FINAL REPORT: ENVIRONMENTAL MONITORING – MEADOWVIEW LANDFILL

2018 Monitoring Program

Stantec

Prepared for:
Municipality of the County of Kings

Prepared by:
Stantec Consulting Ltd.
102 – 40 Highland Park Drive
Dartmouth, NS
B3A 0A3

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 GENERAL

Stantec Consulting Ltd. (Stantec) was retained by the Municipality of the County of Kings (the Municipality) to perform environmental compliance monitoring at the Meadowview Landfill (the Site). The 2018 program included groundwater and surface water monitoring, completed in general accordance with Stantec's proposal dated March 28, 2016. The 2018 environmental monitoring program is comprised of field data collection, analysis, and reporting.

The scope of the 2018 monitoring program differs from previous years and follows the recommendations to reduce the monitoring program as put forward by Stantec (Stantec Consulting Ltd. (a), 2018). These scope changes were confirmed with both the Municipality and NSE and are summarized in Section 1.2.1.

1.2 BACKGROUND

The Town of Kentville established a landfill at the Site in the late 1960s. The Municipality took over operations and continued to operate the landfill until it closed on June 30, 1999. Upon closure, the Municipality implemented a Closure Plan, which drew on specifications outlined in the Site Closure Report (Porter Dillon, 1995). The Closure Plan set out the requirements for an environmental monitoring program, which have recently been updated (Section 1.2.1), and which this report serves to satisfy.

1.2.1 2018 Monitoring Plan Update

The environmental monitoring program for the Site was updated twice during 2017 based on a review of available data and to better align with regulatory requirements. The first update was provided to the Municipality and NSE and focused on reducing the number of sampling locations and adjusting the sampling frequency at some monitoring locations (Stantec Consulting Ltd. (b), 2017). Discussions with NSE further revealed that environmental compliance monitoring for the Site was not required as the Site is considered a Class 1 Landfill. As environmental compliance monitoring is no longer required from a regulatory perspective for Class 1 Landfills (as informed by NSE), the need for an ongoing monitoring program was re-examined from a due diligence perspective and Stantec recommended that the Municipality adjust the ongoing monitoring to focus on areas where potential impacts from the Site have been observed. These recommended changes were adopted in the 2018 monitoring and included:

- Fish habitat monitoring should not be carried forward.
- Surface water monitoring should be conducted at SW7, SW7A, and SW3 in 2018. A new surface water monitoring location should be established immediately upstream of the confluence of Palmer Brook and the Cornwallis River (SWA).
- Groundwater monitoring should continue as recommended in the monitoring program review (Stantec Consulting Ltd. (b), 2017).

1.3 SITE DESCRIPTION

The Site is located between Lanzy Road and Brooklyn Street, south of Camp Aldershot in the Town of Kentville, NS (Figure 1, Appendix A), and is described by Service Nova Scotia and Municipal Relations' Property Online as PIDs No. 55047310, 55058325, 55047328, 55047369, 55047351, 55049035, 55047336, and 55047476. The current monitoring locations are situated on land owned by the Municipality and historical monitoring locations are also located on land owned by the Department of National Defence (DND).

The topography of the Site and surrounding areas slopes south towards the Cornwallis River. The landscape surrounding the Site is comprised of forested areas intersected by several roads, with marsh and river habitat to the south.

1.4 REGULATORY FRAMEWORK

The regulatory guidelines used in 2018 were adopted from the 2017 monitoring report and are described in the sections below. The historical groundwater and surface water data presented prior to the 2017 annual monitoring report was screened against the Guidelines for Canadian Drinking Water Quality (GCDWQ) (Health Canada, 2017) and Canadian Environmental Quality Guidelines (issued by the Canadian Council of Ministers of the Environment [CCME] - updates) for Freshwater Aquatic Life [FAL] (Canadian Council of Ministers of the Environment, 1999), respectively. As described in Stantec's 2017 program review, the Site is no longer considered potable due to the connection of the local dwellings to municipal water supply (Stantec Consulting Ltd. (b), 2017).

1.4.1 Groundwater

Groundwater chemistry analytical results are compared to the following specific standards that are applicable to non-potable sites in Nova Scotia, local soil conditions, and the separation distances between monitoring wells and surface water features:

- NS Tier 1 Environmental Quality Standards (EQS) for groundwater (commercial/industrial, non-potable, coarse grained) (Nova Scotia Environment (a), 2013)
- NS Tier 2 Pathway Specific Standards (PSS) for groundwater >10 m from a fresh surface water body (Nova Scotia Environment (b), 2013).

1.4.2 Surface Water

Surface water chemistry analytical results are compared to NS Tier 1 EQS for surface water. CCME FAL (CCME updates) are also included for comparison because they include general chemistry parameters that do not have provincial standards. In general, the NS Tier 1 EQS and CCME FAL metals guidance values are identical for common parameters, but the NS Tier 1 EQS includes a more comprehensive list of parameters.

1.5 OBJECTIVES AND SCOPE

The scope of the 2018 monitoring program generally consisted of:

- groundwater sampling at six monitoring wells (MW)
- surface water sampling at four locations (SW).

The locations of these sampling points are shown on Figure 1 (Appendix A). The overall objective of the monitoring program is to track the influence of water emanating from the landfill and identify if concentrations exceed guideline values established to protect relevant receptors. By monitoring the groundwater and surface water over time, trends or changes can be identified and where necessary alterations to the monitoring program can be implemented.

Field work was conducted on July 20, 2018 and analytical results reviewed in the fall of 2018.

2.0 FIELD INVESTIGATION

2.1 HEALTH AND SAFETY

Stantec prepared and reviewed a project specific risk management strategy prior to the commencement of field work. Relevant safe work practices were reviewed by all Stantec staff that completed field work on this project. During field work, a site safety meeting was conducted by Stantec staff each morning at which a last-minute risk assessment (LMRA) was completed and site conditions assessed. This LMRA form identified potential health and safety risks at the Site that might not have been previously identified during project planning. Copies of all signed health and safety documentation are retained by Stantec in the project file. No health and safety incidents occurred while Stantec was on the Site conducting field work.

2.2 METHODOLOGY

Figure 1 (Appendix A) provides the location of all sampling points assessed in 2018. Groundwater and surface water sampling was conducted on July 20, 2018. Table 1 provides a summary of laboratory analyses conducted.

Table 1 Meadowview Landfill Monitoring Locations and Analysis

Location	Easting (m)	Northing (m)	General Chemistry and Metals
Groundwater			
MW-4A	380795	4993550	X
MW-22A	380036	4993547	X
MW-22B	380036	4993546	X
MW-22C	380034	4993546	X

Table 1 Meadowview Landfill Monitoring Locations and Analysis

Location	Easting (m)	Northing (m)	General Chemistry and Metals
Groundwater			
MW-25B	380242	4993537	X
TH-1	380612	4993546	X
MW-40D (MW4A dup)			X
Surface Water			
SW3	380817	4993379	X
SW7	380015	4993519	X
SW7A	380033	4993444	X
SWA	379969	4993211	X

2.2.1 Groundwater

Field staff conducted groundwater sampling in general accordance with Stantec's Standard Operating Procedures (SOPs). Static water levels were measured in each monitoring well from the top of the PVC well casing using a water level probe. Monitoring well conditions were noted and the stickup height was measured from the top of the PVC well casing to ground. Water levels were measured prior to purging or sampling. Each monitoring well was purged using the existing dedicated Waterra tubing and foot valve until dry or three well volumes were removed.

In-situ physical water quality parameters of temperature, pH, dissolved oxygen, and conductivity were measured using a YSI 556 multi meter. Qualitative groundwater descriptions of colour, turbidity, and sheen were also recorded by field staff. Metals samples were field filtered using single use 0.45 µm disposable filters. Samples were collected in laboratory supplied containers and preserved in insulated coolers provided by Maxxam Analytics, of Bedford, NS (Maxxam).

2.2.2 Surface Water

Field staff conducted surface water sampling in general accordance with Stantec's SOPs. Special care was taken at the sampling locations to not disturb the substrate in order to minimize the amount of sediment that entered sample containers. In-situ physical water quality parameters of temperature, pH, dissolved oxygen, and conductivity were measured using a YSI 556 multi meter. Grab samples were collected in laboratory supplied containers and preserved in insulated coolers provided by Maxxam.

2.2.3 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) procedures included following appropriate field methodologies and SOPs. One blind field duplicate sample (MW-40D, duplicate of MW 4A) was submitted as part of the groundwater monitoring program. All samples were uniquely labelled, and control was maintained using chain of custody forms. The laboratories reported the results from their own internal QA/QC process, which are included in certificates of analyses provided in Appendix E.

3.0 RESULTS

The following sections summarize the results of the 2018 monitoring program.

3.1 GROUNDWATER

3.1.1 Field Results

Table B-1 (Appendix B) provides the in-situ physical parameters and observations collected during well purging. These can be summarized as follows:

- Groundwater elevations ranged from 7.21 to 8.79 meters above sea level (mASL).
- pH ranged from 5.07 to 7.78.
- Water temperature ranged from 8.79 to 10.81 °C.
- Conductivity ranged from 0.315 to 1.115 mS/cm.
- No requirements to repair monitoring wells were noted.

3.1.2 Analytical Results

Analytical results for the 2018 monitoring program are provided in Tables B-3 and B-4 (Appendix B) and are discussed below. Additionally, results from historical monitoring events at the monitoring wells sampled in 2018 are provided in Tables C-1 through C-12 (Appendix C). Historical analytical chemistry results were provided to Stantec by the consultant responsible for the 2012–2015 monitoring events, WSP Canada Inc. and have not been verified by Stantec (WSP, 2015).

3.1.2.1 General Chemistry and Metals

Laboratory results for general chemistry are listed in Table B-3 and results for metals are listed in Table B-4, both in Appendix B. Concentrations for general chemistry and metals analysis were found to be below the applicable Tier 1 EQS and Tier 2 PSS, with the following exceptions:

- Arsenic exceeded Tier 2 PSS levels in MW-4A, MW-40D (MW-4A dup), and MW-22A.
- Iron exceeded Tier 2 PSS levels in MW-4A, MW-40D (MW-4A dup), MW-22A, MW-22B, and TH-1.

Elevated arsenic and iron can be naturally occurring in Nova Scotia.

3.1.3 Trend Analysis

Trends in indicator parameters associated with landfill leachate were analyzed in all monitoring wells sampled in 2018. Indicator parameters were identified in the Site Closure Report (Porter Dillon, 1995) and were further refined in the Monitoring Plan Evaluation (Stantec Consulting Ltd. (b), 2017). The leachate indicator parameters included ammonia, chloride, and conductivity. Historical analytical results for these three parameters have been plotted according to the monitoring area that the well is located in

(Areas 1 to 3 on Figure 1, Appendix A) and can be seen in leachate indicator Figures D-1 to D-6 (Appendix D).

Trends for locations sampled in 2018 noted through a visual assessment of the leachate indicator figures are summarized below:

- Ammonia
  - Area 1 – Ammonia concentrations show generally stable trends (no distinct increase, peak, or decrease) with TH1 and MW-4A showing similar, elevated levels compared with other monitoring location in Area 1 (MW-25B).
  - Area 2 - Ammonia concentrations show generally stable trends (no distinct increase, peak, or decrease) with concentrations increasing from deep (MW-22C) to shallow (MW-22A) wells.
  - No new data collected for ammonia in Area 3.

- Chloride
  - Area 1 – Chloride concentrations continue to show a generally decreasing trend in TH1 and MW-4A while MW-25B concentrations are more variable and show a generally increasing trend in recent years. MW-25B is on the downgradient side of Brooklyn Street and may be influenced by road salt.
  - Area 2 – Chloride concentrations continue to show an increasing trend in MW-22C while MW-22B and MW-22A generally show stable to decreasing trends.
  - No new data collected for chloride in Area 3.

- Conductivity
  - Area 1 – Conductivity values generally show a decreasing trend in TH1, stable in MW-4A, and more variability in MW-25B, with a stable to increasing trend. It is noted that the conductivity trend in MW-25B correlates well to the chloride concentration trend.
  - Area 2 – Conductivity levels generally show a decreasing trend in MW-22A, stable in MW-22B, and increasing trend in MW-22C.
  - No new data collected for conductivity in Area 3.

Groundwater elevations over the history of the monitoring program were also evaluated for trends and are shown in Figure D-7 for monitoring wells downgradient of the Site (Appendix D). Only downgradient wells are shown as this is where all wells carried forward after the monitoring program review are located. Results from the 2018 monitoring event were consistent with historical ranges and showed no discernable trends, indicating that the closed landfill is not influencing groundwater elevations downgradient of it.

3.1.4 Action Levels

As described in the Monitoring Plan Evaluation (Stantec Consulting Ltd. (b), 2017), action levels were developed for each of the Indicator Parameters. Action levels are concentration values for indicator parameters that would initiate further response. The generic definition of an action level is an indicator parameter concentration that increases more than three standard deviations from the mean of the historical data (defined here as data collected in 2007 through 2017; the calculation is made using half of the reportable detection limit, where applicable). Table 2 below shows that no indicator parameters exceeded their respective action levels for the monitoring well locations sampled in 2018.

Table 2 2018 Data and Action Level Comparison for Indicator Parameters

Monitoring Location	Dissolved Chloride (mg/L)	Nitrogen (ammonia nitrogen) (mg/L)	Conductivity (uS/cm)
MW-4A			
MW-4A - Action Level	139	109	2463
MW-4A - 2018 Data	40	56	1400
MW-22A			
MW-22A - Action Level	204	48	1506
MW-22A - 2018 Data	46	22	950
MW-22B			
MW-22B - Action Level	291	3.3	2251
MW-22B - 2018 Data	140	2.1	1600
MW-22C			
MW-22C - Action Level	51	14	755
MW-22C - 2018 Data	45	<0.05	480
MW-25B			
MW-25B - Action Level	178	0.50	1654
MW-25B - 2018 Data	85	<0.05	760
TH1			
TH1 - Action Level	60	79	1565
TH1 - 2018 Data	20	29	940

3.1.5 QA/QC

QA/QC measures included following appropriate field methodologies and SOPs, and collection of a field duplicate sample from MW-4A. Analysis of the field duplicate was completed for general chemistry and metals. Results for the field duplicate of MW-4A (MW-40D) can be seen in Tables B-3 and B-4 (Appendix B). Relative percent differences (RPD) between MW-4A and MW-40D were calculated and are shown in Tables B-5 and B-6 (Appendix B). RPD values calculated were outside of the generally accepted variance ranges (50% for general chemistry parameters and 80% for metals parameters) for two of the general chemistry parameters. All other calculated RPDs were less than 20%. These results do not suggest that there is any significant issue with the analytical quality. Maxxam also follows laboratory QA/QC procedures which are identified in the laboratory certificates of analysis (COA) found in Appendix E.

3.2 SURFACE WATER MONITORING

3.2.1 Field Results

Table B-2 (Appendix B) contains in-situ physical parameters measured at all surface water sampling locations using a YSI 556 multi meter, and these are summarized below;

- pH ranged from 6.70 to 8.13.
- Water temperature ranged from 13.56 to 21.18 °C.
- Conductivity ranged from 0.139 to 0.433 mS/cm.
- Dissolved oxygen ranged from 3.26 to 11.37 mg/L.

3.2.2 Analytical Results

Analytical results for the 2018 monitoring program are provided in Table B-7 (Appendix B) and are discussed below. Additionally, results from historical monitoring events are provided in Tables C-13 through C-16, Appendix C. Historical analytical chemistry results were provided to Stantec by the consultant responsible for the 2012–2015 monitoring events, WSP Canada Inc. and have not been verified by Stantec.

Results from the July 2018 sampling event showed concentrations for general chemistry and metals analysis were found to be below the applicable Tier 1 EQS Fresh Water and CCME FAL, with the following exceptions:

- Aluminum exceeded at SW3, SW7, SW7A, and SWA for the Tier 1 EQS protective of freshwater and at SW3 for CCME FAL.
- Arsenic exceeded at SW7A for both the Tier 1 EQS and CCME FAL.
- Iron exceeded at SW3, SW7, SW7A, and SWA for both the Tier 1 EQS and CCME FAL.
- Manganese exceeded at SW7 and SW7A for the Tier 1 EQS.

A review of surface water analytical data shows water quality in the Cornwallis River downstream of the Site (SW3) is of similar quality to water upstream of the Site (SWA), with both reporting exceedances of aluminum and iron. Water quality downstream of the Site in the Cornwallis River (SW3) does show increased concentrations in aluminum, iron, ammonia, and titanium, which may be attributed to the Site. Water quality in Palmer Brook (SW7 and SW7A) exhibits poorer water quality, particularly at SW7A. This may indicate that surface water adjacent to SW7A is influenced by the Site and that impacts (i.e. elevated levels of some parameters) are spatially restricted as their influence is not detected downstream (Cornwallis River). High levels of turbidity were noted in Palmer Brook at SW7A, generally an order of magnitude or two higher than levels recorded just upstream at SW7. This may be attributable to high iron levels at SW7A and resulting flocs forming in Palmer Brook as a result of groundwater input.

3.2.3 Trends Analysis

Trends in indicator parameters associated with landfill leachate were analyzed at the surface water sites sampled in 2018. Indicator parameters were identified in the Site Closure Report (Porter Dillon, 1995) and were further refined in the Monitoring Plan Evaluation (Stantec Consulting Ltd. (b), 2017). The leachate indicator parameters included ammonia, chloride, and conductivity. Historical analytical results for these three parameters can be seen in leachate indicator Figures D-8 to D-10 (Appendix D).

Trends for locations sampled in 2018, as noted through a visual assessment of the leachate indicator figures are summarized below. It is noted that location SWA has only one monitoring event and no trends are discussed:

- Conductivity: Locations SW7 and SW3 have over 20 years of data and generally appear to have no discernible trends. A large spike at SW7 is noted in 2007 and 2008 but levels have returned to historical norms in the last several monitoring events. A possible upward trend is noted at SW7A but needs to be confirmed with further monitoring as the initial sampling result may be an anomalously low result.
- Ammonia: Locations SW7 and SW3 have over 20 years of data and generally appear to have low concentrations and no discernable trends. A large spike at location SW7A was reported in 2016 but concentrations have declined in the previous two monitoring events.
- Chloride: Locations SW7 and SW3 have over 20 years of data and generally appear to have no discernible trends. A spike at SW7 is noted in 2007 and 2008 but levels have returned to historical norms in the last several monitoring events. A possible downward trend is noted at SW7A with limited available data.

4.0 CONCLUSIONS

The following conclusions were developed based on the results of the 2018 sampling program and historical data.

4.1 GROUNDWATER MONITORING

Based on the results of the 2018 groundwater monitoring program, the following conclusions can be made:

- Water level elevations ranged from 7.21 to 8.79 mASL during the July 2018 monitoring event. These elevations are consistent with the range of historical water level elevations.
- Indicator parameter concentrations were below Action Levels at all monitoring locations.
- Groundwater quality and trends were generally consistent with historical monitoring events. The results generally fall below applicable guidelines (Tier 1 EQS and Tier 2 PSS), with the exception of arsenic and iron, which can be naturally elevated in groundwater in Nova Scotia

4.2 SURFACE WATER MONITORING

Based on the results of the 2018 surface water monitoring program, the following conclusions can be made:

- Water quality downstream of the Site in the Cornwallis River (SW3) appeared consistent with upstream water quality (SWA).
- Surface water quality in Palmer Brook (SW7 and more particularly SW7A) continues to show some influence from the Site, with multiple parameters reporting concentrations above natural background levels and applicable guidelines (Tier 1 EQS Fresh Water and CCME FAL) but does show decreasing values compared with previous years. The extent of this potential interaction with the Site should be further refined.

5.0 RECOMMENDATIONS

Stantec recommends that the Municipality continue with the ongoing monitoring following the updated scope followed in 2018. This will focus environmental monitoring on areas where potential impacts from the Site have historically been observed. Additionally, two new surface water monitoring locations are recommended to provide further information on potential interactions between the Site and Palmer Brook. Monitoring to be completed in 2019 is recommended to include:

- Surface water: Sampling for metals and general chemistry parameters at annual sampling locations (SW7, SW7A, SW3, and SWA). Two new sampling locations are also recommended for Palmer Brook, one upstream and one downstream of SW7 and SW7A. The downstream location should be prior to the confluence with the Cornwallis River and the upstream location should be as far upstream of SW7 as possible while maintaining flowing water.
- Groundwater: Sampling for metals and general chemistry parameters at annual monitoring locations (MW-4A, MW-22A, MW-22B, MW-22C, MW-25B, TH-1) and at tri-annual sampling locations (MW-23A, MW-23B, MW-23C, MW-29B, MW-29C, and MW-31A).

6.0 CLOSURE

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available

and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and Stantec assumes no liability for damage to them.

This report was prepared by Andrew Sullivan, M. Phil., P.Eng. with review by Don Carey, M. Sc., P.Eng.

Regards,

STANTEC CONSULTING LTD.

Digitally signed by
Don Carey
Date: 2018.11.22
11:40:17 -04'00'

Don Carey, M. Sc., P.Eng.
Senior Environmental Engineer
Phone: (902) 468-7777
Fax: (902) 468-9009
Donald.carey@stantec.com

Digitally signed by
Andrew Sullivan
Date: 2018.11.20
13:26:16 -04'00'

Andrew Sullivan M.Phil., P.Eng.
Environmental Engineer
Phone: (902) 468-7777
Fax: (902) 468-9009
Andrew.sullivan@stantec.com

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APPENDIX A
Figures

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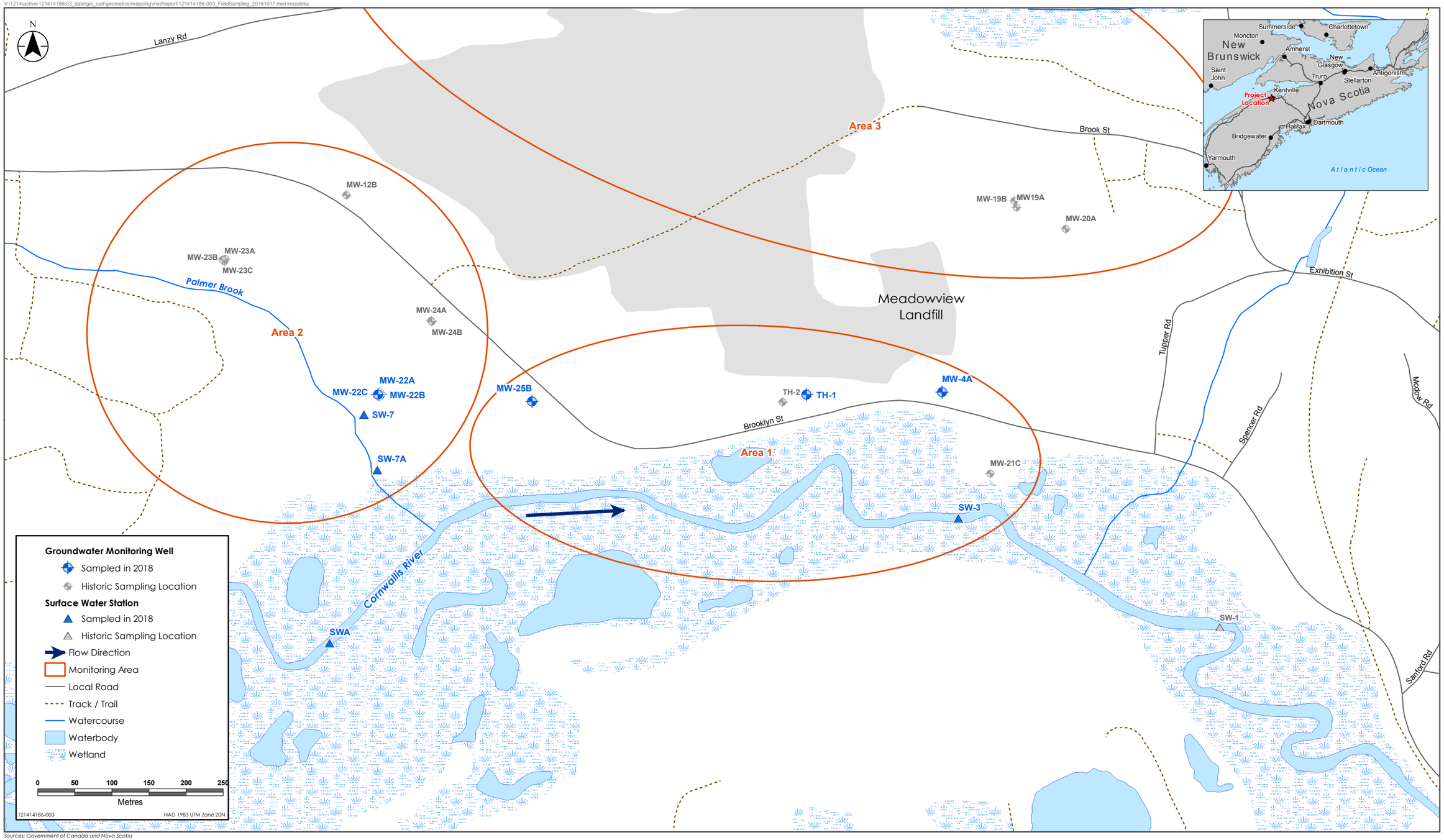

Sources: Government of Canada and Nova Scotia

2018 Sampling Locations

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ENVIRONMENTAL COMPLIANCE MONITORING – MEADOWVIEW LANDFILL

Figure 1

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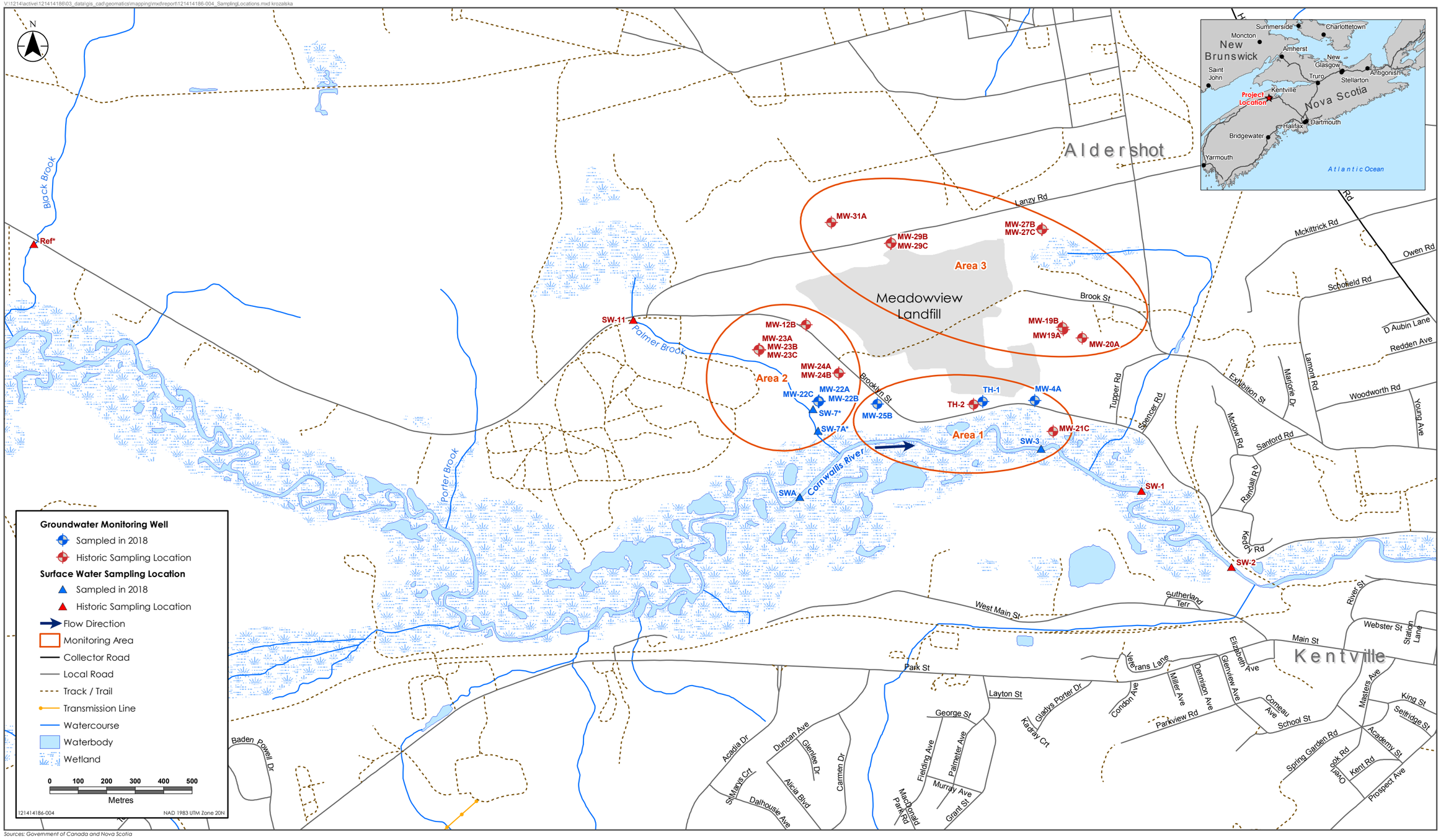

Sources: Government of Canada and Nova Scotia

Historical Sampling Locations

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ENVIRONMENTAL COMPLIANCE MONITORING – MEADOWVIEW LANDFILL

Figure 2

APPENDIX B
Chemistry Tables

Table B-1 Summary of Groundwater Field Measurements
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Well ID	Up-gradient or Down-gradient	Well Depth (m)	Top of Casing Elevation* (masl)	Date Sampled	Depth to Water in Well (m)	Water Elevation (masl)	Depth of Water in Well (m)	pH	Dissolved Oxygen (mg/L)	Temperature (°C)	Conductivity (mS/cm)	Observations
MW-22A	Down-gradient	8.57	11.02	20-Jul-18	2.23	8.79	6.34	5.94	6.63	8.79	0.783	Light brown, little silt, no odour, no sheen.
MW-22B	Down-gradient	13.11	11.08	20-Jul-18	2.49	8.59	10.62	7.54	4.95	10.81	1.115	Very light brown, little silt, no odour, no sheen.
MW-22C	Down-gradient	24.77	11.05	20-Jul-18	3.65	7.40	21.12	7.16	0.89	9.20	0.315	Clear, no silt, no odour, no sheen.
MW-25B	Down-gradient	13.58	11.46	20-Jul-18	4.25	7.21	9.33	7.28	7.00	9.52	0.434	Brown, no silt, no odour, no sheen.
TH-1	Down-gradient	9.02	13.25	20-Jul-18	5.39	7.86	3.63	5.07	15.63	8.80	0.637	Light brown, little silt, swampy odour, no sheen.
MW-4A	Down-gradient	10.43	11.70	20-Jul-18	4.18	7.52	6.25	7.78	5.32	10.22	0.877	Light brown, little silt, no odour, no sheen.

