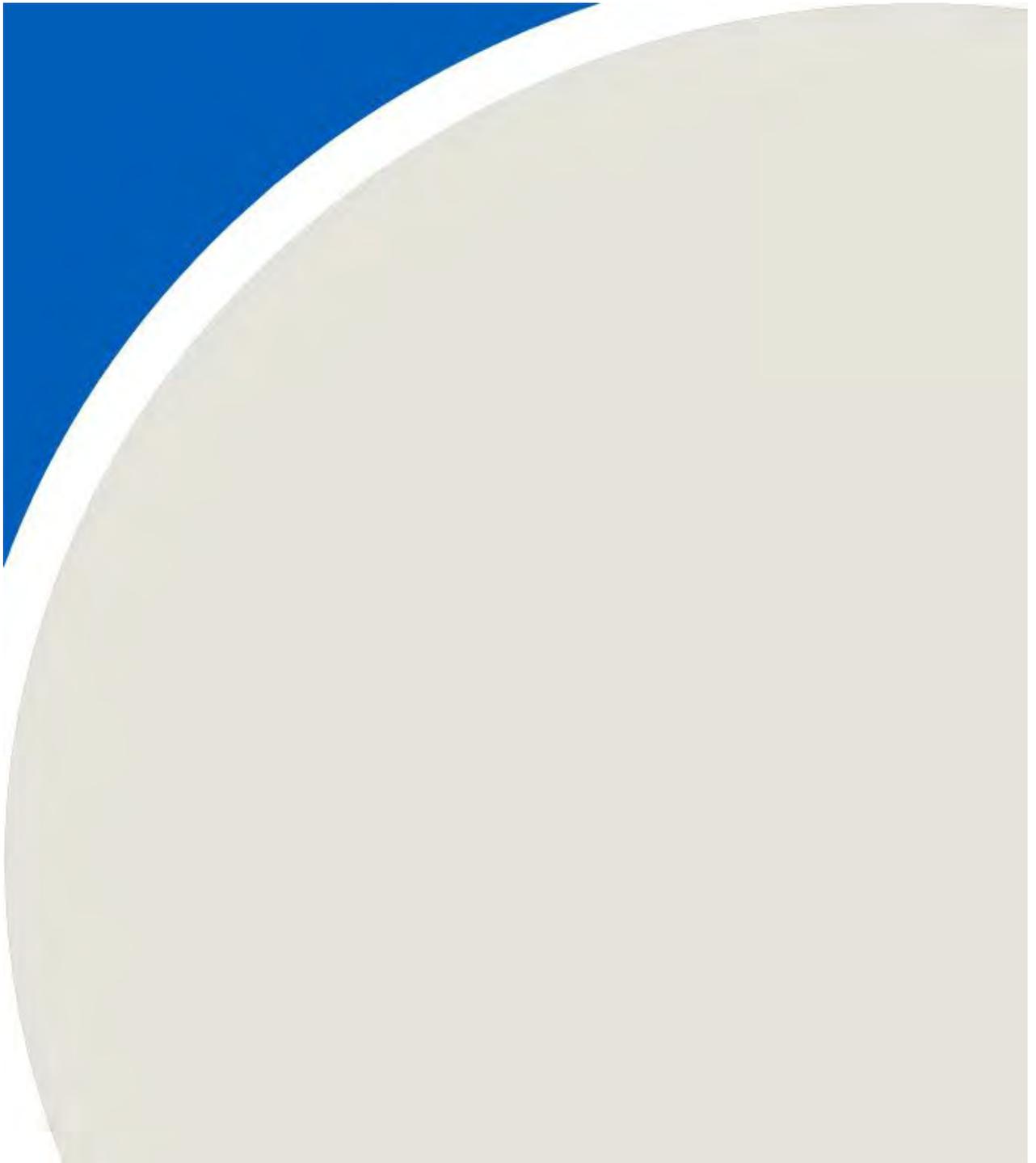


Table D-1 - Groundwater Field Chemical Results

Durham York Energy Centre - 2016 Monitoring Program

Regional Municipality of Durham

Project No. 1604066

Monitor ID	Monitoring Event	Temperature	pH	Conductivity	Turbidity
		°C	pH units	µS/cm	NTU
MW1	29-Apr-16	8.0	7.50	723	426
	10-Aug-16	Insufficient volume available for sample collection.			
	23-Nov-16	Insufficient volume available for sample collection.			
MW2A	29-Apr-16	9.6	8.24	421	267
	10-Aug-16	13.3	8.13	332	571
	23-Nov-16	10.4	8.36	426	218
MW2B	29-Apr-16	8.8	7.87	758	410
	10-Aug-16	13.0	7.88	609	441
	23-Nov-16	10.7	7.88	767	439
MW3A-R	29-Apr-16	9.1	7.72	391	352
	10-Aug-16	12.4	7.58	253	105
	23-Nov-16	10.3	8.71	336	532
MW3B-R	29-Apr-16	8.2	7.62	544	180
	10-Aug-16	13.1	7.64	424	60.4
	23-Nov-16	11.5	8.96	570	303
MW4	29-Apr-16	7.1	7.35	1025	> 1000
	10-Aug-16	16.5	7.67	662	> 1000
	23-Nov-16	11.3	8.06	1024	462
MW5A	29-Apr-16	8.7	7.93	381	369
	10-Aug-16	13.4	7.69	299	219
	23-Nov-16	11.0	8.49	419	405
MW5B	29-Apr-16	8.0	7.79	654	226
	10-Aug-16	14.5	7.66	520	245
	23-Nov-16	11.0	8.26	730	359

Notes:

- 1) µS/cm denotes micro-Siemens per centimetre.
- 2) NTU denotes Nephelometric Turbidity Units.
- 3) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Parameter	Unit	ODWS	MW1	MW1	MW1	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	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		240	244	243	214	226	228	241	223	262	244	229	238	243	235	INS	INS
Carbonate	mg/L		<5	<5	<5	6.00	<5	<5	<5	<5	<5	<5	<5	<5	8.00	<5		
Chloride	mg/L	250 (AO)	14.9	15.0	13.5	15.3	14.8	14.6	13.4	13.5	15.0	15.3	19.9	20.5	19.0	24.4		
Sulphate	mg/L	500 (AO)	152	153	131	147	127	129	132	227	151	150	158	143	139	154		
Calcium	mg/L		83	69	68	74	74	65	66	91	70	69	68	68	69	71		
Magnesium	mg/L		46	44	46	50	53	46	44	62	50	48	46	46	48	49		
Sodium	mg/L	200 (AO)	10.3	8.3	8.1	8.5	10.2	8.6	10.0	9.6	13.4	13.0	21.1	20.2	17.0	20.3		
Potassium	mg/L		2.99	2.99	3.10	3.55	3.28	2.71	2.98	4.32	3.80	3.74	3.24	2.94	3.20	2.99		
Boron	mg/L	5 (IMAC)	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.01		
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	<0.001	<0.001		
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	<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	<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	<0.0001	<0.0001		

Notes:

- 1) ODWS denotes Ontario Drinking Water Standards, Objectives and Guidelines, Ontario Ministry of the Environment, as revised June 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Parameter	Unit	ODWS	MW2A	MW2A	MW2A	MW2A	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	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		221	215	195	168	188	190	206	185	180	188	198	194	202	217	193	192
Carbonate	mg/L		<5	<5	<5	7.00	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	250 (AO)	4.7	3.2	1.8	4.0	1.9	2.7	2.5	3.3	4.5	4.5	6.1	5.1	4.0	4.5	4.5	3.5
Sulphate	mg/L	500 (AO)	73	46	21	29	16	19	22	25	28	26	34	27	23	30	28	24
Calcium	mg/L		48	27	18	20	18	15	17	16	17	15	18	17	15	13	15	15
Magnesium	mg/L		32	31	32	36	38	32	31	34	30	31	32	32	33	30	32	31
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	28.2	28.5	28.7	22.1
Potassium	mg/L		2.31	2.20	1.62	1.80	1.75	1.34	1.51	1.52	1.42	1.30	1.50	1.62	1.26	1.20	1.27	1.24
Boron	mg/L	5 (IMAC)	0.09	0.08	0.09	0.10	0.10	0.11	0.10	0.11	0.11	0.12	0.11	0.11	0.10	0.10	0.11	0.11
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	<0.001	<0.001	<0.001	<0.001
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	<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	<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	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

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- 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Parameter	Unit	ODWS	MW2B	MW2B	MW2B	MW2B	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	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		235	244	252	220	242	241	248	224	236	238	240	225	258	250	233	243
Carbonate	mg/L		<5	<5	<5	8.00	<5	<5	<5	<5	<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	67.0	76.4	78.5	70.5
Sulphate	mg/L	500 (AO)	99	120	94	99	85	82	77	84	78	80	96	80	75	85	83	81
Calcium	mg/L		59	50	46	48	46	41	39	44	45	46	49	48	48	50	50	46
Magnesium	mg/L		35	42	44	50	55	47	44	52	52	53	55	55	57	58	59	56
Sodium	mg/L	200 (AO)	29.1	24.0	20.7	20.4	21.9	18.5	19.3	22.5	22.5	24.5	26.5	27.7	30.9	29.4	29.4	26.2
Potassium	mg/L		1.09	1.67	1.81	2.20	2.23	1.82	2.03	2.02	2.04	2.00	1.98	2.04	2.11	2.27	2.21	2.13
Boron	mg/L	5 (IMAC)	0.08	0.08	0.08	0.09	0.08	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.08	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	<0.001	<0.001	<0.001	<0.001
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	<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	<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	<0.0001	<0.0001	<0.0001	<0.0001

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- 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 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	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	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		181	153	147	130	124	121	151	134	120	123	147	126	137	152	141	140
Carbonate	mg/L		<5	<5	<5	<5	<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	7.5	6.5	6.2	7.7	6.5	6.2	6.3	6.4	5.9
Sulphate	mg/L	500 (AO)	125	79	51	44	29	23	20	27	21	21	27	26	22	21	19	17
Calcium	mg/L		77	44	34	28	26	23	24	22	19	16	18	21	18	20	17	16
Magnesium	mg/L		12	10	9	9	9	7	7	9	9	9	11	12	10	11	11	10
Sodium	mg/L	200 (AO)	47.5	45.3	43.0	46.0	49.6	40.8	44.7	35.1	35.7	34.5	39.2	37.9	40.0	38.5	38.1	36.8
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	1.41	1.67	1.34	1.27
Boron	mg/L	5 (IMAC)	0.13	0.16	0.17	0.18	0.18	0.17	0.17	0.13	0.14	0.16	0.15	0.14	0.12	0.13	0.16	0.15
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	<0.001	<0.001	<0.001	<0.001
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	<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	<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	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

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- 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 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	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	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		247	212	211	186	213	202	235	198	209	203	215	200	235	222	221	220
Carbonate	mg/L		<5	<5	<5	<5	<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	9.2	8.7	9.0	8.8
Sulphate	mg/L	500 (AO)	102	59	52	46	34	40	43	103	89	86	96	83	79	80	76	71
Calcium	mg/L		78	50	48	49	56	47	61	58	47	48	52	52	51	49	50	47
Magnesium	mg/L		22	20	20	22	26	21	25	31	29	29	31	32	32	31	31	30
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	28.9	25.7	25.4	25.0
Potassium	mg/L		2.00	1.42	1.55	1.99	1.59	1.38	2.39	5.92	4.62	4.04	3.43	3.23	3.27	3.02	2.77	2.82
Boron	mg/L	5 (IMAC)	0.07	0.08	0.09	0.09	0.07	0.10	0.08	0.12	0.10	0.12	0.10	0.09	0.08	0.08	0.09	0.10
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	<0.001	<0.001	<0.001	<0.001
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	<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	<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	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

