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Item No. 1
North West Community Council
April 11, 2016

TO: Chair and Members of North West Community Council

Original Signed

SUBMITTED BY: Bob Bjerke, Chief Planner and Director, Planning and Development

DATE: March 9, 2016

SUBJECT: **Bedford West Water Quality Report, Fall 2015**

INFORMATION REPORT

ORIGIN

Bedford Municipal Planning Strategy, Bedford West Secondary Planning Strategy, Policies BW-3, BW-4, and BW-5.

Development Agreements between Halifax Regional Municipality and West Bedford Holdings Ltd, and between Halifax Regional Municipality and Cresco Ltd.

LEGISLATIVE AUTHORITY

The Halifax Regional Municipality Charter, Part VIII, Planning and Development, Section 240, Development Agreements.

BACKGROUND

The Bedford West Secondary Planning Strategy, Policy BW-3, requires that a water quality monitoring program be undertaken for the Paper Mill Lake watershed to track the eutrophication process. The terms of the program are specified within Development Agreements that have been negotiated in consultation with the Bedford Watershed Advisory Board[1] until its dissolution in 2013, and the Regional Watersheds Advisory Board since 2013.

All such agreements require that the municipality designates a member of staff to submit test results to the Developer, the Community Council, and BWAB (now RWAB) within three months of being received from the consultant, or immediately, if total phosphorus ("TP") or bacterial results exceed management thresholds identified therein.

1 RWAB assumed the functions previously performed by BWAB respecting Bedford West SPS once it began conducting meetings in July 2013.

DISCUSSION

This report presents the results of the water quality monitoring event that occurred in October 2015 pursuant to the monitoring program for Bedford West. Monitoring was conducted by SNC Lavalin, which will remain the municipality's contractor through the entirety of calendar year 2016. The monitoring report issued pursuant to this event is provided as Attachment A.

During this event, contractors monitored water quality parameters in the following groups: inorganics - including TP and other nutrients, metals, and microbiologicals.

Overall, there were fewer Total Phosphorus exceedances observed in October 2015 compared with most previous events of that year. Additionally, most exceedance values were lower than those reported earlier in the year. TP results from all sampling events from summer 2013 to present are included as Attachment B. Of the five exceedances, four fell in the mesotrophic range, and only one fell in the eutrophic range.

In addition to Total Phosphorus, several other parameters exceeded the guideline values during one or more monitoring events. Parameters with exceedances are as follows:

Parameter	# Sites Exceeded			
	Spring	**August**	**September**	**October**
Total Phosphorus	2	6	18*	5
E. coli	0	0	--	0
Turbidity	0	2	--	0
Dissolved oxygen	4	0	--	0
pH	2	0	--	2
Dissolved Chloride	3	2	--	0
Aluminum	11	--	--	5
Cadmium	11	--	--	6
Chromium	0	0	--	3
Copper	2	2	--	1
Iron	1	7	--	5
Manganese	0	2	--	1
Selenium	0	0	--	1
Vanadium	0	0	--	1
Zinc	0	2	--	0
Totals	**36**	**22**	**18***	**30**

Table 1. Summary of parameters with guideline value exceedances. Values of '--' indicate that the parameter was not measured in the respective monitoring event. Values marked '*' indicate that the monitoring was conducted at 18 sampling stations, seven more than the standard suite of only 11 stations.

In June 2015, staff introduced a three-phase assessment process to respond to the requirements of Bedford West Secondary Planning Strategy BW-5, as summarized in Table 2.

Phase	Activities	Timeline
Phase 1	1. Report and discuss findings with the developer. 2. Conduct, through contractor, detailed assessment of existing water quality from the Paper Mill Lake watershed to identify trends in TP measurements, considering CCME guidelines.	1. Completed May 29, 2015. 2. Intended for completion mid-August. Completed early October 2015.
Phase 2	In response to the outputs of Phase 1, staff will investigate the cause of the high TP measurements, considering all significant land uses that have occurred in the Paper Mill Lake watershed since the inception of the monitoring program.	Proposed for completion by August 2016.

Phase 3	Pursuant to the results of Phase 2, staff will propose a course of action respecting watershed management and future land use development in the area.	Proposed to start after conclusion of Phase 2, starting September 2016.

Table 2. Summary of proposed assessment plan.

Following the conclusion of Phase 1, staff determined that a broader-based study was required to enable staff to assess how best to proceed regarding land use development and watershed management. Since then, staff has developed the terms for a Paper Mill Lake watershed assessment study in association with Dalhousie University's Centre for Water Resources Studies. The objectives of the study are as follows:

1. Identify known and likely sources of phosphorus to Paper Mill Lake and Kearney Lake, and the relative magnitudes of these sources where possible
    a. Recommend, if possible, practical means of validating estimates for the phosphorus loading coefficients or annual loads.

2. Determine if most phosphorus loading in Kearney Lake and Paper Mill Lake is due to external sources or internal sources (i.e., internal loading). If this determination is not possible based on existing data, recommend whether or not a study should be undertaken to make this determination, and if so recommended, develop the parameters of a study that would be capable of making the determination conclusive.

3. Recommend a water quality monitoring program designed to determine if phosphorus loading from the Bedford West subdivision is increasing over time, both over the entire subdivision and on a sub-area by sub-area basis.

4. Recommend an appropriate, reliable, and conventional methodology that the Municipality should use to determine the current trophic state of a watershed, which may or may not be limited to the use of Total Phosphorus.

5. Outline the potential consequences of adopting alternative water quality management thresholds:

    a. Halifax requires that Dalhousie identify factors which may impact trophic status and body contact recreation opportunities, describe the nature of these impacts, and identify plausible scenarios such as increasing frequency, toxicity, size of affected area, etc., so that the Municipality can make the best informed decision regarding the scope and impact of the proposed watershed management and monitoring program.

6. Obtain the input of the municipality's Regional Watersheds Advisory Board at the project's onset and on the draft final report. Input shall be sought by presenting at the April and July meetings of the Board.

Staff anticipates that the study will conclude by the end of August 2016, and to develop recommendations for the North West Community Council based on the results of the study.

The next scheduled monitoring event will occur in May 2016. Staff will present the results of this event to the North West Community Council upon their receipt from the contractor.

FINANCIAL IMPLICATIONS

There are no financial implications for this report.

COMMUNITY ENGAGEMENT

No community engagement was required for this report.

ATTACHMENTS

Attachment A. Final Report: Water Quality Monitoring Program, Bedford West, Bedford, Nova Scotia - Fall 2015 Sampling Event, SNC Lavalin Inc., November 5, 2015.

Attachment B. Summary of Total Phosphorus Results, Summer 2013 – October 2015.

A copy of this report can be obtained online at http://www.halifax.ca/commcoun/index.php then choose the appropriate Community Council and meeting date, or by contacting the Office of the Municipal Clerk at 902.490.4210, or Fax 902.490.4208.

Report Prepared by: Cameron Deacoff, Environmental Performance Officer, 902.490.1926

Original Signed

Report Approved by:

Shannon Miedema, Acting Manager, Energy & Environment, 902.490.3665

SNC·LAVALIN

Water Quality Monitoring Program
Bedford West, Bedford, NS

Fall 2015 Sampling Event

09 | 12 | 2015 Final Report

Water Quality Monitoring - Fall 2015

Rev. C01 > SLI ref. 631477-0001-T-4E-REP-000-0003

SNC·LAVALIN

SNC-Lavalin Inc.
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December 9, 2015

Halifax Regional Municipality
Energy and Environment
PO Box 1749
Halifax, Nova Scotia
B3J 3A5

Attention: Mr. Cameron Deacoff

Dear Mr. Deacoff:

RE: Final Report: Water Quality Monitoring Program
Bedford West, Bedford, Nova Scotia – Fall 2015 Sampling Event

SNC-Lavalin Inc. (SLI) is pleased to submit one electronic copy of the Final Report presenting the results of the fall 2015 surface water sampling event for the Bedford West Water Quality Monitoring Program in Bedford, Nova Scotia.

If you have any questions or require clarification, please contact the undersigned at 902-492-4544.

Yours truly,

SNC♦LAVALIN INC.

Original Signed

Crysta Cumming, P. Eng
Environmental Department Manager

CC/mg

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EXECUTIVE SUMMARY

On October 23rd, 2015 SNC-Lavalin (Inc.) completed the Bedford West Fall 2015 water quality monitoring sampling event on behalf of Halifax Regional Municipality (HRM). The sampling program consisted of collecting surface water samples from eleven (11) sample stations. Water quality sampling consisted of recording field parameters and collecting surface water samples for the laboratory analyses of inorganics, calculated parameters, standard metals, and microbiological.