Notes:
*Top of casing elevations taken from Terms of Reference

Table B-2 Summary of Surface Water Field Measurements
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Well ID	Date Sampled	pH	Dissolved Oxygen (mg/L)	Temperature (°C)	Conductivity (mS/cm)	Observations
SW 7A	20-Jul-18	6.70	3.26	16.04	0.433	Clear, rust-colour (Fe) observed in area, no odour, no sheen.
SW 7	20-Jul-18	6.90	9.12	13.56	0.139	Flowing, clear, no odour, no sheen.
SW 3	20-Jul-18	6.70	9.29	19.21	0.258	Flowing, light brown (cloudy), no odour, no sheen.
SW A	20-Jul-18	8.13	11.37	21.18	0.250	Flowing, light brown (silty), no odour, no sheen.

Table B-3

2018 General Chemistry Analytical Results for the Groundwater Monitoring Program
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Parameter	Units	NS Tier 1 EQS	NS Tier 2 PSS	MW-4A	MW-40D (DUP)	MW-22A	MW-22B	MW-22C	MW-25B	TH-1
Anion Sum	me/L	-	-	14.9	13.6	10.3	17.3	4.80	8.16	10.2
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	690	620	450	670	180	290	480
Calculated TDS	mg/L	-	-	790	740	580	910	250	420	540
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0
Cation Sum	me/L	-	-	14.8	14.1	11.2	17.3	4.65	7.71	9.87
Hardness (CaCO3)	mg/L	-	-	360	350	230	670	200	340	250
Ion Balance (% Difference)	%	-	-	0.540	1.91	3.91	0.0300	1.59	2.84	1.50
Langelier Index (@ 20C)	-	-	-	0.433	0.275	-0.366	0.756	0.429	0.423	0.323
Langelier Index (@ 4C)	-	-	-	0.186	0.029	-0.614	0.510	0.179	0.175	0.0760
Nitrate (N)	mg/L	-	-	0.054	0.054	<0.050	<0.050	<0.050	<0.050	0.055
Saturation pH (@ 20C)	Units	-	-	6.66	6.69	6.99	6.36	7.35	6.95	6.89
Saturation pH (@ 4C)	Units	-	-	6.90	6.94	7.24	6.60	7.60	7.20	7.14
Total Alkalinity (Total as CaCO3)	mg/L	-	-	690 (1)	620	450	670 (1)	180 (1)	290	480
Dissolved Chloride (Cl)	mg/L	-	15000	40	40	46	140	45	85	20
Colour	TCU	-	-	8.9	9.7	8.0	11	<5.0	<5.0	7.4
Nitrate + Nitrite (N)	mg/L	-	-	0.054	0.054	<0.050	<0.050	<0.050	<0.050	0.055
Nitrite (N)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	-	-	56	47	22	2.1 (1)	<0.050	<0.050	29
Total Organic Carbon (C)	mg/L	-	-	<50 (2)	<50 (2)	11 (2)	14 (2)	1.9	6.8 (2)	7.6 (2)
Orthophosphate (P)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	Units	-	-	7.09	6.97	6.62	7.11	7.78	7.37	7.22
Reactive Silica (SiO2)	mg/L	-	-	34	33	18	19	10	13	29
Dissolved Sulphate (SO4)	mg/L			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Turbidity	NTU	-	-	>1000	>1000	800	250	0.82	880	570
Conductivity	uS/cm	-	-	1400	1300	950	1600	480	760	940
Dissolved Calcium	mg/L	-	-	110	110	69	230	64	110	80
Dissolved Magnesium	mg/L	-	-	22	22	13	26	9.5	14	13
Phosphorus	mg/L	-	-	<0.1	<0.1	0.36	<0.1	<0.1	<0.1	<0.1
Potassium	mg/L	-	-	42	42	24	8.1	6.5	7.1	29
Sodium	mg/L	-	-	47	46	62	72	12	19	36

Notes:

(1) Reporting limit was increased due to matrix

(2) Elevated Reporting limit due to sample turbidity

N/A - Not Applicable

MW-40D = Duplicate of MW-4A

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

Table B-4 2018 Metals Analytical Results for the Groundwater Monitoring Program
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Parameter	Units	Tier 1 EQS	Tier 2 PSS	MW-4A	MW-40D (DUP)	MW-22A	MW-22B	MW-22C	MW-25B	TH-1
Aluminum	ug/L	-	50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Antimony	ug/L	-	200	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/L	-	50	**61**	**60**	**70**	17	1.3	2.9	26
Barium	ug/L	-	10000	2900	2900	1100	670	9.0	11	900
Beryllium	ug/L	-	53	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth	ug/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	ug/L	-	12000	430	430	410	460	<50	100	200
Cadmium	ug/L	-	0.1	<0.010	<0.010	0.016	0.013	<0.010	0.010	<0.010
Calcium	ug/L	-	-	110000	110000	69000	230000	64000	110000	80000
Chromium	ug/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	ug/L	-	100	10	9.9	18	11	<0.40	<0.40	4.6
Copper	ug/L	-	20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Iron	ug/L	-	3000	**16000**	**16000**	**48000**	**9000**	220	<50	**11000**
Lead	ug/L	-	10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	ug/L	-	-	22000	22000	13000	26000	9500	14000	13000
Manganese	ug/L	-	8200	540	560	2900	4000	58	60	1000
Molybdenum	ug/L	-	730	<2.0	<2.0	<2.0	<2.0	3.5	<2.0	<2.0
Nickel	ug/L	-	250	18	17	16	23	<2.0	7.2	4.7
Phosphorus	ug/L	-	-	<100	<100	360	<100	<100	<100	<100
Potassium	ug/L	-	-	42000	42000	24000	8100	6500	7100	29000
Selenium	ug/L	-	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	ug/L	-	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/L	-	-	47000	46000	62000	72000	12000	19000	36000
Strontium	ug/L	-	210000	770	770	380	2000	910	1400	350
Thallium	ug/L	-	8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	ug/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	ug/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	ug/L	-	3000	<0.10	0.1	<0.10	13	34	15	<0.10
Vanadium	ug/L	-	60	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Zinc	ug/L	-	300	<5.0	<5.0	<5.0	5.7	<5.0	<5.0	<5.0

Notes:

N/A - Not Applicable

MW-40D = Duplicate of MW-4A

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

Bold - indicates value exceeds NS PSS

Table B-5 **Field Duplicate Analysis for Relative Percent Difference for General Chemistry**
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Parameter	Units	RDL	MW-4A	MW-40D (DUP)	RPD
Anion Sum	me/L	N/A	14.9	13.6	9%
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	690	620	11%
Calculated TDS	mg/L	1	790	740	7%
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	<1.0	<1.0	<5xRDL
Cation Sum	me/L	N/A	14.8	14.1	5%
Hardness (CaCO3)	mg/L	1	360	350	3%
Ion Balance (% Difference)	%	N/A	0.540	1.91	112%
Langelier Index (@ 20C)	-	N/A	0.433	0.275	45%
Langelier Index (@ 4C)	-	N/A	0.186	0.0290	146%
Nitrate (N)	mg/L	0.05	0.054	0.054	0%
Saturation pH (@ 20C)	Units	N/A	6.66	6.69	0%
Saturation pH (@ 4C)	Units	N/A	6.90	6.94	1%
Total Alkalinity (Total as CaCO3)	mg/L	5	690	620	11%
Dissolved Chloride (Cl)	mg/L	1	40	40	0%
Colour	TCU	5	8.9	9.7	9%
Nitrate + Nitrite (N)	mg/L	0.05	0.054	0.054	0%
Nitrite (N)	mg/L	0.01	<0.010	<0.010	<5xRDL
Nitrogen (Ammonia Nitrogen)	mg/L	2.5	56	47	17%
Total Organic Carbon (C)	mg/L	0.5	<50 (2)	<50 (2)	<5xRDL
Orthophosphate (P)	mg/L	0.01	<0.010	<0.010	<5xRDL
pH	Units	N/A	7.09	6.97	2%
Reactive Silica (SiO2)	mg/L	2.5	34	33	3%
Dissolved Sulphate (SO4)	mg/L	2	<2.0	<2.0	<5xRDL
Turbidity	NTU	1	>1000	>1000	<5xRDL
Conductivity	uS/cm	1	1400	1300	7%
Dissolved Calcium	mg/L	0.1	110	110	0%
Dissolved Magnesium	mg/L	0.1	22	22	0%
Phosphorus	mg/L	0.1	<0.1	<0.1	<5xRDL
Potassium	mg/L	0.1	42	42	0%
Sodium	mg/L	0.1	47	46	2%

Notes:
RDL = Reported Detection Limit
RPD = Relative Percent Difference
MW-40D = Duplicate of MW-4A
<5xRDL = Reported when analytical sample results were less than 5 times the RDL.
N/A - Not Applicable
Grey indicates RPD >50%

Table B-6 Field Duplicate analysis for Relative Percent Difference for Metals
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Parameter	Units	RDL	MW-4A	MW-40D (DUP)	RPD
Aluminum	ug/L	5	<5.0	<5.0	<5xRDL
Antimony	ug/L	1	<1.0	<1.0	<5xRDL
Arsenic	ug/L	1	61	60	2%
Barium	ug/L	10	2900	2900	0%
Beryllium	ug/L	1	<1.0	<1.0	<5xRDL
Bismuth	ug/L	2	<2.0	<2.0	<5xRDL
Boron	ug/L	50	430	430	0%
Cadmium	ug/L	0.01	<0.010	<0.010	<5xRDL
Calcium	ug/L	100	110000	110000	0%
Chromium	ug/L	1	<1.0	<1.0	<5xRDL
Cobalt	ug/L	0.4	10	9.9	1%
Copper	ug/L	2	<2.0	<2.0	<5xRDL
Iron	ug/L	50	16000	16000	0%
Lead	ug/L	0.5	<0.50	<0.50	<5xRDL
Magnesium	ug/L	100	22000	22000	0%
Manganese	ug/L	2	540	560	4%
Molybdenum	ug/L	2	<2.0	<2.0	<5xRDL
Nickel	ug/L	2	18	17	6%
Phoshorus	ug/L	100	<100	<100	<5xRDL
Potassium	ug/L	100	42000	42000	0%
Selenium	ug/L	1	<1.0	<1.0	<5xRDL
Silver	ug/L	0.1	<0.10	<0.10	<5xRDL
Sodium	ug/L	100	47000	46000	2%
Strontium	ug/L	2	770	770	0%
Thallium	ug/L	0.1	<0.10	<0.10	<5xRDL
Tin	ug/L	2	<2.0	<2.0	<5xRDL
Titanium	ug/L	2	<2.0	<2.0	<5xRDL
Uranium	ug/L	0.1	<0.10	0.10	<5xRDL
Vanadium	ug/L	2	<2.0	<2.0	<5xRDL
Zinc	ug/L	5	<5.0	<5.0	<5xRDL

Notes:
RDL = Reported Detection Limit
RPD = Relative Percent Difference
MW-40D = Duplicate of MW-4A
<5xRDL = Reported when analytical sample results were less than 5 times the RDL.
Grey indicates RPD >80%

Table B-7 **2018 Surface Water Monitoring Analytical Results**
Municipality of Kings County
Meadowview Landfill
Stantec Consulting Ltd. Project No. 121414186

Parameter	Unit	Tier 1 EQS Fresh Water	CCME FWAL	SW3	SW7	SW7A	SWA
Sampling Date	**-**	**-**	**-**	**20-Jul-18**	**20-Jul-18**	**20-Jul-18**	**20-Jul-18**
Dissolved Organic Carbon	mg/L	-	-	2.6	2.0	7.0	2.5
pH	-	-	6.5-9.0	7.47	7.39	7.25	7.77
Reactive Silica as SiO2	mg/L	-	-	4.8	11	12	4.6
Chloride	mg/L	-	120	36	16	24	34
Sulphate	mg/L	-	-	18	3.6	2.8	18
Alkalinity	mg/L	-	-	66	63	140[a]	61
True Color	TCU	-	(1)	13	14	6.5	10
Turbidity	NTU	-	(2)	2.9	1.7	400	3.4
Electrical Conductivity	uS/cm	-	-	300	190	340	280
Nitrate + Nitrite as N	mg/L	-	-	1.7	0.17	0.14	1.7
Nitrate as N	mg/L	-	13	1.7	0.17	0.14	1.7
Nitrite as N	mg/L	-	0.06	0.016	<0.010	<0.010	0.013
Ammonia as N	mg/L	-	(3)	0.15	0.46	4.4	0.055
Total Organic Carbon	mg/L	-	-	2.6	2.0	7.0	2.5
Ortho-Phosphate as P	mg/L	-	-	0.036	0.013	<0.010	0.037
Total Sodium	ug/L	-	-	17000	10000	17000	15000
Total Potassium	ug/L	-	-	2200	1800	8000	2100
Total Calcium	ug/L	-	-	33000	20000	32000	30000
Total Magnesium	ug/L	-	-	3700	2000	6100	3400
Total Phosphorous	ug/L	-	(4)	110	<100	<100	110
Bicarb. Alkalinity (as CaCO3)	mg/L	-	-	66	63	140	61
Carb. Alkalinity (as CaCO3)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0
Calculated TDS	mg/L	-	-	160	110	210	150
Hardness	mg/L	-	-	96	59	100	89
Langelier Index (@20C)	NA	-	-	-0.575	-0.848	-0.506	-0.336
Langelier Index (@ 4C)	NA	-	-	-0.826	-1.10	-0.755	-0.586
Saturation pH (@ 20C)	NA	-	-	8.04	8.24	7.76	8.10
Saturation pH (@ 4C)	NA	-	-	8.29	8.49	8.01	8.35
Anion Sum	me/L	-	-	2.84	1.80	3.45	2.68
Cation sum	me/L	-	-	2.75	1.71	3.84	2.49
% Difference/ Ion Balance (NS)	%	-	-	1.61	2.56	5.35	3.68
Total Aluminum	ug/L	5	100 (5)	**140**	**10**	**5.8**	**67**
Total Antimony	ug/L	20	-	<1.0	<1.0	<1.0	<1.0
Total Arsenic	ug/L	5	5	1.6	1.2	**17**	1.3
Total Barium	ug/L	1000	-	35	130	480	26
Total Beryllium	ug/L	5.3	-	<1.0	<1.0	<1.0	<1.0
Total Bismuth	ug/L	-	-	<2.0	<2.0	<2.0	<2.0
Total Boron	ug/L	1200	1500	<50	<50	80	<50
Total Cadmium	ug/L	0.01	0.09	<0.010	<0.010	<0.010	<0.010
Total Chromium	ug/L	-	8.9	<1.0	<1.0	<1.0	<1.0
Total Cobalt	ug/L	10	-	<0.40	<0.40	2.7	<0.40
Total Copper	ug/L	2	(6)	<2.0	<2.0	<2.0	<2.0
Total Iron	ug/L	300	300	**600**	**700**	**14000**	**310**
Total Lead	ug/L	1	(6)	<0.50	<0.50	<0.50	<0.50
Total Manganese	ug/L	820	-	140	**880**	**2000**	79
Total Molybdenum	ug/L	73	73	<2.0	<2.0	<2.0	<2.0
Total Nickel	ug/L	25	(6)	<2.0	<2.0	<2.0	<2.0
Total Selenium	ug/L	1	1	<1.0	<1.0	<1.0	<1.0
Total Silver	ug/L	0.1	0.25	<0.10	<0.10	<0.10	<0.10
Total Strontium	ug/L	21000	-	120	42	140	110
Total Thallium	ug/L	0.8	0.8	<0.10	<0.10	<0.10	<0.10
Total Tin	ug/L	-	-	<2.0	<2.0	<2.0	<2.0
Total Titanium	ug/L	-	-	6.0	<2.0	<2.0	<2.0
Total Uranium	ug/L	300	15	1.0	<0.10	<0.10	0.95
Total Vanadium	ug/L	6	-	<2.0	<2.0	<2.0	<2.0
Total Zinc	ug/L	30	30	<5.0	<5.0	<5.0	<5.0

Notes:
CCME FAL = Canadian Council of Ministers of the Environment – Freshwater Aquatic Life Long Term Exposure
Tier 1 EQS = Tier 1 Environmental Quality Standards For Surface Water. From Nova Scotia's Contaminated Sites Regulations (July 2013) Notification of Contamination Protocol, Table 3; Fresh Water
Grey indicates exceedance in CCME FAL
Bold = indicates value exceeds the Tier 1 EQS
#[a]: Reporting limit increased due to turbidity
(1) The mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
(2) High flow or turbid waters: Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.
(3) Using Table 2. water quality guidelines for ammonia for protection of aquatic life ammonia (mg/L total ammonia) guidelines were calculated to be SW3 (3.96 mg/L), SW7 (5.74 mg/L), SW7A (9.39 mg/L), and SWA (0.340 mg/L)
(4) Refer to CCME Fact Sheet - Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems
(5) Guideline value dependent on pH. Value given is for pH ≥ 6.5
(6) Guidelines requiring equations were calculated by the CCME website, using water hardness values to determine guidelines

APPENDIX C
Historical Chemistry Tables

TABLE C-1 **GROUNDWATER GENERAL CHEMISTRY - MW-4A**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	8-Mar-95	21-Mar-96	21-Mar-96	16-Apr-97	6-Apr-98	5-May-99	5-May-99	26-Jul-00	26-Jul-00 Field Dup.	Aug-01	Sep-02	19-Aug-03	19-Aug-03 MW-40D DUP	25-Aug-04	25-Aug-04 MW-40D	25-Aug-04 MW-40D DUP	18-Aug-05	18-Aug-05 MW-40D	23-Nov-06	1-Aug-07	1-Aug-07 MW-4ALF
Anion Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.8	23.1	22.8	19.2	20.8	18.6	19.4	16.2
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	737	621	452	429	696	681	720	718	685	664	737	679.49	739	799	799	911	911	810	890	753	812	649
Calculated TDS	mg/L	1	-	-	968		545	520	900	835	856	845	862	820	1150	907.36	1100	1170	1030	1190	1200	1080	1110	1060	1110	1030
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	0.28	0	0.2	0.2	< 1	0.3	0.3	0.3	< 1	< 1	1	0.51	< 1	1	<1	9	9	ND	ND	1	<1	<1
Cation Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.8	22	22.7	22	21.4	22.2	23.5	24.1
Hardness (CaCO3)	mg/L	1	-	-	703	565	389	374	598	508	567	577	597	519	751	538.12	576	602	547	631	663	580	580	610	670	680
Ion Balance (% Difference)	%	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.57	2.42	0.13	6.68	1.52	8.76	9.7	19.8
Langelier Index (@ 20C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.72	1.74	0.329	0.374	0.751	0.638	0.575
Langelier Index (@ 4C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	1.32	1.34	0.083	0.128	0.506	0.393	0.329
Nitrate (N)	mg/L	0.05	-	-															0.06	<0.05	<0.05	ND	ND	ND	-	-
Saturation pH (@ 20C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	6.28	6.26	6.37	6.33	6.41	6.34	6.42
Saturation pH (@ 4C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	6.68	6.66	6.62	6.57	6.65	6.59	6.66
Total Alkalinity (Total as CaCO3)	mg/L	100	-	-	737	621	452	429	696	681	720	718	686	664	738	680	740	800	800	920	920	810	890	750	810	650
Dissolved Chloride (Cl)	mg/L	1	-	15000	109	110	31.9	32	99.2	83.1	72.9	72.1	86.8	84.8	222	157	150	160	130	160	150	95	94	120	110	110
Colour	TCU	5	-	-	160	55	130	70	17	20	100	93	11	10	15	98	26	37	18	19	19	34	31	25	23	21
Nitrate + Nitrite (N)	mg/L	0.05	-	-	< 0.05	< 0.05	0.11	0.17	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	<0.05	1.66	< 0.05	< 0.05	0.08	<0.05	<0.05	ND	ND	ND	<0.05	<0.05
Nitrite (N)	mg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	<0.01	<0.01	ND	ND	ND	-	-
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	13.2	11.2	11.3	10.7	16.8	18.4	10.6	10.3	27.5	26.6	31.4	<0.1	39	39	42	52	49	49	45	46	46	46
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			ND	ND	22	22	19
Orthophosphate (P)	mg/L	0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.04	<0.3	0.04	0.01	0.06	0.06	<0.01	ND	0.01	0.01	<0.01	0.01
pH	Units	N/A	-	-	6.6	6.7	6.6	6.6	7	6.7	6.6	6.7	7	6.8	7.3	6.9	7	7.2	6.9	8	8	6.7	6.7	7.16	6.98	6.99
Reactive Silica (SiO2)	mg/L	2.5	-	-	49	49.5	26.5	27	48	44.4	44.4	44.8	38.4	37.5	41.1	44.1	37	36	35	36	36	38	37	38	40	40
Dissolved Sulphate (SO4)	mg/L	2	-	-	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2	3	2	8	4.3	10	15	7	8	8	16	16	6	4	3
Turbidity	NTU	1	-	-	300	> 1000	3.2	3.9	1.6	3	20.9	18.8	0.4	0.4	>1000	>1000	755	322	55.1	>1000	>1000	>1000	>1000	350	290	210
Conductivity	uS/cm	1	-	-	1820	1680	968	963	1570	1580	1620	1580	1740	1650	2420	1630	1540	2260	2150	2350	2390	1800	1900	2100	2000	2000
Dissolved Organic Carbon	mg/L	0.5	-	-	24	22.2	7.5	7.5	19	15.8	1600	1570	17.1	17.6	19.1	-	-	-	<50	<500	<500	-	-	-	-	-
Dissolved Calcium	mg/L	0.1	-	-	210	173	128	120	179	158	179	176	191	164	227	169	182	191	170	196	207	190	190	190	210	210
Dissolved Magnesium	mg/L	0.1	-	-	43.4	32.3	16.9	18	36.8	25.9	34.1	33.5	29.2	26.6	44.8	28.2	29.5	30.4	29.8	34.4	35.5	25	26	34	36	36
Phosphorus	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	ND	ND	ND	-	-
Potassium	mg/L	0.1	-	-	8.8	7.9	14	11.8	11.9	9.6	7.9	7.6	19.9	26.2	14.7	18.3	15.7	17	17.7	17.5	18.3	17	17	26	23	22
Sodium	mg/L	0.1	-	-	87.8	83.2	39.7	37.6	83.6	78.4	70	64.4	46.1	45.7	107	76.8	181	192	102	120	127	140	140	140	130	140

Notes:
(1) Reporting limit was increased due to turbidity.
RDL - Reported Detection Limit (updated in 2016)
ND - Values below RDL
Bold indicates exceedance of NS Tier 1 EQS
Bold and shaded indicates exceedance of NS Tier 2 EQS
MW-40D = Duplicate of MW-4A
Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviations
NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)
NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-1

GROUNDWATER GENERAL CHEMISTRY - MW-4A
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	NS Tier 1 EQS	NS Tier 2 PSS	28-Jul-08	28-Jul-08 Dup-A	10-Aug-09	27-Jul-10	27-Jul-10 MW- 40D	21-Sep-11	4-Oct-12	4-Jul-13	4-Jul-13 MW-40D	19-Aug-14	19-Aug-14 MW-40D	21-Jul-15	21-Jul-15 MW-40D	14-Jul-16	19-Jul-17	19-Jul-17 MW-40DDUP	20-Jul-18	20-Jul-18 MW-40D (DUP)		Average 2007 through 2017	Action Level
Anion Sum	me/L	N/A	-	-	15.8	17.9	19.7	17.4	17.8	16	16.0	17.0	17.1	15.6	15.3	15.8	15.8	14.1	11.3	10.7	14.9	13.6		-	-
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	670	770	856	765	782	722	753	751	751	712	708	703	706	650	520	490	690	620		-	-
Calculated TDS	mg/L	1	-	-	943	1020	1050	885	892	865	902	898	897	875	868	920	911	780	610	570	790	740		-	-
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0		-	-
Cation Sum	me/L	N/A	-	-	20.6	21.1	19.9	17.3	17.1	18.3	20.8	18.3	18.2	19	19.3	21.2	20.7	15.6	11.4	10.3	14.8	14.1		-	-
Hardness (CaCO3)	mg/L	1	-	-	540	540	570	425	421	442	493	467	464	407	420	555	536	350	310	300	360	350		-	-
Ion Balance (% Difference)	%	N/A	-	-	13.3	8.11	0.280	0.3	1.9	1.9	13.0	3.7	3.3	9.9	11.6	14.6	13.3	5.360	0.4	1.81	0.540	1.91		-	-
Langelier Index (@ 20C)	-	N/A	-	-	0.443	0.624	0.459	0.51	0.42	0.5	0.52	0.42	0.56	0.49	0.5	0.18	0.25	0.508	0.138	0.371	0.433	0.275		-	-
Langelier Index (@ 4C)	-	N/A	-	-	0.197	0.378	0.213	0.19	0.1	0.18	0.20	0.10	0.24	0.17	0.18	-0.14	-0.07	0.262	-0.11	0.123	0.186	0.0290		-	-
Nitrate (N)	mg/L	0.05	-	-	0.05	0.05	0.07	0.09	0.11	0.38	0.32	0.48	0.47	<0.05	<0.05	0.08	0.1	<0.050	0.76	0.93	0.054	0.054		-	-
Saturation pH (@ 20C)	Units	N/A	-	-	6.50	6.45	6.40	6.69	6.68	6.7	6.68	6.66	6.66	6.75	6.73	6.64	6.65	6.70	6.79	6.83	6.66	6.69		-	-
Saturation pH (@ 4C)	Units	N/A	-	-	6.74	6.69	6.65	7.01	7	7.02	7.00	6.98	6.98	7.07	7.05	6.96	6.97	6.95	7.04	7.08	6.90	6.94		-	-
Total Alkalinity (Total as CaCO3)	mg/L	100	-	-	670	770	860	765	782	722	753	751	751	712	708	703	706	650	520 (2)	490 (1)	690	620		-	-
Dissolved Chloride (Cl)	mg/L	1	-	15000	84	88	92	71	72	54	33	68	69	49	40	59	58	38	31	27	40	40		63	139
Colour	TCU	5	-	-	17	19	21	11	14	17	18	17	18	6	12	10	18	11	27	22	8.9	9.7		-	-
Nitrate + Nitrite (N)	mg/L	0.05	-	-	0.05	0.05	0.07	0.09	0.11	0.38	0.32	0.48	0.47	<0.05	<0.05	0.08	0.1	<0.050	0.78	0.95	0.054	0.054		-	-
Nitrite (N)	mg/L	0.01	-	-	<0.01	<0.01	ND	<0.05	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	0.02	0.025	<0.010	<0.010		-	-
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	49	47	38	60.4	65	63.2	85.9	59.0	58.6	76.3	76.4	64.2	63.8	74	32	32	56	47		59	109
Total Organic Carbon (C)	mg/L	0.5	-	-	26	27	21 (1)	23.7	83.7	30	<0.5	80.1	72.8	23.9	19.6	<0.5	<0.5	19 (1)	30 (1)	27 (2)	<50 (2)	<50 (2)		-	-
Orthophosphate (P)	mg/L	0.01	-	-	0.01	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.02	0.02	0.02	<0.01	<0.01	0.034	<0.010	<0.010	<0.010	<0.010		-	-
pH	Units	N/A	-	-	6.94	7.07	6.86	7.2	7.1	7.1	7.2	7.1	7.2	7.24	7.23	6.82	6.9	7.21	6.93	7.2	7.09	6.97		-	-
Reactive Silica (SiO2)	mg/L	2.5	-	-	37	37	37	36.1	34.1	34.1	35.5	38.9	37.7	34.6	33.7	36	35.2	35	28	29	34	33		-	-
Dissolved Sulphate (SO4)	mg/L	2	-	-	<2	<2	ND	5	5	2	<10	3	3	<2	<2	2	2	<2.0	<2.0	<2.0	<2.0	<2.0		-	-
Turbidity	NTU	1	-	-	>1000	>1000	480	176	3930	3200	640	5610	5150	869	1150	3730	5750	>1000	>1000	>1000	>1000	>1000		-	-
Conductivity	uS/cm	1	-	-	1900	1900	1900	1760	1950	1480	1550	1640	1650	1640	1620	1610	1550	1400	1000	1000	1400	1300		1625	2463
Dissolved Organic Carbon	mg/L	0.5	-	-	-	-	-	8.9	54.2	54.2	<0.5	10.4	<0.5	23.9	18	<0.5	<0.5	-			-	-		-	-
Dissolved Calcium	mg/L	0.1	-	-	170	170	170	127	129	132	135	140	139	121	125	158	152	100	96	91	110	110		-	-
Dissolved Magnesium	mg/L	0.1	-	-	31	31	36	26.1	23.9	27.2	37.9	28.4	28.3	25.4	26.2	39	38.1	23	18	17	22	22		-	-
Phosphorus	mg/L	0.1	-	-	0.2	0.1	0.1	0.1	<0.1	<0.1	<0.02	0.06	0.06	0.18	0.22	<0.02	<0.02	0.12	<0.10	<0.10	<0.100	<0.100		-	-
Potassium	mg/L	0.1	-	-	37	43	45	30.5	29	41.9	52.2	40.8	40.8	61.7	62.9	63	63	50	36	35	42	19		-	-
Sodium	mg/L	0.1	-	-	110	120	93	73.1	63.7	75	79.4	70.7	70.7	75.9	75.7	67	66.3	33	33	26	47	46		-	-

Notes:

(1) Reporting limit was increased due to turbidity.