- 1) ODWS denotes Ontario Drinking Water Standards, Objectives and Guidelines, Ontario Ministry of the Environment, as revised June 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Parameter	Unit	ODWS	MW4	MW4	MW4	MW4	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	9-Nov-15	29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		300	430	506	346	330	448	496	301	353	300	539	482	574	590	425	337
Carbonate	mg/L		<5	<5	<5	8.0	<5	<5	<5	<5	<5	<5	<5	<5	<5	15.0	<5	<5
Chloride	mg/L	250 (AO)	12.3	14.5	7.1	12.0	8.2	7.5	6.8	8.6	8.5	12.2	7.0	7.6	8.7	6.6	28.3	141.0
Sulphate	mg/L	500 (AO)	51	48	48	61	39	63	63	24	32	32	78	59	72	66	63	36
Calcium	mg/L		43	36	43	46	42	45	39	29	32	31	39	46	44	41	37	42
Magnesium	mg/L		52	73	88	68	69	84	84	55	62	54	103	102	106	114	89	87
Sodium	mg/L	200 (AO)	22.0	25.5	28.0	23.1	23.7	28.6	35.8	22.2	25.5	22.0	40.0	36.6	47.6	37.4	31.4	35.2
Potassium	mg/L		4.39	2.45	2.70	6.08	2.81	3.55	3.61	2.30	2.73	2.63	2.68	3.43	3.70	3.18	3.23	3.43
Boron	mg/L	5 (IMAC)	0.06	0.06	0.07	0.06	0.04	0.06	0.07	0.04	0.05	0.05	0.07	0.07	0.08	0.06	0.07	0.06
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	<0.001	<0.001	<0.001	<0.001
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	<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	<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	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

- 1) ODWS denotes Ontario Drinking Water Standards, Objectives and Guidelines, Ontario Ministry of the Environment, as revised June 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 Monitoring Program

Regional Municipality of Durham

Project No. 1604066

Parameter	Unit	ODWS	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
Bicarbonate	mg/L		207	199	183	200	198	215	215	200	203
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	6.0
Chloride	mg/L	250 (AO)	5.3	3.9	3.2	2.8	2.7	2.2	1.9	2.0	2.2
Sulphate	mg/L	500 (AO)	16.9	11.0	5.6	9.4	7.6	6.9	9.1	7.7	9.9
Calcium	mg/L		25	19	17	20	21	17	25	18	17
Magnesium	mg/L		35	32	31	33	35	35	35	35	35
Sodium	mg/L	200 (AO)	12.2	11.2	11.4	11.9	11.7	12.9	11.8	11.5	11.4
Potassium	mg/L		3.83	2.89	2.82	2.53	2.44	2.38	2.75	2.20	2.05
Boron	mg/L	5 (IMAC)	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.04	0.04
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<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
Mercury	mg/L	0.001 (MAC)	<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, Objectives and Guidelines, Ontario Ministry of the Environment, as revised June 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

Durham York Energy Centre - 2016 Monitoring Program

Regional Municipality of Durham

Project No. 1604066

Parameter	Unit	ODWS	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
Bicarbonate	mg/L		240	247	234	247	229	274	266	263	262
Carbonate	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	6.0
Chloride	mg/L	250 (AO)	5.9	5.0	4.8	8.0	10.1	12.9	14.0	17.8	34.9
Sulphate	mg/L	500 (AO)	96	91	96	107	103	99	111	104	95
Calcium	mg/L		41	34	36	39	47	39	44	40	40
Magnesium	mg/L		57	52	53	55	60	59	61	60	61
Sodium	mg/L	200 (AO)	10.2	10.1	10.2	12.2	13.0	16.6	14.9	15.6	19.1
Potassium	mg/L		4.37	3.76	3.51	2.95	3.31	3.25	3.21	2.96	3.10
Boron	mg/L	5 (IMAC)	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.05
Cadmium	mg/L	0.005 (MAC)	<0.002	<0.002	<0.002	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L		<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
Mercury	mg/L	0.001 (MAC)	<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, Objectives and Guidelines, Ontario Ministry of the Environment, as revised June 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Table D-2 - Groundwater Laboratory Chemical Results

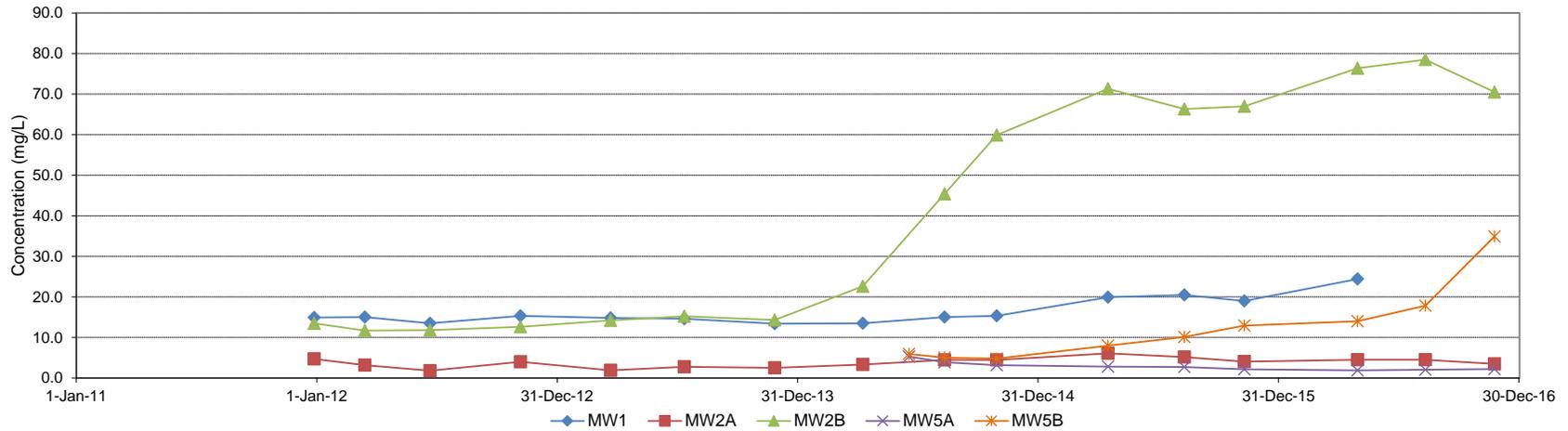
Durham-York Energy Centre - 2016 Monitoring Program
 Regional Municipality of Durham
 Project No. 1604066

Parameter	Unit	ODWS	Duplicate	Duplicate	Duplicate
			MW2A	MW2A	MW2A
			29-Apr-16	10-Aug-16	23-Nov-16
Bicarbonate	mg/L		213	190	187
Carbonate	mg/L		<5	<5	<5
Chloride	mg/L	250 (AO)	5.1	3.8	3.2
Sulphate	mg/L	500 (AO)	30	24	23
Calcium	mg/L		13	15	14
Magnesium	mg/L		30	33	31
Sodium	mg/L	200 (AO)	27.9	25.1	21.4
Potassium	mg/L		1.24	1.39	1.18
Boron	mg/L	5 (IMAC)	0.10	0.12	0.12
Cadmium	mg/L	0.005 (MAC)	<0.001	<0.001	<0.001
Cobalt	mg/L		<0.001	<0.001	<0.001
Lead	mg/L	0.01 (MAC)	<0.002	<0.002	<0.002
Mercury	mg/L	0.001 (MAC)	<0.0001	<0.0001	<0.0001

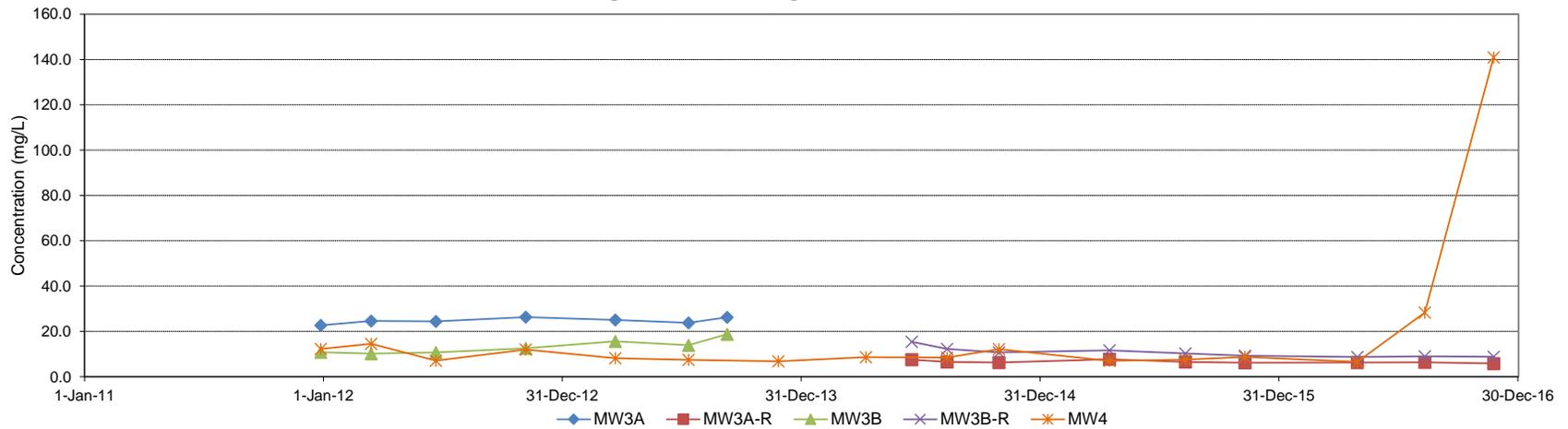
Notes:

- 1) ODWS denotes Ontario Drinking Water Standards, Objectives and Guidelines, Ontario Ministry of the Environment, as revised June 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) mg/L denotes milligrams per litre.
- 6) INS denotes insufficient volume available for sample collection.
- 7) Blank denotes data not available.

Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
CHLORIDE**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-1

APPROX. SCALE

NTS

PROJECT NUMBER

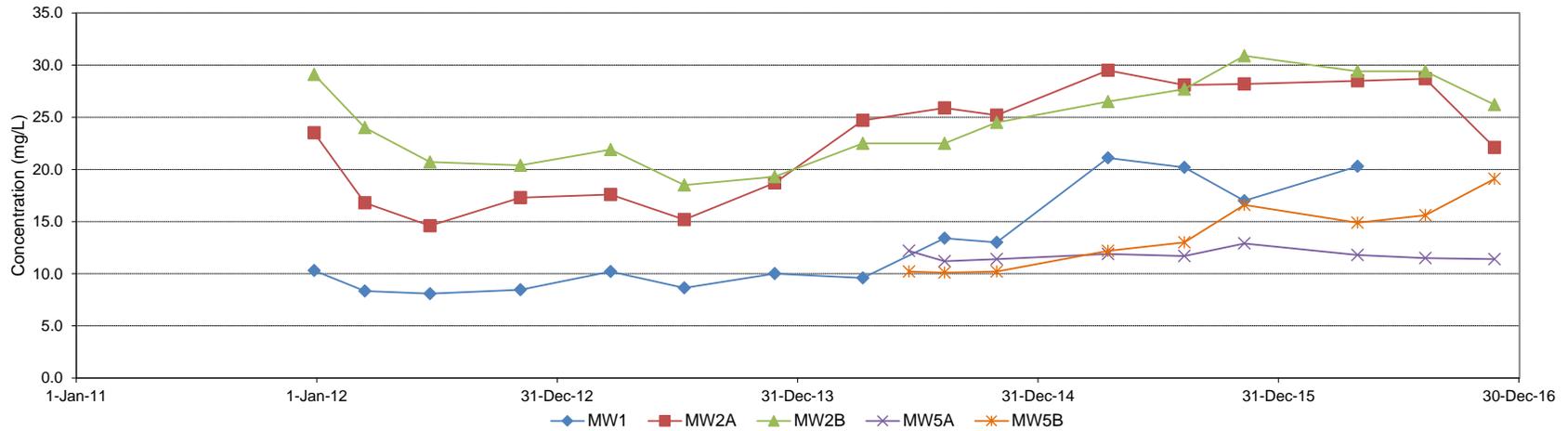
1604066

DATE REVISED

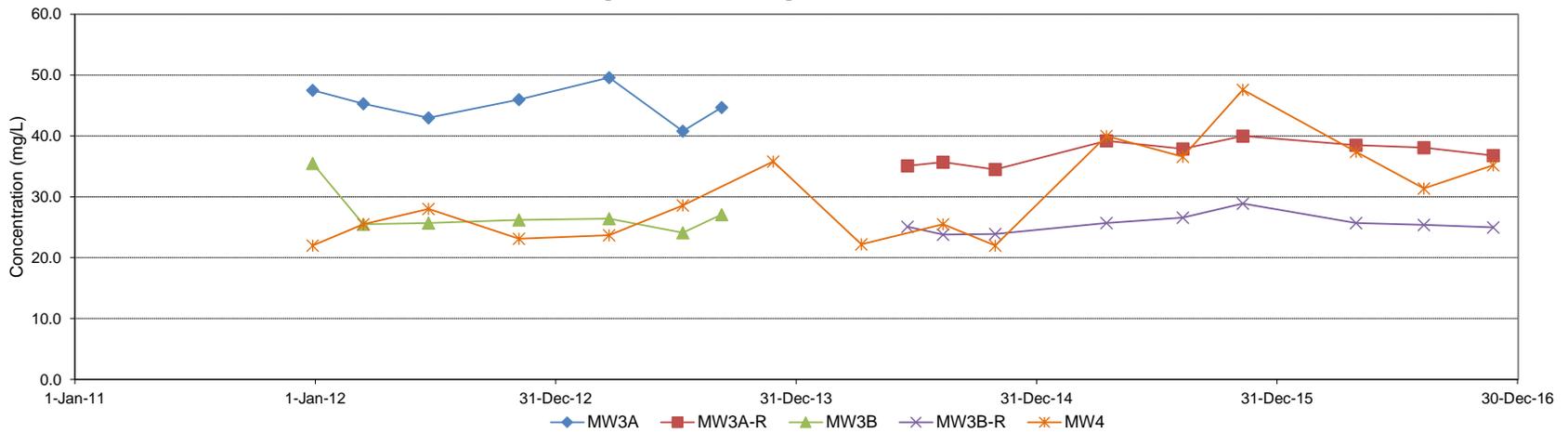
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
SODIUM**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-2

APPROX. SCALE

NTS

PROJECT NUMBER

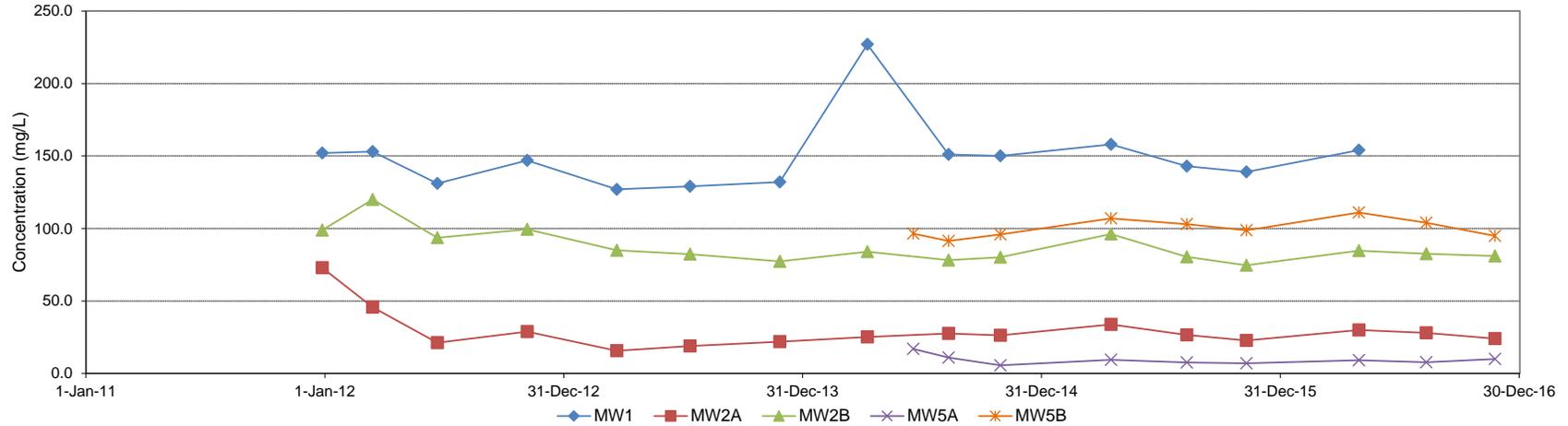
1604066

DATE REVISED

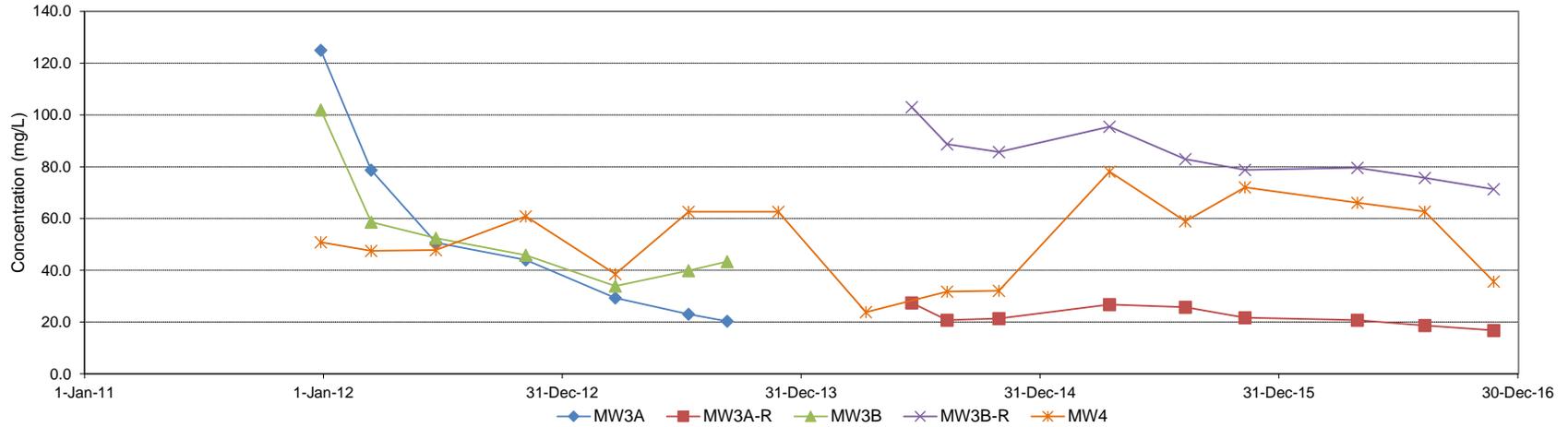
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
SULPHATE**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-3

APPROX. SCALE

NTS

PROJECT NUMBER

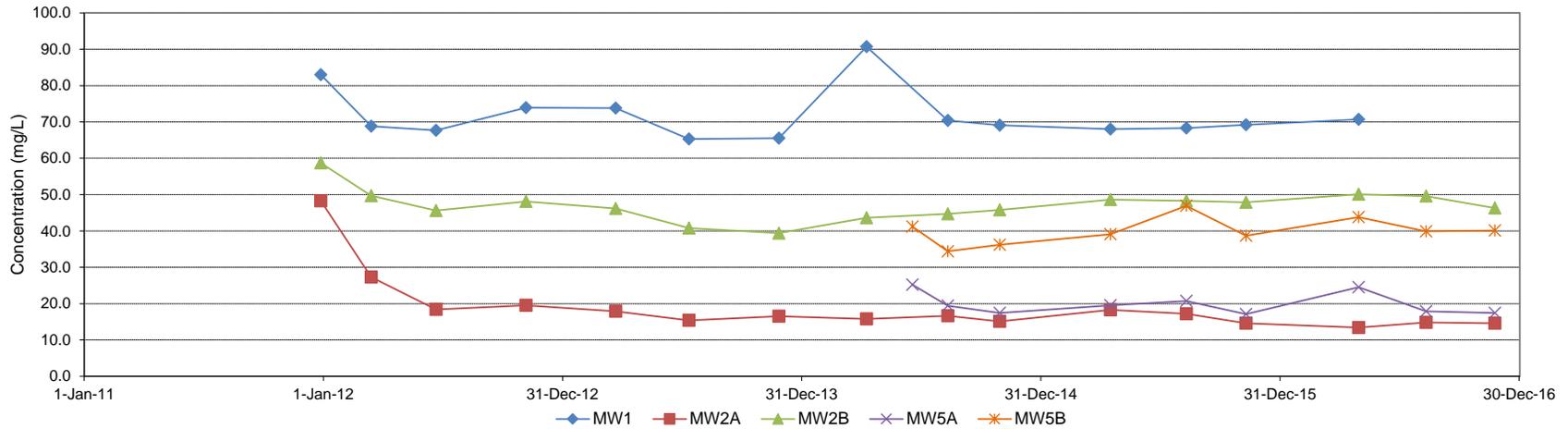
1604066

DATE REVISED

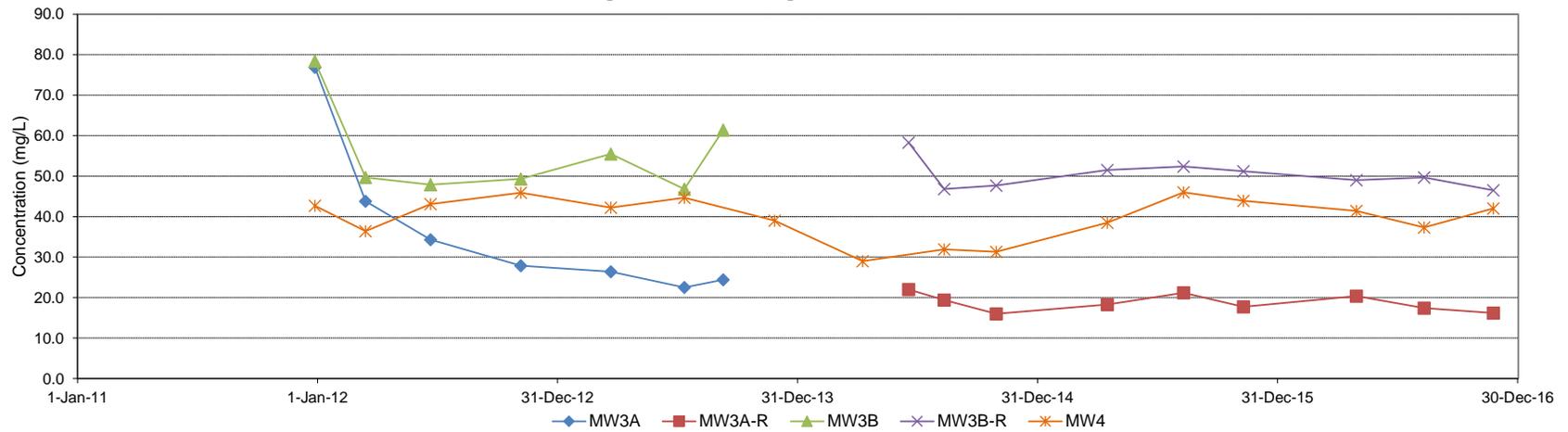
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
CALCIUM**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-4