Applicable water quality criteria included:

- Canadian Council of Ministers of the Environment (CCME) guidelines for the Protection of Aquatic Life – Freshwater (PAL-F).
- Health Canada guidelines for Canadian Recreational Water Quality (2012, Third Edition).
- Nova Scotia Environment (NSE) Environmental Quality Standards (EQS) for Surface Water (EQS for Contaminated Sites (NSE 2014) Table A2, Reference for Pathway Specific Standards for Surface Water – Fresh Water.

During the fall 2015 water quality monitoring, the following parameters exceeded the recommended water quality criteria. Detail information such as station ID and analytical results are outlined in the report.

1. pH
2. Total Phosphorous
3. Standard Metals as follows:
    - Total Aluminium
    - Total Cadmium
    - Total Chromium
    - Total Copper
    - Total Iron
    - Total Manganese
    - Total Selenium
    - Total Vanadium

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1 INTRODUCTION AND BACKGROUND

SNC-Lavalin Inc. (SLI) has prepared this report to provide Halifax Regional Municipality (HRM) with water quality data for eleven (11) surface water stations throughout the Bedford West development area.

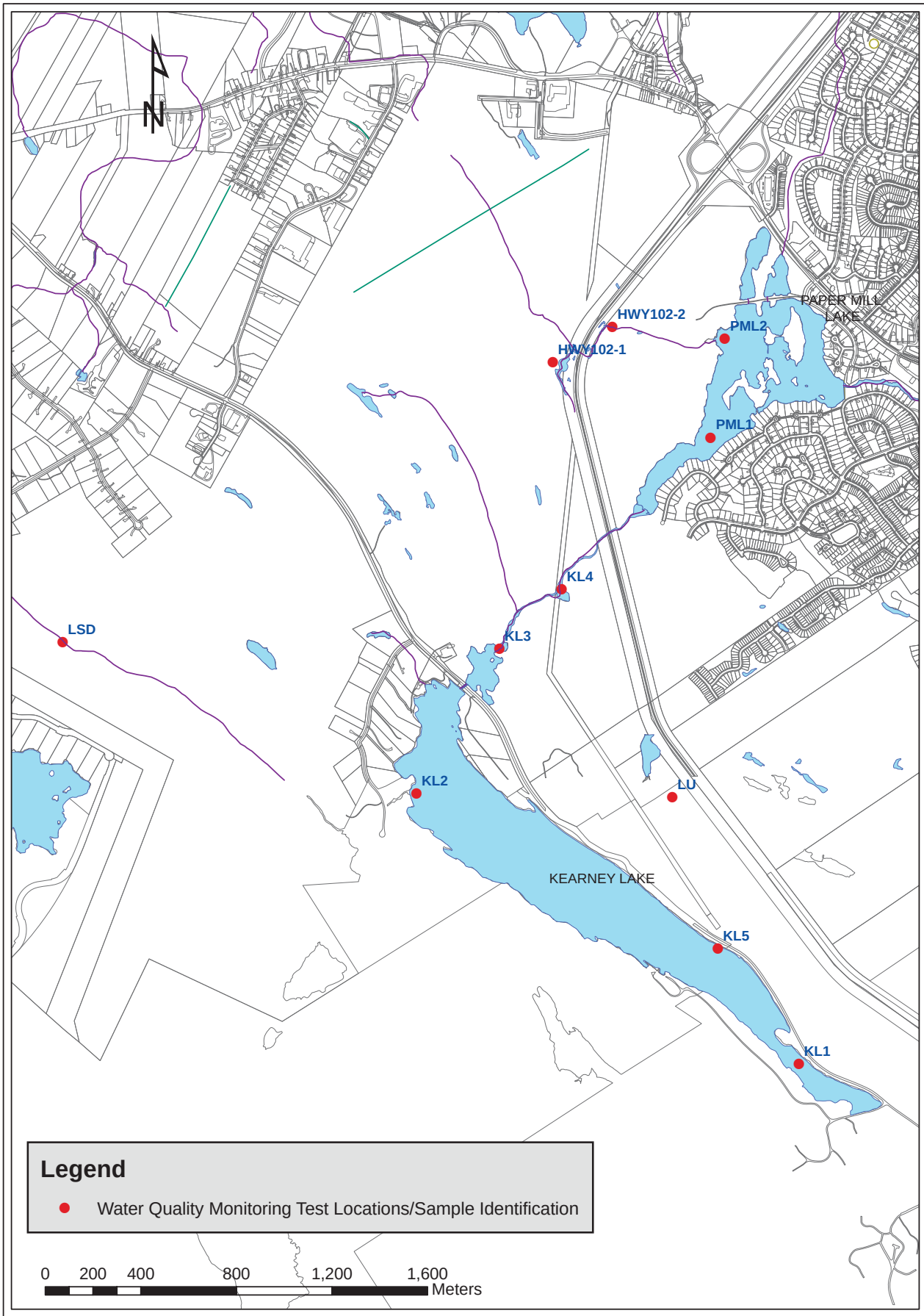
Water quality monitoring at the Bedford West development area has been ongoing since 2009. SLI was retained by HRM to complete water quality monitoring program each spring, summer and fall for two years beginning in 2015. The results of the fall 2015 monitoring program are detailed herein.

The overall purpose of the program is to conduct water quality sampling and testing prior to and during construction activities of the development project in order to detect any impacts on and/or changes to water quality.

The fall 2015 program consists of collecting surface water samples from eleven (11) specified test stations. Sampling locations are summarized in Table 1 and shown in Figure 1.

Table 1: Bedford West Sampling Stations

Water Course	Sample Location Name	Updated Coordinates (UTM NAD 83)	
		Easting	Northing
Kearney Lake	KL-1	20T445718E	4948496N
Kearney Lake	KL-2	20T0443859	4949738N
Kearney Run	KL-3	20T444390E	4950406N
Kearney Run	KL-4	20T444463E	4950571N
Kearney Lake	KL-5	20T4949142E	445280N
Creek Above Highway	HWY 102-1	20T444708E	4951644N
Creek Below Highway	HWY 102-2	20T444829E	4951778N
Lake Shore Drive	LSD	20T442583E	4950431N
Larry Uteck Off-Ramp	LU	20T444954E	4949891N
Paper Mill Lake	PML-1	20T445129E	4951154N
Paper Mill Lake	PML-2	20T445363E	4951740N



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HALIFAX REGIONAL MUNICIPALITY

PROJECT: WATER QUALITY MONITORING WITHIN BEDFORD WEST

TITLE: WATER QUALITY MONITORING TEST LOCATIONS

DESIGNED:	CH
DRAWN:	CH
CHECKED:	DH
SCALE:	AS SHOWN
DATE:	21-09-2015
PROJECT #:	631477-0001
DRAWING #:	1

2 METHODOLOGY

The fall 2015 water quality sampling event included collection of Field Parameters (Group A) and surface water for laboratory analysis of:

- Inorganic (Group B)
- Calculated Parameters (Group C)
- Standard Metals (Group D)
- Microbiological (Group E)

Table 2 below summarizes the water quality parameters measured in the field or analyzed by the laboratory.

Table 2: Analytical Parameter Groups

Field Parameters (A)	Inorganic (B)	Calculated Parameters (C)
▪ pH ▪ TDS ▪ Dissolved Oxygen ▪ Temperature ▪ Secchi Depth ▪ Conductance ▪ Air Temperature ▪ Cloud Cover ▪ Incidental Wildlife Sightings	▪ Total Alkalinity (as $CaCO_3$) ▪ Dissolved Chloride ▪ Colour ▪ Total Kjeldahl Nitrogen ▪ Nitrate + Nitrite ▪ Nitrate ▪ Nitrite ▪ Nitrogen (as NH4) ▪ Total Organic Carbon ▪ Orthophosphate (P) ▪ pH ▪ Low Total Phosphorus ▪ Reactive Silica ▪ Total Suspended Solids ▪ Dissolved Sulphate ▪ Turbidity ▪ Conductivity	▪ Anion Sum ▪ Cation Sum ▪ Ion Balance ▪ Bicarbonate Alkalinity(as $CaCO_3$) ▪ Carbonate Alkalinity (as $CaCO_3$) ▪ Hardness ▪ Total Dissolved Solids ▪ Saturation pH (@4°C & 20°C) ▪ Langelier Index (@4°C & 20°C)
Standard Metals (D)		**Microbiologicals (E)**
▪ Calcium ▪ Copper ▪ Iron ▪ Magnesium ▪ Manganese ▪ Potassium ▪ Sodium ▪ Zinc		▪ Chlorophyll A ▪ E. coli ▪ Most Probable Number (MPN) or CFU per 100 mL

All water samples and associated field parameters were collected on October 23rd, 2015. In addition, secchi depth measurements were collected on October 24th, 2015.