RDL - Reported Detection Limit (updated in 2016)

ND - Values below RDL

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

MW-40D = Duplicate of MW-4A

Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviatio

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coar

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh s

TABLE C-2 **GROUNDWATER GENERAL CHEMISTRY - MW-22A**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	8-Mar-95	20-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	26-Jul-00 Lab Dup.	Aug-01	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	18-Aug-05 MW-22A Dup	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	5-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	18-Jul-17	18-Jul-17 Lab-Dup
Anion Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	22.8	15.7	-	15	13	10.3	10.4	7.79	9.13	347	9.46	6.95	8.43	4.53	9.9	-
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	309	1080	1020	1010	1030	1130	1020	1020	1170	931.24	99	879	689	-	597	524	460	450	72	395	347	411	328	379	170	440	-
Calculated TDS	mg/L	1	-	-	495	-	1590	1610	1570	1620	1550	1560	1540	1215.26	133	1110	836	-	834	774	611	574	413	501	416	527	409	516	240	590	-
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	0.07	0	0.6	< 1	0.8	2.7	< 1	2	3	1.75	< 1	<1	ND	-	ND	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	1.4	<1.0	-
Cation Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	18.8	16	-	16.3	16.3	12.8	10.7	5.57	9.86	8.85	10.80	9.1	11.3	4.46	12.2	-
Hardness (CaCO3)	mg/L	1	-	-	325	858	879	762	712	666	611	617	516	397.23	93.8	467	380	-	360	360	270	250	71.7	223	282	244	212	256	190	250	-
Ion Balance (% Difference)	%	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	9.71	0.883	-	3.93	11.4	10.6	1.51	16.6	3.8	7.6	6.5	13.4	14.6	0.78	10.2	-
Langelier Index (@ 20C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38	-0.141	-	-0.101	0.19	-0.0290	-0.165	-1.61	-0.19	-0.22	-0.38	-0.37	-0.63	0.554	-0.138	-
Langelier Index (@ 4C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.02	-0.388	-	-0.348	-0.057	-0.276	-0.413	-1.93	-0.51	-0.54	-0.70	-0.69	-0.95	0.304	-0.386	-
Nitrate (N)	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	ND	-	ND	-	<0.05	<0.05	9.48	0.18	0.20	<0.05	<0.05	<0.05	<0.050	<0.050	-
Saturation pH (@ 20C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	6.52	6.68	-	6.76	6.8	6.96	6.97	8.51	7.19	7.22	7.18	7.33	7.13	7.39	6.96	-
Saturation pH (@ 4C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	6.92	6.93	-	7.01	7.05	7.21	7.21	8.83	7.51	7.54	7.50	7.65	7.45	7.64	7.21	-
Total Alkalinity (Total as CaCO3)	mg/L	100	-	-	309	1080	1020	1010	1030	1130	1020	1020	1170	933	100	880	690	710	600	520	460	450	72	395	-	411	328	379	170	450	440
Dissolved Chloride (Cl)	mg/L	1	-	15000	99.3	330	312	350	309	311	273	278	223	176	13	180	68	68	110	89	39	50	193	43	23	44	14	30	40	35	35
Colour	TCU	5	-	-	45	32	140	34	45	28	31	32	26	334	< 5	44	35	30	16	11	9	10	<5	132	<5	7	64	10	<5.0	63	68
Nitrate + Nitrite (N)	mg/L	0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.06	< 0.05	<0.05	ND	-	ND	<0.05	<0.05	<0.05	9.48	0.18	0.20	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050
Nitrite (N)	mg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	ND	ND	ND	-	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	<0.010
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	4.4	32	34.5	39	60	69.5	69.5	71.4	72	<0.1	< 0.05	58	42	-	31	31	27	19	6.02	22.3	-	19.4	20.4	12	<0.050	23	-
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-		12	-	15	11	10	8	4.7	18.6	3.0	38.7	10	<0.5	1.6	17 (1)	-
Orthophosphate (P)	mg/L	0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07	0.01	<0.01	<0.3	< 0.01	<0.01	ND	ND	ND	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	<0.010	<0.010
pH	Units	N/A	-	-	6.4	6.6	6.8	7	6.9	7.4	7	7.2	7.4	7.3	7.9	6.9	6.54	-	6.66	6.99	6.93	6.8	6.9	7	7.0	6.8	6.96	6.5	7.94	6.82	-
Reactive Silica (SiO2)	mg/L	2.5	-	-	14.2	23	24	21	19.5	20.3	18	18	17.6	20.5	8.5	19	21	20	21	19	20	19	12.1	17.2	18.6	18.4	18.1	16.8	10	17	17
Dissolved Sulphate (SO4)	mg/L	2	-	-	4	< 2	< 2	3	< 2	< 2	5	7	2	3.5	< 2	7	ND	ND	ND	<2	<2	<2	11	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Turbidity	NTU	1	-	-	342	671	66	6.3	6.4	3.1	4	4.8	>1000	96	0.6	666	490	-	400	500	400	450	469	256	272	385	233	4780	0.87	850	-
Conductivity	uS/cm	1	-	-	971	2860	2840	3130	3180	3510	3140	3190	3260	2180	235	2000	1400	-	1500	1300	1000	990	887	852	707	920	740	854	440	890	-
Dissolved Organic Carbon	mg/L	0.5	-	-	36.3	44.5	35.1	38.5	34	3270	41.5	41	31.1	49	-	294	-	-	-	-	-	-	2.3	12.6	<0.5	13.2	<0.5	<0.5	-	-	-
Dissolved Calcium	mg/L	0.1	-	-	105	229	230	201	179	163	156	158	127	104	30.3	117	100	100	98	99	74	73	19.3	73.4	77.2	73.4	62.8	89.3	61	75	-
Magnesium	mg/L	0.1	-	-	15.2	69.6	74	63.2	64.3	63	53.8	54	48.7	33.4	4.4	42.5	30	30	28	28	20	17	5.7	9.6	21.6	14.7	13.4	7.9	9.2	15	-
Phosphorus	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	ND	ND	ND	-	0.2	0.2	<0.1	<0.01	<0.02	0.18	0.31	<0.02	<0.1	0.34	-
Potassium	mg/L	0.1	-	-	5.9	23.9	34.1	38.2	50.7	68.6	69	70.3	72.8	51	4.9	52.3	43	43	42	37	36	30	14.5	25.3	25.6	21.9	25.6	22.1	6.3	23	-
Sodium	mg/L	0.1	-	-	59.9	208	252	276	254	225	270	267	258	267	9.4	91.2	83	82	120	96	78	50	76.2	22.4	52.7	41.4	30.3	41.9	12	74	-

Notes:

RDL - Reported Detection Limit (updated in 2016)

ND - Values below RDL

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviations

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-2 GROUNDWATER GENERAL CHEMISTRY - MW-22A
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

20-Jul-18		Average 2007 through 2017	Action Level
10.3		-	-
450		-	-
580		-	-
<1.0		-	-
11.2		-	-
230		-	-
3.91		-	-
-0.366		-	-
-0.614		-	-
<0.050		-	-
6.99		-	-
7.24		-	-
450		-	-
46		55	204
8.0		-	-
<0.050		-	-
<0.010		-	-
22		16	48
11 (2)		-	-
<0.010		-	-
6.62		-	-
18		-	-
<2.0		-	-
800		-	-
950		871	1506
-		-	-
69		-	-
13		-	-
0.36		-	-
24		-	-
62		-	-

TABLE C-3 **GROUNDWATER GENERAL CHEMISTRY - MW-22B**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	20-Dec-94	8-Mar-95	20-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	5-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	18-Jul-17	20-Jul-18		Average 2007 through 2017	Action Level
Anion Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	23.2	22.8	10.2	14.6	14.5	16.5	20	19	19.8	18.9	15.7	16.9	17.9	15.3	17.3		-	-
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	683	703	856	725	762	596	445	710	683	780.66	399	789	797	444	404	428	519	704	693	710	691	632	612	690	550	670		-	-
Calculated TDS	mg/L	1	-	-	1010	-	-	982	1090	972	831	1180	1110	1109.66	987	1190	1210	549	982	929	954	1070	1020	1050	982	887	939	930	830	910		-	-
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	-	-	0.51	1	1	2.7	3.6	0.9	1.1	1	2	2.32	1	<1	ND	ND	<1	<1	<1	<10	<10	<10	<10	<10	<10	1.3	1.3	<1.0		-	-
Cation Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	21.8	23.6	10.2	24.5	21.9	20.2	22.1	21	21.5	19.2	19.8	19.9	17.6	16.2	17.3		-	-
Hardness (CaCO3)	mg/L	1	-	-	624	726	865	793	882	812	661	968	845	684.38	892	856	940	260	950	830	780	842	812	827	724	762	746	690	610	670		-	-
Ion Balance (% Difference)	%	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	2.97	1.68	0.148	25.3	20.2	10.1	4.8	5	4.0	0.9	11.5	8.2	0.76	2.76	0.0300		-	-
Langelier Index (@ 20C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	0.92	0.796	-0.252	0.913	0.786	0.713	0.9	0.99	1.19	0.84	1.04	0.52	0.965	0.914	0.756		-	-
Langelier Index (@ 4C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	0.52	0.551	-0.5	0.667	0.540	0.467	0.58	0.67	0.87	0.52	0.72	0.2	0.719	0.667	0.510		-	-
Nitrate (N)	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.05	1.5	-	<0.05	0.08	0.14	0.08	0.33	0.59	<0.05	<0.05	0.12	0.072	<0.050		-	-
Saturation pH (@ 20C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	6.18	6.14	6.97	6.44	6.46	6.41	6.4	6.41	6.41	6.46	6.47	6.47	6.34	6.48	6.36		-	-
Saturation pH (@ 4C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	6.58	6.39	7.22	6.68	6.71	6.65	6.72	6.73	6.73	6.78	6.79	6.79	6.58	6.73	6.60		-	-
Total Alkalinity (Total as CaCO3)	mg/L	100	-	-	684	704	857	728	766	597	446	711	685	783	400	790	800 (1)	440	400	430	520	704	693	710	691	632	612	690	550 (2)	670		-	-
Dissolved Chloride (Cl)	mg/L	1	-	15000	166	143	162	152	215	224	231	282	287	287	280	260	240	42	230	210	220	210	182	199	178	110	165	150	150	140		182	291
Colour	TCU	5	-	-	13	86	12	15	8	15	10	11	19	90	43	13	22	7	16	10	13	15	14	9	11	10	<5	13	6.8	11		-	-
Nitrate + Nitrite (N)	mg/L	0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.06	< 0.05	<0.05	0.07	1.5	<0.05	<0.05	0.080	0.14	0.08	0.33	0.59	<0.05	<0.05	0.12	0.072	<0.050		-	-
Nitrite (N)	mg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	0.02	0.03	-	<0.01	<0.01	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.010	<0.010	<0.010		-	-
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	4.1	0.48	0.08	0.17	< 0.05	0.15	< 0.05	0.37	<0.05	<0.1	0.18	0.62	0.06	27	0.28	0.38	0.24	1.1	1.34	1.95	2.25	1.56	1.82	1.2	1.6	2.1		1.2	3.3
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23	9.3	20	17	19	38	24.6	<0.5	32.6	23.2	9.2	1.3	14 (1)	14		-	-
Orthophosphate (P)	mg/L	0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.3	< 0.01	0.01	ND	ND	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.019	<0.010	<0.010		-	-
pH	Units	N/A	-	-	6.9	7	7.1	7.6	7.7	7.2	7.4	7.3	7.5	7.5	7.5	7.1	6.94	6.72	7.35	7.25	7.12	7.3	7.4	7.6	7.3	7.51	6.99	7.3	7.39	7.11		-	-
Reactive Silica (SiO2)	mg/L	2.5	-	-	13.6	13.6	15.5	17.1	17.1	16.2	15	16.2	14.8	17.1	12	17	18	19	17	18	18	18.5	20.3	18.6	18.9	17.8	15.9	19	19	19		-	-
Dissolved Sulphate (SO4)	mg/L	2	-	-	14	< 2	< 2	< 2	< 2	< 2	< 2	2	3	<2.0	11	<2	ND	ND	<2	<2	<2	<2	<2	<10	<2	<2	<2	<2.0	<2.0	<2.0		-	-
Turbidity	NTU	1	-	-	459	< 1000	420	14.7	0.4	2.4	1.7	0.3	>1000	26	> 1000	>1000	180	390	190	180	330	265	147	69.6	138.0	4170	589	120	90	250		-	-
Conductivity	uS/cm	1	-	-	1810	1770	2190	1810	1900	2050	1840	2520	2450	2150	2500	2490	1900	1100	1800	1900	1800	2070	1680	1720	1740	1670	1440	1600	1500	1600		1720	2251
Dissolved Organic Carbon	mg/L	0.5	-	-	106	99	250	12.1	18.4	14.7	1710	24.4	16.4	28.3	-	<500	-	-	-	-	-	37.6	27	<0.5	<0.5	23.4	9.2	-	-	-		-	-
Dissolved Calcium	mg/L	0.1	-	-	207	242	291	262	293	270	209	316	270	219	298	286	320	72	320	280	260	280	274	270	245	259	270	230	200	230		-	-
Magnesium	mg/L	0.1	-	-	26	29.5	33.7	33.1	36.5	33.4	33.7	43.4	41.5	33.4	36	34.4	36	18	37	33	31	34.7	31.1	37.2	27.3	28.1	17.5	27	26	26		-	-
Phosphorus	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	ND	ND	-	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.1	<0.10	<0.100		-	-
Potassium	mg/L	0.1	-	-	14.1	7.5	7.5	7.7	8	7.4	8.5	9.4	8.4	8.3	11.4	8.3	8	35	8.7	14	8.2	5.6	5.6	6.1	8.4	9.4	4.9	8.1	8.6	8.1		-	-
Sodium	mg/L	0.1	-	-	152	90.1	76.8	71.1	59.7	60.2	64.4	80.8	69.8	73	98.5	103	100	46	110	100	92	98.1	89.7	103	84.8	84.7	93.1	78	79	72		-	-

Notes:
RDL - Reported Detection Limit (updated in 2016)
ND - Values below RDL
Bold indicates exceedance of NS Tier 1 EQS
Bold and shaded indicates exceedance of NS Tier 2 EQS
Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviations
NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)
NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-4 **GROUNDWATER GENERAL CHEMISTRY - MW-22C**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	8-Mar-95	20-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	5-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	18-Jul-17	20-Jul-18		Average 2007 through 2017	Action Level
Anion Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	2.28	2.4	2.82	3.09	3.49	3.56	3.46	3.26	3.87	3.94	3.41	3.68	7.69	4.9	4.80		-	-
Bicarb. Alkalinity (calc. as CaC	mg/L	1	-	-	41.6	42	43.5	67.7	75.4	87.4	117	97	101.99	819	95	99.4	112	123	137	137	133	126	147	145	131	133	350	180	180		-	-
Calculated TDS	mg/L	1	-	-	60	-	58	91	102	117	148	128	131.53	1110	128	137	158	175	195	193	173	176	199	207	193	202	450	260	250		-	-
Carb. Alkalinity (calc. as CaCO	mg/L	1	-	-	0.31	0	0.4	< 1	0.6	0.5	< 1	<1	0.96	< 1	<1	ND	ND	<1	1	<1	<10	<10	<10	<10	<10	<10	<1.0	1.3	1.0		-	-
Cation Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	2.36	2.65	3.03	3.42	3.78	3.62	3.24	3.74	3.90	4.12	4.34	4.35	8.89	4.57	4.65		-	-
Hardness (CaCO3)	mg/L	1	-	-	29	32	42	59.4	69	82	113	86.3	88.59	506	89.5	100	120	130	150	150	134	162	162	163	183	190	190	190	200		-	-
Ion Balance (% Difference)	%	N/A	-	-	-	-	-	-	-	-	-	-	-	-	1.55	4.92	3.71	5.07	3.99	0.84	3.2	6.9	0.4	2.2	12	8.4	7.24	3.48	1.59		-	-
Langelier Index (@ 20C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-0.41	-0.306	-0.102	0.19	0.417	0.047	0.15	0.33	0.17	0.25	0.35	0.03	-0.139	0.52	0.429		-	-
Langelier Index (@ 4C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-0.81	-0.557	-0.352	-0.06	0.167	-0.203	-0.17	0.01	-0.15	-0.07	0.03	-0.29	-0.388	0.27	0.179		-	-
Nitrate (N)	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	ND	ND	-	<0.05	<0.05	0.09	0.07	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050		-	-
Saturation pH (@ 20C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	8.01	7.83	7.73	7.68	7.58	7.57	7.85	7.77	7.73	7.74	7.73	7.68	7.13	7.36	7.35		-	-
Saturation pH (@ 4C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	8.41	8.08	7.98	7.93	7.83	7.82	8.17	8.09	8.05	8.06	8.05	8	7.38	7.61	7.60		-	-
Total Alkalinity (Total as CaCO	mg/L	100	-	-	42	42	44	68	76	88	118	98	103	820	95	100	110	120	140	140	133	126	147	145	131	133	350	180 (2)	180		-	-
Dissolved Chloride (Cl)	mg/L	1	-	15000	4.4	5	5.4	6.3	8.1	10.1	11.8	11.9	11.2	140	12	14	20	22	26	29	28	26	33	37	28	36	25	46	45		31	51
Colour	TCU	5	-	-	< 3	5	15	21	24	7	< 5	<5	68	25	8	ND	ND	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	26	<5.0	<5.0		-	-
Nitrate + Nitrite (N)	mg/L	0.05	-	-	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	0.08	<0.06	< 0.05	<0.05	ND	ND	<0.05	<0.05	<0.05	0.09	0.07	<0.05	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050		-	-
Nitrite (N)	mg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	ND	ND	-	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	<0.010		-	-
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.19	<0.1	49	<0.05	ND	ND	<0.05	<0.05	<0.05	0.07	<0.05	<0.03	0.04	<0.03	<0.03	14	<0.050	<0.050		1.3	13.9
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.9	1.1	1.5	<5	2.9	2.6	0.8	7.9	4.6	3.6	9.5	<5.0 (1)	1.9		-	-
Orthophosphate (P)	mg/L	0.01	-	-	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	0.02	0.02	<0.3	< 0.01	0.11	ND	ND	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.016	<0.010	<0.010		-	-
pH	Units	N/A	-	-	7.9	7.9	8	7.7	7.9	7.8	7.7	8	8	7	7.6	7.52	7.63	7.87	8.00	7.62	8	8.1	7.9	8.0	8.08	7.71	7	7.88	7.78		-	-
Reactive Silica (SiO2)	mg/L	2.5	-	-	8.3	8.1	8.3	9	8.3	8.1	7.6	8.4	8.8	19	8.6	8.7	8.9	9	9.4	9.4	9.7	9.5	9.9	9.8	9.6	9.2	15	10	10		-	-
Dissolved Sulphate (SO4)	mg/L	2	-	-	2	2	< 2	< 2	2	2	2	4	3.5	6	<2	ND	ND	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0		-	-
Turbidity	NTU	1	-	-	1.5	505	41	17	5.2	3.8	0.2	398	12	322	3.2	2.2	1.3	3.8	1.1	16	1.3	15.8	4.9	41.5	8.6	70.1	450	54	0.82		-	-
Conductivity	uS/cm	1	-	-	99	98	107	155	174	205	262	224	230	2330	230	230	280	300	350	360	367	312	372	395	385	382	730	470	480		402	755
Dissolved Organic Carbon	mg/L	0.5	-	-	9.9	0.8	< 0.5	< 0.05	< 0.05	214	< 0.5	<0.5	1.2	-	1.2	-	-	-	-	-	1.5	2.7	<0.5	1.7	<0.5	3.4	-	-	-		-	-
Dissolved Calcium	mg/L	0.1	-	-	9.2	10.4	13.7	19	22.2	26.1	36.5	27.3	28.6	132	28.9	34	39	41	46	47	43.8	55.2	52.5	52.4	59.1	64.9	60	62	64		-	-
Magnesium	mg/L	0.1	-	-	1.4	1.5	2	2.9	3.3	4.1	5.4	4.4	4.17	42.8	4.2	4.8	5.9	6	7.1	7.1	6.1	5.9	7.5	7.8	8.5	6.9	8.6	9.3	9.5		-	-
Phosphorus	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	ND	ND	-	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	0.02	<0.02	0.28	<100	<0.100		-	-
Potassium	mg/L	0.1	-	-	2.9	2.9	2.9	3.6	4.2	4.1	5	4.4	4.5	61.7	4.7	4.9	5.4	5.8	8.1	6.1	4.8	5	5.3	6.5	6.9	5.1	16	6.6	6.5		-	-
Sodium	mg/L	0.1	-	-	7.1	6	6.8	7.6	8.1	9.9	8.8	8.2	8.9	151	10.2	10	11	17	15	12	9.6	8.3	12.1	15.7	11.6	9.3	52	12	12		-	-

Notes:
RDL - Reported Detection Limit (updated in 2016)
ND - Values below RDL
Bold indicates exceedance of NS Tier 1 EQS
Bold and shaded indicates exceedance of NS Tier 2 EQS
Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviations
NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)
NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-5 **GROUNDWATER GENERAL CHEMISTRY - MW-25B**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	Sep-93	NS Tier 1 EQS	NS Tier 2 PSS	8-Mar-95	19-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Aug-01 Duplicate	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	16-Aug-07 Dup B	28-Jul-08	10-Aug-09	28-Jul-10	21-Sep-11	4-Oct-12	8-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	20-Jul-18	20-Jul-18 Lab-Dup		Average 2007 through 2017	Action Level
Anion Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	5.03	2.9	10	8.45	1.37	3.55	6.35	11.7	1.95	9.49	6.28	9.57	8.63	10.8	5.28	8.16	N/A		-	-
Bicarb. Alkalinity (calc. as CaC	mg/L	1	75.4	-	-	143	44.5	49.8	91.4	46	42	42	41	43.63	229	180	102	344	274	63	120	215	393	62	333	204	353	292	380	170	290	N/A		-	-
Calculated TDS	mg/L	1	111	-	-		67	69	137	74	74	68	68	69.17	369	261	164	541	480	89	232	352	560	100	454	331	515	484	560	280	420	N/A		-	-
Carb. Alkalinity (calc. as CaC	mg/L	1	0.56	-	-	1	0.4	< 1	0.5	0.9	< 1	<1	<1	0.33	1	<1	ND	ND	2	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	N/A		-	-
Cation Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	4.6	3.14	10.6	10	1.55	5.20	7.03	9.62	1.81	7.93	6.62	10.8	10.8	10.2	5.02	7.71	N/A		-	-
Hardness (CaCO3)	mg/L	1	71	-	-	166	44	40.8	105	47.3	52.3	40.7	40.4	41.33	321	199	130	470	440	5	190	300	421	74.8	337	279	460	466	440	220	340	N/A		-	-
Ion Balance (% Difference)	%	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	4.42	3.89	2.72	8.6	6.16	18.9	5.08	9.7	3.9	8.9	2.6	6.2	11.2	2.72	2.52	2.84	N/A		-	-
Langelier Index (@ 20C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	-0.589	0.448	1.08	-1.36	-0.0140	0.267	0.59	-0.4	0.61	0.11	0.68	0.22	0.694	0.303	0.423	N/A		-	-
Langelier Index (@ 4C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.39	-0.84	0.2	0.836	-1.61	-0.264	0.018	0.27	-0.72	0.29	-0.21	0.36	-0.1	0.446	0.054	0.175	N/A		-	-
Nitrate (N)	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	ND	ND	-	-	<0.05	<0.05	0.09	0.11	0.06	<.05	<0.05	<0.05	<0.050	0.056	<0.050	N/A		-	-
Saturation pH (@ 20C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	7.39	7.7	6.74	6.86	9.33	7.53	7.1	6.91	8.4	7.09	7.36	6.93	7.01	6.73	7.32	6.95	N/A		-	-
Saturation pH (@ 4C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	7.79	7.95	6.99	7.1	9.58	7.78	7.35	7.23	8.72	7.41	7.68	7.25	7.33	6.98	7.57	7.20	N/A		-	-
Total Alkalinity (Total as CaC	mg/L	25	76	-	-	144	45	50	92	47	42	42	41	44	230	180	100	340	280	64	120	220	393	62	333	204	353	292	380	170 (2)	290	280		-	-
Dissolved Chloride (Cl)	mg/L	1	11.5	-	15000	32.1	5.2	5.4	21	10.4	9.1	10.4	9.9	9.7	74	49	30	110	100	3	41	72	135	25	100	78	89	99	110	64	85	83		83	178
Colour	TCU	5	< 3	-	-	5	8	40	6	24	15	<5	<5	176	6	5	ND	6	6	<5	9	6	8	<5	<5	<5	<5	5	<5.0	<5.0	<5.0	<5.0		-	-
Nitrate + Nitrite (N)	mg/L	0.05	< 0.05	-	-	< 0.05	0.08	0.06	< 0.05	< 0.05	0.06	<0.05	<0.05	0.52	< 0.05	<0.05	ND	ND	<0.05	0.1	<0.05	<0.05	0.09	0.11	0.06	<.05	<0.05	<0.05	<0.050	0.056	<0.050	<0.050		-	-
Nitrite (N)	mg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	ND	ND	-	-	<0.01	<0.01	<0.05	<0.05	<0.05	<.05	<0.05	<0.05	<0.010	<0.010	<0.010	<0.010		-	-
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.05	<0.1	0.09	0.22	0.06	ND	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.03	0.03	0.04	0.5	<0.050	0.052	<0.050	N/A		0.07	0.50
Total Organic Carbon (C)	mg/L	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND	6	14	4	1.9	<5	12.6	1.2	<0.5	2.8	4.4	3.8	9.4 (2)	<5.0 (1)	6.8	N/A		-	-
Orthophosphate (P)	mg/L	0.01	< 0.01	-	-	< 0.01	0.01	0.01	< 0.01	< 0.01	0.04	<0.01	<0.01	<0.3	0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.021	<0.010	<0.010	0.011		-	-
pH	Units	N/A	7.9	-	-	7.7	8	7.5	7.8	8.3	7.8	7.9	7.9	7.9	7.8	7.4	7.11	7.19	7.94	7.97	7.52	7.37	7.5	8	7.7	7.47	7.61	7.23	7.43	7.63	7.37	7.63		-	-
Reactive Silica (SiO2)	mg/L	0.5	9	-	-	11	7.8	8.1	9	7.8	7.2	7.8	7.7	7.6	13	11	9.2	15	14	11	9.5	12	15.9	8.4	14.3	11.7	15.1	11.8	15	11	13	13		-	-
Dissolved Sulphate (SO4)	mg/L	2	4	-	-	< 2	2	< 2	< 2	< 2	5	<2	4	<2.0	< 2	<2	ND	ND	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0	<2.0		-	-
Turbidity	NTU	0.1	0.8	-	-	798	8.3	22	4	30.4	4	835	339	95	99.2	95.4	220	330	210	190	290	160	55	111	113	4070	699	956	1.5	450	880	N/A		-	-
Conductivity	uS/cm	1	190	-	-	370	111	108	249	124	121	116	115	124	780	495	280	960	920	130	370	640	1190	197	889	614	1040	839	970	510	760	770		744	1654
Dissolved Organic Carbon	mg/L	0.5	2.4	-	-	1.8	< 0.5	< 0.5	0.3	132	1.2	<0.5	0.6	0.6	-	<5	-	-	-	-	-	-	11.6	1.8	<0.5	<0.5	4.4	3.3	-		-	-		-	-
Dissolved Calcium	mg/L	0.1	23.3	-	-	55.1	14.4	13.2	33.7	15.3	17	13	12.9	13.5	107	65.5	45	160	150	1.6	61	100	144	25	109	92.3	153	152	150	71	110	N/A		-	-
Magnesium	mg/L	0.1	3.2	-	-	6.8	2	1.9	5.1	2.2	2.4	2	2	1.85	13.1	8.7	5.5	18	18	0.2	8.1	13	15	3	15.7	11.8	18.9	20.9	18	9.9	14	N/A		-	-
Phosphorus	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	ND	ND	-	-	<0.1	<0.1	<0.1	<0.1	<0.02	0.02	0.04	<0.02	<0.1	<0.10	<0.100	N/A		-	-
Potassium	mg/L	0.1	5.3	-	-	6	3.5	3.6	4.8	3.4	3.9	3.6	3.6	3.8	6.4	5.8	4.7	7	7.7	1.8	14	7.6	5.2	4	4.6	7.0	8.6	5.1	6.6	6.6	7.1	N/A		-	-
Sodium	mg/L	0.1	9.3	-	-	6.1	4.6	3.9	5.6	4.6	3.8	3.6	3.5	3.8	15.5	10.4	7.5	24	24	32	26	18	24	4.8	24.5	19.6	28.8	30.2	29	11	19	N/A		-	-