APPROX. SCALE

NTS

PROJECT NUMBER

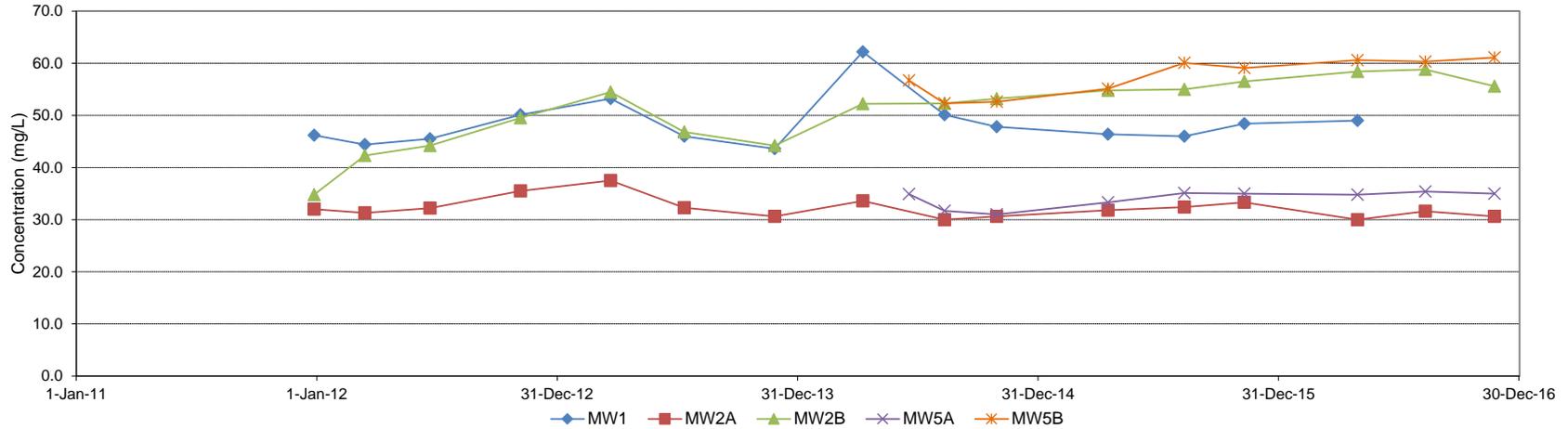
1604066

DATE REVISED

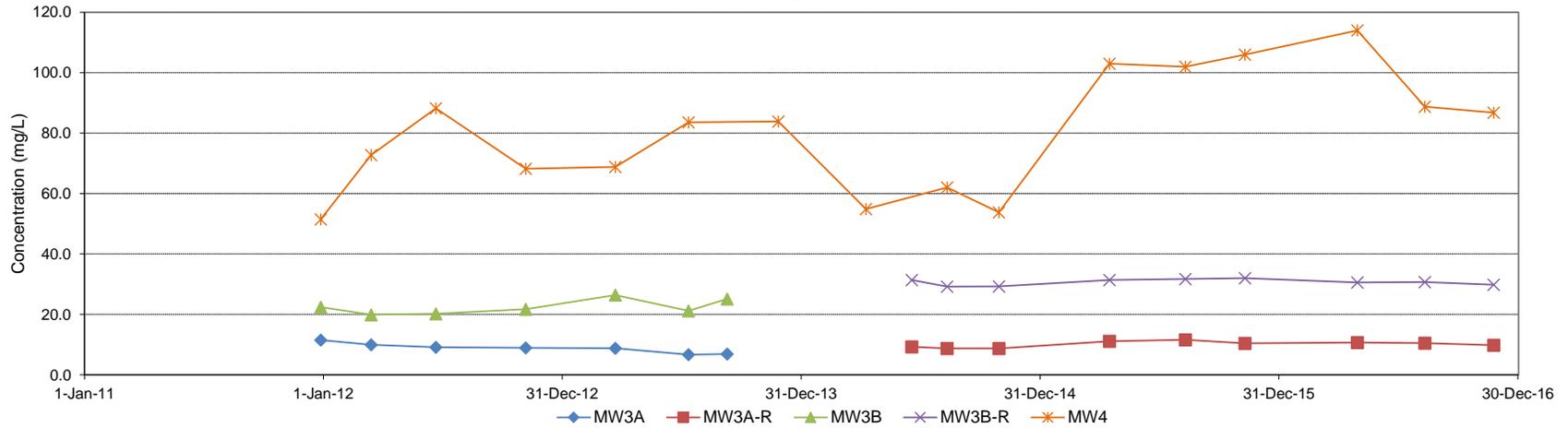
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
MAGNESIUM**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-5

APPROX. SCALE

NTS

PROJECT NUMBER

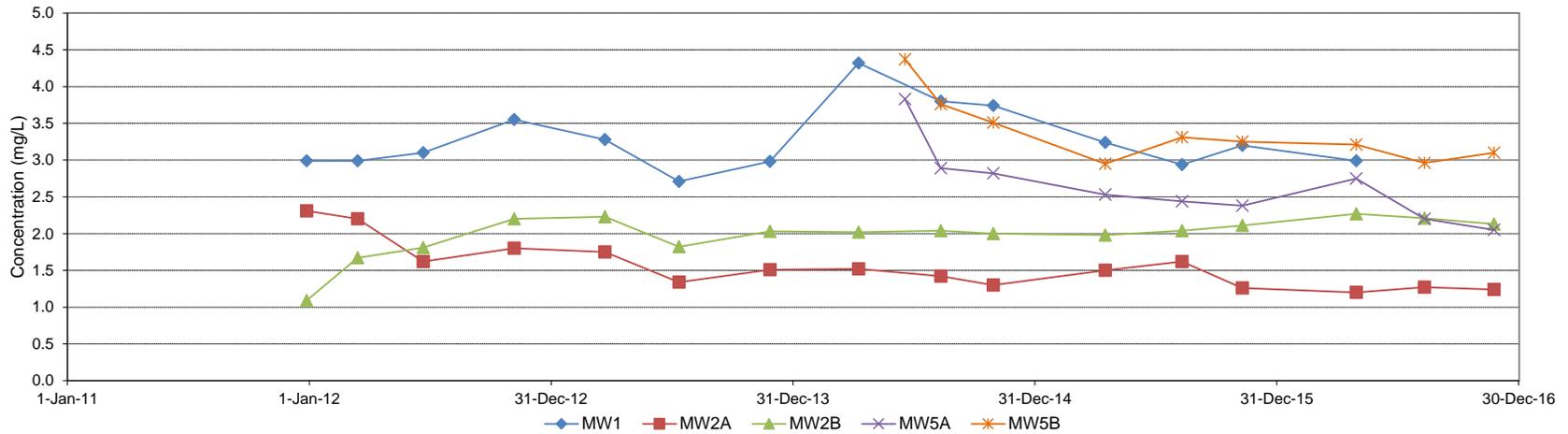
1604066

DATE REVISED

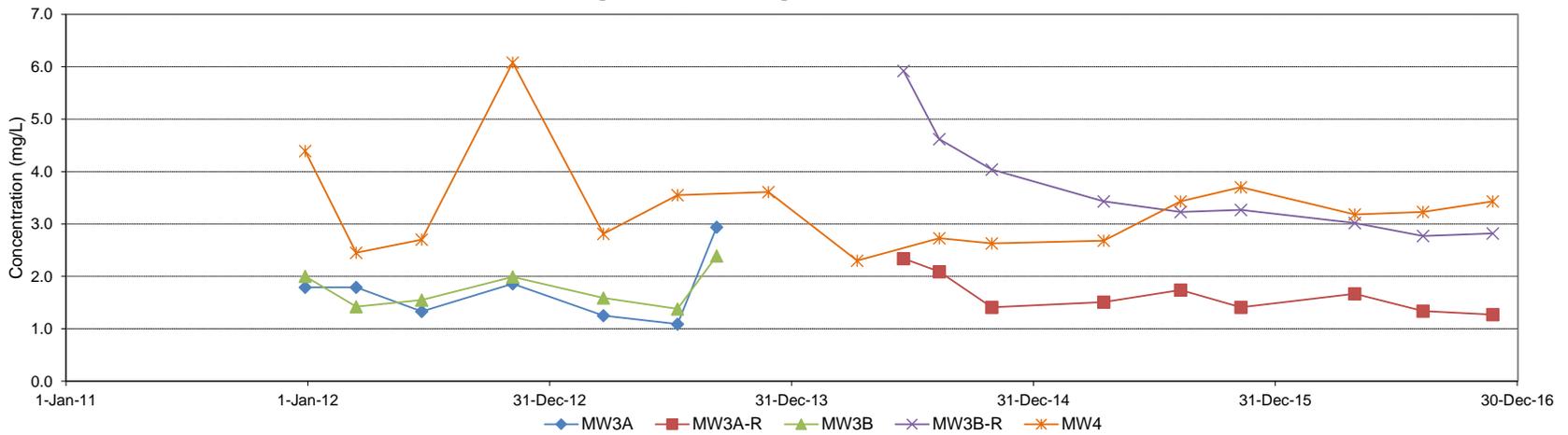
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
POTASSIUM**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-6