Field parameters consisting of pH, dissolved oxygen, specific conductivity, water temperature and air temperature were measured at each station using an **YSI Professional Plus (YSI QUATRO ISE-ISE-DO-COND-T, Serial 12F100289)**. The probe measures temperature, conductivity, DO, pH, ORP. The instrument is calibrated annually by the manufacturer. In addition, a pre-calibration was conducted by the provider (Open Road Environmental) prior to conduct the water quality sampling event.

Site conditions (i.e. weather, air temperature, cloud cover, site accessibility and wildlife sightings) and field parameters for each sampling location were recorded on a field report sheet. Each sample station was photographed during the sample event.

The water samples and field parameter readings were collected within a depth of 1.0 m below surface. Water samples were collected from the shore at all sample locations. Surface water sampling followed SNC-Lavalin Inc.'s Standard Operating Procedures (SOP) for surface water sampling. A new pair of latex gloves was used at each sample location.

Surface water samples were collected and placed in clean laboratory-supplied jars and stored in a chilled container together with a chain of custody record for transport to the laboratory. All surface water samples were submitted to AGAT Laboratories in Dartmouth, NS.

3 ASSESSMENT STANDARDS

- Total Phosphorous

  There is currently no national environmental quality guideline for phosphorus in freshwater aquatic environments. In the Canadian framework, trigger ranges are based on the trophic classification of the baseline condition. A trigger range is a desired concentration range for phosphorus; if the upper limit of the range is exceeded, it indicates potential for quality environmental issues, which "triggers" the need for further investigation.

  According to Canadian Council of Ministers of the Environment (CCME) 10 µg/L of total phosphorous is the threshold between oligotrophic and mesotrophic trophic classifications. For this water quality monitoring program, HRM defined a Total Phosphorous management threshold value of 10µg/L or 0.01mg/L.

- pH, Dissolved Oxygen and Dissolved Chloride

  The Canadian Council of Ministers of the Environment (CCME) guidelines for the Protection of Aquatic Life – Freshwater (PAL-F) were used.

- pH, Dissolved Oxygen, Dissolved Chloride, Total Suspended Solids and Turbidity

  For Total Suspended Solids (TSS) and Turbidity, the CCME Narrative Total Particulate Matter - Table 1 Suspended Sediments and Turbidity, High Flow Conditions, updated 2002 were used.

For TSS, the guideline value is equal to a maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. When background is greater than 250 mg/L, the concentration should not increase more than 10% of background levels.

- *E.coli,* Secchi Depth, and Turbidity

  The Health Canada guidelines for Canadian Recreational Water Quality (2012, Third Edition) were used. The Canadian Recreational Water Quality guidelines indicate that the clarity of the water should be sufficiently clear such that a Secchi disk is visible at a minimum of 1.2 metres. For turbidity, the guidelines indicate a limit of 50 Nephelometric Turbidity Units (NTU).

- Inorganic Parameters

  Nova Scotia Environment (NSE) Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table A2, Reference for Pathway Specific Standards for Surface Water (µg/L) – Fresh Water were used.

4 WATER QUALITY RESULTS SUMMER 2015

Laboratory Certificates of Analysis are enclosed in **Appendix A**.

4.1 FIELD OBSERVATIONS

Site conditions were recorded for all **water quality monitoring locations (stations)** and are included in the field data sheets in **Appendix B**.

Site condition observations include weather, cloud cover, air temperature, wildlife sightings and site accessibility. In addition, site photographs are included in **Appendix C**.

4.2 FIELD MEASUREMENTS

Field measurements were recorded on field data sheets, which are provided in **Appendix B**. Field data sheets include the following information: date and time of sample collection, sample depth, pH, Dissolved Oxygen, water temperature, conductivity and secchi depth (if applicable).

Field measurements are summarized in **Table 3** attached at the end of this report.

Dissolved oxygen readings in all water stations were within the range of 5.5-9.5 mg/L recommended in the CCME PAL-F guidelines.

NOTE: In situ pH, water temperature, conductivity and secchi depth do not have a recommended or applicable guideline.

4.3 LABORATORY ANALYTICAL RESULTS

Laboratory analytical results are presented in **Table 3**, which is attached at the end of this report.

4.3.1 TOTAL PHOSPHOROUS

Total Phosphorus concentrations that exceeded the management threshold criteria of 10 µg/L (0.01 mg/L) listed in the HRM RFP 14-338 were reported at five (5) of the monitoring stations as follows:

NOTE: results are also presented in mg/L for comparison with Table 3.

- KL1 11 µg/L (0.011 mg/L)
- HWY-102-2 12 µg/L (0.012 mg/L)
- LSD 95 µg/L (0.095 mg/L)
- LU 11 µg/L (0.011 mg/L)
- PLM-1 18 µg/L (0.018 mg/L)

4.3.2 GENERAL CHEMISTRY

pH was outside the CCM-PAL-F guideline of 6.5 - 9 at two (2) monitoring stations as follows:

- KL-2 6.28
- HWY-102-2 6.18

4.3.3 STANDARD METALS

Total Aluminium exceeded the applicable NSE EQS guideline of 5 µg/L at the following five (5) monitoring stations. It should also be noted that the CCME Guideline PAL-F limit is 5 - 100 µg/L.

- KL-2 284 µg/L
- HWY-102-2 129 µg/L
- LSD 1960 µg/L
- PML-1 2320 µg/L
- PLM-2 278 µg/L

Total Cadmium exceeded the applicable NSE EQS guideline of 0.01 µg/L at the following six (6) monitoring stations. Note that the CCME Guideline PAL-F is 0.017 µg/L.

- KL-1 0.187 µg/L
- KL-2 0.176 µg/L
- KI-5 0.332 µg/L

- LU 0.176 µg/L
- PLM-1 0.146 µg/L
- PLM-2 0.145 µg/L

Total Chromium exceeded the applicable CCME Guideline PAL-F of 1 µg/L at following monitoring stations:

- KL-5 7 µg/L
- LSD 3 µg/L
- PLM-1 2 µg/L

Total Copper exceeded the applicable NSE EQS guideline of 2µg/L at the one (1) station. Note that the CCME Guideline PAL-F is 2.0 – 4.0 µg/L.

- LSD 6 µg/L

Total Iron exceeded the applicable NSE EQS guideline of 300µg/L at the following five (5) stations. Note that the CCME Guideline PAL-F is also 300µg/L.

- KL2 478 µg/L
- HWY102-2 714 µg/L
- LSD 4570 µg/L
- PML-1 6020 µg/L
- PLM-2 368 µg/L

Total Manganese exceeded the applicable NSE EQS guideline of 820µg/L at the following station:

- LSD 985 µg/L

Total Selenium exceeded the applicable NSE EQS guideline of 1µg/L at the following station. Note that the CCME Guideline FWAL is also 1µg/L.

- KL-5 3 µg/L

Total Vanadium exceeded the applicable NSE EQS guideline of 6µg/L at the following station:

- PLM-1 7 µg/L

4.3.4 MICROBIOLOGICAL

Eleven (11) *E.coli* samples were collected during the fall 2015 sampling program. *E.coli* did not exceed the Heath Canada Guidelines of 400 CFU /100 mL in any of the samples collected.

5 STATISTICAL PRESENTATION

Table 4, which is attached at the end of this report, provides the seasonal statistics of the eleven (11) stations representing water quality data from 2009 to 2015 for six (6) key water quality parameters as follows:

- Total Phosphorous
- Chloride
- Laboratory measured pH
- Total Suspended Solids
- Conductivity
- Chlorophyll-A

6 GRAPHS

Appendix D includes seasonal (fall) and yearly graphs that illustrate concentrations from 2009 to 2015 of the six (6) key water quality parameters; dissolved chloride (mg/L), pH, total phosphorus (mg/L), total suspended solids (mg/L), conductivity (µS/cm) and chlorophyll A (µg/L); at each of the eleven (11) water quality monitoring sites. Graphs allow for comparison between sites and identification of concentration increases (i.e. above applicable CCME guidelines).

As many parameters show seasonal concentration fluctuations, the data was also graphed showing only the concentrations for a given season (i.e. fall sampling events in this case). Where results were found to be less than the recordable detection limit (<RDL), they were graphed as half the recordable detection limit (1/2 RDL).