Notes:
RDL - Reported Detection Limit (updated in 2016)
ND - Values below RDL
Bold indicates exceedance of NS Tier 1 EQS
Bold and shaded indicates exceedance of NS Tier 2 EQS
Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviations
NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)
NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-6 **GROUNDWATER GENERAL CHEMISTRY - TH-1**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	8-Mar-95	19-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Sept-02	19-Aug-03	25-Aug-04	25-Aug-04 DUP	18-Aug-05	18-Aug-05 TH1 Dup	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	4-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	20-Jul-18		Average 2007 through 2017	Action Level
Anion Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	17.1	17.1	16.9	-	15.1	11.8	13.7	12.9	12.2	11.4	11.6	11.0	9.55	9.49	10.2	10.5	10.2		-	-
Bicarb. Alkalinity (calc. as CaC	mg/L	1	-	-	1100	1020	1080	1140	999	995	934	836	937.77	655	741	743	755	-	666	516	625	588	552	529	537	502	453	442	470	490	480		-	-
Calculated TDS	mg/L	1	-	-	1450		1400	1430	1270	1240	1220	1160	1116.86	903	903	907	882	-	819	744	737	694	679	612	645	634	533	518	580	580	540		-	-
Carb. Alkalinity (calc. as CaCO	mg/L	1	-	-	2.06	1	1.6	4.3	1.2	0.9	1	5	2.21	5	9	7	ND	-	ND	<1	1	<1	<10	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0		-	-
Cation Sum	me/L	N/A	-	-	-	-	-	-	-	-	-	-	-	-	16.6	16.9	16.3	-	15.6	16.9	13.6	12.5	14.1	12.6	14.1	13.9	11.5	10.4	11.6	11	9.87		-	-
Hardness (CaCO3)	mg/L	1	-	-	634	546	636	650	550	531	533	556	479.61	409	362	369	380	-	350	380	290	290	257	294	312	262	273	279	280	270	250		-	-
Ion Balance (% Difference)	%	N/A	-	-	-	-	-	-	-	-	-	-	-	-	1.64	0.69	1.78	-	1.5	17.8	0.400	1.85	7.4	5.2	9.8	11.6	9.3	4.4	6.1	2.32	1.50		-	-
Langelier Index (@ 20C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	1.5	1.41	0.346	-	0.361	0.453	0.563	0.446	0.45	0.62	0.42	0.46	0.48	0.09	0.451	0.454	0.323		-	-
Langelier Index (@ 4C)	-	N/A	-	-	-	-	-	-	-	-	-	-	-	-	1.1	1.01	0.099	-	0.114	0.206	0.317	0.199	0.13	0.3	0.10	0.14	0.16	-0.23	0.203	0.207	0.0760		-	-
Nitrate (N)	mg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	ND	-	0.55	-	<0.05	0.34	2.94	0.29	0.54	<0.05	<0.05	<0.05	<0.050	0.063	0.055		-	-
Saturation pH (@ 20C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	6.6	6.59	6.57	-	6.66	6.73	6.76	6.78	7.05	6.98	6.98	7.06	7.07	7.01	6.86	6.88	6.89		-	-
Saturation pH (@ 4C)	Units	N/A	-	-	-	-	-	-	-	-	-	-	-	-	7	6.99	6.82	-	6.91	6.97	7.00	7.03	7.37	7.3	7.30	7.38	7.39	7.33	7.11	7.12	7.14		-	-
Total Alkalinity (Total as CaCO	mg/L	100	-	-	1100	1020	1080	1140	1000	996	935	841	940	660	750	750	760	750	670	520	630	590	552	529	537	502	453	442	470	490 (2)	480		-	-
Dissolved Chloride (Cl)	mg/L	1	-	15000	203	198	169	164	150	143	133	136	117	91	74	73	62	61	60	51	41	36	31	26	28	34	15	23	27	26	20		31	60
Colour	TCU	5	-	-	31	90	70	27	27	27	20	21	128	25	16	17	18	18	15	13	15	21	11	9	13	11	<5	8	7.6	<5.0	7.4		-	-
Nitrate + Nitrite (N)	mg/L	0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	<0.06	< 0.05	<0.05	<0.05	ND	-	0.57	<0.05	<0.05	1.3	2.94	0.29	0.69	<0.05	<0.05	<0.05	<0.050	0.063	0.055		-	-
Nitrite (N)	mg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	0.01	ND	ND	0.02	-	<0.01	0.95	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.010	<0.010	<0.010		-	-
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	-	-	48.9	71	67	62.5	72.5	72.1	73.4	72.4	<0.1	58	54	55	49	-	50	54	42	32	58.3	43.8	58.3	44.0	37.6	16.7	40	33	29		42	79
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	13	11	11	19	25.9	4.9	20.4	11.9	<0.5	<0.5	7.4 (1)	10 (1)	7.6		-	-
Orthophosphate (P)	mg/L	0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	<0.01	<0.3	< 0.01	0.01	<0.01	ND	ND	ND	<0.01	<0.01	<0.01	0.02	0.02	0.01	0.01	0.01	<0.01	0.027	<0.010	<0.010		-	-
pH	Units	N/A	-	-	7.3	7	7.2	7.6	7.1	7.1	7.1	7.8	7.4	7.9	8.1	8	6.92	-	7.02	7.18	7.32	7.23	7.5	7.6	7.4	7.5	7.55	7.1	7.31	7.33	7.22		-	-
Reactive Silica (SiO2)	mg/L	2.5	-	-	19.8	27.6	28.5	28	26.9	27.9	27.8	29.5	31.1	30	30	30	30	30	31	32	32	30	28.8	22.6	30.9	32.5	28.6	24.5	31	30	29		-	-
Dissolved Sulphate (SO4)	mg/L	2	-	-	2	< 2	< 2	3	< 2	< 2	5	9	3.3	7	<2	<2	ND	ND	3	<2	2	3	4	2	2	2	3	<2	<2.0	<2.0	<2.0		-	-
Turbidity	NTU	1	-	-	308	524	12.5	0.8	1.3	1.3	0.3	375	36	330	302	294	230	-	210	220	220	84	127	240	286	232	2880	1160	160	400	570		-	-
Conductivity	uS/cm	1	-	-	2980	2710	2700	2520	2590	2590	2590	2590	2050	1380	1800	1810	1500	-	1400	1400	1300	1200	1270	1080	1090	1080	1020	940	1000	1000	940		1125	1565
Dissolved Organic Carbon	mg/L	0.5	-	-	58	46	38.7	36	30	30	27	22.6	34.9	-	<50	<50	-	-	-	-	-	-	21.2	0.8	15.2	<0.5	<0.5	<0.5	-	-	-		-	-
Dissolved Calcium	mg/L	0.1	-	-	248	169	197	199	171	167	164	170	152	126	112	114	120	-	110	120	91	89	76.2	92.6	91.6	81.6	85.4	100	88	83	80		-	-
Magnesium	mg/L	0.1	-	-	3.5	30.1	34.9	37.3	29.8	27.6	29.9	31.9	24.3	23	20.1	20.5	20	-	19	20	16	15	16.1	15.2	20.3	14.2	14.6	7.2	16	14	13		-	-
Phosphorus	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	ND	-	ND	-	<0.1	<0.1	<0.1	<0.1	<0.02	0.05	0.1	<0.02	0.1	<0.10	<0.100		-	-
Potassium	mg/L	0.1	-	-	19.4	35.9	41.7	45.2	42.1	42	52.6	51.6	49.1	47.8	45.9	45.8	43	-	46	45	43	43	45	39	39.8	35.1	39	37.7	33	32	29		-	-
Sodium	mg/L	0.1	-	-	230	176	188	186	159	138	149	132	176	107	99	101	94	-	87	87	73	68	77.4	51.7	61.4	96.4	44.7	47.8	41	48	36		-	-

Notes:
(1) Reporting limit was increased due to turbidity.
RDL - Reported Detection Limit (updated in 2016)
ND - Values below RDL
Bold indicates exceedance of NS Tier 1 EQS
Bold and shaded indicates exceedance of NS Tier 2 EQS
Action Level = average between 2007 and 2016 (excluding duplicates) plus three standard deviations
NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)
NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-7 GROUNDWATER METALS CHEMISTRY - MW-4A
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL*	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	21-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	26-Jul-00 Dup.	Aug-01	Sep-02	Sep-02 Duplicate	19-Aug-03	25-Aug-04	25-Aug-04 MW-40D	25-Aug-04 Lab Dup	18-Aug-05	18-Aug-05 MW-40D	23-Nov-06	1-Aug-07	16-Aug-07 MW-4ALF	28-Jul-08	28-Jul-08 Dup-A	12-Aug-09	12-Aug-09 MW-40D	27-Jul-10	27-Jul-10 MW-40D	21-Sep-11	4-Oct-12	4-Jul-13	4-Jul-13 MW-40D	19-Aug-14	19-Aug-14 MW-40D	21-Jul-15	21-Jul-15 MW-40D	14-Jul-16	19-Jul-17	19-Jul-17 MW-40D
Aluminum	ug/L	5	-	50	9	13	33	33	< 5	**4000**	**2500**	14	<20	<20	*< 100*	*<100*	*<100*	*<101*	*<100*	*<100*	ND	<50	<50	<50	<50	<50	<50	<10	<10	<10	<5	**347**	**62**	10	10	<5	<5	<5.0	6.5	<5.0
Antimony	ug/L	1	-	200	3	< 2	< 2	< 2	< 2	< 20	< 20	<2	<0.4	<0.4	< 20	<20	<20	<21	<20	<20	ND	<20	<20	<20	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	<1.0	<1.0
Arsenic	ug/L	1	-	50	**170**	39	**93**	**81**	**59**	**100**	**67**	33	**61.9**	**64.4**	23	<20	25	24	**51**	47	ND	**76**	**69**	**68**	**68**	**67**	**62**	**122**	**117**	**57**	43	**66**	**64**	**89**	**90**	**84**	**82**	**64**	47	6.4
Barium	ug/L	10	-	10000	2900	1800	2700	2300	2200	3300	2900	1400	4560	4570	2800	2800	3200	3200	3200	3200	3000	3760	3860	3740	3990	4030	3760	2900	3000	3250	3420	3170	3200	4090	3980	4090	4110	3300	2300	1900
Beryllium	ug/L	1	-	53	< 5	< 5	< 5	< 5	< 5	< 50	< 50	<5	<0.5	<0.5	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	<1.0	<1.0
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	-	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Boron	ug/L	50	-	12000	540	250	400	420	440	390	390	200	450	450	780	660	790	860	980	990	900	845	867	734	727	548	565	624	610	690	773	591	681	726	704	801	651	390	330	270
Cadmium	ug/L	0.01	-	0.1	*< 0.5*	*< 0.3*	*< 0.3*	*< 0.3*	*< 0.3*	**1.6**	**1.1**	0.09	*<0.3*	*<0.3*	*< 3*	*<3*	*<3*	*<3*	*<3*	*<3*	ND	**0.21**	*<0.17*	*<0.17*	*<0.17*	*<0.17*	*<0.17*	*<0.3*	*<0.3*	*<0.3*	**0.452**	*<0.017*	0.029	<0.017	<0.017	<0.017	<0.017	<0.010	0.015	**0.27**
Chromium	ug/L	1	-	-	4	5	< 2	4	5	24	< 20	<2	2	3	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<10	<10	2	3	<2	<1	3	<1	<1	<1	3	3	<1.0	<1.0	<1.0
Cobalt	ug/L	0.4	-	100	29	21	26	22	20	91	56	15	21	22	20	24	24	23	17	18	18	14.8	13.8	15.6	15.6	15.8	15.5	6	7	7	9	11	11	10	10	6	6	12	10	11
Copper	ug/L	2	-	20	< 10	3	3	4	< 2	63	37	2	10	11	< 20	<20	<20	<20	<20	<20	ND	<20	<20	35	<20	<20	<20	<2	<2	<2	<2	<2	3	4	<2	<2	<2	<2.0	<2.0	<2.0
Iron	ug/L	50	-	3000	**24800**	**20000**	**28000**	**22000**	**13000**	**210000**	**94000**	**14000**	**25000**	**25500**	< 500	<500	1300	1300	**11000**	**7800**	ND	**20500**	**20900**	**18800**	**18600**	**16600**	**17600**	**14400**	**15200**	**15900**	<50	**17400**	**17200**	**15600**	**14800**	**25900**	**24400**	**19000**	**13000**	<50
Lead	ug/L	0.5	-	10	0.1	0.4	0.4	0.5	< 0.5	**51**	**29**	<.5	<1	<1	< 5	<5	<5	<5	<5	<5	ND	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.9	1.8	<0.5	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Manganese	ug/L	2	-	8200	420	5400	900	890	450	**33000**	**17000**	3500	785	811	480	1100	550	550	480	470	540	493	481	497	515	497	520	384	407	641	702	541	513	430	443	657	633	550	1200	1700
Mercury	ug/L	0.026	-	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.101	<0.026	0.029	<0.026	<0.026	<0.026	-	-	-
Molybdenum	ug/L	2	-	730	< 2	< 2	< 2	< 2	< 2	< 20	< 20	<2	<4	<4	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	<2	<2	<2	5	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Nickel	ug/L	2	-	250	47	28	36	39	26	120	69	12	41	42	50	56	68	69	48	51	45	32	31	33	33	32	28	17	15	15	39	27	25	19	18	9	9	18	16	22
Selenium	ug/L	1	-	10	< 2	< 2	< 2	< 2	< 2	< 10	< 10	<1	2	3	*< 20*	*<20*	*<20*	*<20*	*<20*	*<20*	ND	<10	<10	<10	<10	<10	<10	3	3	<2	2	<1	<1	<1	<1	7	7	<1.0	<1.0	<1.0
Silver	ug/L	0.1	-	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*< 5*	*< 5*	<0.1	*<2*	*<2*	*< 5*	*<5*	*<5*	*<5*	*<5*	*<5*	ND	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
Strontium	ug/L	2	-	210000	730	370	580	510	580	600	550	350	859	876	950	940	1100	1100	960	960	1000	1080	1090	970	1010	1040	1040	865	875	823	872	980	974	845	853	974	936	770	620	550
Thallium	ug/L	0.1	-	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1	< 1	<0.1	<0.8	<0.8	< 1	<1	<1	<1	<1	<1	ND	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
Tin	ug/L	2	-	-	< 2	< 2	< 2	< 2	< 2	< 20	< 20	<2	,20	<20	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	-	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Uranium	ug/L	0.1	-	3000	0.1	0.1	0.2	0.2	0.1	6.6	3.5	0.2	0.21	0.21	< 1	<1	<1	<1	<1	<1	1	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1	0.1	<0.1	0.6	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.10	<0.10	0.27
Vanadium	ug/L	2	-	60	< 2	< 2	< 2	< 2	< 2	50	22	<2	4	5	< 20	<20	<20	<20	<20	<20	ND	<20	<20	<20	<20	<20	<20	4	4	2	<2	<2	<2	<2	<2	2	3	<2.0	<2.0	<2.0
Zinc	ug/L	5	-	300	< 10	43	21	14	12	< 200	< 200	22	7	7	< 50	<50	<50	<50	<50	<50	ND	<50	<50	<50	<50	<50	<50	10	<5	<5	<5	35	20	9	<5	9	8	7.2	11	15

Notes:

RDL - Reported Detection Limit (updated in 2016, except for Mercury)

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Shaded and italics indicates the detection limit exceeds NS Tier 2 PSS

MW-40D = Duplicate of MW-4A

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-8 **GROUNDWATER METALS CHEMISTRY - MW-22A**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL*	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	20-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	26-Jul-00 Lab Dup.	Aug-01	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	5-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	
Aluminum	ug/L	5	-	50	5	*< 100*	< 10	< 10	< 10	**1000**	**3700**	**120**	20	< 10	<10	*<100*	ND	<5.0	<5.0	12.4	<10	<10	<5	21	<5	<5	<5.0	<5.0	
Antimony	ug/L	1	-	200	9	< 20	< 2	< 2	< 2	< 20	< 20	<2	<0.4	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Arsenic	ug/L	1	-	50	36	< 20	**100**	**110**	**97**	**61**	**92**	**110**	**106**	2	<2	27	ND	**101**	**104**	**111**	<2	**107**	<2	75	**88**	**106**	1.4	**95**	
Barium	ug/L	1	-	10000	990	1800	4100	4000	4000	4300	4600	3500	602	6	150	1300	920	1230	1080	1090	357	815	730	938	910	1110	8.6	1100	
Beryllium	ug/L	1	-	53	< 5	< 50	< 5	< 5	< 5	< 50	< 50	<5	<0.5	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Boron	ug/L	50	-	12000	160	1000	1300	1400	1600	1800	1800	2100	830	7	780	470	630	387	429	295	135	212	336	291	229	322	<50	440	
Cadmium	ug/L	0.01	-	0.1	*< 0.5*	*< 0.5*	*< 0.3*	*< 0.3*	*< 0.3*	*< 1*	*< 1*	0.05	*<0.3*	*< 0.3*	*<0.3*	*<3*	ND	0.023	<0.017	**0.358**	*<0.3*	*<0.3*	<0.017	0.022	<0.017	<0.017	<0.010	75000	
Chromium	ug/L	1	-	-	5	< 20	2	10	6	< 20	< 20	2	3	< 2	<2	<20	ND	2.2	3.3	1.4	3	<2	1	<1	<1	2	<1.0	<1.0	
Cobalt	ug/L	0.4	-	100	35	50	48	33	37	38	45	26	21	< 1	3	26	28	23	19.3	23.3	<1	18	18	26	17	16	<0.40	19	
Copper	ug/L	2	-	20	10	< 20	< 2	2	7	**40**	**90**	4	21	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Iron	ug/L	50	-	3000	**118000**	1500	**76000**	**50000**	**50000**	**30000**	**53000**	**39000**	**41500**	< 50	1100	**22000**	**16000**	**45900**	**33700**	**37000**	<50	**56100**	990	**56000**	**36900**	**74400**	200	**49000**	
Lead	ug/L	0.5	-	10	0.2	< 1	0.5	< 0.5	< 0.5	**11**	**29**	1.1	<1	< 0.5	<0.5	<5	ND	<0.50	<0.50	<0.50	1.4	0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	
Manganese	ug/L	2	-	8200	2290	4800	7200	4100	4300	3700	4800	3200	2740	39	350	3600	3300	4220	2570	4330	656	4800	5030	4220	3020	7770	57	4000	
Mercury	ug/L	0.026	-	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.049	<0.026	<0.026	-	-	
Molybdenum	ug/L	2	-	730	< 2	< 20	3	3	3	< 20	< 20	3	<4	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Nickel	ug/L	2	-	250	29	60	48	47	49	53	60	44	30	< 2	4	25	25	18	17.3	15.4	3	9	12	19	10	10	<2.0	16	
Selenium	ug/L	1	-	10	< 2	*< 20*	< 2	< 2	< 2	< 10	< 10	<1	1	< 2	<2	*<20*	ND	<1.0	<1.0	<1.0	<2	<2	<1	<1	<1	2	<1.0	<1.0	
Silver	ug/L	0.1	-	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*< 5*	*< 5*	<0.1	*<2*	< 0.5	<0.5	*<5*	ND	<0.10	<0.10	<0.10	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Strontium	ug/L	2	-	210000	300	940	1100	1100	1200	1000	1100	1000	906	420	84	670	560	521	475	436	154	411	415	418	327	392	850	420	
Thallium	ug/L	0.1	-	8	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 1	< 1	0.1	<0.8	< 0.1	<0.1	<1	ND	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Tin	ug/L	2	-	-	< 2	< 20	< 2	< 2	< 2	< 20	< 20	<2	<20	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Uranium	ug/L	0.1	-	3000	0.1	< 0.1	0.2	0.3	0.4	3.2	5	1.2	1.04	10	0.1	<1	ND	<0.10	<0.10	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	33	<0.10	
Vanadium	ug/L	2	-	60	< 2	< 2	3	3	2	< 20	< 20	4	6	< 2	<2	<20	ND	<2.0	<2.0	<2.0	<2	3	3	<2	<2	2	<2.0	<2.0	
Zinc	ug/L	5	-	300	20	< 50	9	11	24	< 200	< 200	10	10	< 5	<5	160	ND	22.4	5.5	<5.0	5	5	<5	23	8	<5	<5.0	<5.0	

Notes:

RDL - Reported Detection Limit (updated in 2016, except for Mercury)

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Shaded and italics indicates the detection limit exceeds NS Tier 2 PSS

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater,
commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater
>10 m from fresh surface water (NSE 2013b)

TABLE C-9 **GROUNDWATER METALS CHEMISTRY - MW-22B**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL*	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	20-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	5-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	
Aluminum	ug/L	5	-	50	5	**260**	26	< 20	30	**2300**	<50	<20	*< 100*	*<100*	*<100*	ND	<50	<50	<50	<10	<10	<5	29	<5	<5	<5.0	<5.0	
Antimony	ug/L	1	-	200	12	< 2	< 2	< 2	< 2	< 20	<20	<0.4	< 20	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Arsenic	ug/L	1	-	50	10	13	15	4	7	22	<20	14.2	< 20	<20	<20	ND	<20	<20	<20	41	**57**	12	23	26	36	4.1	9.5	
Barium	ug/L	1	-	10000	1400	420	520	350	510	900	580	548	720	590	510	1000	596	581	572	735	3250	672	734	896	814	700	690	
Beryllium	ug/L	1	-	53	< 5	< 5	< 5	< 5	< 5	< 50	<50	<0.5	< 20	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	< 20	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Boron	ug/L	50	-	12000	320	120	160	180	250	330	370	280	440	600	500	350	567	504	470	601	690	726	541	480	449	460	490	
Cadmium	ug/L	0.01	-	0.1	*< 0.5*	*< 0.5*	*< 0.3*	*< 0.3*	*< 0.3*	*< 1*	*0.5*	*<0.3*	*< 3*	*<3*	*<3*	ND	<0.17	<0.17	**0.8**	*<0.3*	*<0.3*	0.023	<0.017	<0.017	<0.017	0.052	0.018	
Chromium	ug/L	1	-	-	2	8	< 2	< 2	2	< 20	<20	<2	< 20	<20	<20	3	<20	<20	<10	4	<2	3	<1	<1	8	<1.0	<1.0	
Cobalt	ug/L	0.4	-	100	34	22	11	5	8	23	10	6	17	15	13	24	10.4	9.5	9.6	10	7	10	16	13	9	9.5	8.4	
Copper	ug/L	2	-	20	10	14	< 2	2	4	**31**	<20	9	< 20	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Iron	ug/L	50	-	3000	**3200**	**9900**	**14000**	720	1600	**18000**	**8800**	**11500**	1300	<500	2400	**7100**	**10100**	**8820**	**8690**	**15500**	**15900**	<50	**14200**	**10400**	**14200**	2700	**5100**	
Lead	ug/L	0.5	-	10	0.2	2	1.1	< 0.5	0.9	**22**	<5.0	<1	< 5	<5	<5	ND	<5.0	<5.0	<5.0	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	
Manganese	ug/L	2	-	8200	5280	3100	4300	270	1700	6900	2400	736	4300	4400	4500	4100	4070	4180	3650	4490	641	4520	4260	4270	4870	3400	1200	
Mercury	ug/L	0.026	-	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.026	<0.026	<0.026	-	-	
Molybdenum	ug/L	2	-	730	20	6	5	3	4	< 20	<20	<4	23	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Nickel	ug/L	2	-	250	80	20	15	14	28	38	26	24	77	36	30	17	32	28	27	22	15	22	35	25	16	25	25	
Selenium	ug/L	1	-	10	4	< 2	< 2	< 2	< 2	< 10	<10	3	*< 20*	*<20*	*<20*	ND	<10	<10	<10	5	<2	3	2	<1	11	<1.0	<1.0	
Silver	ug/L	0.1	-	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*< 5*	<1	*<2*	*< 5*	*<5*	*<5*	ND	<1.0	<1.0	<1.0	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Strontium	ug/L	2	-	210000	1500	2400	2500	2400	2300	3000	2900	2840	3100	2800	2500	450	2540	2460	2410	2280	823	2190	1990	2030	1970	2000	2000	
Thallium	ug/L	0.1	-	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1	<1	<0.8	< 1	<1	<1	ND	<1.0	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Tin	ug/L	2	-	-	< 2	< 2	< 2	< 2	< 2	< 20	<20	<20	< 20	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	< 20	<20	<20	ND	<20	<20	<20	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Uranium	ug/L	0.1	-	3000	2	2.8	3.9	1.8	7.6	13	7.1	4.1	75	15	9.6	0.1	9.9	12.0	11	3.3	<0.1	22.2	5.0	11.5	7.8	12	9.6	
Vanadium	ug/L	2	-	60	< 2	3	< 2	< 2	< 2	< 20	<20	3	< 20	<20	<20	ND	<20	<20	<20	5	2	3	<2	<2	3	<2.0	<2.0	
Zinc	ug/L	5	-	300	20	53	9	11	18	170	24	7	< 50	<50	<50	14	<50	<50	<50	<5	<5	<5	12	17	<5	8	<5.0	

Notes:

RDL - Reported Detection Limit (updated in 2016, except for Mercury)

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Shaded and italics indicates the detection limit exceeds NS Tier 2 PSS

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-10 **GROUNDWATER METALS CHEMISTRY - MW-22C**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL*	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	20-Mar-96	16-Apr-97	8-Apr-98	5-May-99	26-Jul-00	Aug-01	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	28-Jul-08	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	5-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	
Aluminum	ug/L	5	-	50	18	**170**	**170**	**69**	**110**	**260**	19	<20	*< 100*	<10	ND	44	5.2	<5.0	<5.0	<10	<10	<5	18	6	<5	<5.0	<5.0	
Antimony	ug/L	1	-	200	6	< 2	< 2	< 2	< 2	< 2	<2	<0.4	< 20	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Arsenic	ug/L	1	-	50	< 20	2	< 2	2	2	3	2	2	32	2	ND	ND	<2.0	2.2	<2.0	2	<2	<2	<2	<2	2	62	1.3	
Barium	ug/L	1	-	10000	6	13	6	5	61	19	11	12	1900	8	6.7	9	10.9	8.5	7.5	7	5	6	25	8	7	710	8.8	
Beryllium	ug/L	1	-	53	< 5	< 5	< 5	< 5	< 5	< 5	<5	<0.5	< 20	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	< 20	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Boron	ug/L	50	-	12000	10	12	9	12	21	< 20	12	<100	1200	9	8.9	9	13.5	9.9	9.4	10	10	25	48	12	17	370	<50	
Cadmium	ug/L	0.01	-	0.1	*< 0.5*	*< 0.5*	*< 0.3*	*< 0.3*	*< 0.3*	*< 0.1*	0.02	*<0.3*	*< 3*	*<0.3*	ND	**0.3**	0.019	0.027	0.025	*<0.3*	*<0.3*	<0.017	<0.017	<0.017	<0.017	<0.010	62000	
Chromium	ug/L	1	-	-	< 2	3	< 2	< 2	< 2	< 2	<2	<2	< 20	<2	ND	ND	<2.0	<2.0	2.5	<2	<2	1	<1	<1	1	<1.0	<1.0	
Cobalt	ug/L	0.4	-	100	< 1	1	1	1	1	1	0.4	<1	28	<1	ND	ND	<0.40	<0.40	<0.40	<1	<1	<1	<1	<1	<1	15	<0.40	
Copper	ug/L	2	-	20	10	15	2	4	9	14	<2	6	< 20	<2	ND	ND	<2.0	<2.0	<2.0	2	<2	<2	35	<2	<2	<2.0	<2.0	
Iron	ug/L	50	-	3000	60	210	120	120	230	250	20	110	**23000**	<50	ND	ND	109	156	145	176	135	<50	150	156	94	**41000**	230	
Lead	ug/L	0.5	-	10	0.1	1.1	0.6	0.7	0.5	1.2	<0.5	<1	< 5	<0.5	ND	ND	<0.50	<0.50	<0.50	1.5	<0.5	<0.5	2	<0.5	<0.5	<0.50	<0.50	
Manganese	ug/L	2	-	8200	40	41	15	15	93	94	100	83	3800	24	ND	46	62.4	54.2	51.4	47	47	10	51	44	43	3300	57	
Mercury	ug/L	0.026	-	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.087	<0.026	<0.026	-	-	
Molybdenum	ug/L	2	-	730	< 2	< 2	< 2	< 2	< 2	< 2	<2	<4	< 20	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Nickel	ug/L	2	-	250	< 2	2	< 2	< 2	2	2	<2	<3	35	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	3	<2	<2	12	<2.0	
Selenium	ug/L	1	-	10	< 2	< 2	< 2	< 2	< 2	< 1	<1	<1	< 20	<2	ND	ND	<1.0	<1.0	<1.0	<2	<2	<1	<1	<1	2	<1.0	<1.0	
Silver	ug/L	0.1	-	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<2	*< 5*	<0.5	ND	ND	<0.10	<0.10	<0.10	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Strontium	ug/L	2	-	210000	130	150	230	270	330	460	380	429	850	400	400	470	534	589	630	580	753	721	740	697	786	280	12000	
Thallium	ug/L	0.1	-	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.8	< 1	<0.1	ND	ND	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	870	
Tin	ug/L	2	-	-	< 2	< 2	< 2	< 2	< 2	< 2	<2	<20	< 20	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<0.10	
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	< 20	<2	ND	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Uranium	ug/L	0.1	-	3000	1.5	5.1	8.3	7.2	8.7	12	40	20.8	< 1	8.6	28	24	19.4	18.7	23.8	17	25.2	26.5	27.4	33.6	34.7	<0.10	<2.0	
Vanadium	ug/L	2	-	60	< 2	2	< 2	< 2	< 2	6	4	3	< 20	<2	6.4	ND	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	34	
Zinc	ug/L	5	-	300	< 10	37	5	22	18	13	6	7	< 50	<5	ND	5	50.8	10.8	<5.0	<5	<5	<5	29	6	<5	<5.0	<2.0	

Notes:

RDL - Reported Detection Limit (updated in 2016, except for Mercury)

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Shaded and italics indicates the detection limit exceeds NS Tier 2 PSS