APPROX. SCALE

NTS

PROJECT NUMBER

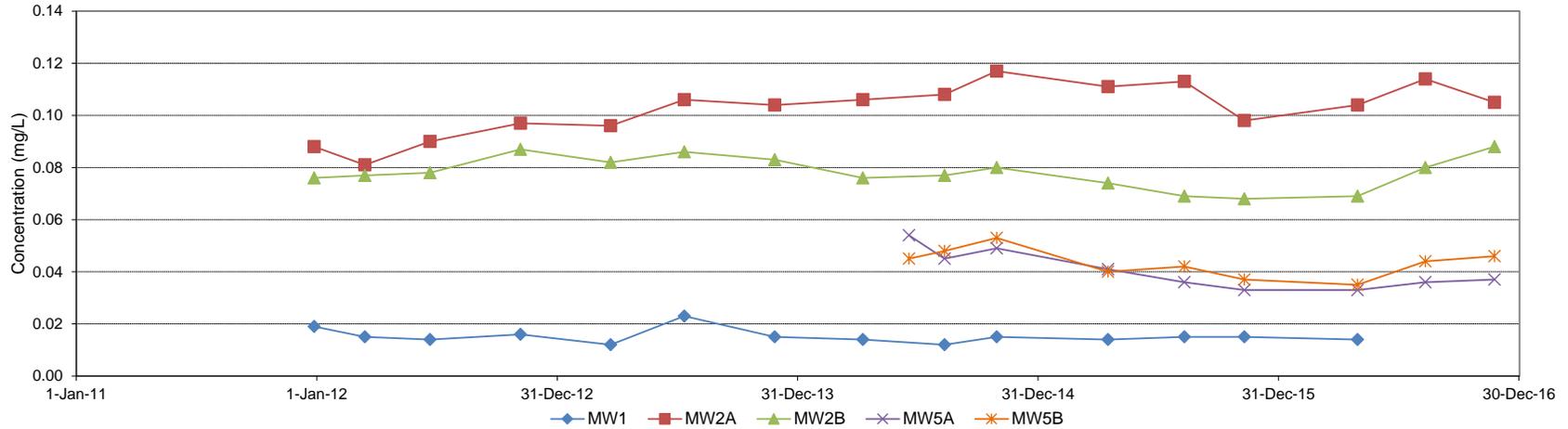
1604066

DATE REVISED

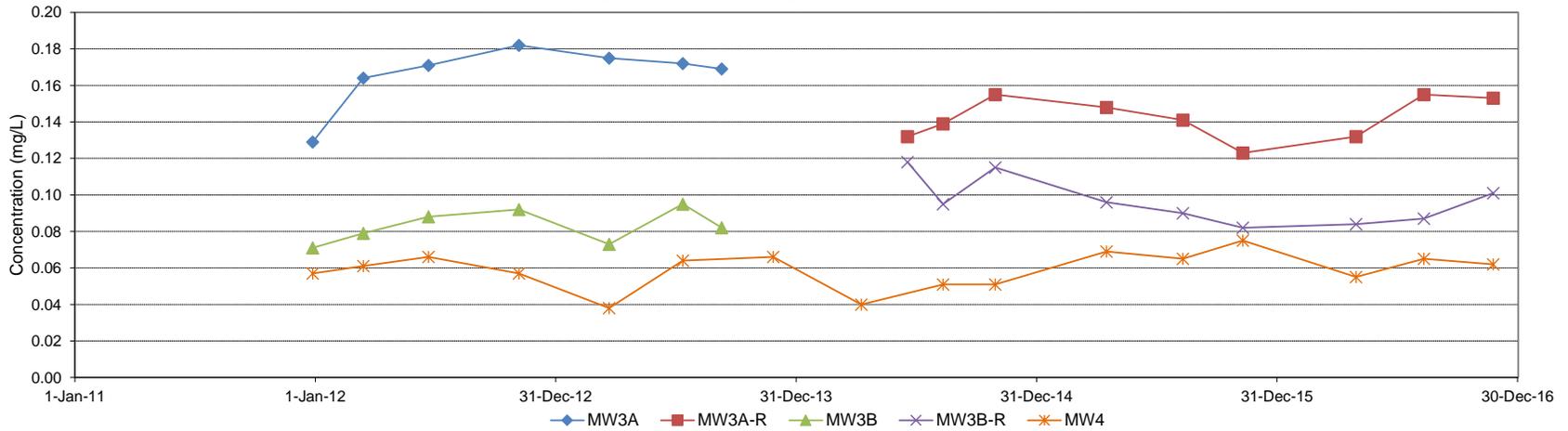
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
BORON**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-7

APPROX. SCALE

NTS

PROJECT NUMBER

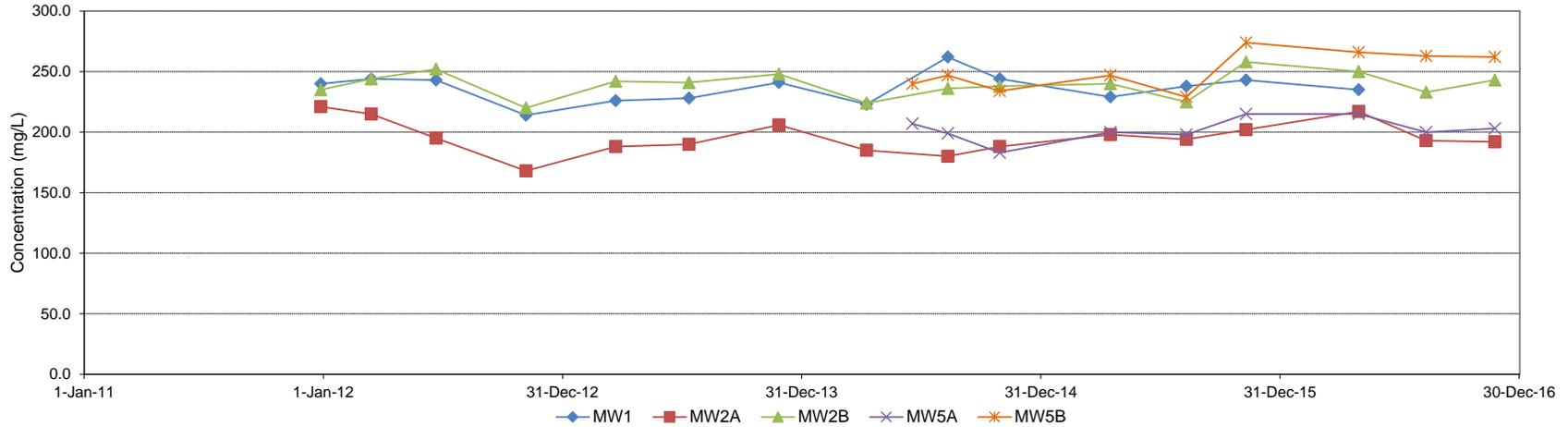
1604066

DATE REVISED

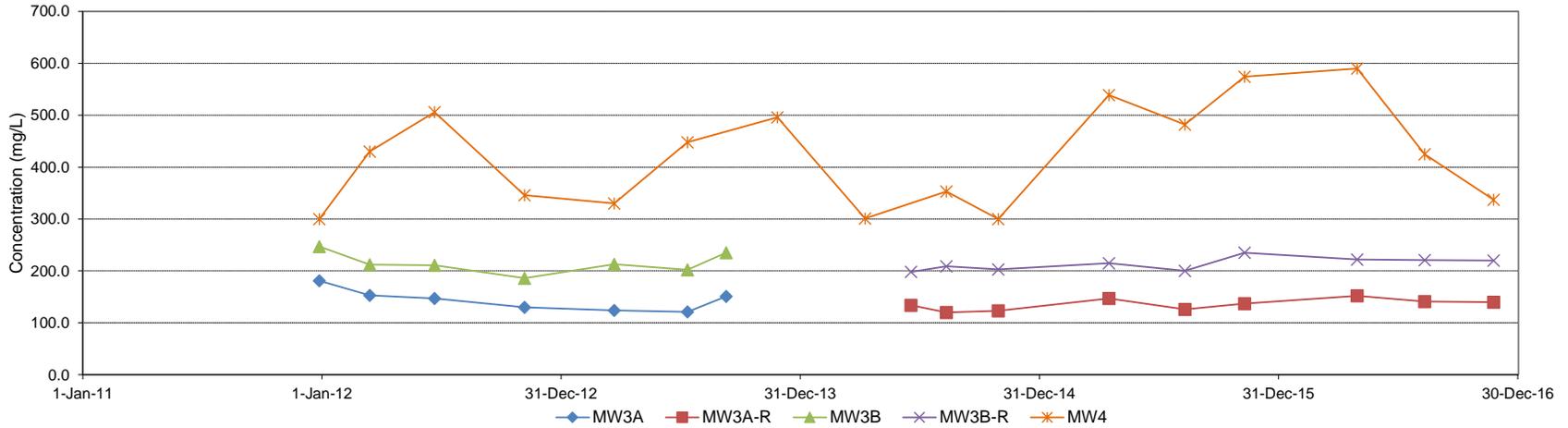
01/02/2017



Monitoring Locations: MW1 (Crossgradient), MW2 (Upgradient), and MW5 (Internal Assessment)



Downgradient Monitoring Locations: MW3 and MW4



NOTES:

1. mg/L denotes milligrams per litre.

**CONCENTRATION VS. TIME PLOT
BICARBONATE**

2016 ANNUAL MONITORING REPORT

*REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre*

FIGURE NUMBER

D-8

APPROX. SCALE

NTS

PROJECT NUMBER

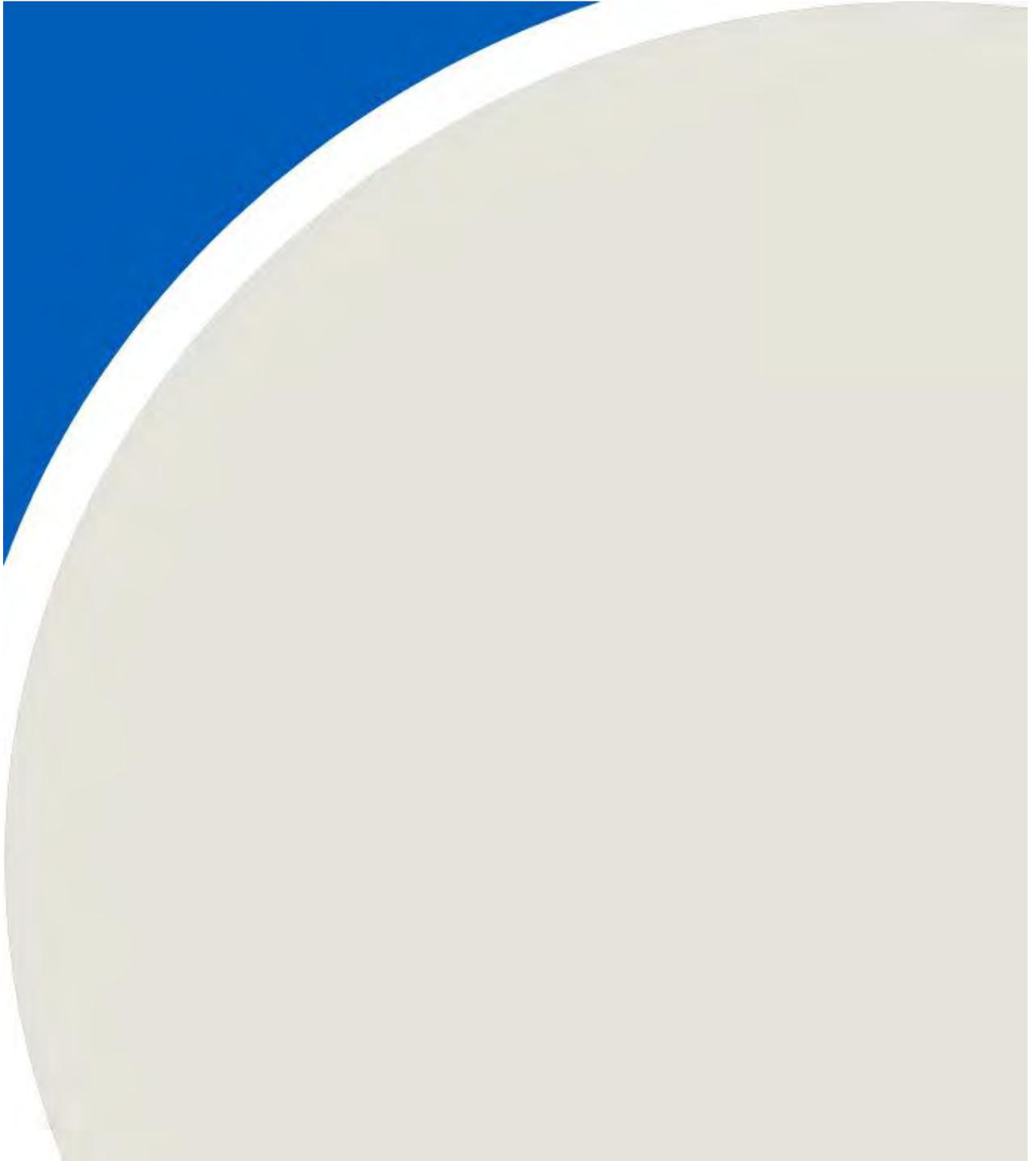
1604066

DATE REVISED

01/02/2017



APPENDIX E



CLIENT NAME: WSP CANADA INC.
605 ROSSLAND ROAD EAST, PO BOX 710
WHITBY, ON L1N0A9
(905) 668-7711

ATTENTION TO: Steve Taziar

PROJECT: 111-26648-00

AGAT WORK ORDER: 16T090786

WATER ANALYSIS REVIEWED BY: Elizabeth Polakowska, MSc (Animal Sci), PhD (Agri Sci), Inorganic Lab
Supervisor