7 CONCLUSIONS

The fall 2015 water quality monitoring program included collection of surface water samples at eleven (11) monitoring stations for the analysis of general chemistry, total metals, total phosphorus, total suspended solids, *E.coli*, and chlorophyll-A. Additionally, field parameters collected at each station included pH, water temperature, dissolved oxygen, conductivity, secchi depth (if applicable), air temperature, cloud cover and wildlife sightings.

Based on the fall 2015 monitoring results and their comparison with applicable guidelines, the following list summarizes the results:

- **Total Phosphorous** was above the management threshold criteria of 10µg/L at five stations as follows: KL1: 11 µg/L; HWY-102-2: 12 µg/L; LSD: 95 µg/L; LU: 11 µg/L and PLM-1: 18 µg/L.

General Chemistry

- **pH** was outside the CCM-PAL-F guideline of 6.5 - 9 at two (2) stations as follows KL-2: 6.28 and HWY-102-2: 6.18.

Standard Metals

- **Aluminium** exceeded the applicable NSE EQS guideline of 5µg/L at the following five (5) stations: KL-2: 284 µg/L; HWY-102-2: 129 µg/L; LSD: 1960 µg/L; PML-1: 2320 µg/L; and PLM-2: 278 µg/L.
- **Cadmium** exceeded the applicable NSE EQS guideline of 0.01µg/L at the following six (6) stations: KL-1: 0.187 µg/L; KL-2: 0.176 µg/L; KL-5: 0.332 µg/L; LU: 0.176 µg/L; PLM-1: 0.146 µg/L; and PLM-2: 0.145 µg/L.
- **Chromium** exceeded the applicable CCME Guideline FWAL of 1µg/L at following three stations: KL-5: 7 µg/L; LSD: 3 µg/L; and PLM-1: 2 µg/L.
- **Copper** exceeded the applicable NSE EQS guideline of 2 µg/L at station LSD: 6µg/L.
- **Iron** exceeded the applicable NSE EQS guideline of 300 µg/L at the following five (5) stations: KL2: 478 µg/L; HWY102-2: 714 µg/L; LSD: 4570 µg/L; PML-1: 6020 µg/L; and PLM-2: 368 µg/L.
- **Manganese** exceeded the applicable NSE EQS guideline of 820 µg/L at station LSD: 985 µg/L.
- **Selenium** exceeded the applicable NSE EQS guideline of 1 µg/L at station KL-5: 3 µg/L.
- **Vanadium** exceeded the applicable NSE EQS guideline of 6 µg/L at the station PLM-1: 7 µg/L.

Microbiological

- ***E.coli*** analytical results did not report excedances of the Heath Canada Guideline of 400CFU/100mL in any of the eleven (11) sample stations.

8 REFERENCES

Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, 2004, "Phosphorous: Canadian Guidance Framework for the Management of Freshwater Systems".

Canadian Council of Ministers of the Environment (CCME) guidelines for the Protection of Aquatic Life – Freshwater (FWAL). For TSS and turbidity, the CCME Narrative Total Particulate Matter – Table 1 Suspended Sediments and Turbidity, High Flow Conditions, updated 2002 were used.

Environment Canada (EC), 2005, The Inspector's field sampling manual. Second Edition. Retrieved on March 6, 2015 from http://publications.gc.ca/collections/Collection-R/En40-498-2005-1E.pdf

Health Canada guidelines for Canadian Recreational Water Quality (2012, Third Edition). For turbidity, the guidelines indicate a limit of 50 Nephelometric Turbidity Units (NTU).

Nova Scotia Environment (NSE), Environmental Quality Standards for Surface Water (Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table A2 Reference for Pathway Specific Standards for Surface Water (ug/L) – Fresh Water

9 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SNC-Lavalin Inc (SLI) for Halifax Regional Municipality (HRM), hereafter referred to as the "Client". It is intended for the sole and exclusive use of Halifax Regional Municipality.

The report has been prepared in accordance with the Scope of Work and agreement between SLI and the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SLI.

This report has been prepared in a manner generally accepted by professional consulting principles and practices for the same locality and under similar conditions. No other representations or warranties, expressed or implied, are made.

Opinions and recommendations contained in this report are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, stations, time frames and project parameters as outlined in the Scope or Work and agreement between SLI and the Client. The data reported, findings, observations and conclusions expressed are limited by the Scope of Work. SLI is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SLI does not warranty the accuracy of information provided by third party sources.