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-11 GROUNDWATER METALS CHEMISTRY - MW-25B
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL*	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	19-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Aug-01 Duplicate	Sept-02	19-Aug-03	25-Aug-04	18-Aug-05	23-Nov-06	16-Aug-07	16-Aug-07 Dup A	28-Jul-08	10-Aug-09	28-Jul-10	21-Sep-11	4-Oct-12	8-Jul-13	19-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	
Aluminum	ug/L	5	-	50	7	22	**160**	39	50	**450**	26	19	<20	< 10	<10	ND	ND	6.3	**98.4**	<5.0	<5.0	<10	<10	<5	15	9	<5	<5.0	<5.0	
Antimony	ug/L	1	-	200	2	< 2	< 2	< 2	< 2	< 2	<2	<2	<0.4	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Arsenic	ug/L	1	-	50	< 2	2	2	< 2	2	2	2	2	1.5	< 2	<2	ND	3	2	<2.0	<2.0	2.8	5	<2	3	3	5	8	3.6	1.9	
Barium	ug/L	1	-	10000	12	23	5	11	16	11	6	5	5.3	24	13	7.2	42	22.1	<5.0	11.3	12.7	29	<5	27	14	77	35	27	7.6	
Beryllium	ug/L	1	-	53	< 5	< 5	< 5	< 5	< 5	< 5	<5	<5	<0.5	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Boron	ug/L	50	-	12000	14	11	10	12	18	7	7	6	<100	63	41	21	140	93.4	11.8	44.0	78.9	186	18	170	100	162	165	160	56	
Cadmium	ug/L	0.01	-	0.1	*< 0.5*	*< 0.5*	*< 0.3*	*< 0.3*	*< 0.3*	0.1	0.03	0.03	*<0.3*	*< 0.3*	*<0.3*	ND	ND	0.029	<0.017	<0.017	0.065	*<0.3*	1	**0.512**	**0.449**	<0.017	0.02	0.021	0.019	
Chromium	ug/L	1	-	-	2	< 2	< 2	< 2	2	< 2	<2	<2	<2	< 2	<2	ND	2	<2.0	<2.0	<2.0	<1.0	3	<2	3	<1	<1	4	<1.0	<1.0	
Cobalt	ug/L	0.4	-	100	< 0.1	< 1	1	1	< 1	< 1	<0.4	<0.4	<1	< 1	<1	ND	ND	0.5	<0.40	<0.40	<0.40	<1	<1	<1	<1	2	1	0.84	<0.40	
Copper	ug/L	2	-	20	< 10	6	< 2	4	2	**21**	9	6	5	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Iron	ug/L	50	-	3000	30	18	130	57	80	200	<20	<20	<100	< 50	<50	ND	ND	<50	57	<50	<50	<50	<50	<50	<50	3270	83	<50	<50	
Lead	ug/L	0.5	-	10	0.1	0.4	0.4	< 0.5	< 0.5	1.4	<0.5	<0.5	<1	< 0.5	<0.5	ND	ND	<0.50	<0.50	<0.50	<0.50	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	
Manganese	ug/L	2	-	8200	150	3	16	7	56	32	34	32	7	30	17	19	140	86.2	10.3	60.4	35.8	250	8	283	<2	1410	435	300	11	
Mercury	ug/L	0.026	-	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.026	<0.026	<0.026	-	-	
Molybdenum	ug/L	2	-	730	35	< 2	< 2	< 2	< 2	< 2	<2	<2	<4	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Nickel	ug/L	2	-	250	8	< 2	< 2	< 2	< 2	2	<2	<2	<3	3	2	ND	8	7.2	<2.0	3.8	6	10	<2	8	10	11	9	11	6600	
Selenium	ug/L	1	-	10	< 2	< 2	< 2	< 2	< 2	< 1	<1	<1	<1	< 2	<2	ND	ND	<1.0	<1.0	<1.0	<1.0	4	<2	2	<1	<1	10	<1.0	<1.0	
Silver	ug/L	0.1	-	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.1	<0.1	<2	< 0.5	<0.5	ND	ND	<0.1	<0.10	<0.10	<0.10	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Strontium	ug/L	2	-	210000	240	140	150	370	180	190	170	160	230	1100	780	440	1500	1310	23.2	632	1180	1510	262	1030	917	1520	1480	1600	880	
Thallium	ug/L	0.1	-	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.8	< 0.1	<0.1	ND	ND	<0.1	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Tin	ug/L	2	-	-	< 2	< 2	< 2	< 2	< 2	< 2	<2	<2	<20	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	< 2	<2	ND	2	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Uranium	ug/L	0.1	-	3000	1	3	2.9	4.3	2.7	3	3	2.8	2.98	9.8	5.9	4.6	15	13	<0.10	4.40	10.6	18.2	3.1	9.5	9.6	14	15.9	17	9.8	
Vanadium	ug/L	2	-	60	< 2	2	2	< 2	2	2	<2	<2	<2	< 2	<2	ND	ND	<2.0	<2.0	<2.0	<2.0	3	<2	2	<2	<2	<2	<2.0	<2.0	
Zinc	ug/L	5	-	300	< 10	18	5	11	6	14	7	6	4	5	<5	ND	ND	12.5	<5.0	23.3	<5.0	<5	8	6	10	6	<5	<5.0	<5.0	

Notes:

RDL - Reported Detection Limit (updated in 2016, except for Mercury)

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Shaded and italics indicates the detection limit exceeds NS Tier 2 PSS

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-12 GROUNDWATER METALS CHEMISTRY - TH-1
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL*	NS Tier 1 EQS	NS Tier 2 PSS	Sep-93	19-Mar-96	16-Apr-97	6-Apr-98	5-May-99	26-Jul-00	Aug-01	Sept-02	19-Aug-03	25-Aug-04	25-Aug-04 Lab DUP	18-Aug-05	23-Nov-06	16-Aug-07	28-Jul-08	28-Jul-08 Dup-B	10-Aug-09	27-Jul-10	21-Sep-11	4-Oct-12	4-Jul-13	20-Aug-14	22-Jul-15	14-Jul-16	19-Jul-17	
Aluminum	ug/L	5	-	50	5	**70**	< 10	< 10	< 10	**130**	<50	<20	< 10	*<100*	*<100*	ND	ND	<5.0	<5.0	<5.0	<5.0	<10	<10	<5	37	5	<5	<5.0	<5.0	
Antimony	ug/L	1	-	200	4	< 2	< 2	< 2	< 2	< 20	<20	<0.4	< 2	<20	<20	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Arsenic	ug/L	1	-	50	43	26	34	8	27	27	30	22.6	10	<20	<20	11	4	35.9	49.7	43.1	36	35	25	10	28	33	21	26	24	
Barium	ug/L	1	-	10000	3800	3300	3400	2800	2800	3100	3100	2460	2000	1600	1700	1400	1200	1500	1400	1400	1370	1030	1210	1090	1030	1170	1130	1000	970	
Beryllium	ug/L	1	-	53	< 5	< 5	< 5	< 5	< 5	< 50	<50	<0.5	< 2	<20	<20	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<1.0	<1.0	
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	< 2	<20	<20	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Boron	ug/L	50	-	12000	1200	1000	950	1000	920	900	870	650	610	630	670	500	450	351	344	350	323	363	254	365	2210	244	240	220	210	
Cadmium	ug/L	0.01	-	0.1	**0.5**	**1**	*< 0.3*	*< 0.3*	*< 0.3*	*< 1*	0.1	*<0.3*	*< 0.3*	*<3*	*<3*	ND	ND	<0.017	0.059	0.047	0.089	<0.3	**1**	<0.017	<0.017	<0.017	0.023	<0.010	<0.010	
Chromium	ug/L	1	-	-	7	5	5	4	7	< 20	<20	<2	3	<20	<20	3.3	3	<2.0	3.4	2.2	1.7	<2	<2	1	7	<1	1	<1.0	<1.0	
Cobalt	ug/L	0.4	-	100	21	17	18	14	14	12	16	10	16	12	13	9.9	16	7.89	11.2	10.7	8.29	4	5	4	6	6	4	6.3	4.1	
Copper	ug/L	2	-	20	< 10	7	< 2	2	< 2	< 20	<20	15	< 2	<20	<20	ND	ND	<2.0	4.1	2.1	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Iron	ug/L	50	-	3000	**25300**	**13000**	**23000**	120	**13000**	**23000**	**26000**	**15200**	80	<500	<500	1700	78	**14100**	**12100**	**11900**	**11600**	**8630**	**9710**	<50	**11800**	**10400**	**14000**	**12000**	**13000**	
Lead	ug/L	0.5	-	10	0.3	1	0.2	< 0.5	< 0.5	< 5	<5	<1	< 0.5	<5	<5	ND	ND	<0.50	<0.50	<0.50	<0.50	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	
Manganese	ug/L	2	-	8200	1740	1400	1600	1400	1300	1500	1500	1280	1100	990	1000	950	750	855	774	759	841	774	1030	1000	913	914	1200	1100	990	
Mercury	ug/L	0.026	-	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.026	<0.026	<0.026	-	-	
Molybdenum	ug/L	2	-	730	2	2	2	< 2	< 2	< 20	<20	<4	2	<20	<20	ND	4	<2.0	4.9	4.8	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Nickel	ug/L	2	-	250	41	29	33	21	18	< 20	21	16	25	<20	<20	15	25	10.8	21.8	20.3	8.9	6	5	5	9	5	4	6.5	4.7	
Selenium	ug/L	1	-	10	< 2	< 2	< 2	< 2	< 2	< 10	<10	2	< 2	<20	<20	ND	ND	<1.0	<1.0	<1.0	<1.0	<2	<2	1	<1	<1	4	<1.0	<1.0	
Silver	ug/L	0.1	-	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	<1	<2	< 0.5	<5	<5	ND	ND	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Strontium	ug/L	2	-	210000	920	790	840	800	770	860	840	873	690	570	590	520	470	439	429	415	425	430	434	413	384	376	400	400	380	
Thallium	ug/L	0.1	-	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1	<1	<0.8	< 0.1	<1	<1	ND	ND	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Tin	ug/L	2	-	-	3	3	2	2	2	< 20	<20	<20	2	<20	<20	ND	3	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	< 2	<20	<20	ND	ND	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2.0	
Uranium	ug/L	0.1	-	3000	0.5	1	0.4	0.2	0.2	< 1	<1	0.18	0.2	<1	<1	0.1	0.5	<0.10	0.15	0.13	<0.10	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	
Vanadium	ug/L	2	-	60	2	2	3	< 2	< 2	< 20	<20	4	< 2	<20	<20	ND	ND	<2.0	<2.0	<2.0	<2.0	3	3	<2	<2	<2	<2	<2.0	<2.0	
Zinc	ug/L	5	-	300	180	44	12	6	9	27	<20	7	7	<50	<50	ND	ND	27.6	6.4	17.6	<5.0	8	<5	6	15	<5	<5	<5.0	<5.0	

Notes:

RDL - Reported Detection Limit (updated in 2016, except for Mercury)

Bold indicates exceedance of NS Tier 1 EQS

Bold and shaded indicates exceedance of NS Tier 2 EQS

Shaded and italics indicates the detection limit exceeds NS Tier 2 PSS

NS Tier 1 EQS = Nova Scotia Tier 1 EQS for groundwater, commercial/industrial, non-potable, coarde grained (NSE 2013a)

NS Tier 2 PSS = Nova Scotia Tier 2 Pathway Specific Standard for groundwater >10 m from fresh surface water (NSE 2013b)

TABLE C-13 **Surface Water Inorganic Chemistry and Metals - SW-3**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	DL	Tier 1 EQS Fresh Water	CCME-FAL	May-96	Sept.-96	Nov.-96	May-97	Oct.-97	Sept.-98	Jul-00	Jul-00 Dup	Aug.-01	Sept.-02	Aug 19/03	25-Aug-04	14-Jan-06	23-Nov-06	1-Aug-07	12-Aug-09	Jul-13	Jul-17	Jul-17 Lab-Dup	Jul-18
Alkalinity (as CaCO3)	mg/L	5	-	-	36	6	38	38	53	56	63	61	60	52	57	60	27	46	180	210		65	N/A	66
Ammonia (as N)	mg/L	0.05	-	2.22 (3)	<0.05	< 0.05	0.05	< 0.05	0.07	0.09	0.07	0.07	0.17	<0.1	0.08	<0.05	0.09	0.13	13	6.1		0.10	N/A	0.15
Anion Sum	me/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.38	1.52	2.19	5.59	5.69		2.79	N/A	2.84
Bicarbonate (as CaCO3)	mg/L	1	-	-	35.9	62.9	37.9	37.9	52.9	55.7	63	61	60	51.66	57	60	27	46	179	215		64	N/A	66
Calcium	mg/L	0.1	-	-	22.8	31.4	23.4	23.1	33.4	31.9	32.2	32.9	29.8	30.9	30.3	39.5	18	29	99	50		32000	N/A	33
Carbonate (as CaCO3)	mg/L	1	-	-	<0.1	< 1	< 1	< 1	0.1	0.3	< 1	< 1	<1	0.31	< 1	<1	ND	ND	<1	<1		<1.0	N/A	<1.0
Cation Sum	me/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5	1.61	2.35	18.6	8.27		2.60	N/A	2.75
Chloride	mg/L	1	-	120	19	31.2	19.2	18.4	49.6	54	29.6	29.6	37.4	32.7	30	43	21	25	71	50		32	N/A	36
Color	TCU	5	-	(1)	33	20	28	33	20	11	14	14	9	68	22	9	23	19	9	72		13	N/A	13
Conductivity (RCAp)	uS/cm	1	-	-	187	267	203	199	377	375	274	274	284	291	283	388	160	220	590	510		270	N/A	300
Dissolved Organic Carbon	mg/L	-	-	-	5.8		3.9	4.6	1.3	2.8	3	3.2	1.9	8.6		2.2	-	-		-		-	-	-
Hardness (as CaCO3)	mg/L	-	-	-	68.5	92.4	70.8	69.2	102	99.4	95.6	97.4	90.1	90.83	91.3	116	54	88	340	160		94	N/A	96
Ion Balance	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.67	2.94	3.37	53.8	18.5		3.53	N/A	1.61
Langelier Index (@ 20C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.38	-1.87	-0.824	-0.411	-0.555		-0.424	N/A	-0.575
Langelier Index (@ 4C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.78	-2.12	-1.08	-0.658	-0.804		-0.674	N/A	-0.826
Magnesium	mg/L	0.1	-	-	2.8	3.4	3	2.8	4.5	4.8	3.7	3.7	3.8	3.32	3.8	4.1	2.5	3.7	22	7.5		3.5	N/A	3.7
Nitrate	mg/L	0.05	-	13	-	-	-	-	-	-	-	-	-	-	-	1.84	1.6	2.0		<0.05		0.012	N/A	1.7
Nitrate + Nitrite (as N)	mg/L	0.05	-	-	1.68	1.78	1.6	1.16	1.87	0.5	1.4	1.38	1.93	2.08	1.9	1.9	1.6	2.0	0.05	0.05		2.0	N/A	1.7
Nitrite	mg/L	0.01	-	0.06	-	-	-	-	-	-	-	-	-	-	-	0.06	ND	0.02		0.01		2.0	N/A	0.016
Orthophosphate	mg/L	0.01	-	-	0.04	0.11	0.05	0.04	0.06	0.12	0.06	0.06	0.04	<0.3	0.09	0.18	0.04	0.07	<0.01	0.01		0.013	N/A	0..36
pH	-	-	-	(6.5-9.0)	7.3	7.3	7.2	7.5	7.4	7.7	7.7	7.5	7.9	7.8	7.6	7.7	6.79	7.41	6.84	6.86		7.64	N/A	7.47
Phosphorus	mg/L	0.2	-	(4)	-	-	-	-	-	-	-	-	-	-	-	0.2	<0.1	0.2		1.5		<0.100	N/A	0.110
Potassium	mg/L	0.1	-	-	1.6	2.5	1.9	1.6	3.3	3.5	1.9	1.9	2.2	2.9	2.8	3.4	1.9	2.3	25	15		1.9	N/A	2.2
Reactive Silica (as SiO2)	mg/L	0.5	-	-	5.2	7.3	8.9	4.2	5.4	7.4	4.1	4.1	5.1	9	10	5.8	6.4	9.5	23	18		6.6	N/A	4.8
Saturation pH (@ 20C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.08	8.66	8.23	7.25	7.42		8.06	N/A	8.04
Saturation pH (@ 4C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.48	8.91	8.49	7.5	7.66		8.31	N/A	8.29
Sodium	mg/L	0.1	-	-	9.8	14.1	9.6	-	-	-	-	-	-	-	-	25.2	11	11	35	35		15	N/A	17
Sulphate	mg/L	2	-	-	19	21	24	17	30	24	20	20	19	28.4	19	40	13	20	<2	<2		21	N/A	18
TDS (Calculated)	mg/L	1	-	-	-	-	-	-	-	-	149	149	159	153.8	155	205	97	139	652	395		160	N/A	160
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-		4.8	3.4	59	27		2.7	N/A	2.6
Turbidity	NTU	0.1	-	(2)	3.9	1.9	1	1.4	4	1.9	< 0.1	< 0.1	1.9	12	4.3	2.3	14	5.6	740	580		26	30	2.9
			-																					
Aluminum	ug/L	10	5	100 (5)	**100**	**97**	**110**	**38**	**253**	**500**	**10**	**10**	**26**	**110**	**10**	**10**	**130**	**240**	**38800**	**1360**	**210**	**120**	N/A	**140**
Antimony	ug/L	2	20	-	<2	< 2	< 2	< 2	-	< 20	< 2	< 2	<2	<0.4	< 2	<2	ND	ND	<20	<2.0	<2	<1.0	N/A	<1.0
Arsenic	ug/L	2	5	5	<2	2	< 2	< 2	-	**< 20**	< 2	< 2	<2	1.8	2	2	ND	ND	**359**	**105**	<2	1.5	N/A	1.6
Barium	ug/L	5	1000	-	24	37	**3000**	19	39	< 50	33	32	43	55.1	32	38	24	31	**2870**	**1070**	31	31	N/A	35
Beryllium	ug/L	2	5.3	-	<5	< 5	< 5	< 5	< 5	**< 50**	< 5	< 5	<5	<0.5	< 2	<2	ND	ND	**<20**	<2.0	<2	<1.0	N/A	<1.0
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	-	< 2	<2	ND	ND	<20	<2.0	<2	<2.0	N/A	<2.0
Boron	ug/L	5	1200	1500	10	18	10	8	20	< 50	15	15	18	<100	16	21	11	13	179	135	20	<50	N/A	<50
Cadmium	ug/L	0.3	0.01	0.09	**<0.3**	**< 0.3**	**< 0.3**	**< 0.3**	**< 5**	**< 3**	**< 0.1**	**< 0.1**	**0.02**	**<0.3**	**< 0.3**	**<0.3**	ND	ND	**2.05**	**0.380**	**0.018**	<0.010	N/A	<0.010
Chromium	ug/L	2	-	8.9	<2	< 2	< 2	< 2	< 5	< 20	< 2	< 2	<2	<2	< 2	<2	ND	ND	47	2.1	<1	<1.0	N/A	<1.0
Cobalt	ug/L	1	10	-	<1	< 1	< 1	< 1	< 5	< 10	< 1	< 1	<0.4	<1	< 1	<1	ND	ND	**20.2**	1.91	<1	<0.40	N/A	<0.40
Copper	ug/L	2	2	(6)	<2	< 2	< 2	< 2	**< 10**	**< 20**	< 2	< 2	<2	**4**	< 2	<2	ND	ND	**123**	**6.2**	**3**	<2.0	N/A	<2.0
Iron	ug/L	50	300	300	**340**	**500**	**280**	**320**	**340**	**1100**	**320**	**330**	**440**	**810**	**590**	150	190	**670**	**235000**	**78700**	**830**	**560**	N/A	**600**
Lead	ug/L	0.5	1	(6)	0.2	0.5	0.5	0.3	**< 2.5**	**< 5**	< 0.5	< 0.5	<0.5	<1	< 0.5	<0.5	ND	ND	**76.7**	**3.78**	<0.5	<0.50	N/A	<0.50
Manganese	ug/L	2	820	-	40	110	39	33	130	120	60	59	160	238	290	51	14	87	**7700**	**4860**	130	120	N/A	140
Molybdenum	ug/L	2	73	73	<2	< 2	< 2	< 2	< 10	< 20	< 2	< 2	3	<4	< 2	<2	ND	ND	<20	<2.0	<2	-	-	<2.0
Nickel	ug/L	2	25	25-150 (6)	<2	< 2	< 2	< 2	< 10	< 20	< 2	< 2	<2	<3	< 2	<2	ND	ND	**49**	3.3	<2	<2.0	N/A	<2.0
Selenium	ug/L	2	1	1	**<2**	**< 2**	**< 2**	**< 2**		**< 20**	< 1	< 1	<1	<1	**< 2**	**<2**	ND	ND	**<10**	<1.0	<1	<1.0	N/A	<1.0
Silver	ug/L	0.5	0.1	0.25	**<0.5**	**< 0.5**	**< 0.5**	**< 0.5**	**< 3**	**< 5**	**< 0.5**	**< 0.5**	**<0.1**	**<2**	**< 0.5**	**<0.5**	ND	ND	<1.0	<0.10	<0.1	<0.10	N/A	<0.10
Strontium	ug/L	5	21000	-	68	0.1	77	71	-	130	120	120	100	160	110	170	58	91	415	257	104	120	N/A	120
Thallium	ug/L	0.1	0.8	0.8	<0.1	< 0.1	< 0.1	< 0.1	-	< 1	< 0.1	< 0.1	<0.1	<0.8	< 0.1	<0.1	ND	ND	<1.0	<0.10	<0.1	<0.10	N/A	<0.10
Tin	ug/L	2	-	-	<2	< 2	< 2	< 2	< 50	< 20	< 2	< 2	<2	<20	< 2	<2	ND	ND	<20	<2.0	<2	<2.0	N/A	<2.0
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	-	< 2	<2	5	7	146	25.7	7	3.3	N/A	6.0
Uranium	ug/L	0.1	300	15	0.5	0.7	0.5	0.5	-	< 1	0.6	0.6	0.8	0.62	0.5	1	0.2	0.8	4.4	0.28	0.7	1.0	N/A	1.0
Vanadium	ug/L	2	6	-	<2	< 2	< 2	< 2	**< 10**	**< 20**	< 2	< 2	<2	<2	< 2	<2	ND	ND	**139**	**8.5**	<2	<2.0	N/A	<2.0
Zinc	ug/L	5	30	30	5	12	15	21	< 10	< 20	6	4	24	8	< 5	<5	8	5	**395**	**36.3**	8	<5.0	N/A	<5.0
Hydroxide	mg/L	5	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-
Fluoride	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	-	-	-

Notes:
RDL – Reported Detection Limit
CCME FWAL = Canadian Council of Ministers of the Environment – Freshwater Aquatic Life Long Term Exposure
Tier 1 EQS = Tier 1 Environmental Quality Standards For Surface Water. From Nova Scotia's Contaminated Sites Regulations (July 2013) Notification of Contamination Protocol, Table 3; Fresh Water
Grey indicates exceedance in CCME FWAL
Bold = indicates value exceeds the Tier 1 EQS
#[#]: Reporting limit increased due to turbidity

(1) The mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
(2) High flow or turbid waters: Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.
(3) For ph of 7.5 and temperature of 15.
(4) Refer to CCME Fact Sheet - Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems
(5) Guideline value dependent on pH. Value given is for pH ≥ 6.5
(6) Guidelines requiring equations were calculated by the CCME website, using water hardness values to determine guidelines

TABLE C-14 **Surface Water Inorganic Chemistry and Metals - SW-7**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	Tier 1 EQS Fresh Water	CCME-FAL	May-93	Aug-93	Nov-93	May-96	Sep-96	Nov-96	May-97	Oct.-97	Sept.-98	Jul-00	Aug.-01	Sept.-02	Aug 19/03	Aug 19/03 Lab Dup	25-Aug-04	18-Aug-05	14-Jan-06	23-Nov-06	1-Aug-07	29-Jul-08
Alkalinity (as CaCO3)	mg/L	5	-	-	76	85	66	48	84	58	66	87	74	81	111	89	110	120	88	93	54	68	72	72
Ammonia (as N)	mg/L	0.03	-	2.22 (3)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.59	1.66	<0.1	2.8	2.8	2.5	2.5	1.3	1.8	1.9	1.4
Anion Sum	me/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.44	2.58	1.85	2.03	2.05	2.11
Bicarbonate (as CaCO3)	mg/L	5	-	-	75.9	84.8	65.9	47.9	83.7	57.9	65.7	85.9	73.9	81	110	88.44	109	119	88	93.1	54	68	72	72
Calcium	mg/L	0.1	-	-	25	30.9	24.3	20	28.7	24.7	23	27.3	22.9	26.6	34.7	26.7	32.3	32.8	25.2	28	18	23	23	23
Carbonate (as CaCO3)	mg/L	10	-	-	0.11	0.2	0.1	< 0.1	< 1	< 1	< 1	1	0.1	< 1	1	0.52	< 1	< 1	<1	ND	ND	ND	<1	<1
Cation Sum	me/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.39	2.55	1.91	2.08	2.17	2.08
Chloride	mg/L	1	-	120	20.1	20.2	18.2	20.9	22.3	21.9	24.5	23.5	22.2	21.1	28.3	21.9	30	32	21	23	24	20	19	21
Color	TCU	5	-	(1)	64	29	24	31	30	53	58	30	22	20	27	54	59	58	27	22	31	20	12	19
Conductivity (RCAp)	uS/cm	1	-	-	233	229	186	177	226	210	215	250	220	233	306	252	349	348	244	250	180	200	210	220
Dissolved Organic Carbon	mg/L	0.5	-	-	17	4.1	3.8	4.4	-	3.6	5.2	1.3	2.8	2.5	2	2.8	-	-	1.1	-	-	-	-	-
Hardness (as CaCO3)	mg/L	-	-	-	76.8	91.6	71.8	59	83.6	72.8	68.1	80.5	67.5	77.5	102	76.68	97.1	98.4	74.9	82	56	68	69	69
Ion Balance	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.02	0.662	1.65	1.27	2.84	0.720
Langelier Index (@ 20C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.9	-0.846	-1.5	-0.794	-0.731	-0.593
Langelier Index (@ 4C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-1.3	-1.1	-1.75	-1.05	-0.982	-0.844
Magnesium	mg/L	0.1	-	-	3.5	3.5	2.7	2.2	2.9	2.7	2.6	3	2.5	2.7	3.8	2.43	4	4	2.9	3.3	2.5	2.7	2.6	2.7
Nitrate	mg/L	0.05	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.14	0.11	0.19	-	-
Nitrate + Nitrite (as N)	mg/L	0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.06	0.18	0.16	0.1	0.14	0.11	0.19	0.15	0.17
Nitrite	mg/L	0.05	-	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	ND	ND	ND	-	-
Orthophosphate	mg/L	0.01	-	-	< 0.01	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	<0.01	<0.3	0.01	0.01	<0.01	0.01	ND	0.01	0.01	0.01
pH	-	-	-	(6.5-9.0)	7.2	7.4	7.2	7.1	7.5	7	7.6	8.1	7.3	7.6	8.1	7.8	7.7	7.8	7.2	7.1	6.85	7.37	7.4	7.54
Phosphorus	mg/L	0.02	-	(4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	ND	-	-
Potassium	mg/L	0.1	-	-	1.1	1	1	1	1.2	1.3	1.4	1.3	1.4	1.5	1.8	1.7	2.8	2.8	2.4	2.5	2	2.5	2.4	2.2
Reactive Silica (as SiO2)	mg/L	0.5	-	-	7.9	10.5	10.3	7.8	11.5	10	8.5	12	10.9	10.8	11.9	12	11	12	12	12	8.8	11	12	12
Saturation pH (@ 20C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.1	7.95	8.35	8.16	8.13	8.13
Saturation pH (@ 4C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	8.2	8.6	8.42	8.38	8.38
Sodium	mg/L	0.1	-	-	11.5	9.5	9.2	12.5	12.6	14	17	16.5	14.4	14.5	18.2	12.1	21.4	21.7	15.1	14	14	11	13	12
Sulphate	mg/L	2	-	-	< 2	< 2	4	8	6	10	< 2	5	< 2	6	4	4	10	< 5	4	3.4	4	4	3	3
TDS (Calculated)	mg/L	1	-	-	-	-	-	-	-	-	-	-	-	133	172	134.29	182	187	139	149	110	120	123	123
Total Organic Carbon (C)	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	4.6	1.9	1.6	2.1
Turbidity	NTU	0.1	-	(2)	1.66	2.95	1.23	1.4	1.3	1	1.2	2.9	1.5	1.6	7.9	**13**	5	5.7	3.7	3.4	2.2	1.2	1.6	2
	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	ug/L	5	5	100 (5)	**28**	< 5	**14**	**22**	**27**	**31**	**40**	**< 25**	**< 50**	**10**	**6**	**20**	**10**	**30**	**<10**	**19**	**27**	**13**	**8.4**	**10.1**
Antimony	ug/L	2	20	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	< 20	< 2	<2	<0.4	< 2	< 2	<2	ND	ND	ND	<2.0	<2.0
Arsenic	ug/L	2	5	5	3	3	2	2	2	< 2	2	-	**< 20**	2	3	3.4	2	2	2	2.7	ND	ND	2.3	<2.0
Barium	ug/L	5	1000	-	180	160	**3000**	120	170	150	150	224	180	220	390	284	360	370	270	300	160	180	186	188
Beryllium	ug/L	2	5.3	-	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	**< 50**	< 5	<5	<0.5	< 2	< 2	<2	ND	ND	ND	<2.0	<2.0
Bismuth	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 2	< 2	<2	ND	ND	ND	<20	<2.0
Boron	ug/L	5	1200	1500	13	14	10	24	32	29	33	50	< 50	42	56	<100	47	46	35	26	20	19	15.5	11.9
Cadmium	ug/L	0.017	0.01	0.09	**< 0.5**	**< 0.5**	**< 0.5**	**< 0.3**	**< 0.3**	**< 0.3**	**< 0.3**	**< 5**	**< 0.5**	**< 0.1**	**<0.017**	**<0.3**	**< 0.3**	**< 0.3**	**<0.3**	ND	ND	ND	**<0.017**	**0.049**
Chromium	ug/L	1	-	8.9	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 20	< 2	<2	<2	< 2	< 2	<2	ND	ND	ND	<2.0	<2.0
Cobalt	ug/L	1	10	-	1	1	< 1	< 1	< 1	< 1	< 1	< 5	< 10	< 1	1.3	<1	2	2	1	ND	ND	ND	0.41	<0.40
Copper	ug/L	2	2	(6)	**< 10**	**< 10**	**< 10**	< 2	< 2	< 2	< 2	**< 10**	**< 20**	< 2	<2	<	< 2	< 2	<2	ND	ND	ND	<2.0	<2.0
Iron	ug/L	50	300	300	**2880**	**1650**	**1030**	**980**	**1500**	**1500**	**1700**	**2130**	**1800**	**1100**	**3100**	**2900**	**3000**	**3100**	**850**	**2200**	**860**	**1200**	**1050**	**855**
Lead	ug/L	0.5	1	(6)	0.1	< 0.1	0.1	0.2	0.1	0.3	< 0.1	**< 2.5**	**< 5**	< 0.5	<0.5	<1	< 0.5	< 0.5	<0.5	ND	ND	ND	<0.50	<0.50
Manganese	ug/L	2	820	-	**2050**	**1060**	**920**	700	**1000**	**930**	**860**	**1380**	**960**	470	**1800**	771	**5000**	**5100**	**1300**	**2000**	480	670	571	514
Molybdenum	ug/L	2	73	73	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 10	< 20	< 2	<2	<4	< 2	< 2	<2	ND	ND	ND	<2.0	<2.0
Nickel	ug/L	2	25	25-150 (6)	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 10	< 20	< 2	2	<3	2	2	<2	ND	ND	ND	<2.0	<2.0
Selenium	ug/L	1	1	1	**< 2**	**< 2**	**< 2**	**< 2**	**< 2**	**< 2**	**< 2**	-	**< 20**	< 1	<1	<1	**< 2**	**< 2**	**<2**	ND	ND	ND	<10	**<2.0**
Silver	ug/L	0.1	0.1	0.25	**< 0.5**	**< 0.5**	**< 0.5**	**< 0.5**	**< 0.5**	**< 0.5**	**< 0.5**	**< 3**	**< 5**	**< 0.5**	<0.1	**<2**	**< 0.5**	**< 0.5**	**<0.5**	ND	ND	ND	**<1.0**	<0.10
Strontium	ug/L	5	21000	-	70	74	73	43	57	48	47	-	52	56	80	80	84	84	57	66	42	45	415	51.6
Thallium	ug/L	0.1	0.8	0.8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	**< 1**	< 0.1	<0.1	<0.8	< 0.1	< 0.1	<0.1	ND	ND	ND	**<1.0**	<0.10
Tin	ug/L	2	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 50	< 20	< 2	<2	<20	< 2	< 2	<2	ND	ND	ND	<20	<2.0
Titanium	ug/L	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 2	< 2	<2	ND	ND	ND	146	<2.0
Uranium	ug/L	0.1	300	15	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 1	< 0.1	0.1	<0.15	0.1	0.1	0.1	ND	ND	ND	4.4	<0.10
Vanadium	ug/L	2	6	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	**< 10**	**< 20**	< 2	<2	<2	< 2	< 2	<2	ND	ND	ND	**139**	<2.0
Zinc	ug/L	5	30	30	10	< 10	< 10	9	9	15	< 2	< 10	< 20	4	2	5	< 5	< 5	<5	ND	11	6	**395**	9.2
Hydroxide	mg/L	5	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
RDL – Reported Detection Limit
CCME FWAL = Canadian Council of Ministers of the Environment – Freshwater Aquatic Life Long Term Exposure
Tier 1 EQS = Tier 1 Environmental Quality Standards For Surface Water. From Nova Scotia's Contaminated Sites Regulations (July 2013) Notification of Contamination Protocol, Table 3; Fresh Water
Grey indicates exceedance in CCME FWAL
Bold = indicates value exceeds the Tier 1 EQS
#[Q]: Reporting limit increased due to turbidity
(1) The mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
(2) High flow or turbid waters: Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.
(3) For ph of 7.5 and temperature of 15.
(4) Refer to CCME Fact Sheet - Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems
(5) Guideline value dependent on pH. Value given is for pH ≥ 6.5
(6) Guidelines requiring equations were calculated by the CCME website, using water hardness values to determine guidelines