DATE REPORTED: May 11, 2016

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 16T090786

PROJECT: 111-26648-00

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: Courtice

ATTENTION TO: Steve Taziar

SAMPLED BY: Eric Taylor

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2016-05-02

DATE REPORTED: 2016-05-11

Parameter	Unit	SAMPLE DESCRIPTION:		MW1		MW2A		MW2B		MW3A-R		MW3B-R	
		SAMPLE TYPE:		Water		Water		Water		Water		Water	
		DATE SAMPLED:		2016-04-29		2016-04-29		2016-04-29		2016-04-29		2016-04-29	
		G / S	RDL	7530470	RDL	7530473	RDL	7530477	RDL	7530481	RDL	7530485	
Bicarbonate (as CaCO3)	mg/L	5	235	5	217	5	250	5	152	222			
Carbonate (as CaCO3)	mg/L	5	<5	5	<5	5	<5	5	<5	<5			
Chloride	mg/L	0.50	24.4	0.10	4.48	0.50	76.4	0.10	6.29	8.70			
Sulphate	mg/L	0.50	154	0.10	29.9	0.50	84.7	0.10	20.7	79.6			
Calcium	mg/L	0.05	70.7	0.05	13.4	0.05	50.1	0.05	20.4	49.0			
Magnesium	mg/L	0.05	49.0	0.05	30.0	0.05	58.4	0.05	10.7	30.6			
Sodium	mg/L	0.05	20.3	0.05	28.5	0.05	29.4	0.05	38.5	25.7			
Potassium	mg/L	0.05	2.99	0.05	1.20	0.05	2.27	0.05	1.67	3.02			
Boron	mg/L	0.010	0.014	0.010	0.104	0.010	0.069	0.010	0.132	0.084			
Cadmium	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001			
Cobalt	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001			
Lead	mg/L	0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002			
Mercury	mg/L	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001			

Certified By:

Elizabeth Potkowska

Certificate of Analysis

AGAT WORK ORDER: 16T090786

PROJECT: 111-26648-00

5835 COOPERS AVENUE
 MISSISSAUGA, ONTARIO
 CANADA L4Z 1Y2
 TEL (905)712-5100
 FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: Courtice

ATTENTION TO: Steve Taziar

SAMPLED BY: Eric Taylor

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2016-05-02

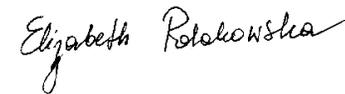
DATE REPORTED: 2016-05-11

Parameter	Unit	SAMPLE DESCRIPTION:		MW4		MW5A		MW5B		Duplicate
		SAMPLE TYPE:		Water		Water		Water		Water
		DATE SAMPLED:		2016-04-29		2016-04-29		2016-04-29		2016-04-29
		G / S	RDL	7530489	RDL	7530493	RDL	7530497	RDL	7530503
Bicarbonate (as CaCO3)	mg/L		5	590	5	215	5	266	5	213
Carbonate (as CaCO3)	mg/L		5	15	5	<5	5	<5	5	<5
Chloride	mg/L	0.50		6.58	0.10	1.89	0.50	14.0	0.10	5.12
Sulphate	mg/L	0.50		66.1	0.10	9.11	0.50	111	0.10	30.0
Calcium	mg/L	0.05		41.4	0.05	24.5	0.05	43.8	0.05	13.3
Magnesium	mg/L	0.05		114	0.05	34.8	0.05	60.6	0.05	29.7
Sodium	mg/L	0.05		37.4	0.05	11.8	0.05	14.9	0.05	27.9
Potassium	mg/L	0.05		3.18	0.05	2.75	0.05	3.21	0.05	1.24
Boron	mg/L	0.010		0.055	0.010	0.033	0.010	0.035	0.010	0.100
Cadmium	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Cobalt	mg/L		0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Lead	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002	0.002	<0.002
Mercury	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7530470-7530503 Elevated RDLs for anions indicate samples dilution prior to analysis in order to reduce matrix interference and to keep analytes within the calibration range.

Certified By:



Quality Assurance

CLIENT NAME: WSP CANADA INC.
 PROJECT: 111-26648-00
 SAMPLING SITE: Courtice

AGAT WORK ORDER: 16T090786
 ATTENTION TO: Steve Taziar
 SAMPLED BY: Eric Taylor

Water Analysis															
RPT Date: May 11, 2016			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Durham - Groundwater - Group F Parameters

Bicarbonate (as CaCO ₃)	7530481	7530481	152	153	0.7%	< 5	NA			NA			NA		
Carbonate (as CaCO ₃)	7530481	7530481	<5	<5	NA	< 5	NA			NA			NA		
Chloride	7530647		37.9	37.7	0.5%	< 0.10	95%	90%	110%	109%	90%	110%	102%	80%	120%
Sulphate	7530647		<0.50	<0.50	NA	< 0.10	97%	90%	110%	105%	90%	110%	99%	80%	120%
Calcium	7530470	7530470	70.7	69.4	1.9%	< 0.05	103%	90%	110%	102%	90%	110%	101%	70%	130%
Magnesium	7530470	7530470	49.0	48.3	1.4%	< 0.05	99%	90%	110%	98%	90%	110%	100%	70%	130%
Sodium	7530470	7530470	20.3	20.1	1.0%	< 0.05	103%	90%	110%	102%	90%	110%	100%	70%	130%
Potassium	7530470	7530470	2.99	3.03	1.3%	< 0.05	105%	90%	110%	105%	90%	110%	104%	70%	130%
Boron	7530470	7530470	0.014	0.013	NA	< 0.010	98%	90%	110%	98%	90%	110%	94%	70%	130%
Cadmium	7530470	7530470	<0.001	<0.001	NA	< 0.001	99%	90%	110%	106%	90%	110%	114%	70%	130%
Cobalt	7530470	7530470	<0.001	<0.001	NA	< 0.001	102%	90%	110%	105%	90%	110%	109%	70%	130%
Lead	7530470	7530470	<0.002	<0.002	NA	< 0.002	102%	90%	110%	106%	90%	110%	107%	70%	130%
Mercury	7530470	7530470	<0.0001	<0.0001	NA	< 0.0001	102%	90%	110%	103%	90%	110%	101%	80%	120%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: _____

Elizabeth Polakowska

Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 16T090786

PROJECT: 111-26648-00

ATTENTION TO: Steve Taziar

SAMPLING SITE: Courtice

SAMPLED BY: Eric Taylor

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: WSP
 Contact: Steve Taziar
 Address: 126 Don Hillcock Dr
Aurora ON L4E 0E9
 Phone: 905.750.3880 Fax: _____
 Reports to be sent to: _____
 1. Email: Stephen.Taziar@wspcorp.com
lyndsay.walker@durham.ca
 2. Email: _____

Project Information:

Project: 111-26648-00
 Site Location: Caustic
 Sampled By: EST
 AGAT Quote #: 585-2012 PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis

Invoice Information:

Company: Region of Durham
 Contact: Lyndsay Walker
 Address: _____
 Email: lyndsay.walker@durham.ca

Bill To Same: Yes No

Regulatory Requirements:

(Please check all applicable boxes)
 Regulation 153/04
 Sewer Use
 Regulation 558
 Table Indicate One
 Ind/Com
 Res/Park
 Agriculture
 Storm
 Sanitary
 CCME
 Prov. Water Quality Objectives (PWQO)
 Other 00005
 Soil Texture (Check One)
 Coarse
 Fine
 Region Indicate One

Is this submission for a Record of Site Condition?
 Yes NO

Report Guideline on Certificate of Analysis
 Yes NO

Sample Matrix Legend

- B Biota
- GW Ground Water
- O Oil
- P Paint
- S Soil
- SD Sediment
- SW Surface Water

Field Filtered - Metals, Hg, CrVI
(Please Circle)

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Y / N
MU1A	Apr 29/16		3	GW	Results to Lyndsay Walker Region of Durham (see email/attach)	Y
MU1B						
MU3A-R						
MU3B-R						
MU4						
MU5A						
MU5B						
Duplicate						

Laboratory Use Only

Work Order #: 16T090786
 Cooler Quantity: _____
 Arrival Temperatures: 25.19 1.50
 Custody Seal Intact: Yes No N/A
 Notes: _____

Turnaround Time (TAT) Required:

Regular TAT 5 to 7 Business Days
 Rush TAT (Rush Surcharges Apply)
 3 Business Days 2 Business Days 1 Business Day
 OR Date Required (Rush Surcharges May Apply): _____

Please provide prior notification for rush TAT
 *TAT is exclusive of weekends and statutory holidays

Sampler Requisitioned By (Print Name and Sign): Eric Taylor Date: Apr 29/16 Time: 2:30pm
 Samples Requisitioned By (Print Name and Sign): _____ Date: _____ Time: _____
 Samples Received By (Print Name and Sign): R. Williams Date: 5/13/16 Time: 10:20
 Samples Received By (Print Name and Sign): _____ Date: _____ Time: _____

Page 1 of 1
 No: T 025281

CLIENT NAME: WSP CANADA INC.
605 ROSSLAND ROAD EAST, PO BOX 710
WHITBY, ON L1N0A9
(905) 668-7711

ATTENTION TO: Steve Taziar

PROJECT: 111-26648-00

AGAT WORK ORDER: 16T125820

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Aug 19, 2016

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 16T125820

PROJECT: 111-26648-00

5835 COOPERS AVENUE
 MISSISSAUGA, ONTARIO
 CANADA L4Z 1Y2
 TEL (905)712-5100
 FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: Courtice, ON

ATTENTION TO: Steve Taziar

SAMPLED BY: Eric Taylor

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2016-08-12

DATE REPORTED: 2016-08-19

Parameter	Unit	SAMPLE DESCRIPTION: MW2A		MW2B		MW3Ar		MW3Br		MW4	
		SAMPLE TYPE: Water		Water		Water		Water		Water	
		DATE SAMPLED: 2016-08-10		2016-08-10		2016-08-10		2016-08-10		2016-08-10	
		G / S	RDL	RDL	RDL	RDL	RDL	RDL	RDL	RDL	RDL
Bicarbonate (as CaCO3)	mg/L	5	193	5	233	5	141	221	5	425	
Carbonate (as CaCO3)	mg/L	5	<5	5	<5	5	<5	<5	5	<5	
Chloride	mg/L	0.10	4.49	0.20	78.5	0.10	6.38	9.00	0.50	28.3	
Sulphate	mg/L	0.10	28.0	0.20	82.5	0.10	18.7	75.7	0.50	62.7	
Calcium	mg/L	0.05	14.8	0.05	49.6	0.05	17.4	49.7	0.05	37.3	
Magnesium	mg/L	0.05	31.6	0.05	58.8	0.05	10.5	30.7	0.05	88.8	
Sodium	mg/L	0.05	28.7	0.05	29.4	0.05	38.1	25.4	0.05	31.4	
Potassium	mg/L	0.05	1.27	0.05	2.21	0.05	1.34	2.77	0.05	3.23	
Boron	mg/L	0.010	0.114	0.010	0.080	0.010	0.155	0.087	0.010	0.065	
Cadmium	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	
Cobalt	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	
Lead	mg/L	0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	
Mercury	mg/L	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 16T125820

PROJECT: 111-26648-00

5835 COOPERS AVENUE
 MISSISSAUGA, ONTARIO
 CANADA L4Z 1Y2
 TEL (905)712-5100
 FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

SAMPLING SITE: Courtice, ON

ATTENTION TO: Steve Taziar

SAMPLED BY: Eric Taylor

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2016-08-12

DATE REPORTED: 2016-08-19

Parameter	Unit	SAMPLE DESCRIPTION: MW5A		MW5B		Duplicate	
		G / S	RDL	G / S	RDL	G / S	RDL
Bicarbonate (as CaCO ₃)	mg/L	5	200	5	263	5	190
Carbonate (as CaCO ₃)	mg/L	5	<5	5	<5	5	<5
Chloride	mg/L	0.10	2.03	0.20	17.8	0.10	3.81
Sulphate	mg/L	0.10	7.73	0.20	104	0.10	23.5
Calcium	mg/L	0.05	17.9	0.05	39.9	0.05	15.2
Magnesium	mg/L	0.05	35.4	0.05	60.3	0.05	32.6
Sodium	mg/L	0.05	11.5	0.05	15.6	0.05	25.1
Potassium	mg/L	0.05	2.20	0.05	2.96	0.05	1.39
Boron	mg/L	0.010	0.036	0.010	0.044	0.010	0.118
Cadmium	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001
Cobalt	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001
Lead	mg/L	0.002	<0.002	0.002	<0.002	0.002	<0.002
Mercury	mg/L	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7768288-7768312 Elevated RDLs for Anions indicate the degree of dilution prior to analysis in order to keep analytes within the calibration range of the instruments and to reduce matrix interferences.