TABLE 3: Bedford West Water Quality Sampling Program

Fall 2015	Units	RDL (October 2015)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	CCME Phosphorus Trigger Range (Applied)	Kearney Lake																	
Sample Sites							KL1																	
Sampling Date	yyyy-mm-dd	–					2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2013/08/16	2013/10/16	2014/05/14	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22
Sampling Time	hh:mm	–					08:00	11:45	08:30	11:00	13:10	12:00	11:00	14:30	14:00	8:30	11:20	9:50	10:20	11:10	13:30	10:30	14:15	14:55	08:30	14:54	12:30
FIELD DATA																											
Secchi Depth	Meters	–	--	1.2	--		4.1	4.2	5.0	N/A	5.0	4.9	2.4	3.2	2.4	2.35	5.36	N/A	2.50	2.03	2.90	2.36	2.70	2.54	NCC	N/A	2.21
Water Temp	Celsius	0.1	--	--	--		14.0	22.2	16.7	12.9	23.3	8.8	11.5	25.6	15.9	8.9	23.3	15.4	13.2	22.2	14.1	12.7	23.2	12.2	14.12	26.1	9.4
Dissolved Oxygen	mg/L	0.01	--	--	5.5 - 9.5		10.77	8.20	7.00	9.13	7.86	10.48	10.69	8.22	9.22	8.98	7.93	8.72	9.76	8.57	8.30	15.29	7.22	8.12	9.55	8.13	7.38
pH	pH	N/A	--	--	--		6.20	6.76	6.67	7.23	7.32	6.61	6.60	6.16	6.04	8.67	6.91	6.32	6.32	8.24	6.35	6.74	7.46	6.44	8.33	6.95	7.02
Specific Conductance	uS/cm	1	--	--	--		263	299	261	248	242	219	288	179	146	277	279	198.1	243	216.5	217.9	547.0	341.0	223.0	0.182	298.3	238.5
INORGANICS																											
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		6	8	8	7	8	6	<5	9	7	24	7	<5	<5	<5	8	30	14	<5	5.2	6	7
Dissolved Chloride (Cl)	mg/L	1	--	--	120		81	74	64	62	60	55	73	45	33	66	70	50	66	59	48	80	76	46	60	62	58
Colour	TCU	30	--	--	--		18	18	16	26	8	21	28	40	45	50	11	20	11	37	20	13	8	23	37	8	22
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.18	0.09	0.12	0.21	0.16	0.23	0.2	0.11	0.13	0.20	0.09	0.10	0.18	0.14	0.19	0.11	0.11	0.08	0.15	0.15	0.17
Nitrate (N)	mg/L	0.05	--	--	13000		0.18	--	--	0.21	0.16	--	0.2	–	–	0.20	0.09	0.10	0.18	0.14	0.19	0.11	0.11	0.08	0.15	0.15	0.17
Nitrite (N)	mg/L	0.05	--	--	60		<0.01	--	--	<0.01	<0.01	--	<0.01	–	–	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	--	--	19		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.03	<0.03	0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.050	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.9	3.1	0.4	--	0.7	<0.4	1.1	<0.4	0.4	0.22	4.5	0.4
Total Organic Carbon	mg/L	0.5	--	--	--		2.4	2.9	4.7	3.3	3.2	3.1	3.4	5.9	5.5	5.4	2.9	5.2	4.4	4.1	4.3	4.6	2.4	4.4	3.0	5.3	5.5
Orthophosphate (as 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	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5-9		6.94	6.65	6.68	6.91	7.00	6.79	6.52	6.51	6.52	6.7	7.2	6.9	6.78	6.93	6.85	6.72	7.06	6.35	6.62	6.95	6.99
Total Calcium (Ca)	mg/L	0.1	--	--	--		9.2	8.5	7.2	7.72	8.66	8.30	7.65	4.82	5.31	6.8	8.4	6.3	7.5	6.6	6.5	8.1	11	6.0	6400	7.9	6.1
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.5	1.4	1.2	1.42	1.36	1.30	1.29	0.86	1.06	1.1	1.5	1.5	1.1	1.2	1.2	1.6	1.6	0.9	920	1.3	0.9
Total Phosphorus (1M depth)	mg/L	0.002	--	--	--	**0.01**	<0.02	<0.02	<0.002	0.009	0.007	0.005	0.008	0.012	0.009	0.037	0.043	0.007	0.007	0.011	0.008	0.011	0.026	0.01	0.0008	0.002	**0.011**
Total Potassium (K)	mg/L	0.1	--	--	--		1.1	0.9	1.3	0.876	0.888	0.901	0.788	0.773	0.871	0.7	0.9	0.9	0.8	0.7	1.1	0.9	1.6	0.7	680	0.9	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		51	46	37	31.8	35.2	33.8	43.7	22.8	19.8	40.1	42.0	29.8	35.8	26.2	31.6	50.2	54.2	37.6	33	43.3	39.8
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.6	2.2	2.3	2.9	2.7	2.9	2.8	1.9	2.3	2.4	1.3	2.2	2.5	1.8	2.2	2.0	1.5	1.8	2.5	1.8	2.7
Total Suspended Solids	mg/L	5	--	--	--		1	1	<1	4	17	3	2	2	3	<5	<5	<5	<5	<5	5	<5	<5	<5	<1.0	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		14	13	12	11	11	11	12	10	8	8	9	9	11	9	9	12	11	7	8.7	10	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	0.8	1.0	1.0	1.3	0.6	1	1	0.9	2.4	0.8	1.3	1.6	3.3	0.5	2.9	0.7	1.9	0.81	1.9	1.1
Conductivity (uS/cm)	µS/cm	1	--	--	--		310	290	250	240	240	230	290	180	140	246	274	196	259	241	212	290	339	235	220	257	244
Calculated Parameters																											
Anion Sum	me/L	N/A	--	--	--		2.72	2.52	2.23	2.12	2.08	1.91	2.33	1.66	1.27	2.52	2.31	1.60	2.10	1.86	1.71	3.11	2.66	1.45	1.98	2.09	1.95
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		6	8	8	7	8	6	<1	9	7	24	7	<5	<5	<5	8	30	14.00	<5	5.2	6	7
Calculated TDS	mg/L	1	--	--	--		166	151	131	123	125	118	143	92	77	139	137	98	124	104	103	172	165.00	99	120	130	119
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10
Cation Sum	me/L	N/A	--	--	--		2.85	2.57	2.12	1.92	2.10	2.02	2.42	1.33	1.25	2.24	2.41	1.79	2.08	1.61	1.84	2.77	3.09	2.05	1.84	2.43	2.14
Hardness (CaCO3)	mg/L	1	--	--	--		29	27	23	25	27	26	24	16	18	21.5	27.2	21.9	23.3	21.4	21.2	26.8	34.10	18.7	20.0	25.1	18.9
Ion Balance (% Difference)	%	N/A	--	--	--		2.33	0.98	2.53	4.95	0.48	2.80	1.89	11.00	0.79	5.9	2.1	5.3	0.7	7.3	3.4	5.8	7.50	17.2	3.66	7.5	4.5
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-2.68	-2.87	-2.94	-2.72	-2.51	-2.87	NC	-3.18	-3.21	-2.69	-2.63	-3.19	-3.24	-3.14	-3.02	-2.51	-2.36	-3.76	-3.21	-2.97	-2.97
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-2.93	-3.12	-3.19	-2.97	-2.76	-3.12	NC	-3.43	-3.46	-3.01	-2.95	-3.51	-3.56	-3.46	-3.34	-2.83	-2.68	-4.08	-3.46	-3.29	-3.29
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.62	9.52	9.62	9.63	9.51	9.66	NC	9.69	9.73	9.39	9.83	10.10	10.0	10.1	9.87	9.23	9.42	10.1	9.83	9.92	9.96
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.87	9.77	9.87	9.88	9.76	9.91	NC	9.94	9.98	9.71	10.2	10.4	10.3	10.4	10.2	9.55	9.74	10.4	10.1	10.2	10.3
Metals (ICP-MS)																											
Total Aluminum (Al)	µg/L	5	5	--	5-100		230	--	--	299	47.8	--	338	–	–	321	43	168	191	120	56	229	42	156		--	88
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	18.5	15.9	--	13	–	–	12	15	9	12	7	16	14	20	9	16	--	17
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	11.4	9.1	--	<50	–	–	<5	11	33	6	10	9	7	22	10	<50	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.017		<0.3	--	--	0.053	<0.017	--	0.056	--	--	0.032	0.027	0.021	0.020	<0.017	0.017	0.037	<0.017	0.025		--	0.187
Total Chromium (Cr)	µg/L	1	---	--	1		<2	--	--	<1.0	<1.0	--	<1.0	–	–	<1	<1	<1	<1	<1	<1	6	<1	<1	<1.0	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		1	--	--	0.54	<0.40	--	0.79	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1
Total Copper (Cu)	µg/L	1	2	--	2.0-4.0		<2	--	--	5.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	1	1	<1	1	<2.0	<1	2
Total Iron (Fe)	µg/L	50	300	--	300		130	--	--	313	62	125	177	162	304	229	137	195	207	132	92	147	124	168	110	157	81
Total Lead (Pb)	µg/L	0.5	1	--	1.0-7.0		<0.5	--	--	10.3	<0.50	--	<0.50	--	--	<0.5	<0.5	1.9	<0.5	<0.5	<0.5	5.1	<0.5	<0.5	<0.50	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		100	--	--	79.2	57.1	59	78.4	52.3	55.8	48	65	68	73	48	24	48	115	42	39	41	22
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25-150		5	--	--	3.2	<2.0	--	3.2	–	–	<2	<2	2	2	<2	<2	3	<2	3	<2.0	--	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.1		<0.5	--	--	<0.10	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		46	--	--	39.1	37.7	--	36	–	–	32	41	32	37	33	30	40	45	26	29	--	19
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.10	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		11	--	--	6.4	<2.0	--	5.4	–	–	8	<2	3	4	2	<2	2	<2	5	2.3	--	<2
Total Uranium (U)	µg/L	0.1	300	--	15		0.1	--	--	0.11	<0.10	--	0.12	–	–	0.1	<0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.10	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		27	--	--	14.4	7.5	11.1	12.1	13.3	9.7	5	<5	11	11	6	5	14	<5	9	13	8	<5
MICROBIOLOGICAL																											
Total Coliform	MPN/100mL	1	--	--	--		200	65	--	>250	63	>250	91	>250	--	2420	>2420	1120	1200	866	488	525	1550	>2420	---	980	122
E. coli	MPN/100mL	1	--	400	--		39	24	--	9	15	37	8	>250	<100	41	11	17	48	2	7	<1	15	28	60	24	6
Fecal Coliform	MPN/ml	--	--	400	--		--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.53	0.79	1.11	1.73	1.47	0.99	0.76	1.44	1.36	0.62	2.3	1.54	1.22	1.40	1.19	0.40	0.41	0.84	0.64	1.14	1.79
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.48	0.69	1.17	1.61	1.42	0.81	0.69	1.15	1.14	0.63	2.3	2.16	1.40	1.40	1.19	1.32	0.36	0.8	0.62	1.11	0.95

Notes:

NA - Not Applicable; NC - Not Calcuable; NCC - Not Collected
RDL = Recordable Detection Limit (represents most recent sampling event RDL)
* --- * = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guidelines (updated 2011)
CCME FWAL Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME FWAL calculation equations). The largest guideline value for each respective element range was always used.
Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September 2009)
Nova Scotia Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table A2 Reference for Pathway Specific Standards for Surface Water (ug/L) - Fresh Water

Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result (pH, Dissolved Oxygen, Dissolved Chloride, Total Suspended Solids and Turbidity)
Bold = Parameter concentration exceeds NSE EQS Contaminated Sites Regulations - Present Result (Inorganics, Metals)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result (SNC Lavalin)