TABLE C-14 Surface Water Inorganic Chemistry and Metals - SW-7
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

10-Aug-09	10-Aug-10	Jul-13	Aug-14	Jul-16	Jul-17	Jul-17 Lab-Dup	Dec-17	Jul-18	
89	66	-	-	85	71	N/A	46	63	
1.1	1.91	-	-	1.2	0.75	N/A	0.078	0.46	
2.89	2.26	-	-	2.52	71	N/A	1.1	1.80	
89	66	-	-	85	2.09	N/A	46	63	
28	19.3	-	-	25	71	N/A	14	20	
<1	<10	-	-	<1.0	<1.0	N/A	<1.0	<1.0	
2.80	2.18	-	-	2.44	1.95	N/A	1.05	1.71	
32	29	-	-	26	21	N/A	6.3	16	
69	19	-	-	46	30	N/A	53	14	
270	251	-	-	240	200	N/A	100	190	
-	4.3	-	-	-	-	-		-	
87	57.3	-	-	76	63	N/A	40	59	
1.58	1.8	-	-	-	3.47	N/A		2.56	
-1.24	-0.99	-	-	-0.790	-0.742	N/A	-1.07	-0.848	
-1.49	-1.31	-	-	-1.04	-0.993	N/A	-1.32	-1.10	
4.2	2.2	-	-	3.2	2.4	N/A	1	2	
2.1	0.48	-	-	0.16	<0.010	N/A	<0.010	0.17	
2.1	0.48	-	-	0.16	0.15	N/A	0.08	0.17	
0.02	<0.05	-	-	<0.010	0.15	N/A	0.08	<0.010	
<0.01	0.01	-	-	0.017	<0.010	N/A	0.023	0.013	
6.74	7.5	-	-	7.25	7.43	N/A	7.4	7.39	
<0.1	0.08	-	-	<0.100	<0.100	N/A	<0.100	<0.100	
3.9	2	-	-	2.7	1.9	N/A	0.67	1.8	
12	11.7	-	-	11	11	N/A	12	11	
7.98	8.49	-	-	8.04	8.18	N/A	8.51	8.24	
8.23	8.81	-	-	8.29	8.43	N/A	8.76	8.49	
16	13.4	-	-	15	12	N/A	5.2	10	
3	4	-	-	3.7	3.6	N/A	<2.0	3.6	
169	121	-	-	150	120	N/A	67	110	
27	4.8	-	-	2.9	3.2	3.5	6	2.0	
260	9.4	-	-	11	5.2	N/A	1.3	1.7	
-	-	-	-	-	-	-			
15.5	**45**	**52**	**31**	**21**	**19**	N/A	**64**	**10**	
<2.0	<2	<2	<2	<1.0	<1.0	N/A	<1.0	<1.0	
3.9	**9**	4	<2	3.1	2.2	N/A	1.4	1.2	
364	220	160	257	250	160	N/A	25	130	
<2.0	<2	<2	<2	<1.0	<1.0	N/A	<1.0	<1.0	
<2.0	<2	<2	<2	<2.0	<2.0	N/A	<2.0	<2.0	
19.6	15	9	11	<50	<50	N/A	<50	<50	
<0.017	**0.107**	**0.165**	**<0.017**	<0.010	<0.010	N/A	<0.010	<0.010	
<1.0	<1	74	<1	1.9	<1.0	N/A	<1.0	<1.0	
0.51	<1	<1	<1	1.2	0.48	N/A	<0.40	<0.40	
<2.0	<2	<2	<1	<2.0	<2.0	N/A	<2.0	<2.0	
4510	**5450**	**2680**	**1510**	**3400**	**1600**	N/A	**310**	**700**	
<0.50	0.8	<0.5	<0.5	<0.50	<0.50	N/A	<0.50	<0.50	
1330	**1670**	**1700**	**2780**	**2400**	**1800**	N/A	59	**880**	
<2.0	<2	<2	<2	<2.0	<2.0	N/A	<2.0	<2.0	
<2.0	<2	<2	<2	<2.0	<2.0	N/A	<2.0	<2.0	
<0.10	<1	<1	<1	<1.0	<1.0	N/A	<1.0	<1.0	
<0.10	<0.1	<0.1	<0.1	<0.10	<0.10	N/A	<0.10	<0.10	
80.4	57	42	70	61	47	N/A	34	42	
<0.10	<0.1	<0.1	<0.1	<0.10	<0.10	N/A	<0.10	<0.10	
<2.0	<2	<2	<2	<2.0	<2.0	N/A	<2.0	<2.0	
<2.0	<2	<2	<2	<2.0	<2.0	N/A	<2.0	<2.0	
<0.10	<0.1	<0.1	<0.1	<0.10	<0.10	N/A	<0.10	<0.10	
<2.0	<2	<2	<2	<2.0	<2.0	N/A	<2.0	<2.0	
<5.0	<5	<5	<5	<5.0	<5.0	N/A	<5.0	<5.0	
-	<5	<5	-	-	-	-	-	-	
-	<0.1	0.4	-	-	-	-	-	-	

TABLE C-15 **Surface Water Inorganic Chemistry and Metals - SW-7A**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	Tier 1 EQS Fresh Water	CCME-FAL	Jul-13	Jul-15	Jul-17	Jul-17	Jul-18	
Alkalinity (as CaCO3)	mg/L	5	-	-	5	24.1	150	290	140	
Ammonia (as N)	mg/L	0.05	-	2.22 (3)	0.03	**108**	**17**	**15**	4.4	
Anion Sum	me/L	-	-	-		3.52	3.89	6.76	3.45	
Bicarbonate (as CaCO3)	mg/L	1	-	-	5	3.13	150	290	140	
Calcium	mg/L	0.1	-	-	0.1	38.1	58	53	32	
Carbonate (as CaCO3)	mg/L	1	-	-	10	214	<1.0	<1.0	<1.0	
Cation Sum	me/L	-	-	-		<10	16.1	9.02	3.84	
Chloride	mg/L	1	-	120	1	5.11	29	35	24	
Color	TCU	5	-	(1)	5	26	<5.0	5.3	6.5	
Conductivity (RCAp)	uS/cm	1	-	-	1	325	380	650	340	
Dissolved Organic Carbon	mg/L	-	-	-	0.5	34	-	-	-	
Hardness (as CaCO3)	mg/L	-	-	-		112	200	180	100	
Ion Balance	%	-	-	-		3.2	61.1	14.3	5.35	
Langelier Index (@ 20C)	-	-	-	-		-0.73	-0.442	-0.318	-0.506	
Langelier Index (@ 4C)	-	-	-	-		-1.05	-0.689	-0.566	-0.755	
Magnesium	mg/L	0.1	-	-	0.1	4.2	15	12	6.1	
Nitrate	mg/L	0.05	-	13	0.05	0.09	<0.010	<0.050	0.14	
Nitrate + Nitrite (as N)	mg/L	0.05	-	-	0.05	0.09	0.28	<0.050	0.14	
Nitrite	mg/L	0.01	-	0.06	0.05	<0.05	0.28	<0.010	<0.010	
Orthophosphate	mg/L	0.01	-	-	0.01	<0.01	<0.010	<0.010	<0.010	
pH	-	-	-	(6.5-9.0)		7.28	7.10	6.95	7.25	
Phosphorus	mg/L	0.2	-	(4)	0.02	0.23	4.3	0.89	<100	
Potassium	mg/L	0.1	-	-	0.1	5.3	24	21	8000	
Reactive Silica (as SiO2)	mg/L	0.5	-	-	0.5	9.5	12	17	12	
Saturation pH (@ 20C)	-	-	-	-		8.01	7.54	7.27	7.76	
Saturation pH (@ 4C)	-	-	-	-		8.33	7.79	7.51	8.01	
Sodium	mg/L	0.1	-	-	0.1	28	32	31	17	
Sulphate	mg/L	2	-	-	2	<2	2.8	<2.0	2.8	
TDS (Calculated)	mg/L	1	-	-	1	108	540	430	210	
Total Organic Carbon (C)	mg/L	0.5	-	-	0.5	3	76	20[a]	7.0	
Turbidity	NTU	0.1	-	(2)	0.1	98.3	>1000	330	400	
			-							
Aluminum	ug/L	10	5	100 (5)	5	**48**	**1800**	**210**	**5.8**	
Antimony	ug/L	2	20	-	2	<2	<1.0	<1.0	<1.0	
Arsenic	ug/L	2	5	5	2	**41**	**720**	**160**	**17**	
Barium	ug/L	5	1000	-	5	578	**3000**	**1100**	**480**	
Beryllium	ug/L	2	5.3	-	2	<2	<1.0	<1.0	<1.0	
Bismuth	ug/L	2	-	-	2	<2	<2.0	<2.0	<2.0	
Boron	ug/L	5	1200	1500	5	82	250	220	80	
Cadmium	ug/L	0.3	0.01	0.09	0.017	<0.017	**0.10**	0.013	<0.010	
Chromium	ug/L	2	-	8.9	1	<1	9.7	2.5	<1.0	
Cobalt	ug/L	1	10	-	1	2	**35**	**10**	2.7	
Copper	ug/L	2	2	(6)	2	<1	**6.4**	<2.0	<2.0	
Iron	ug/L	50	300	300	50	**31700**	**250000**	**68000**	**14000**	
Lead	ug/L	0.5	1	(6)	0.5	<0.5	**5.4**	0.82	<0.50	
Manganese	ug/L	2	820	-	2	3270	5700	3100	2000	
Molybdenum	ug/L	2	73	73	2	<2	-	<2.0	<2.0	
Nickel	ug/L	2	25	25-150 (6)	2	<2	**25**	6	<2.0	
Selenium	ug/L	2	1	1	1	**1**	<1.0	<1.0	<1.0	
Silver	ug/L	0.5	0.1	0.25	0.1	<0.1	<0.10	<0.10	<0.10	
Strontium	ug/L	5	21000	-	5	131	390	310	140	
Thallium	ug/L	0.1	0.8	0.8	0.1	<0.1	<0.10	<0.10	<0.10	
Tin	ug/L	2	-	-	2	<2	<2.0	<2.0	<2.0	
Titanium	ug/L	2	-	-	2	<2	39	4.4	<2.0	
Uranium	ug/L	0.1	300	15	0.1	0.1	0.29	<0.10	<0.10	
Vanadium	ug/L	2	6	-	2	<2	**20**	2.4	<2.0	
Zinc	ug/L	5	30	30	5	<5	19	<5.0	<5.0	
Mercury	ug/L	0.013	0.026	0.12	-	**0.027**	-	-	-	
Fluoride	mg/L	5	-	-	-	<0.1	-	-	-	
Hydroxide	mg/L	0.1	-	-	-	<5	-	-	-	

Notes:

RDL – Reported Detection Limit
CCME FWAL = Canadian Council of Ministers of the Environment – Freshwater Aquatic Life Long Term Exposure
Tier 1 EQS = Tier 1 Environmental Quality Standards For Surface Water. From Nova Scotia's Contaminated Sites Regulations (July 2013) Notification of Contamination Protocol, Table 3; Fresh Water
Grey indicates exceedance in CCME FWAL
Bold = indicates value exceeds the Tier 1 EQS
#[a]: Reporting limit increased due to turbidity

(1) The mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
(2) High flow or turbid waters: Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.
(3) For ph of 7.5 and temperature of 15.
(4) Refer to CCME Fact Sheet - Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems
(5) Guideline value dependent on pH. Value given is for pH ≥ 6.5
(6) Guidelines requiring equations were calculated by the CCME website, using water hardness values to determine guidelines

TABLE C-16 **Surface Water Inorganic Chemistry and Metals - SW-A**
Municipality of the County of Kings
Meadowview Landfill, Kentville, NS
Stantec Consulting Ltd. Project No. 121414186

Compound	Units	RDL	Tier 1 EQS Fresh Water	CCME-FAL	Jul-18			
Alkalinity (as CaCO3)	mg/L	5	-	-	61			
Ammonia (as N)	mg/L	0.05	-	2.22 (3)	0.055			
Anion Sum	me/L	-	-	-	2.68			
Bicarbonate (as CaCO3)	mg/L	1	-	-	<1.0			
Calcium	mg/L	0.1	-	-	30			
Carbonate (as CaCO3)	mg/L	1	-	-	<1.0			
Cation Sum	me/L	-	-	-	2.49			
Chloride	mg/L	1	-	120	34			
Color	TCU	5	-	(1)	10			
Conductivity (RCAp)	uS/cm	1	-	-	280			
Dissolved Organic Carbon	mg/L	-	-	-	-			
Hardness (as CaCO3)	mg/L	-	-	-	89			
Ion Balance	%	-	-	-	3.68			
Langelier Index (@ 20C)	-	-	-	-	-0.336			
Langelier Index (@ 4C)	-	-	-	-	-0.586			
Magnesium	mg/L	0.1	-	-	3.4			
Nitrate	mg/L	0.05	-	13	1.7			
Nitrate + Nitrite (as N)	mg/L	0.05	-	-	1.7			
Nitrite	mg/L	0.01	-	0.06	0.013			
Orthophosphate	mg/L	0.01	-	-	0.037			
pH	-	-	-	(6.5-9.0)	7.77			
Phosphorus	mg/L	0.2	-	(4)	0.11			
Potassium	mg/L	0.1	-	-	2.1			
Reactive Silica (as SiO2)	mg/L	0.5	-	-	4.6			
Saturation pH (@ 20C)	-	-	-	-	8.10			
Saturation pH (@ 4C)	-	-	-	-	8.35			
Sodium	mg/L	0.1	-	-	15.0			
Sulphate	mg/L	2	-	-	18			
TDS (Calculated)	mg/L	1	-	-	150			
Total Organic Carbon (C)	mg/L	0.5	-	-	2.5			
Turbidity	NTU	0.1	-	(2)	3.4			
			-					
Aluminum	ug/L	10	5	100 (5)	**67**			
Antimony	ug/L	2	20	-	<1.0			
Arsenic	ug/L	2	5	5	1.3			
Barium	ug/L	5	1000	-	26			
Beryllium	ug/L	2	5.3	-	<1.0			
Bismuth	ug/L	2	-	-	<2.0			
Boron	ug/L	5	1200	1500	<50			
Cadmium	ug/L	0.3	0.01	0.09	<0.010			
Chromium	ug/L	2	-	8.9	<1.0			
Cobalt	ug/L	1	10	-	<0.40			
Copper	ug/L	2	2	(6)	<2.0			
Iron	ug/L	50	300	300	**310**			
Lead	ug/L	0.5	1	(6)	<0.50			
Manganese	ug/L	2	820	-	79			
Molybdenum	ug/L	2	73	73	<2.0			
Nickel	ug/L	2	25	25-150 (6)	<2.0			
Selenium	ug/L	2	1	1	<1.0			
Silver	ug/L	0.5	0.1	0.25	<0.10			
Strontium	ug/L	5	21000	-	110			
Thallium	ug/L	0.1	0.8	0.8	<0.10			
Tin	ug/L	2	-	-	<2.0			
Titanium	ug/L	2	-	-	<2.0			
Uranium	ug/L	0.1	300	15	0.95			
Vanadium	ug/L	2	6	-	<2.0			
Zinc	ug/L	5	30	30	<5.0			
Mercury	**ug/L**	0.013	0.026	0.12	-			
Fluoride	mg/L	5	-	-	-			
Hydroxide	mg/L	0.1	-	-	-			

Notes:
RDL – Reported Detection Limit
CCME FWAL = Canadian Council of Ministers of the Environment – Freshwater Aquatic Life Long Term Exposure
Tier 1 EQS = Tier 1 Environmental Quality Standards For Surface Water. From Nova Scotia's Contaminated Sites Regulations (July 2013) Notification of Contamination Protocol, Table 3; Fresh Water
Grey indicates exceedance in CCME FWAL
Bold = indicates value exceeds the Tier 1 EQS
#$^{(2)}$: Reporting limit increased due to turbidity
(1) The mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
(2) High flow or turbid waters: Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.
(3) For ph of 7.5 and temperature of 15.
(4) Refer to CCME Fact Sheet - Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems
(5) Guideline value dependent on pH. Value given is for pH ≥ 6.5
(6) Guidelines requiring equations were calculated by the CCME website, using water hardness values to determine guidelines