Certified By:



Quality Assurance

CLIENT NAME: WSP CANADA INC.
 PROJECT: 111-26648-00
 SAMPLING SITE: Courtice, ON

AGAT WORK ORDER: 16T125820
 ATTENTION TO: Steve Taziar
 SAMPLED BY: Eric Taylor

Water Analysis															
RPT Date: Aug 19, 2016			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Durham - Groundwater - Group F Parameters

Bicarbonate (as CaCO3)	7768629		100	105	4.9%	< 5	NA			NA			NA		
Carbonate (as CaCO3)	7768629		<5	<5	NA	< 5	NA			NA			NA		
Chloride	7768302	7768302	28.3	27.4	3.2%	< 0.10	93%	90%	110%	101%	90%	110%	105%	80%	120%
Sulphate	7768302	7768302	62.7	61.0	2.7%	< 0.10	100%	90%	110%	101%	90%	110%	104%	80%	120%
Calcium	7768288	7768288	14.8	14.8	0.0%	< 0.05	105%	90%	110%	105%	90%	110%	109%	70%	130%
Magnesium	7768288	7768288	31.6	31.6	0.0%	< 0.05	99%	90%	110%	99%	90%	110%	107%	70%	130%
Sodium	7768288	7768288	28.7	27.8	3.2%	< 0.05	100%	90%	110%	99%	90%	110%	111%	70%	130%
Potassium	7768288	7768288	1.27	1.29	1.6%	< 0.05	99%	90%	110%	99%	90%	110%	113%	70%	130%
Boron	7769223		0.440	0.390	12.0%	< 0.010	102%	90%	110%	107%	90%	110%	91%	70%	130%
Cadmium	7769223		<0.001	<0.001	NA	< 0.001	103%	90%	110%	106%	90%	110%	97%	70%	130%
Cobalt	7769223		<0.001	<0.001	NA	< 0.001	105%	90%	110%	101%	90%	110%	94%	70%	130%
Lead	7769223		<0.002	<0.002	NA	< 0.002	100%	90%	110%	98%	90%	110%	90%	70%	130%
Mercury	7768288	7768288	< 0.0001	< 0.0001	NA	< 0.0001	104%	90%	110%	102%	90%	110%	102%	80%	120%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: _____



Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 16T125820

PROJECT: 111-26648-00

ATTENTION TO: Steve Taziar

SAMPLING SITE: Courtice, ON

SAMPLED BY: Eric Taylor

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS



AGAT Laboratories

169

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 16T125820

Cooler Quantity: _____
Arrival Temperatures: 86 | 79 | 176

Custody Seal Intact: Yes No N/A
Notes: ON ICE

Turnaround Time (TAT) Required:

Regular TAT 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

3 Business Days 2 Business Days 1 Business Day

OR Date Required (Rush Surcharges May Apply): _____

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: WSP
Contact: Steve Taziar
Address: 126 Dan Hillcock Dr.
Aurora, ON. L4G 0G9
Phone: 905 750 3080 Fax: _____
Reports to be sent to:
1. Email: stephen.taziar@wspgroup.com
2. Email: _____

Regulatory Requirements:

(Please check all applicable boxes)

Regulation 153/04 Sewer Use Regulation 558
 Ind/Com Sanitary CCME
 Res/Park Storm Prov. Water Quality Objectives (PWQO)
 Agriculture Other
Soil Texture (Check One) Region _____
 Coarse Fine ODWQS
 Fine Indicate One

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Project Information:

Project: 111-26648-00
Site Location: Courtyce, ON
Sampled By: EWT
AGAT Quote #: 565-2012 PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis

Invoice Information:

Bill To Same: Yes No

Company: _____
Contact: _____
Address: _____
Email: _____

Sample Matrix Legend

B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, Cr (Please Circle)	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl- <input type="checkbox"/> CN- <input type="checkbox"/> Cr6+ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO3/NO2 <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH3 <input type="checkbox"/> TKN <input type="checkbox"/> NO3 <input type="checkbox"/> NO2 <input type="checkbox"/> NO/NO2	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNS	PAHS	Chlorophenols	PCBS	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	
MW2A	Aug. 10/16		3	GW																			X
MW2B																							
MW3Ar																							
MW3Br																							
MW4																							
MW5A																							
MW5B																							
Duplicate																							

Please send billing & chemistry results to Lyndsay Walker@Durham.ca

Samples Relinquished By (Print Name and Sign): <u>Eric Taylor</u>	Date: <u>Aug. 10/16</u>	Time: <u>3:00 pm</u>	Samples Received By (Print Name and Sign): <u>Sima</u>	Date: <u>16/8/12</u>	Time: <u>10:14</u>
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:

Page 1 of 1

No: **T 032438**

CLIENT NAME: WSP CANADA INC.
605 ROSSLAND ROAD EAST, PO BOX 710
WHITBY, ON L1N0A9
(905) 668-7711

ATTENTION TO: Steve Taziar

PROJECT: 111-26648-00

AGAT WORK ORDER: 16T163578

WATER ANALYSIS REVIEWED BY: Elizabeth Polakowska, MSc (Animal Sci), PhD (Agri Sci), Inorganic Lab
Supervisor

DATE REPORTED: Jan 27, 2017

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



Certificate of Analysis

AGAT WORK ORDER: 16T163578

PROJECT: 111-26648-00

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Steve Taziar

SAMPLING SITE:

SAMPLED BY:

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2016-11-24

DATE REPORTED: 2017-01-27

Parameter	Unit	SAMPLE DESCRIPTION: MW2A		MW2B		MW3A		MW3B		MW4	
		SAMPLE TYPE: Water		Water		Water		Water		Water	
		DATE SAMPLED: 2016-11-23		2016-11-23		2016-11-23		2016-11-23		2016-11-23	
		G / S	RDL	8040248	RDL	8040254	RDL	8040257	8040260	RDL	8040263
Bicarbonate (as CaCO3)	mg/L	5	192	5	243	5	140	220	5	337	
Carbonate (as CaCO3)	mg/L	5	<5	5	<5	5	<5	<5	5	<5	
Chloride	mg/L	0.10	3.46	0.50	70.5	0.10	5.85	8.79	0.50	141	
Sulphate	mg/L	0.10	24.0	0.50	81.0	0.10	16.8	71.3	0.50	35.7	
Calcium	mg/L	0.05	14.6	0.05	46.3	0.05	16.2	46.5	0.10	42.0	
Magnesium	mg/L	0.05	30.6	0.05	55.6	0.05	9.80	29.8	0.10	86.8	
Sodium	mg/L	0.05	22.1	0.05	26.2	0.05	36.8	25.0	0.10	35.2	
Potassium	mg/L	0.05	1.24	0.05	2.13	0.05	1.27	2.82	0.10	3.43	
Boron	mg/L	0.010	0.105	0.010	0.088	0.010	0.153	0.101	0.010	0.062	
Cadmium	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	
Cobalt	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	
Lead	mg/L	0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	0.002	<0.002	
Mercury	mg/L	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	

Certified By:

Elizabeth Potokowska



Certificate of Analysis

AGAT WORK ORDER: 16T163578

PROJECT: 111-26648-00

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Steve Taziar

SAMPLING SITE:

SAMPLED BY:

Durham - Groundwater - Group F Parameters

DATE RECEIVED: 2016-11-24

DATE REPORTED: 2017-01-27

Parameter	Unit	SAMPLE DESCRIPTION: MW5A		MW5B		Duplicate	
		SAMPLE TYPE: Water		Water		Water	
		DATE SAMPLED: 2016-11-23		2016-11-23		2016-11-23	
		G / S	RDL	RDL		RDL	
Bicarbonate (as CaCO ₃)	mg/L	5	203	5	262	5	187
Carbonate (as CaCO ₃)	mg/L	5	6	5	6	5	<5
Chloride	mg/L	0.10	2.19	0.20	34.9	0.10	3.20
Sulphate	mg/L	0.10	9.92	0.20	94.9	0.10	22.7
Calcium	mg/L	0.05	17.4	0.05	40.1	0.05	14.3
Magnesium	mg/L	0.05	35.0	0.05	61.1	0.05	31.1
Sodium	mg/L	0.05	11.4	0.05	19.1	0.05	21.4
Potassium	mg/L	0.05	2.05	0.05	3.10	0.05	1.18
Boron	mg/L	0.010	0.037	0.010	0.046	0.010	0.116
Cadmium	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001
Cobalt	mg/L	0.001	<0.001	0.001	<0.001	0.001	<0.001
Lead	mg/L	0.002	<0.002	0.002	<0.002	0.002	<0.002
Mercury	mg/L	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8040248-8040272 Elevated RDLs indicate sample dilution prior to analyses in order to reduce matrix interference and to keep analytes within the calibration range of the instrument.

Certified By:

Elizabeth Potkowska

Quality Assurance

CLIENT NAME: WSP CANADA INC.
 PROJECT: 111-26648-00
 SAMPLING SITE:

AGAT WORK ORDER: 16T163578
 ATTENTION TO: Steve Taziar
 SAMPLED BY:

Water Analysis															
RPT Date: Jan 27, 2017			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Durham - Groundwater - Group F Parameters															
Bicarbonate (as CaCO ₃)	8040260	8040260	220	215	2.2%	< 5	NA			NA			NA		
Carbonate (as CaCO ₃)	8040260	8040260	<5	<5	NA	< 5	NA			NA			NA		
Chloride	8040254	8040254	70.5	70.9	0.6%	< 0.10	95%	90%	110%	102%	90%	110%	99%	80%	120%
Sulphate	8040254	8040254	81.0	80.3	0.9%	< 0.10	94%	90%	110%	101%	90%	110%	96%	80%	120%
Calcium	8040248	8040248	14.6	14.9	2.0%	< 0.05	103%	90%	110%	104%	90%	110%	103%	70%	130%
Magnesium	8040248	8040248	30.6	30.9	1.0%	< 0.05	97%	90%	110%	98%	90%	110%	99%	70%	130%
Sodium	8040248	8040248	22.1	22.5	1.8%	< 0.05	99%	90%	110%	98%	90%	110%	98%	70%	130%
Potassium	8040248	8040248	1.24	1.25	0.8%	< 0.05	100%	90%	110%	99%	90%	110%	101%	70%	130%
Boron	8040248	8040248	0.105	0.108	2.8%	< 0.010	101%	90%	110%	102%	90%	110%	114%	70%	130%
Cadmium	8040248	8040248	<0.001	<0.001	NA	< 0.001	97%	90%	110%	97%	90%	110%	106%	70%	130%
Cobalt	8040248	8040248	<0.001	<0.001	NA	< 0.001	109%	90%	110%	105%	90%	110%	105%	70%	130%
Lead	8040248	8040248	<0.002	<0.002	NA	< 0.002	107%	90%	110%	100%	90%	110%	105%	70%	130%
Mercury	8040248	8040248	<0.0001	<0.0001	NA	< 0.0001	102%	90%	110%	97%	90%	110%	98%	80%	120%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: _____