TABLE 3: Bedford West Water Quality Sampling Program

Fall 2015	Units	RDL (October 2015)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	CCME Phosphorus Trigger Range (Applied)	Kearney Lake																			
Sample Sites							KL2																			
Sampling Date	yyyy-mm-dd	–					2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2013/08/15	2013/10/16	2014/05/14	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22
Sampling Time	hh:mm	–					11:00	10:30	10:45	10:15	12:25	10:50	09:30	14:00	13:15	9:50	10:30	10:20	09:10	16:10	14:30	10:45	9:20	14:04	09:15	13:29	13:05
FIELD DATA																										
Secchi Depth	Meters	–	--	1.2	--		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NCC	N/A	1.3
Water Temp	Celsius	0.1	--	--	--		16.8	18.2	15.4	13.5	20.4	8.0	9.9	19.1	14.1	7.6	21.8	12.3	10.1	22.9	9.7	11.7	21.1	10.8	13.13	24.7	8.1
Dissolved Oxygen	mg/L	0.01	--	--	5.5 - 9.5		**10.16**	8.50	5.70	6.28	**4.66**	**9.58**	**9.66**	7.06	8.43	6.47	5.82	7.63	9.37	6.38	7.40	**14.90**	6.95	7.7	8.41	7.28	7.14
pH	pH	N/A	--	--	--		6.33	6.35	6.19	6.61	6.96	6.25	6.77	5.90	5.62	7.72	6.41	6.29	5.75	7.47	5.57	6.60	7.22	5.79	6.36	5.88	6.43
Specific Conductance	uS/cm	1	--	--	--		46	106	89	199	104	75	80	67	54	58	96.6	61.1	77.9	65.3	64.5	188.0	266.0	63.0	0.053	107.9	73.6
INORGANICS																										
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		8	8	8	8	7	<5	<5	7	<5	20	<5	8	<5	<5	<5	29	7	28	<5.0	7	<5
Dissolved Chloride (Cl)	mg/L	1	--	--	120		48	48	48	48	25	17	19	14	10	16	20	12	19	21	14	20	17	12	15	14	12
Colour	TCU	30	--	--	--		20	20	20	20	63	95	80	110	120	52	60	94	37	90	71	25	44	168	50	63	61
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.19	0.19	0.19	0.19	0.07	0.06	0.12	0.07	<0.05	0.11	0.08	<0.05	0.12	<0.05	<0.05	0.08	<0.05	<0.05	0.059	0.08	<0.05
Nitrate (N)	mg/L	0.05	--	--	13000		0.19	0.19	0.19	0.19	0.07	--	0.12	–	–	0.11	0.08	<0.05	0.12	<0.05	<0.05	0.08	<0.05	<0.05	0.059	0.08	<0.05
Nitrite (N)	mg/L	0.05	--	--	60		<0.05	<0.05	<0.05	<0.05	<0.01	--	<0.01	–	–	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	--	--	19		<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	0.04	<0.03	<0.050	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	2.2	0.7	--	1.1	<0.4	<0.4	0.4	<0.4	0.4	0.8	0.8
Total Organic Carbon	mg/L	0.5	--	--	--		4.3	4.3	4.3	4.3	6.6	9.7	6.5	10	12	8.1	7.1	10.9	7.5	11.1	10.9	6.2	6.6	12.9	4.0	13.3	14.0
Orthophosphate (as 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	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5-9		6.85	6.85	6.85	6.85	6.78	**6.11**	**6.27**	**6.4**	**6.05**	6.5	6.7	6.5	**6.37**	6.62	**6.34**	6.53	6.87	**6.06**	**6.32**	6.99	**6.28**
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.5	6.5	6.5	4.08	3.55	2.51	2.48	2.21	2.4	3.6	2.9	2.7	2.5	2.4	3.4	4.0	2.4	2600	3.4	1.1
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.2	1.2	1.2	0.98	0.84	0.63	0.64	0.36	0.7	1.0	1.0	0.7	0.5	0.8	1.1	1.0	0.6	640	0.9	0.7
Total Phosphorus (1M depth)	mg/L	0.002	--	--	--	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	0.009	0.009	0.009	0.008	**0.013**	**0.021**	**0.059**	**0.013**	**0.010**	**0.020**	**0.029**	**0.013**	**0.039**	**0.03**	0.008	**0.012**	0.008
Total Potassium (K)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.1	0.634	0.826	0.534	0.497	0.734	0.5	0.7	0.8	0.5	0.5	0.7	0.7	0.9	0.7	540	0.7	0.6
Total Sodium (Na)	mg/L	0.1	--	--	--		31.6	31.6	31.6	31.6	14.7	10.6	11.1	7.8	6.9	9.8	14.2	9.5	8.9	7.0	7.9	17.5	14.0	7.6	8.4	11.5	6.6
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.2	2.2	2.2	2.2	4.2	4.7	2.7	4.3	4	2.6	4.0	4.9	2.8	4.4	4.9	2.4	3.3	4.6	2.0	3.7	5.1
Total Suspended Solids	mg/L	5	--	--	--		103	103	103	103	7	<1	<1	<2	<1	<5	<5	<5	<5	135	<5	<5	<5	<5	<1.0	<5	17
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		9	9	9	9	<2	<2	<2	<2	<2	3	3	2	4	5	4	4	2	3	2.8	<2	3
Turbidity (NTU)	NTU	0.1	--	50	--		0.5	0.5	0.5	0.5	1.0	1.0	0.4	0.7	0.6	0.5	1.1	1.0	1.9	2.2	1.0	0.9	0.8	1.2	<1.0	1.6	6.2
Conductivity (uS/cm)	µS/cm	1	--	--	--		212	212	212	212	100	97	79	66	54	71	91	61	83	69	62	87	94	66	64	81	73
Calculated Parameters																										
Anion Sum	me/L	N/A	--	--	--		0.49	0.82	0.45	0.77	0.85	0.49	0.53	0.53	0.28	0.92	0.63	0.54	0.63	0.70	0.48	1.23	0.66	0.96	0.48	0.54	0.40
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		<1	8	<1	5	7	<1	<1	7	<1	20	<5	8	<5	<5	<5	29	7	28	<1.0	7	<5
Calculated TDS	mg/L	1	--	--	--		36	55	35	46	55	38	37	34	25	45	44	34	37	37	31	65	44	44	32	36	25
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10
Cation Sum	me/L	N/A	--	--	--		0.71	0.99	0.67	0.74	0.95	0.74	0.68	0.55	0.49	0.65	0.94	0.73	0.63	0.54	0.60	1.07	0.97	0.57	0.57	0.82	0.47
Hardness (CaCO3)	mg/L	1	--	--	--		10	15	10	12	14	12	9	9	8	8.9	13.1	11.4	9.6	8.3	9.3	13.0	14.1	8.5	9.1	12.2	5.6
Ion Balance (% Difference)	%	N/A	--	--	--		18.30	9.39	19.60	1.99	5.56	20.30	12.40	1.85	27.30	17.6	19.7	15.1	0.3	12.9	11.0	7.1	19.1	25.7	8.57	20.5	7.5
Langelier Index (@ 20C)	N/A	N/A	--	--	--		NC	-3.20	NC	-3.44	-3.05	NC	NC	-3.66	NC	-3.37	-3.60	-3.68	-4.05	-3.83	-4.12	-3.04	-3.23	-3.66	NC	-3.18	-4.51
Langelier Index (@ 4C)	N/A	N/A	--	--	--		NC	-3.45	NC	-3.70	-3.30	NC	NC	-3.91	NC	-3.69	-3.92	-4.00	-4.37	-4.15	-4.44	-3.36	-3.55	-3.98	NC	-3.50	-4.83
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	9.78	NC	10.00	9.83	NC	NC	10.10	NC	9.87	10.3	10.2	10.4	10.5	10.5	9.57	10.1	9.72	NC	10.20	10.8
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	10.00	NC	10.30	10.10	NC	NC	10.30	NC	10.2	10.6	10.5	10.7	10.8	10.8	9.89	10.4	10.0	NC	10.5	11.1
Metals (ICP-MS)																										
Total Aluminum (Al)	µg/L	5	5	--	5-100		**290**	--	--	**175**	**151**	--	**271**	--	–	**209**	**205**	**338**	**256**	**270**	**259**	**205**	**236**	**340**	***190***	--	**284**
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		9	--	--	11.7	14.3	--	9.5	–	–	9	11	10	8	<5	13	13	18	9	9.2	--	9
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	14.7	12.7	--	<50	–	–	6	14	22	6	11	9	11	12	12	<50	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.017		<0.3	--	--	**0.018**	<0.017	--	<0.017	–	–	<0.017	<0.017	<0.017	<0.017	<0.017	**0.019**	<0.017	<0.017	**0.018**	***0.014***	--	**0.176**
Total Chromium (Cr)	µg/L	1	---	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	–	<1	<1	<1	<1	<1	<1	**9**	<1	<1	<1.0	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	<0.40	<0.40	--	<0.40	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1
Total Copper (Cu)	µg/L	1	2	--	2.0-4.0		<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	<1	2	<1	<1	4	<2.0	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		250	--	--	227	**403**	238	202	**418**	**358**	154	**541**	**613**	269	**578**	**523**	174	**773**	**705**	250	**641**	**478**
Total Lead (Pb)	µg/L	0.5	1	--	1.0-7.0		<0.5	--	--	1.01	<0.50	--	<0.50	–	–	<0.5	<0.5	1.1	<0.5	0.5	<0.5	5.8	<0.5	0.5	<0.50	--	0.6
Total Manganese (Mn)	µg/L	2	820	--	--		26	--	--	43.2	83.3	34.7	12.1	68.4	22.6	17	90	114	24	67	53	33	146	25	47	120	57
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25-150		<2	--	--	<2.0	<2.0	--	<2.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	–	<1	<1	1	<1	<1	<1	<1	<1	<1	<1.0	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.1		<0.5	--	--	**0.42**	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		14	--	--	17.8	19.5	--	11.9	–	–	10	18	15	12	9	12	16	17	12	12	--	8
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.10	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	–	<2	<2	3	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		2	--	--	<2.0	<2.0	--	2.8	--	–	<2	2	3	4	<2	2	2	<2	3	2.5	--	<2
Total Uranium (U)	µg/L	0.1	300	--	15		<0.1	--	--	<0.10	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	5.4	5.3	6.5	<5.0	<5.0	<5.0	<5	<5	7	<5	<5	<5	<5	<5	<5	<5.0	<5	<5
MICROBIOLOGICAL																										
Total Coliform	MPN/100mL	1	--	--	--		1800	170	--	>250	11	>250	59	>250	–	>2420	1986	>2420	>2420	>2420	>2420	525	>2420	>2420	---	>2420	>2420
E. coli	MPN/100mL	1	--	400	--		**1500**	100	--	**>250**	6	6	2	**>250**	<100	3	7	3	12	6	2	<1	18	11	30	11	5
Fecal Coliform	MPN/ml	--	--	400	--		--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.82	6.05	1.97	0.73	0.55	0.22	0.44	0.89	0.97	0.53	2.2	0.07	0.62	1.00	0.73	0.13	0.83	0.41	0.34	0.96	0.46
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.87	5.97	1.95	0.66	0.54	0.21	0.42	0.73	0.82	0.56	2.2	0.12	0.72	1.00	0.74	0.14	0.86	0.41	---	1.26	0.26