APPENDIX D
Chemistry Trend Analysis Figures

Figure D-1: Area 1 - Ammonia
Meadowview Landfill, Kentville, NS

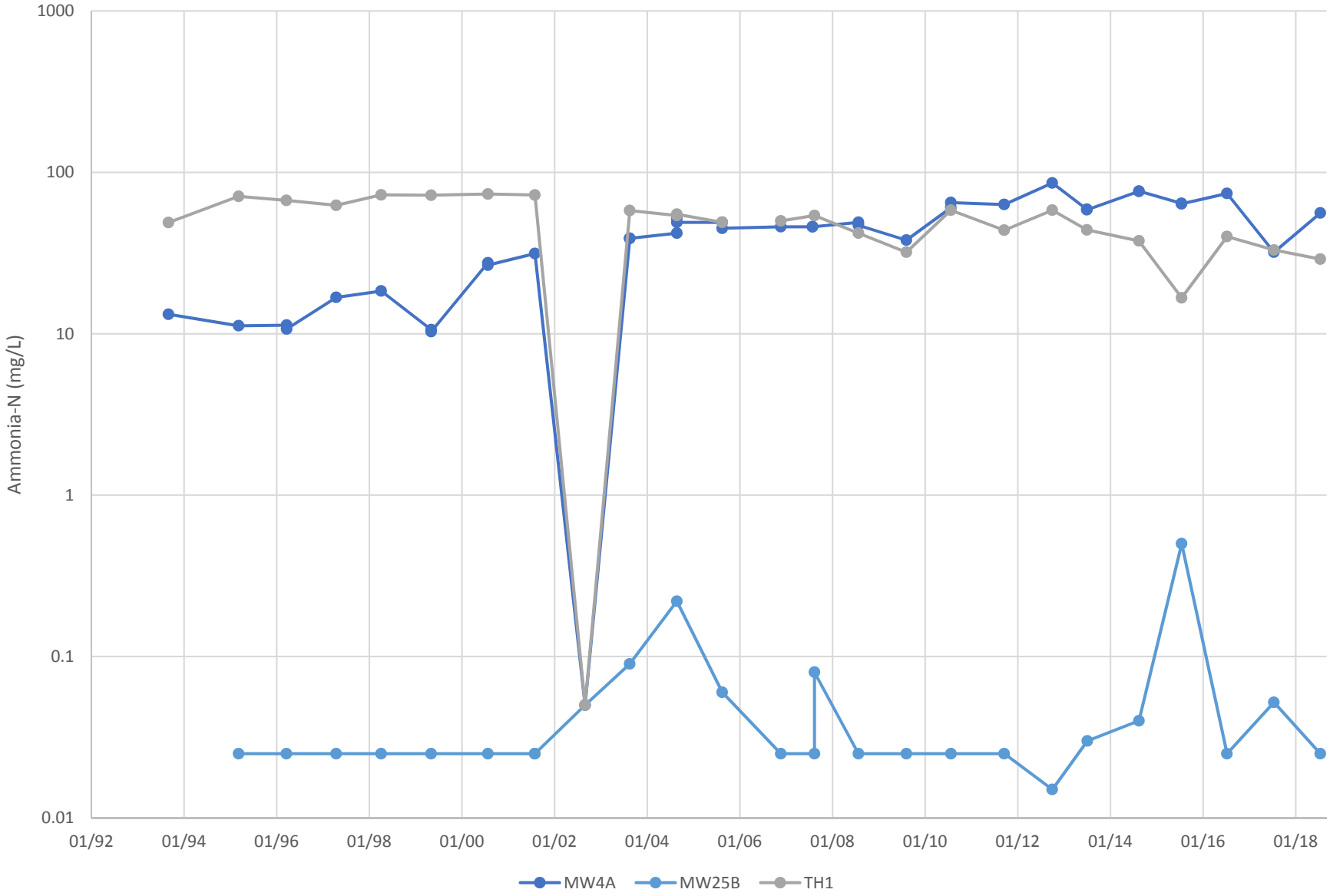


Figure D-2: Area 2 - Ammonia
Meadowview Landfill, Kentville, NS

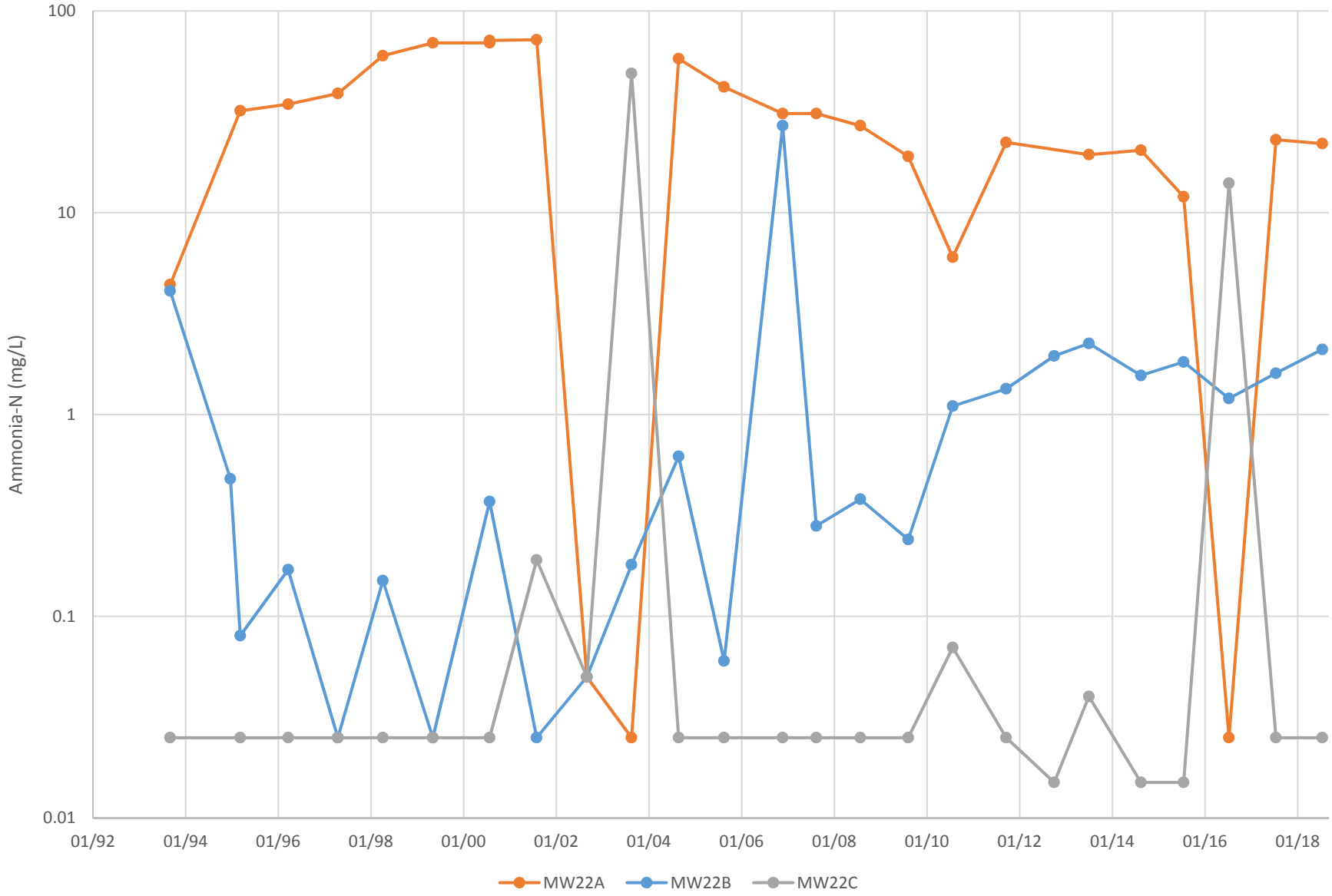


Figure D-3: Area 1 - Chloride
Meadowview Landfill, Kentville, NS

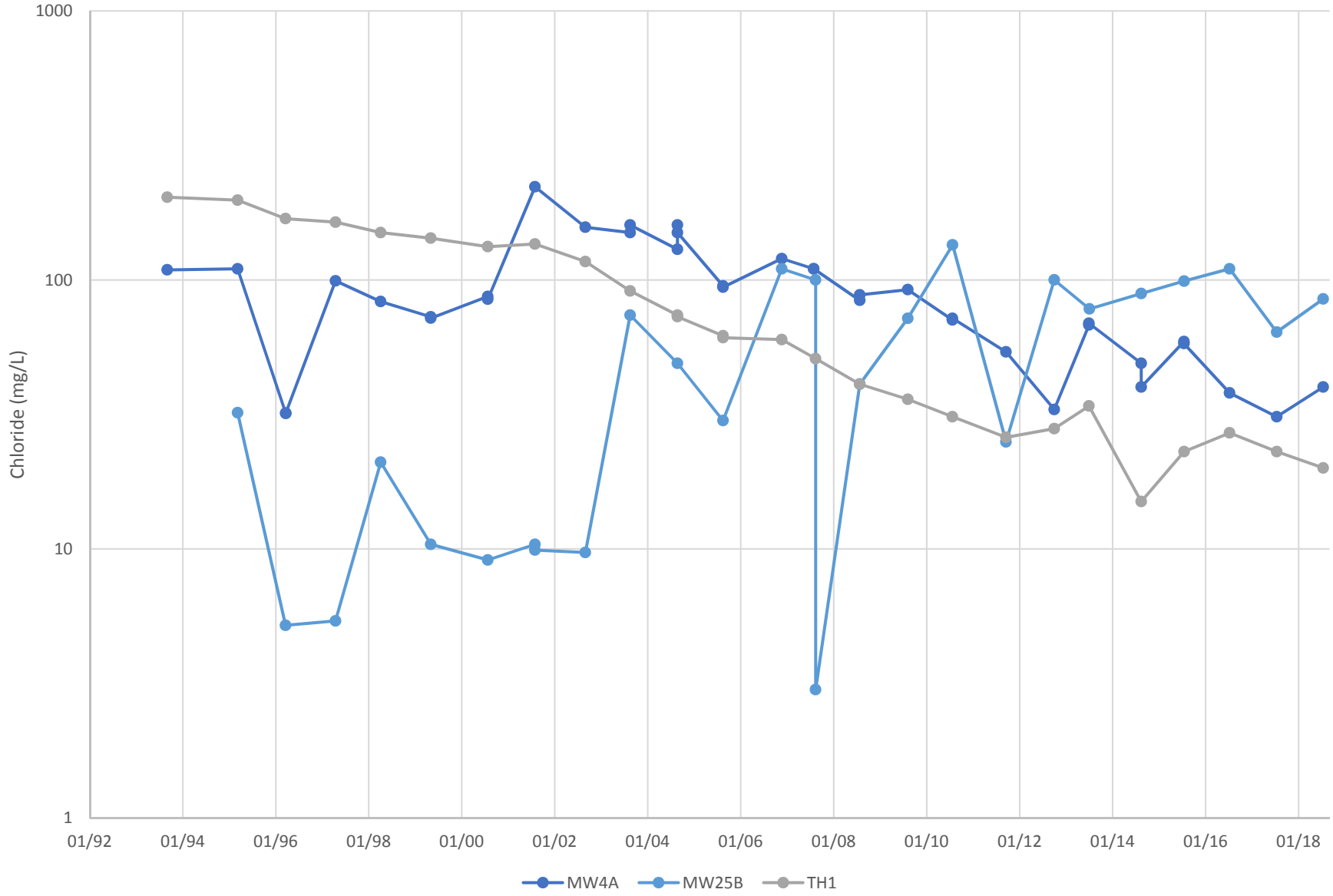


Figure D-4: Area 2 - Chloride
Meadowview Landfill, Kentville, NS

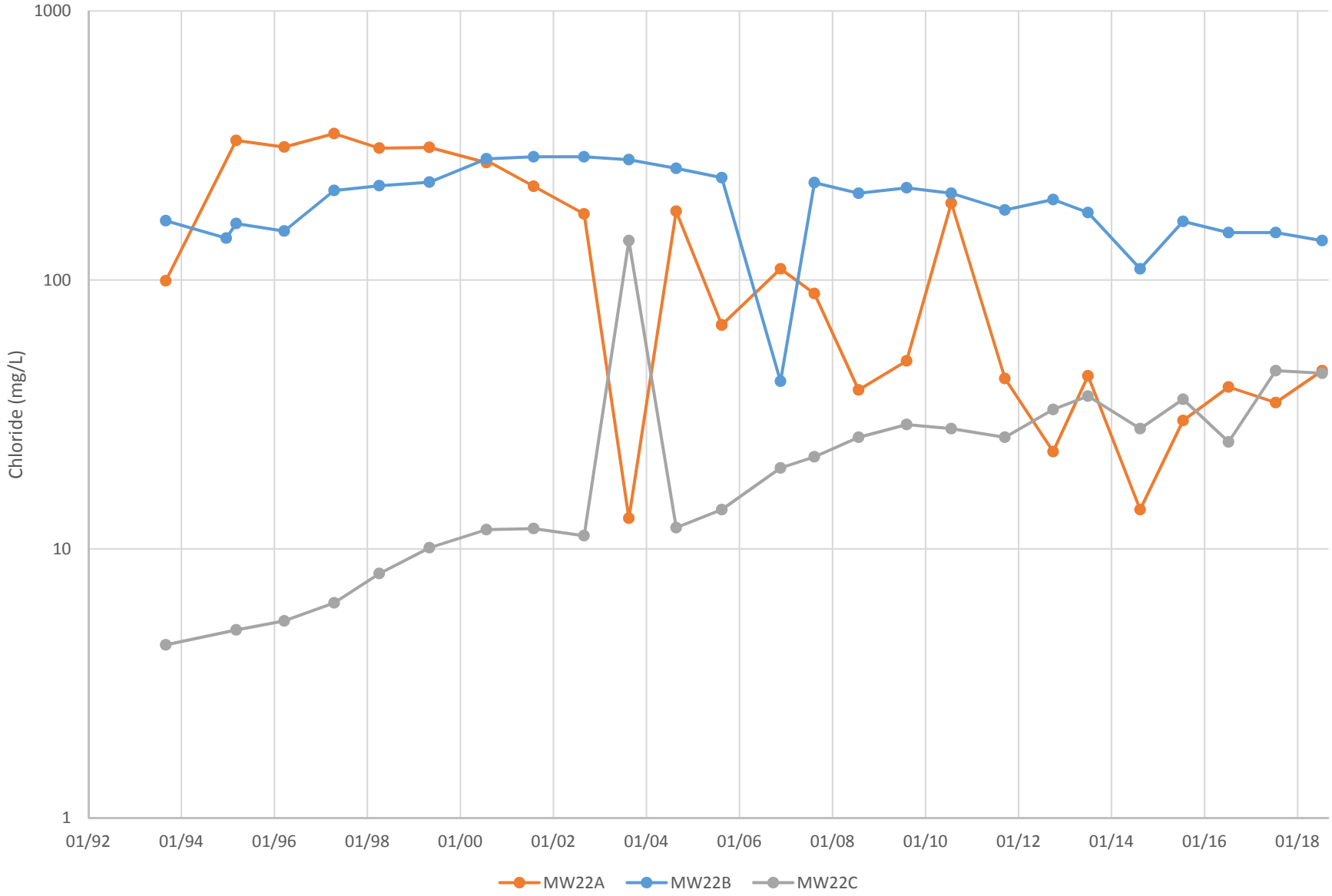


Figure D-5: Area 1 - Conductivity
Meadowview Landfill, Kentville, NS

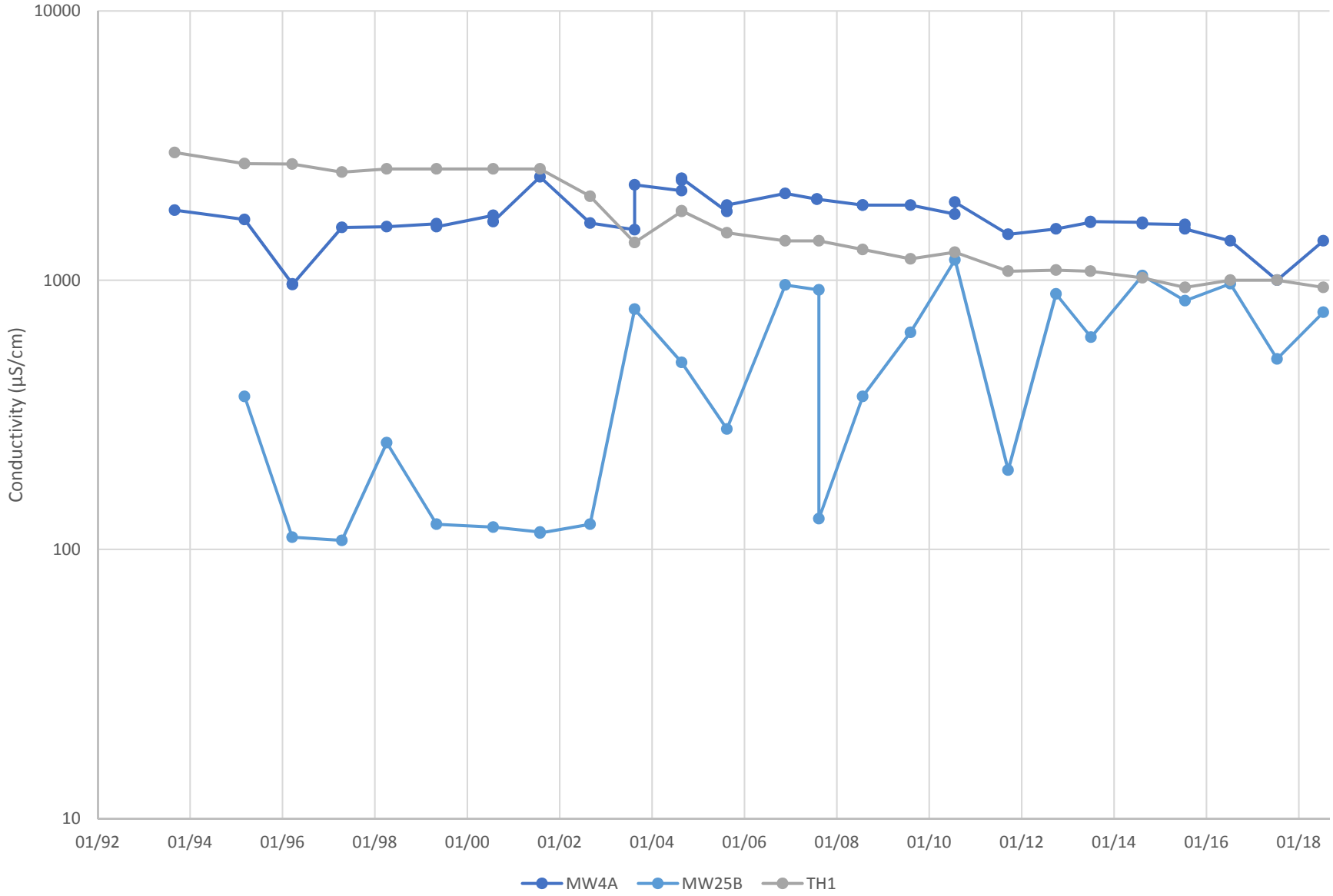


Figure D-6: Area 2 - Conductivity
Meadowview Landfill, Kentville, NS

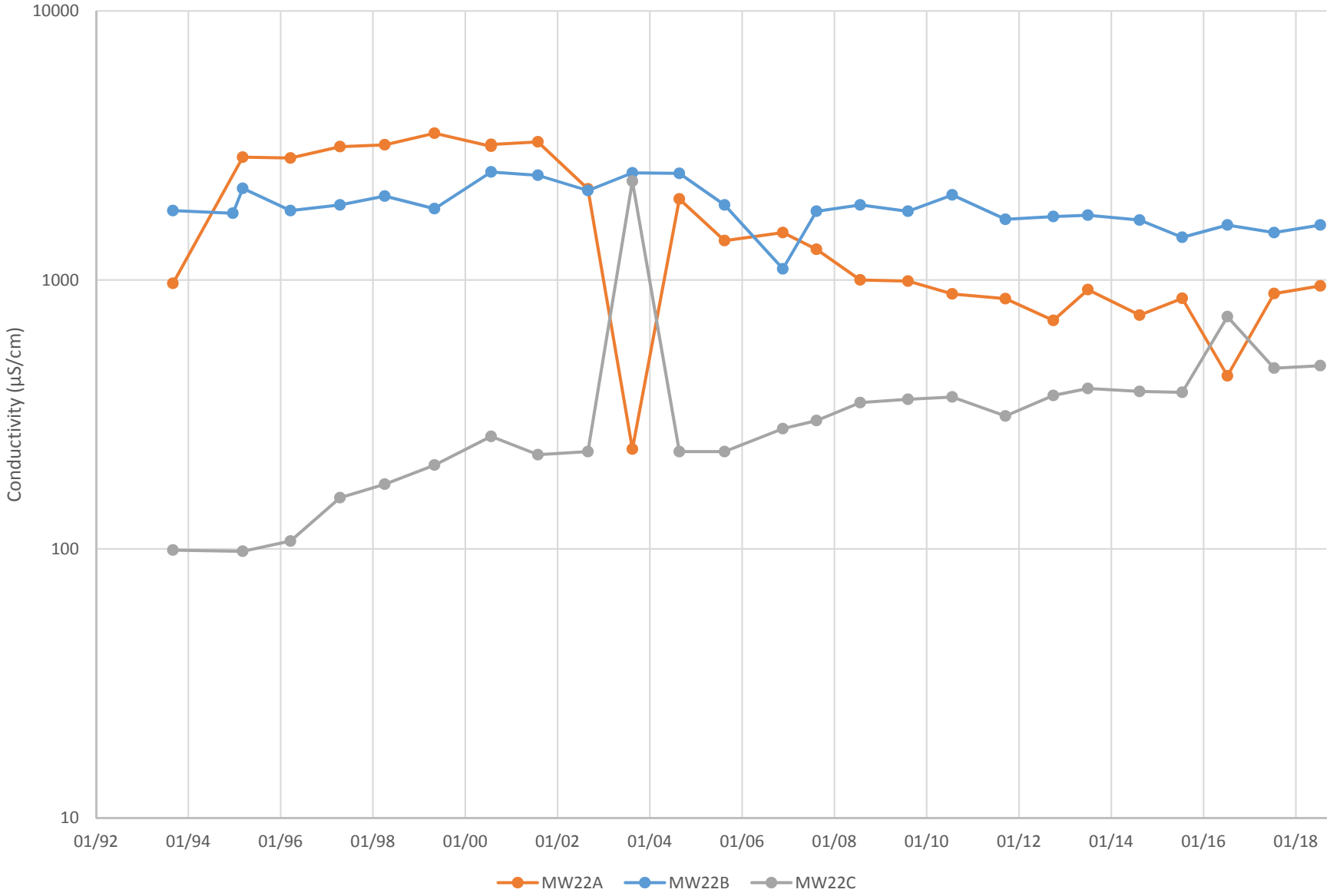


Figure D-7 - Historical Results of Groundwater Elevation in Down-gradient Monitoring Wells

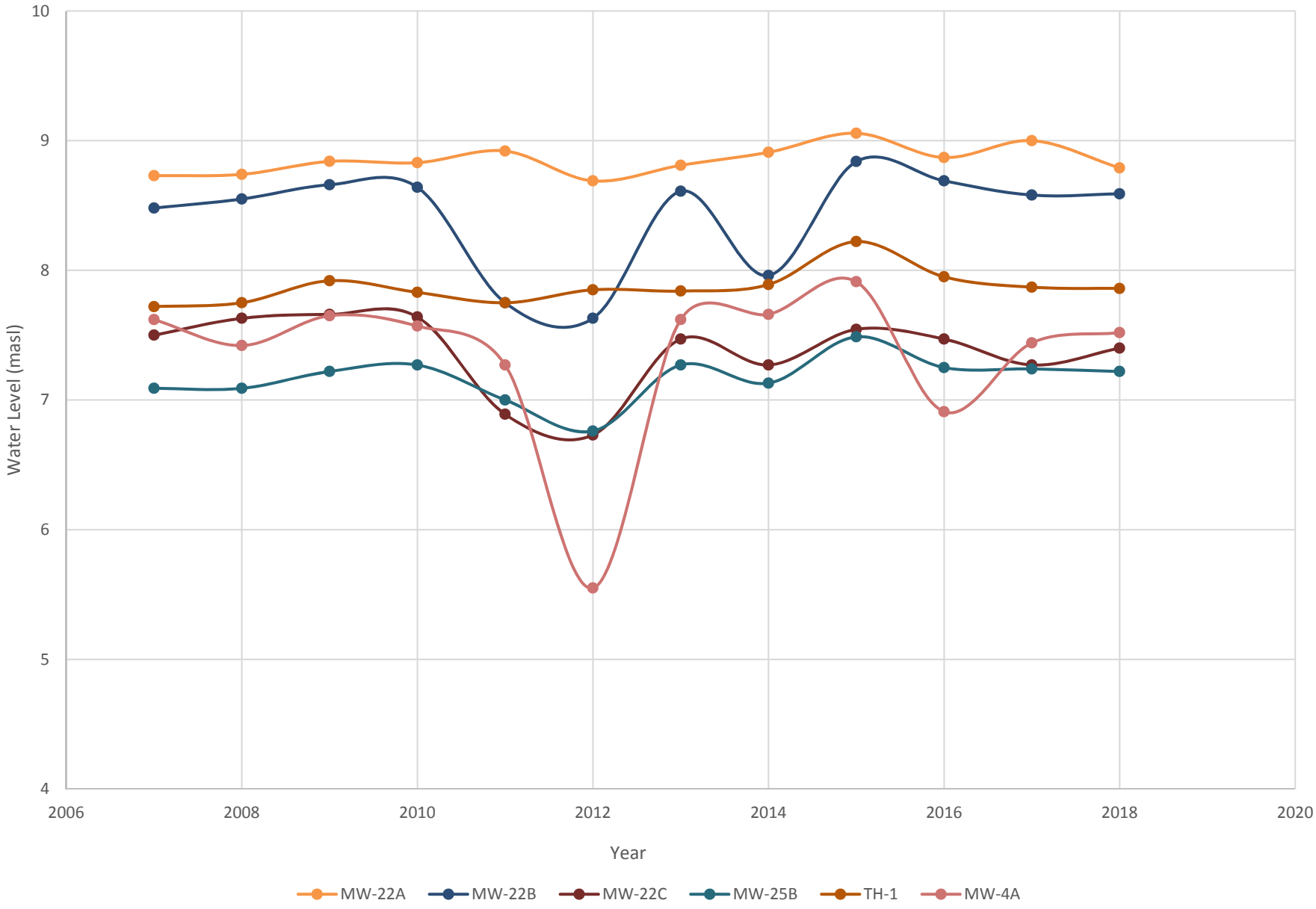


Figure D-8 Surface Water - Conductivity
Meadowview Landfill, Kentville, NS

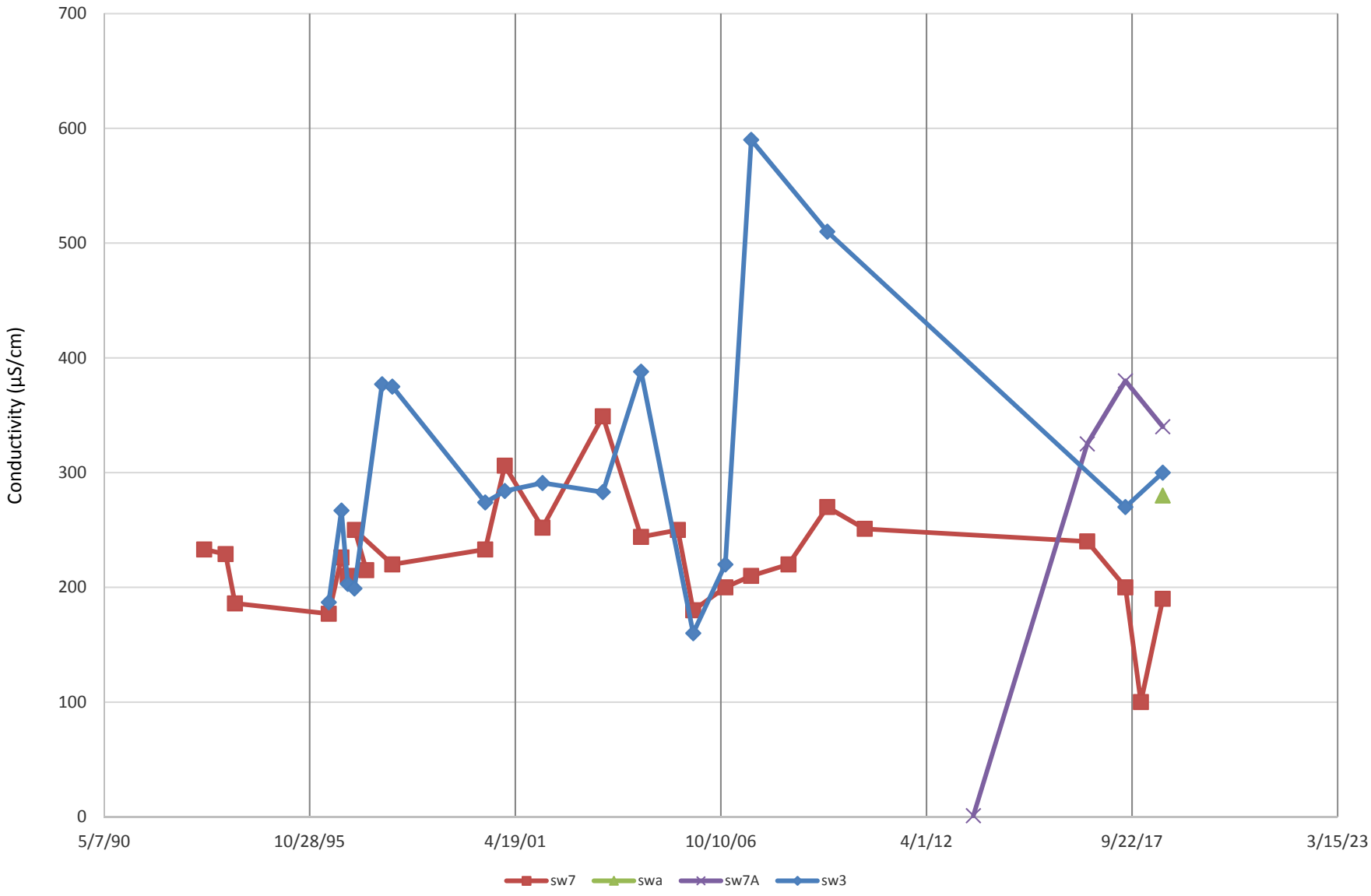


Figure D-9 Surface Water - Ammonia
Meadowview Landfill, Kentville, NS

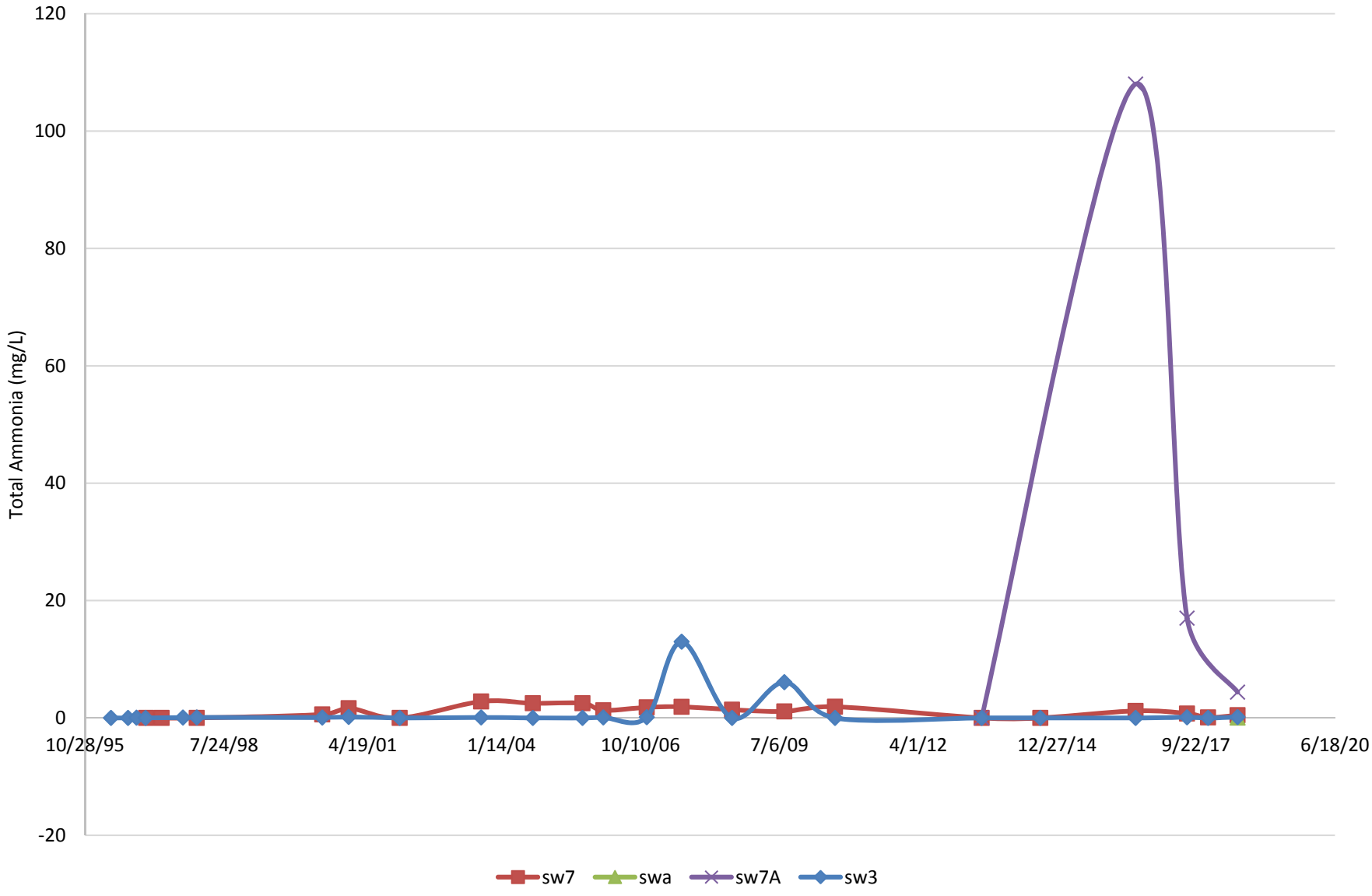
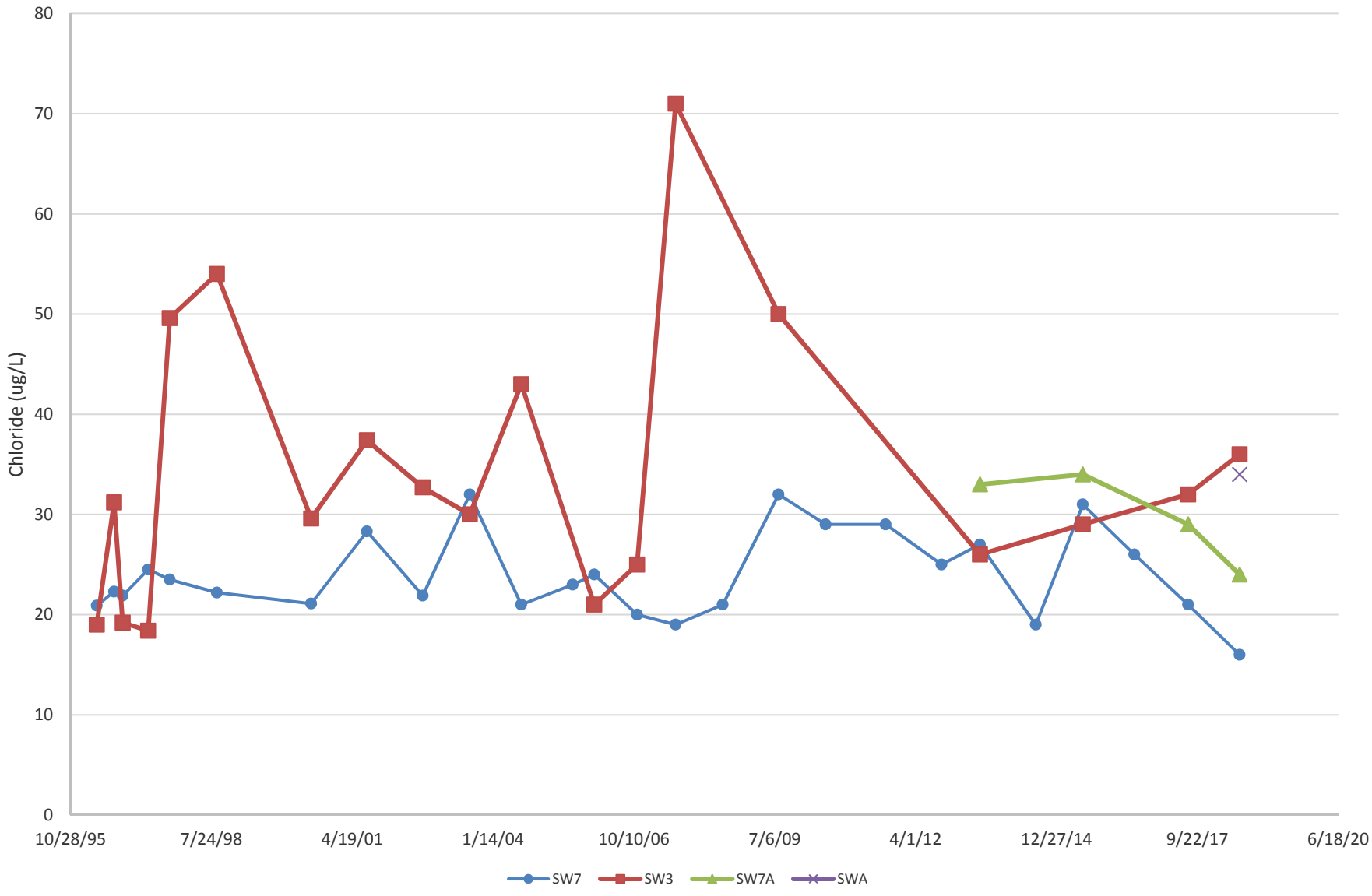


Figure D-10 Surface Water - Chloride
Meadowview Landfill, Kentville, NS



APPENDIX E
Laboratory Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: 121414186
Your C.O.C. #: C#673343-01-01, C#673343-02-01

Attention: Andrew Sullivan

Stantec Consulting Ltd
40 Highfield Park Drive
Suite 102
Dartmouth, NS
CANADA B3A 0A3

Report Date: 2018/07/30
Report #: R5327099
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I7364
Received: 2018/07/23, 11:28

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	11	N/A	2018/07/30	N/A	SM 22 4500-CO2 D
Alkalinity	9	N/A	2018/07/26	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	2	N/A	2018/07/27	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	5	N/A	2018/07/26	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	6	N/A	2018/07/27	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	11	N/A	2018/07/27	ATL SOP 00020	SM 22 2120C m
Conductance - water	11	N/A	2018/07/30	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3)	4	N/A	2018/07/27	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	7	N/A	2018/07/30	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (as rec'd)	5	N/A	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Metals Water Diss. MS (as rec'd)	2	N/A	2018/07/30	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS	4	2018/07/26	2018/07/26	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference)	11	N/A	2018/07/30	N/A	Auto Calc.
Anion and Cation Sum	11	N/A	2018/07/30	N/A	Auto Calc.
Nitrogen Ammonia - water	11	N/A	2018/07/26	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	11	N/A	2018/07/27	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	11	N/A	2018/07/26	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	11	N/A	2018/07/27	ATL SOP 00018	ASTM D3867-16
pH (1)	11	N/A	2018/07/30	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	11	N/A	2018/07/26	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	11	N/A	2018/07/30	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	11	N/A	2018/07/30	ATL SOP 00049	Auto Calc.
Reactive Silica	11	N/A	2018/07/27	ATL SOP 00022	EPA 366.0 m
Sulphate	11	N/A	2018/07/27	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	4	N/A	2018/07/27	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	7	N/A	2018/07/30	N/A	Auto Calc.
Organic carbon - Total (TOC) (2)	11	N/A	2018/07/27	ATL SOP 00203	SM 23 5310B m
Turbidity	11	N/A	2018/07/27	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Your Project #: 121414186
Your C.O.C. #: C#673343-01-01, C#673343-02-01

Attention: Andrew Sullivan

Stantec Consulting Ltd
40 Highfield Park Drive
Suite 102
Dartmouth, NS
CANADA B3A 0A3

Report Date: 2018/07/30
Report #: R5327099
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I7364
Received: 2018/07/23, 11:28

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(2) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marie Muise, Key Account Specialist
Email: MMuise@maxxam.ca
Phone# (902)420-0203 Ext:253