Elizabeth Polakowska

Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 16T163578

PROJECT: 111-26648-00

ATTENTION TO: Steve Taziar

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Bicarbonate (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO ₃)	INOR-93-6000	SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Calcium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Magnesium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Potassium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW 846 7470 & 245.1	CVAAS



Laboratory Use Only

Work Order #: 16T163578

Cooler Quantity: _____
Arrival Temperatures: 76 | 74 | 82
Custody Seal Intact: Yes No N/A
Notes: _____

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: WSP
Contact: Steve Taziar
Address: 126 Don Hillock Dr
Aurora, ON L4G 0G9
Phone: 905 750 3090 Fax: _____
Reports to be sent to:
1. Email: Stephen.Taziar@wspgroup.com
2. Email: Lyndsay.Waller@Durham.ca

Regulatory Requirements: No Regulatory Requirement

(Please check all applicable boxes)

Regulation 153/04 Sewer Use Regulation 558
 Ind/Com Sanitary CCME
 Res/Park Storm Prov. Water Quality Objectives (PWQO)
 Agriculture Other
Soil Texture (Check One) Region: _____
 Coarse Fine ODWQS
Indicate One

Turnaround Time (TAT) Required:

Regular TAT 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
 3 Business Days 2 Business Days Next Business Day
OR Date Required (Rush Surcharges May Apply): _____

Project Information:

Project: HR 111-26648-00
Site Location: Courtis, ON
Sampled By: EWT
AGAT Quote #: 565-2012 PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Invoice Information:

Bill To Same: Yes No
Company: _____
Contact: _____
Address: _____
Email: _____

Sample Matrix Legend

B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

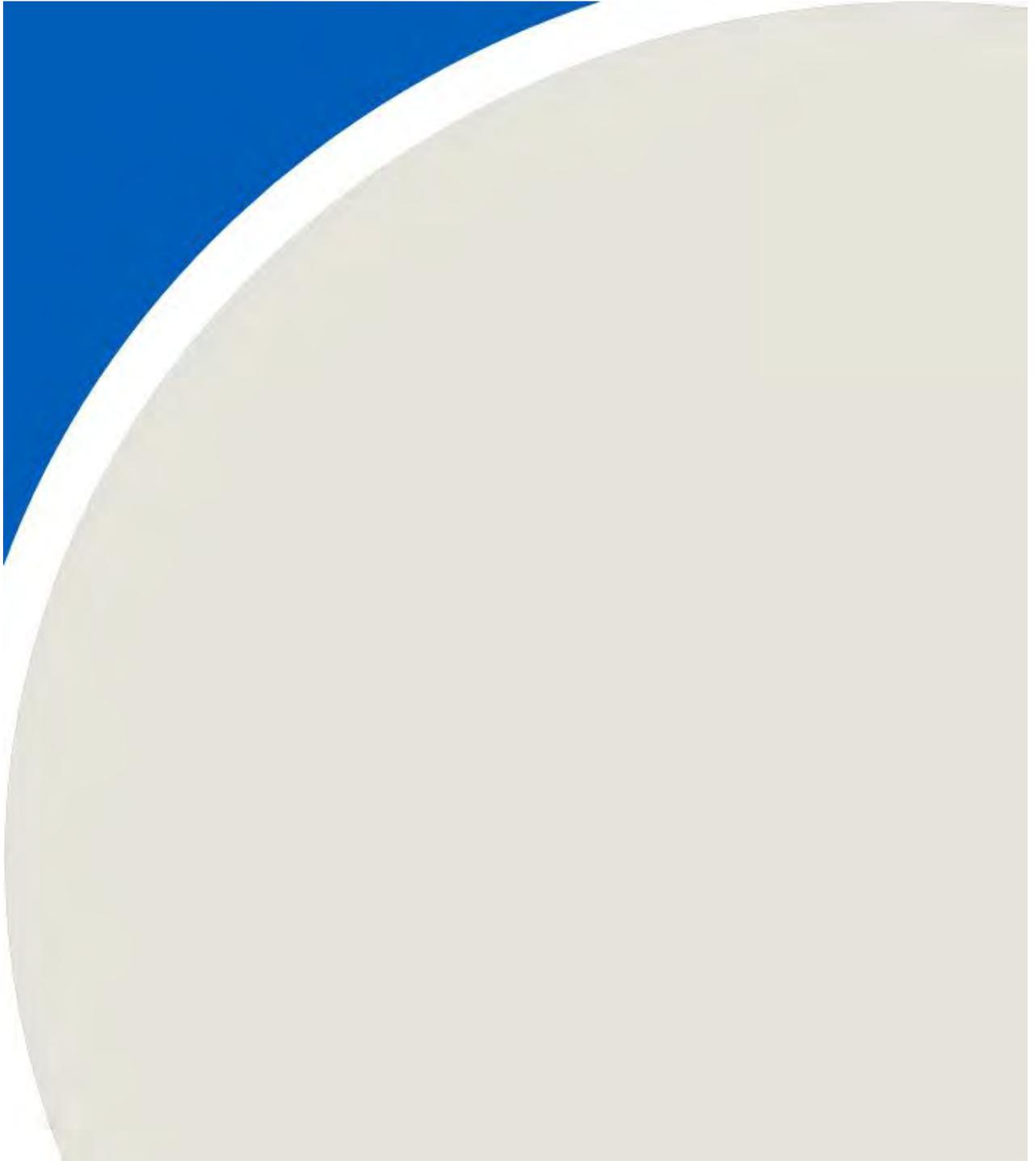
Field Filtered - Metals, Hg, CrVI	0, Reg 153	Metals and Inorganics	Hydride Metals	ORPs	Full Metals Scan	Regulatory/Custom Metals	Nutrients	Volatiles	CCME Fractions 1 to 4	ABNS	PAHS	PCBS	Organochlorine Pesticides	TCLP	Sewer Use
		<input type="checkbox"/> All Metals <input type="checkbox"/> 153 Metals (excl. Hydrides)	<input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN	<input type="checkbox"/> Cr ⁶⁺ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> Hg	<input type="checkbox"/> pH <input type="checkbox"/> SAR	<input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN	<input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₃ +NO ₂	<input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM						<input type="checkbox"/> M&I <input type="checkbox"/> VOCs <input type="checkbox"/> ABNS <input type="checkbox"/> BtP <input type="checkbox"/> PCBs	<input type="checkbox"/> Sewer Use
															X GW-F

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Y/N
MW2A	Nov. 23/16		3	GW	Please forward a copy of the chemistry & invoicing to Lyndsay Waller see email.	
MW2B						
MW3A						
MW3B						
MW4						
MW5A						
MW5B Duplicate						

Samples Relinquished By (Print Name and Sign): <u>Eric Taylor</u>	Date: <u>Nov. 23/16</u>	Time: <u>4:30pm</u>	Samples Received By (Print Name and Sign): <u>Simon</u>	Date: <u>16/11/24</u>	Time: <u>9:29</u>
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____

Page 1 of 1
No: T 038856

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

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)	2016
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	<input checked="" type="radio"/> Annual <input type="radio"/> Other	Specify (Type Here):
The site is:	<input checked="" type="radio"/> Active <input type="radio"/> Inactive <input type="radio"/> 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?	<input type="radio"/> Yes <input checked="" type="radio"/> 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)	<input type="radio"/> Yes <input checked="" type="radio"/> 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:

<p>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:</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	
<p>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):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>	<p>If no, list exceptions below or attach information.</p>

Groundwater Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
MW1	As an insufficient volume of groundwater was present in the monitoring well at the time of the groundwater monitoring event, a sample could not be collected.	10-Aug-2016
MW1	As an insufficient volume of groundwater was present in the monitoring well at the time of the groundwater monitoring event, a sample could not be collected.	23-Nov-2016

<p>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.</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>	
<p>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:</p>	<p><input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Not Applicable</p>	<p>If no, list exceptions below or attach additional information.</p>
<p>Groundwater Sampling Location</p>	<p>Description/Explanation for change (change in name or location, additions, deletions)</p>	<p>Date</p>
<p>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):</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>WSP Canada Inc. conducted the groundwater monitoring program for the Site in 2016.</p>

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

<p>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.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>		
<p>6) The site meets compliance and assessment criteria.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Refer to Section 4.3 of the 2016 Annual Groundwater and Surface Water Monitoring Report for additional details.</p>	
<p>7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Refer to Section 4.3 of the 2016 Annual Groundwater and Surface Water Monitoring Report for additional details.</p>	
<p>1) Is one or more of the following risk reduction practices in place at the site:</p> <p>(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</p> <p>(b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or</p> <p>(c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation):</p> <p><i>i.</i> The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and</p> <p><i>ii.</i> Seasonal and annual water levels and water quality fluctuations are well understood.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Note which practice(s):</p>	<p><input type="checkbox"/> (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/> (c)</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>	<p>Refer to Section 4.3 of the 2016 Annual Groundwater and Surface Water Monitoring Report for additional details.</p>	

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:

Select Date

Recommendations:

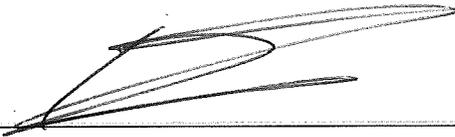
Based on my technical review of the monitoring results for the waste disposal site:

No changes to the monitoring program are recommended

The following change(s) to the monitoring program is/are recommended:

No Changes to site design and operation are recommended

The following change(s) to the site design and operation is/are recommended:

CEP Signature		
Relevant Discipline	Geology	
Date:	<i>April 10, 2017</i>	
CEP Contact Information:	Brent Langille, B.Sc, P.Geo.	
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:	Brent.Langille@rwdi.com	
Save As		Print Form

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. At its nearest point, Tooley Creek is located approximately 700 m southwest 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:	<input type="radio"/> Yes <input checked="" type="radio"/> No	With MOECC approval, the routine surface water monitoring program (i.e., placement and monitoring of sondes in Tooley Creek) for the DYEC has been suspended for at least three (3) years, beginning in 2016, due to construction activities for the Highway 401/Courtice Road interchange. As such, the routine surface water monitoring program for the DYEC was not required to be completed in 2016.
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):	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> 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

<p>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.</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>	
<p>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:</p>	<p><input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Not Applicable</p>	<p>If no, specify below or provide details in an attachment.</p>
<p>Surface Water Sampling Location</p>	<p>Description/Explanation for change (change in name or location, additions, deletions)</p>	<p>Date</p>
<p>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):</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Not applicable.</p>

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):	<input checked="" type="radio"/> Yes <input type="radio"/> 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)?	<input checked="" type="radio"/> Yes <input type="radio"/> No	Not applicable.
--	--	-----------------

<p>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.</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	<p>Not applicable.</p>
<p>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)):</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> Not Known</p> <p><input type="radio"/> Not Applicable</p>	<p>Groundwater quality naturally exceeds select PWQOs. Please refer to the 2016 Annual Groundwater and Surface Water Monitoring Report.</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Applicable</p>	

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:

Select Date

Recommendations:

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

<p><input checked="" type="radio"/> No Changes to the monitoring program are recommended</p> <p><input type="radio"/> The following change(s) to the monitoring program is/are recommended:</p>	
<p><input checked="" type="radio"/> No changes to the site design and operation are recommended</p> <p><input type="radio"/> The following change(s) to the site design and operation is/are recommended:</p>	

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Seal:	Add Image 		
Signature:		Date: April 10, 2017	
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Co-signers for additional expertise provided:			
Signature:		Date:	
Signature:		Date:	