Notes:

NC - Not Calculable
RDL = Recordable Detection Limit (represents most recent sampling event RDL)
* -- * = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)
CCME FWAL Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME FWAL calculation equations). The largest guideline value for each respective element range was

Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September 2009) (Referenced)
Nova Scotia Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table A2 Reference for Pathway Specific Standards for Surface Water (ug/L) - Fresh Water

Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result (pH, Dissolved Oxygen, Dissolved Chloride, Total Suspended Solids and Turbidity)
Bold = Parameter concentration exceeds NSE EQS Contaminated Sites Regulations - Present Result (Inorganics, Metals)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result (SNC Lavalin)

TABLE 3: Bedford West Water Quality Sampling Program

Fall 2015	Units	RDL (October 2015)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	CCME Phosphorus Trigger Range (Applied)	Kearney Lake																		
Sample Sites							KL3																		
Sampling Date	yyyy-mm-dd	–					2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2013/08/16	2013/10/16	2014/05/14	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22
Sampling Time	hh:mm	–					09:00	11:00	09:30	11:30	14:12	11:40	10:30	12:20	12:00	10:26	12:20	11:20	9:50	10:00	14:00	11:00	11:50	14:25	10:35	11:45	10:40
FIELD DATA																											
Secchi Depth	Meters	–	--	1.2	--		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NCC	N/A	N/A
Water Temp	Celsius	0.1	--	--	--		14.0	21.6	17.3	14.7	23.1	9.9	10.3	21.1	15.5	9	24.5	15.6	11.7	21.5	13.6	11.0	22.7	12.8	14.73	25.0	8.4
Dissolved Oxygen	mg/L	0.01	--	--	5.5 - 9.5		**10.79**	8.00	8.00	9.26	7.83	**10.35**	**11.06**	8.42	**9.60**	8.89	8.17	7.72	**10.20**	9.20	8.90	5.90	7.87	8.12	8.02	**9.91**	8.65
pH	pH	N/A	--	--	--		7.27	6.74	6.97	7.27	7.33	6.76	6.83	6.96	6.30	7.68	6.85	6.51	5.86	7.25	6.49	6.55	7.37	6.67	6.84	6.87	7.17
Specific Conductance	uS/cm	1	--	--	--		95	282	246	220	228	199	220	175	161	204	225	177.2	207.3	194.4	210.6	405.0	252.0	208.0	0.185	245.1	236.6
INORGANICS																											
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		<5	7	7	6	7	7	6	7	7	23	6	5	<5	5	7	15	5	6	<5.0	6	6
Dissolved Chloride (Cl)	mg/L	1	--	--	120		66	63	60	55	55	53	56	43	37	50	57	46	54	40	46	58	46	45	60	56	56
Colour	TCU	30	--	--	--		22	20	20	28	12	20	31	38	40	57	15	31	19	23	20	16	13	20	34	13	14
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.14	0.12	0.14	0.24	0.15	0.22	0.24	0.15	0.16	0.19	0.09	0.09	0.21	0.11	<0.05	0.17	0.13	0.13	0.16	0.12	0.21
Nitrate (N)	mg/L	0.05	--	--	13000		0.14	--	--	0.24	0.15	--	0.24	–	–	0.19	0.09	0.09	0.21	0.11	<0.05	0.17	0.13	0.13	0.16	0.12	0.21
Nitrite (N)	mg/L	0.05	--	--	60		<0.01	--	--	<0.01	<0.01	--	<0.01	–	–	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	--	--	19		<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.050	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	2.8	<0.4	--	1.3	<0.4	0.6	0.4	0.4	0.15	1.2	0.9
Total Organic Carbon	mg/L	0.5	--	--	--		2.6	3.9	4.3	3.6	3.1	3.3	3.8	5.1	5	5.9	3.4	4.9	4.3	4.4	4.6	4.6	2.8	4.5	3.4	5.7	5.8
Orthophosphate (as 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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5-9		**6.38**	6.67	6.82	6.82	6.99	6.87	6.52	6.5	**6.38**	6.7	7.1	6.9	6.68	6.96	6.86	6.68	6.87	6.59	6.54	6.92	6.94
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.7	7.1	6.8	6.81	7.98	8.29	7.09	4.73	5.63	5.7	6.9	6.0	7.0	5.3	6.8	6.4	7.9	6.8	6600	7.8	5.2
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.2	1.11	1.22	1.28	1.27	1.21	0.83	1.01	1.0	1.2	1.3	1.0	0.9	1.3	1.4	1.2	1.0	940	1.2	0.9
Total Phosphorus (1M depth)	mg/L	0.002	--	--	--	**0.01**	**<0.02**	**<0.02**	0.005	0.005	<0.002	0.003	0.008	0.003	**0.012**	**0.019**	**0.045**	0.007	0.006	0.006	**0.012**	0.009	**0.023**	**0.35**	0.0004	0.004	0.002
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.1	0.9	0.791	0.837	0.990	0.879	0.681	0.921	0.7	0.9	0.9	0.8	0.6	1.2	0.8	1.1	0.9	770	0.9	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		38	38	35	28.3	33.1	33.0	33.0	20.8	21.3	31.2	34.5	26.37	35.1	20.1	32.1	36.4	39.0	35.3	34	40.0	27.1
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.7	2.6	2.6	3.2	2.9	3.2	2.9	2.5	2.6	2.7	2.0	2.6	2.9	2.6	2.7	2.6	1.9	2.4	2.5	2.4	2.6
Total Suspended Solids	mg/L	5	--	--	--		<1	1	1	2	<2	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	2.8	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		11	12	12	10	10	10	9	10	8	7	8	7	7	7	8	9	7	7	7.9	9	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	1.4	0.6	0.3	0.5	0.6	0.6	0.6	0.4	0.8	0.7	1	0.7	2.4	0.4	0.4	0.3	0.9	0.7	0.5	0.7
Conductivity (uS/cm)	µS/cm	1	--	--	--		250	250	240	220	220	220	220	170	160	197	222	182	219	216	204	218	243	216	220	242	238
Calculated Parameters																											
Anion Sum	me/L	N/A	--	--	--		2.11	2.17	2.08	1.90	1.93	1.87	1.90	1.58	1.36	2.03	1.90	1.55	1.68	1.38	1.60	2.14	1.55	1.54	1.87	1.90	1.88
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		<1	7	7	6	7	7	6	7	7	23	6	5	<5	5	7	15	5	6	<1.0	6.0	6
Calculated TDS	mg/L	1	--	--	--		128	130	123	110	117	116	115	88	82	111	113	91	106	78	100	122	106	100	110	119	103
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10
Cation Sum	me/L	N/A	--	--	--		2.12	2.16	1.99	1.69	1.97	1.98	1.92	1.23	1.32	1.77	1.98	1.60	2.00	1.24	1.89	2.07	2.23	2.00	1.89	2.27	1.95
Hardness (CaCO3)	mg/L	1	--	--	--		22	23	22	22	25	26	23	15	18	18.4	22.2	20.3	21.6	16.9	22.3	21.7	24.7	21.1	20	24.4	16.7
Ion Balance (% Difference)	%	N/A	--	--	--		0.24	0.23	2.21	5.85	1.03	2.86	0.52	12.50	1.49	6.8	2.1	1.6	8.6	5.5	8.3	1.5	17.9	12.8	0.53	9.0	9.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		NC	-3.00	-2.89	-2.92	-2.60	-2.73	-3.23	-3.33	-3.35	-2.77	-2.88	-3.21	-3.37	-3.19	-3.05	-2.93	-3.12	-3.39	NC	-3.00	-3.15
Langelier Index (@ 4C)	N/A	N/A	--	--	--		NC	-3.25	-3.14	-3.17	-2.85	-2.99	-3.49	-3.58	-3.60	-3.09	-3.20	-3.53	-3.69	-3.51	-3.37	-3.25	-3.44	-3.71	NC	-3.32	-3.47
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	9.67	9.71	9.74	9.59	9.60	9.75	9.83	9.73	9.47	9.98	10.10	10.0	10.2	9.91	9.61	9.99	9.98	NC	9.92	10.1
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	9.92	9.96	9.99	9.84	9.86	10.00	10.10	9.98	9.79	10.3	10.4	10.4	10.5	10.2	9.93	10.3	10.3	NC	10.2	10.4
Metals (ICP-MS)																											
Total Aluminum (Al)	µg/L	5	5	--	5-100		259	259	--	**124**	53.5	--	**266**	--	–	**199**	54	**153**	**140**	65	100	**260**	52	**105**	***100***	--	90
Total Antimony (Sb)	µg/L	2	20	--	--		<2	<2	--	<1.0	<1.0	--	<1.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	<2	--	<1.0	<1.0	--	<1.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		13	13	--	15.7	13.2	--	19.1	–	–	18	17	15	19	9	18	17	17	16	19	--	19
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	<2	--	<1.0	<1.0	--	<1.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	<2	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		9	9	--	7.8	8.7	--	<50	–	–	5	9	17	7	7	10	8	10	12	<50	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.017		0.019	0.019	--	**0.030**	<0.017	--	**0.046**	--	–	**0.019**	**0.021**	**0.027**	**0.028**	<0.017	<0.017	**0.038**	<0.017	0.017	***0.033***	--	<0.017
Total Chromium (Cr)	µg/L	1	---	--	1		<1	<1	--	<1.0	<1.0	--	<1.0	–	–	<1	<1	<1	<1	<1	<1	**7**	<1	<1	<1.0	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	<1	--	<0.40	<0.40	--	<0.40	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1
Total Copper (Cu)	µg/L	1	2	--	2.0-4.0		2	2	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<1	1	1	<1	2	<2.0	1.0	<1
Total Iron (Fe)	µg/L	50	300	--	300		**523**	**523**	--	73	133	58	136	104	154	137	136	119	131	71	172	137	96	118	120	165	115
Total Lead (Pb)	µg/L	0.5	1	--	1.0-7.0		<0.5	<0.5	--	0.60	<0.50	--	<0.50	–	–	<0.5	<0.5	0.7	<0.5	<0.5	0.9	3.6	<0.5	<0.5	<0.50	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		53	53	--	36.8	67.1	32.1	41.5	33.1	32.5	25	47	46	37	20	92	41	45	27	36	48	24
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	<2	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25-150		<2	<2	--	2.0	<2.0	--	2.3	–	–	<2	<2	<2	<2	<2	<2	2	<2	<2	<2.0	--	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<1	<1	--	<1.0	<1.0	--	<1.0	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.1		<0.1	<0.1	--	<0.10	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		12	12	--	33.5	35.9	--	33.2	–	–	25	33	29	33	18	32	31	32	29	29	--	21
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	<0.1	--	<0.10	<0.10	--	<0.10	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	<2	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		2	2	--	<2.0	<2.0	--	4.9	–	–	<2	<2	<2	<2	<2	2	3	<2	2	2.7	--	<2
Total Uranium (U)	µg/L	0.1	300	--	15		<0.1	<0.1	--	<0.10	<0.10	--	0.11	–	–	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	--	0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	<2	--	<2.0	<2.0	--	<2.0	–	–	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		<5	<5	--	9.7	6.9	6.4	9.3	6.6	9.2	<5	<5	8	10	5	7	10	<5	6	8.7	7	8
MICROBIOLOGICAL																											
Total Coliform	MPN/100mL	1	--	--	--		120	24	--	190	16	58	72	110	–	291	1553	178	345	2420	1300	86	1730	>2420	--	2420	285
E. coli	MPN/100mL	1	--	400	--		1	17	--	2	<1	8	5	37	<100	2	<1	3	8	21	<1	<1	<1	13	<0.10	7	6
Fecal Coliform	MPN/ml	--	--	400	--		--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.04	1.11	1.18	1.30	1.14	0.51	0.78	1.26	1.24	0.52	1.3	0.81	1.44	2.00	0.65	0.76	0.59	1.23	0.72	1.27	1.34
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.94	0.97	1.21	1.09	1.19	0.42	0.67	0.98	1.01	0.55	1.2	1.14	1.62	2.30	0.61	0.69	0.51	1.12	0.68	1.34	0.69