==========

This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

Maxxam ID		HHR952		HHR953		HHR954	HHR988		
Sampling Date		2018/07/20		2018/07/20		2018/07/20	2018/07/20		
COC Number		C#673343-01-01		C#673343-01-01		C#673343-01-01	C#673343-02-01		
	UNITS	**SW7**	**RDL**	**SW7A**	**RDL**	**SW3**	**SWA**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	me/L	1.80	N/A	3.45	N/A	2.84	2.68	N/A	5647163
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	63	1.0	140	1.0	66	61	1.0	5647147
Calculated TDS	mg/L	110	1.0	210	1.0	160	150	1.0	5647174
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	5647147
Cation Sum	me/L	1.71	N/A	3.84	N/A	2.75	2.49	N/A	5647163
Hardness (CaCO3)	mg/L	59	1.0	100	1.0	96	89	1.0	5647152
Ion Balance (% Difference)	%	2.56	N/A	5.35	N/A	1.61	3.68	N/A	5647160
Langelier Index (@ 20C)	N/A	-0.848	N/A	-0.506	N/A	-0.575	-0.336	N/A	5647170
Langelier Index (@ 4C)	N/A	-1.10	N/A	-0.755	N/A	-0.826	-0.586	N/A	5647172
Nitrate (N)	mg/L	0.17	0.050	0.14	0.050	1.7	1.7	0.050	5647168
Saturation pH (@ 20C)	N/A	8.24	N/A	7.76	N/A	8.04	8.10	N/A	5647170
Saturation pH (@ 4C)	N/A	8.49	N/A	8.01	N/A	8.29	8.35	N/A	5647172
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	63	5.0	140 (1)	25	66	61	5.0	5649101
Dissolved Chloride (Cl-)	mg/L	16	1.0	24	1.0	36	34	1.0	5649109
Colour	TCU	14	5.0	6.5	5.0	13	10	5.0	5649116
Nitrate + Nitrite (N)	mg/L	0.17	0.050	0.14	0.050	1.7	1.7	0.050	5649119
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	0.016	0.013	0.010	5649121
Nitrogen (Ammonia Nitrogen)	mg/L	0.46	0.050	4.4	0.25	0.15	0.055	0.050	5649257
Total Organic Carbon (C)	mg/L	2.0	0.50	7.0	0.50	2.6	2.5	0.50	5651419
Orthophosphate (P)	mg/L	0.013	0.010	<0.010	0.010	0.036	0.037	0.010	5649118
pH	pH	7.39	N/A	7.25	N/A	7.47	7.77	N/A	5654130
Reactive Silica (SiO2)	mg/L	11	0.50	12	0.50	4.8	4.6	0.50	5649114
Dissolved Sulphate (SO4)	mg/L	3.6	2.0	2.8	2.0	18	18	2.0	5649112
Turbidity	NTU	1.7	0.10	400	1.0	2.9	3.4	0.10	5651129
Conductivity	uS/cm	190	1.0	340	1.0	300	280	1.0	5654131
Metals									
Total Aluminum (Al)	ug/L	10	5.0	5.8	5.0	140	67	5.0	5648603
Total Antimony (Sb)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	5648603
Total Arsenic (As)	ug/L	1.2	1.0	17	1.0	1.6	1.3	1.0	5648603
Total Barium (Ba)	ug/L	130	1.0	480	1.0	35	26	1.0	5648603
Total Beryllium (Be)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	5648603
Total Bismuth (Bi)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	<2.0	2.0	5648603
Total Boron (B)	ug/L	<50	50	80	50	<50	<50	50	5648603

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

ATLANTIC RCAP-MS TOTAL METALS IN WATER (WATER)

Maxxam ID		HHR952		HHR953		HHR954	HHR988		
Sampling Date		2018/07/20		2018/07/20		2018/07/20	2018/07/20		
COC Number		C#673343-01-01		C#673343-01-01		C#673343-01-01	C#673343-02-01		
	UNITS	**SW7**	**RDL**	**SW7A**	**RDL**	**SW3**	**SWA**	**RDL**	**QC Batch**
Total Cadmium (Cd)	ug/L	<0.010	0.010	<0.010	0.010	<0.010	<0.010	0.010	5648603
Total Calcium (Ca)	ug/L	20000	100	32000	100	33000	30000	100	5648603
Total Chromium (Cr)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	5648603
Total Cobalt (Co)	ug/L	<0.40	0.40	2.7	0.40	<0.40	<0.40	0.40	5648603
Total Copper (Cu)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	<2.0	2.0	5648603
Total Iron (Fe)	ug/L	700	50	14000	50	600	310	50	5648603
Total Lead (Pb)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	5648603
Total Magnesium (Mg)	ug/L	2000	100	6100	100	3700	3400	100	5648603
Total Manganese (Mn)	ug/L	880	2.0	2000	2.0	140	79	2.0	5648603
Total Molybdenum (Mo)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	<2.0	2.0	5648603
Total Nickel (Ni)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	<2.0	2.0	5648603
Total Phosphorus (P)	ug/L	<100	100	<100	100	110	110	100	5648603
Total Potassium (K)	ug/L	1800	100	8000	100	2200	2100	100	5648603
Total Selenium (Se)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	<1.0	1.0	5648603
Total Silver (Ag)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	<0.10	0.10	5648603
Total Sodium (Na)	ug/L	10000	100	17000	100	17000	15000	100	5648603
Total Strontium (Sr)	ug/L	42	2.0	140	2.0	120	110	2.0	5648603
Total Thallium (Tl)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	<0.10	0.10	5648603
Total Tin (Sn)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	<2.0	2.0	5648603
Total Titanium (Ti)	ug/L	<2.0	2.0	<2.0	2.0	6.0	<2.0	2.0	5648603
Total Uranium (U)	ug/L	<0.10	0.10	<0.10	0.10	1.0	0.95	0.10	5648603
Total Vanadium (V)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	<2.0	2.0	5648603
Total Zinc (Zn)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	<5.0	5.0	5648603

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		HHR945		HHR946		HHR947		HHR948		
Sampling Date		2018/07/20		2018/07/20		2018/07/20		2018/07/20		
COC Number		C#673343-01-01		C#673343-01-01		C#673343-01-01		C#673343-01-01		
	UNITS	**MW-4A**	**RDL**	**MW-22A**	**RDL**	**MW-22B**	**RDL**	**MW-22C**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	14.9	N/A	10.3	N/A	17.3	N/A	4.80	N/A	5647163
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	690	1.0	450	1.0	670	1.0	180	1.0	5647147
Calculated TDS	mg/L	790	1.0	580	1.0	910	1.0	250	1.0	5647174
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	1.0	1.0	5647147
Cation Sum	me/L	14.8	N/A	11.2	N/A	17.3	N/A	4.65	N/A	5647163
Hardness (CaCO3)	mg/L	360	1.0	230	1.0	670	1.0	200	1.0	5647152
Ion Balance (% Difference)	%	0.540	N/A	3.91	N/A	0.0300	N/A	1.59	N/A	5647160
Langelier Index (@ 20C)	N/A	0.433	N/A	-0.366	N/A	0.756	N/A	0.429	N/A	5647170
Langelier Index (@ 4C)	N/A	0.186	N/A	-0.614	N/A	0.510	N/A	0.179	N/A	5647172
Nitrate (N)	mg/L	0.054	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	5647168
Saturation pH (@ 20C)	N/A	6.66	N/A	6.99	N/A	6.36	N/A	7.35	N/A	5647170
Saturation pH (@ 4C)	N/A	6.90	N/A	7.24	N/A	6.60	N/A	7.60	N/A	5647172
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	690 (1)	75	450	25	670 (1)	100	180 (1)	25	5649101
Dissolved Chloride (Cl-)	mg/L	40	1.0	46	1.0	140	1.0	45	1.0	5649109
Colour	TCU	8.9	5.0	8.0	5.0	11	5.0	<5.0	5.0	5649116
Nitrate + Nitrite (N)	mg/L	0.054	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	5649119
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5649121
Nitrogen (Ammonia Nitrogen)	mg/L	56	2.5	22	1.0	2.1 (1)	0.25	<0.050	0.050	5649257
Total Organic Carbon (C)	mg/L	<50 (2)	50	11 (2)	5.0	14 (2)	5.0	1.9	0.50	5651419
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5649118
pH	pH	7.09	N/A	6.62	N/A	7.11	N/A	7.78	N/A	5654130
Reactive Silica (SiO2)	mg/L	34	1.0	18	0.50	19	0.50	10	0.50	5649114
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	5649112
Turbidity	NTU	>1000	1.0	800	1.0	250	1.0	0.82	0.10	5651129
Conductivity	uS/cm	1400	1.0	950	1.0	1600	1.0	480	1.0	5654131
Metals										
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	5651174
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	5651174
Dissolved Arsenic (As)	ug/L	61	1.0	70	1.0	17	1.0	1.3	1.0	5651174
Dissolved Barium (Ba)	ug/L	2900	10	1100	1.0	670	1.0	9.0	1.0	5651174
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	5651174
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	5651174

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.
(2) Elevated reporting limit due to turbidity.

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Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		HHR945		HHR946		HHR947		HHR948		
Sampling Date		2018/07/20		2018/07/20		2018/07/20		2018/07/20		
COC Number		C#673343-01-01		C#673343-01-01		C#673343-01-01		C#673343-01-01		
	UNITS	**MW-4A**	**RDL**	**MW-22A**	**RDL**	**MW-22B**	**RDL**	**MW-22C**	**RDL**	**QC Batch**
Dissolved Boron (B)	ug/L	430	50	410	50	460	50	<50	50	5651174
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	0.016	0.010	0.013	0.010	<0.010	0.010	5651174
Dissolved Calcium (Ca)	ug/L	110000	100	69000	100	230000	100	64000	100	5651174
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	5651174
Dissolved Cobalt (Co)	ug/L	10	0.40	18	0.40	11	0.40	<0.40	0.40	5651174
Dissolved Copper (Cu)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	5651174
Dissolved Iron (Fe)	ug/L	16000	50	48000	50	9000	50	220	50	5651174
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	5651174
Dissolved Magnesium (Mg)	ug/L	22000	100	13000	100	26000	100	9500	100	5651174
Dissolved Manganese (Mn)	ug/L	540	2.0	2900	2.0	4000	2.0	58	2.0	5651174
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	3.5	2.0	5651174
Dissolved Nickel (Ni)	ug/L	18	2.0	16	2.0	23	2.0	<2.0	2.0	5651174
Dissolved Phosphorus (P)	ug/L	<100	100	360	100	<100	100	<100	100	5651174
Dissolved Potassium (K)	ug/L	42000	100	24000	100	8100	100	6500	100	5651174
Dissolved Selenium (Se)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	5651174
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	5651174
Dissolved Sodium (Na)	ug/L	47000	100	62000	100	72000	100	12000	100	5651174
Dissolved Strontium (Sr)	ug/L	770	2.0	380	2.0	2000	2.0	910	2.0	5651174
Dissolved Thallium (Tl)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	5651174
Dissolved Tin (Sn)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	5651174
Dissolved Titanium (Ti)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	5651174
Dissolved Uranium (U)	ug/L	<0.10	0.10	<0.10	0.10	13	0.10	34	0.10	5651174
Dissolved Vanadium (V)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	5651174
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	<5.0	5.0	5.7	5.0	<5.0	5.0	5651174

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		HHR949	HHR949			HHR950		
Sampling Date		2018/07/20	2018/07/20			2018/07/20		
COC Number		C#673343-01-01	C#673343-01-01			C#673343-01-01		
	UNITS	**MW-25B**	**MW-25B Lab-Dup**	**RDL**	**QC Batch**	**MW-40D (DUP)**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	me/L	8.16	N/A	N/A	5647163	13.6	N/A	5647163
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	290	N/A	1.0	5647147	620	1.0	5647147
Calculated TDS	mg/L	420	N/A	1.0	5647174	740	1.0	5647174
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	N/A	1.0	5647147	<1.0	1.0	5647147
Cation Sum	me/L	7.71	N/A	N/A	5647163	14.1	N/A	5647163
Hardness (CaCO3)	mg/L	340	N/A	1.0	5647152	350	1.0	5647152
Ion Balance (% Difference)	%	2.84	N/A	N/A	5647160	1.91	N/A	5647160
Langelier Index (@ 20C)	N/A	0.423	N/A	N/A	5647170	0.275	N/A	5647170
Langelier Index (@ 4C)	N/A	0.175	N/A	N/A	5647172	0.0290	N/A	5647172
Nitrate (N)	mg/L	<0.050	N/A	0.050	5647168	0.054	0.050	5647168
Saturation pH (@ 20C)	N/A	6.95	N/A	N/A	5647170	6.69	N/A	5647170
Saturation pH (@ 4C)	N/A	7.20	N/A	N/A	5647172	6.94	N/A	5647172
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	290	280 (1)	25	5649101	620 (1)	100	5649101
Dissolved Chloride (Cl-)	mg/L	85	83	1.0	5649109	40	1.0	5649109
Colour	TCU	<5.0	<5.0	5.0	5649116	9.7	5.0	5649116
Nitrate + Nitrite (N)	mg/L	<0.050	<0.050	0.050	5649119	0.054	0.050	5649119
Nitrite (N)	mg/L	<0.010	<0.010	0.010	5649121	<0.010	0.010	5649121
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	N/A	0.050	5649257	47	2.5	5649257
Total Organic Carbon (C)	mg/L	6.8 (2)	N/A	5.0	5651419	<50 (2)	50	5651419
Orthophosphate (P)	mg/L	<0.010	0.011	0.010	5649118	<0.010	0.010	5649118
pH	pH	7.37	7.63	N/A	5654133	6.97	N/A	5654130
Reactive Silica (SiO2)	mg/L	13	13	0.50	5649114	33	1.0	5649114
Dissolved Sulphate (SO4)	mg/L	<2.0	<2.0	2.0	5649112	<2.0	2.0	5649112
Turbidity	NTU	880	N/A	1.0	5651129	>1000	1.0	5651129
Conductivity	uS/cm	760	770	1.0	5654134	1300	1.0	5654131
Metals								
Dissolved Aluminum (Al)	ug/L	<5.0	N/A	5.0	5651174	<5.0	5.0	5651174
Dissolved Antimony (Sb)	ug/L	<1.0	N/A	1.0	5651174	<1.0	1.0	5651174
Dissolved Arsenic (As)	ug/L	2.9	N/A	1.0	5651174	60	1.0	5651174
Dissolved Barium (Ba)	ug/L	11	N/A	1.0	5651174	2900	10	5651174
Dissolved Beryllium (Be)	ug/L	<1.0	N/A	1.0	5651174	<1.0	1.0	5651174

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.
(2) Elevated reporting limit due to turbidity.

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Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		HHR949	HHR949			HHR950		
Sampling Date		2018/07/20	2018/07/20			2018/07/20		
COC Number		C#673343-01-01	C#673343-01-01			C#673343-01-01		
	UNITS	**MW-25B**	**MW-25B Lab-Dup**	**RDL**	**QC Batch**	**MW-40D (DUP)**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	<2.0	N/A	2.0	5651174	<2.0	2.0	5651174
Dissolved Boron (B)	ug/L	100	N/A	50	5651174	430	50	5651174
Dissolved Cadmium (Cd)	ug/L	0.010	N/A	0.010	5651174	<0.010	0.010	5651174
Dissolved Calcium (Ca)	ug/L	110000	N/A	100	5651174	110000	100	5651174
Dissolved Chromium (Cr)	ug/L	<1.0	N/A	1.0	5651174	<1.0	1.0	5651174
Dissolved Cobalt (Co)	ug/L	<0.40	N/A	0.40	5651174	9.9	0.40	5651174
Dissolved Copper (Cu)	ug/L	<2.0	N/A	2.0	5651174	<2.0	2.0	5651174
Dissolved Iron (Fe)	ug/L	<50	N/A	50	5651174	16000	50	5651174
Dissolved Lead (Pb)	ug/L	<0.50	N/A	0.50	5651174	<0.50	0.50	5651174
Dissolved Magnesium (Mg)	ug/L	14000	N/A	100	5651174	22000	100	5651174
Dissolved Manganese (Mn)	ug/L	60	N/A	2.0	5651174	560	2.0	5651174
Dissolved Molybdenum (Mo)	ug/L	<2.0	N/A	2.0	5651174	<2.0	2.0	5651174
Dissolved Nickel (Ni)	ug/L	7.2	N/A	2.0	5651174	17	2.0	5651174
Dissolved Phosphorus (P)	ug/L	<100	N/A	100	5651174	<100	100	5651174
Dissolved Potassium (K)	ug/L	7100	N/A	100	5651174	42000	100	5651174
Dissolved Selenium (Se)	ug/L	<1.0	N/A	1.0	5651174	<1.0	1.0	5651174
Dissolved Silver (Ag)	ug/L	<0.10	N/A	0.10	5651174	<0.10	0.10	5651174
Dissolved Sodium (Na)	ug/L	19000	N/A	100	5651174	46000	100	5651174
Dissolved Strontium (Sr)	ug/L	1400	N/A	2.0	5651174	770	2.0	5651174
Dissolved Thallium (Tl)	ug/L	<0.10	N/A	0.10	5651174	<0.10	0.10	5651174
Dissolved Tin (Sn)	ug/L	<2.0	N/A	2.0	5651174	<2.0	2.0	5651174
Dissolved Titanium (Ti)	ug/L	<2.0	N/A	2.0	5651174	<2.0	2.0	5651174
Dissolved Uranium (U)	ug/L	15	N/A	0.10	5651174	0.10	0.10	5651174
Dissolved Vanadium (V)	ug/L	<2.0	N/A	2.0	5651174	<2.0	2.0	5651174
Dissolved Zinc (Zn)	ug/L	<5.0	N/A	5.0	5651174	<5.0	5.0	5651174

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		HHR951		
Sampling Date		2018/07/20		
COC Number		C#673343-01-01		
	UNITS	**TH-1**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	10.2	N/A	5647163
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	480	1.0	5647147
Calculated TDS	mg/L	540	1.0	5647174
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5647147
Cation Sum	me/L	9.87	N/A	5647163
Hardness (CaCO3)	mg/L	250	1.0	5647152
Ion Balance (% Difference)	%	1.50	N/A	5647160
Langelier Index (@ 20C)	N/A	0.323	N/A	5647170
Langelier Index (@ 4C)	N/A	0.0760	N/A	5647172
Nitrate (N)	mg/L	0.055	0.050	5647168
Saturation pH (@ 20C)	N/A	6.89	N/A	5647170
Saturation pH (@ 4C)	N/A	7.14	N/A	5647172
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	480	25	5649101
Dissolved Chloride (Cl-)	mg/L	20	1.0	5649109
Colour	TCU	7.4	5.0	5649116
Nitrate + Nitrite (N)	mg/L	0.055	0.050	5649119
Nitrite (N)	mg/L	<0.010	0.010	5649121
Nitrogen (Ammonia Nitrogen)	mg/L	29	2.5	5649257
Total Organic Carbon (C)	mg/L	7.6 (1)	5.0	5651419
Orthophosphate (P)	mg/L	<0.010	0.010	5649118
pH	pH	7.22	N/A	5654130
Reactive Silica (SiO2)	mg/L	29	1.0	5649114
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	5649112
Turbidity	NTU	570	1.0	5651129
Conductivity	uS/cm	940	1.0	5654131
Metals				
Dissolved Aluminum (Al)	ug/L	<5.0	5.0	5651174
Dissolved Antimony (Sb)	ug/L	<1.0	1.0	5651174
Dissolved Arsenic (As)	ug/L	26	1.0	5651174
Dissolved Barium (Ba)	ug/L	900	1.0	5651174
Dissolved Beryllium (Be)	ug/L	<1.0	1.0	5651174
Dissolved Bismuth (Bi)	ug/L	<2.0	2.0	5651174
Dissolved Boron (B)	ug/L	200	50	5651174

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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Maxxam Job #: B8I7364
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

Maxxam ID		HHR951		
Sampling Date		2018/07/20		
COC Number		C#673343-01-01		
	UNITS	**TH-1**	**RDL**	**QC Batch**
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	5651174
Dissolved Calcium (Ca)	ug/L	80000	100	5651174
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	5651174
Dissolved Cobalt (Co)	ug/L	4.6	0.40	5651174
Dissolved Copper (Cu)	ug/L	<2.0	2.0	5651174
Dissolved Iron (Fe)	ug/L	11000	50	5651174
Dissolved Lead (Pb)	ug/L	<0.50	0.50	5651174
Dissolved Magnesium (Mg)	ug/L	13000	100	5651174
Dissolved Manganese (Mn)	ug/L	1000	2.0	5651174
Dissolved Molybdenum (Mo)	ug/L	<2.0	2.0	5651174
Dissolved Nickel (Ni)	ug/L	4.7	2.0	5651174
Dissolved Phosphorus (P)	ug/L	<100	100	5651174
Dissolved Potassium (K)	ug/L	29000	100	5651174
Dissolved Selenium (Se)	ug/L	<1.0	1.0	5651174
Dissolved Silver (Ag)	ug/L	<0.10	0.10	5651174
Dissolved Sodium (Na)	ug/L	36000	100	5651174
Dissolved Strontium (Sr)	ug/L	350	2.0	5651174
Dissolved Thallium (Tl)	ug/L	<0.10	0.10	5651174
Dissolved Tin (Sn)	ug/L	<2.0	2.0	5651174
Dissolved Titanium (Ti)	ug/L	<2.0	2.0	5651174
Dissolved Uranium (U)	ug/L	<0.10	0.10	5651174
Dissolved Vanadium (V)	ug/L	<2.0	2.0	5651174
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	5651174

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I7364
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Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.0°C

Sample HHR953 [SW7A] : Poor RCAp Ion Balance due to sample matrix. Excess cations due to presence of turbidity.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B8I7364
Report Date: 2018/07/30

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5648603	Total Aluminum (Al)	2018/07/26	96	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
5648603	Total Antimony (Sb)	2018/07/26	101	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
5648603	Total Arsenic (As)	2018/07/26	99	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
5648603	Total Barium (Ba)	2018/07/26	98	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
5648603	Total Beryllium (Be)	2018/07/26	98	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
5648603	Total Bismuth (Bi)	2018/07/26	102	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Boron (B)	2018/07/26	104	80 - 120	104	80 - 120	<50	ug/L	NC	20		
5648603	Total Cadmium (Cd)	2018/07/26	99	80 - 120	98	80 - 120	<0.010	ug/L	NC	20		
5648603	Total Calcium (Ca)	2018/07/26	104	80 - 120	103	80 - 120	<100	ug/L	NC	20		
5648603	Total Chromium (Cr)	2018/07/26	99	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
5648603	Total Cobalt (Co)	2018/07/26	101	80 - 120	100	80 - 120	<0.40	ug/L	NC	20		
5648603	Total Copper (Cu)	2018/07/26	98	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Iron (Fe)	2018/07/26	103	80 - 120	103	80 - 120	<50	ug/L	NC	20		
5648603	Total Lead (Pb)	2018/07/26	98	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
5648603	Total Magnesium (Mg)	2018/07/26	104	80 - 120	103	80 - 120	<100	ug/L	NC	20		
5648603	Total Manganese (Mn)	2018/07/26	102	80 - 120	102	80 - 120	<2.0	ug/L	3.6	20		
5648603	Total Molybdenum (Mo)	2018/07/26	103	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Nickel (Ni)	2018/07/26	100	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Phosphorus (P)	2018/07/26	106	80 - 120	104	80 - 120	<100	ug/L	NC	20		
5648603	Total Potassium (K)	2018/07/26	103	80 - 120	103	80 - 120	<100	ug/L	NC	20		
5648603	Total Selenium (Se)	2018/07/26	101	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
5648603	Total Silver (Ag)	2018/07/26	99	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
5648603	Total Sodium (Na)	2018/07/26	101	80 - 120	102	80 - 120	<100	ug/L	NC	20		
5648603	Total Strontium (Sr)	2018/07/26	102	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Thallium (Tl)	2018/07/26	102	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
5648603	Total Tin (Sn)	2018/07/26	102	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Titanium (Ti)	2018/07/26	97	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Uranium (U)	2018/07/26	104	80 - 120	103	80 - 120	<0.10	ug/L	NC	20		
5648603	Total Vanadium (V)	2018/07/26	102	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5648603	Total Zinc (Zn)	2018/07/26	98	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
5649101	Total Alkalinity (Total as CaCO3)	2018/07/26	NC	80 - 120	97	80 - 120	<5.0	mg/L	2.3 (1)	25		

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Maxxam Job #: B8I7364
Report Date: 2018/07/30

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5649109	Dissolved Chloride (Cl-)	2018/07/27	91	80 - 120	96	80 - 120	<1.0	mg/L	2.7	25	105	80 - 120
5649112	Dissolved Sulphate (SO4)	2018/07/27	93	80 - 120	98	80 - 120	<2.0	mg/L	NC	25		
5649114	Reactive Silica (SiO2)	2018/07/27	NC	80 - 120	94	80 - 120	<0.50	mg/L	0.32	25		
5649116	Colour	2018/07/27			104	80 - 120	<5.0	TCU	NC	20		
5649118	Orthophosphate (P)	2018/07/26	92	80 - 120	94	80 - 120	<0.010	mg/L	7.7	25		
5649119	Nitrate + Nitrite (N)	2018/07/27	94	80 - 120	98	80 - 120	<0.050	mg/L	NC	25		
5649121	Nitrite (N)	2018/07/26	94	80 - 120	96	80 - 120	<0.010	mg/L	NC	20		
5649257	Nitrogen (Ammonia Nitrogen)	2018/07/26	94	80 - 120	106	80 - 120	<0.050	mg/L	NC	20		
5651129	Turbidity	2018/07/27			98	80 - 120	<0.10	NTU	NC	20	96	80 - 120
5651174	Dissolved Aluminum (Al)	2018/07/27			100	80 - 120	<5.0	ug/L				
5651174	Dissolved Antimony (Sb)	2018/07/27	100	80 - 120	97	80 - 120	<1.0	ug/L				
5651174	Dissolved Arsenic (As)	2018/07/27	96	80 - 120	97	80 - 120	<1.0	ug/L				
5651174	Dissolved Barium (Ba)	2018/07/27	NC	80 - 120	98	80 - 120	<1.0	ug/L				
5651174	Dissolved Beryllium (Be)	2018/07/27	98	80 - 120	98	80 - 120	<1.0	ug/L				
5651174	Dissolved Bismuth (Bi)	2018/07/27	103	80 - 120	102	80 - 120	<2.0	ug/L				
5651174	Dissolved Boron (B)	2018/07/27	99	80 - 120	96	80 - 120	<50	ug/L				
5651174	Dissolved Cadmium (Cd)	2018/07/27	101	80 - 120	98	80 - 120	<0.010	ug/L	7.1	20		
5651174	Dissolved Calcium (Ca)	2018/07/27	101	80 - 120	103	80 - 120	<100	ug/L	0.74	20		
5651174	Dissolved Chromium (Cr)	2018/07/27	94	80 - 120	95	80 - 120	<1.0	ug/L				
5651174	Dissolved Cobalt (Co)	2018/07/27	95	80 - 120	97	80 - 120	<0.40	ug/L				
5651174	Dissolved Copper (Cu)	2018/07/27	93	80 - 120	94	80 - 120	<2.0	ug/L	NC	20		
5651174	Dissolved Iron (Fe)	2018/07/27	131 (2)	80 - 120	103	80 - 120	<50	ug/L	3.6	20		
5651174	Dissolved Lead (Pb)	2018/07/27	99	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
5651174	Dissolved Magnesium (Mg)	2018/07/27	98	80 - 120	100	80 - 120	<100	ug/L	0.16	20		
5651174	Dissolved Manganese (Mn)	2018/07/27	96	80 - 120	98	80 - 120	<2.0	ug/L	2.6	20		
5651174	Dissolved Molybdenum (Mo)	2018/07/27	105	80 - 120	96	80 - 120	<2.0	ug/L				
5651174	Dissolved Nickel (Ni)	2018/07/27	97	80 - 120	96	80 - 120	<2.0	ug/L				
5651174	Dissolved Phosphorus (P)	2018/07/27	105	80 - 120	105	80 - 120	<100	ug/L				
5651174	Dissolved Potassium (K)	2018/07/27	103	80 - 120	103	80 - 120	<100	ug/L	1.4	20		
5651174	Dissolved Selenium (Se)	2018/07/27	98	80 - 120	96	80 - 120	<1.0	ug/L				
5651174	Dissolved Silver (Ag)	2018/07/27	98	80 - 120	98	80 - 120	<0.10	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5651174	Dissolved Sodium (Na)	2018/07/27	92	80 - 120	96	80 - 120	<100	ug/L	2.2	20		
5651174	Dissolved Strontium (Sr)	2018/07/27	97	80 - 120	101	80 - 120	<2.0	ug/L				
5651174	Dissolved Thallium (Tl)	2018/07/27	103	80 - 120	100	80 - 120	<0.10	ug/L				
5651174	Dissolved Tin (Sn)	2018/07/27	105	80 - 120	102	80 - 120	<2.0	ug/L				
5651174	Dissolved Titanium (Ti)	2018/07/27	113	80 - 120	100	80 - 120	<2.0	ug/L				
5651174	Dissolved Uranium (U)	2018/07/27	104	80 - 120	102	80 - 120	<0.10	ug/L				
5651174	Dissolved Vanadium (V)	2018/07/27	98	80 - 120	98	80 - 120	<2.0	ug/L				
5651174	Dissolved Zinc (Zn)	2018/07/27	101	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
5651419	Total Organic Carbon (C)	2018/07/27	98	85 - 115	98	80 - 120	<0.50	mg/L	0.45	15		
5654130	pH	2018/07/30							6.1	N/A	100	97 - 103
5654131	Conductivity	2018/07/30			103	80 - 120	1.1, RDL=1.0	uS/cm	1.7	25		
5654133	pH	2018/07/30							3.5	N/A	100	97 - 103
5654134	Conductivity	2018/07/30			105	80 - 120	1.9, RDL=1.0	uS/cm	0.92	25		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated reporting limit due to sample matrix.

(2) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

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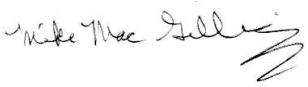
Stantec Consulting Ltd
Client Project #: 121414186
Sampler Initials: DB

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Mike MacGillivray, Scientific Specialist (Inorganics)

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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