Notes:

NC - Not Calculable
RDL = Recordable Detection Limit (represents most recent sampling event RDL)
" -- " = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)
CCME FWAL Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME FWAL calculation equations). The
Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September 2009) (Referenced)
Nova Scotia Environment Environmental Quality Standards for Surface Water (Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table
2: Reference for Pathway Specific Standards for Surface Water (ug/L) - Fresh Water

Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result (pH, Dissolved Oxygen, Dissolved Chloride, Total Suspended Solids and Turbidity)
Bold = Parameter concentration exceeds NSE EQS Contaminated Sites Regulations - Present Result (Inorganics, Metals)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result (SNC Lavalin)

TABLE 3: Bedford West Water Quality Sampling Program

Fall 2015	Units	RDL (October 2015)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	CCME Phosphorus Trigger Range (Applied)	Kearney Lake																				
Sample Sites							KL4																				
Sampling Date	yyyy-mm-dd	--					2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2013/08/16	2013/10/16	2014/05/14	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22
Sampling Time	hh:mm	--					10:00	11:30	10:00	11:20	13:50	11:15	10:10	11:40	11:40	10:16	12:00	11:40	9:41	10:30	14:20	11:15	11:35	14:35	10:25	11:02	11:15
FIELD DATA																											
Secchi Depth	Meters	--	--	1.2	–		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NCC	N/A	N/A
Water Temp	Celsius	0.1	--	--	–		13.4	21.9	17.3	14.5	21.9	9.8	10.1	21.2	15.3	9.0	24.4	15.7	11.7	20.4	13.5	11.0	21.8	12.5	14.75	24.7	9.5
Dissolved Oxygen	mg/L	0.01	--	--	5.5 - 9.5		10.87	8.10	8.30	9.01	6.27	10.89	10.99	8.55	9.65	8.70	7.32	8.87	10.09	8.89	9.60	14.50	5.92	7.52	9.81	9.09	8.8
pH	pH	N/A	--	--	–		8.00	6.71	6.94	7.19	6.98	6.07	6.49	6.43	6.02	9.0	6.71	6.77	5.72	7.08	6.41	6.30	7.25	6.55	6.64	6.81	7.09
Specific Conductance	uS/cm	1	--	--	–		771	262	247	224	226	215	218	172	126	206	225	185.9	207.1	196.2	209.0	273.0	251.0	208.0	0.188	243.5	232.4
INORGANICS																											
Total Alkalinity (as CaCO3)	mg/L	5	--	--	–		5	7	7	6	8	7	5	8	7	22	8	<5	<5	<5	<5	30	5	29	<5.0	6	7
Dissolved Chloride (Cl)	mg/L	1	--	--	120		67	65	60	56	56	53	56	44	37	51	57	46	54	41	47	59	47	48	61	56	55
Colour	TCU	30	--	--	–		22	18	20	27	11	20	32	38	43	48	11	20	17	21	20	13	11	28	33	10	12
Nitrite + Nitrate	mg/L	0.05	--	--	–		0.15	0.12	0.14	0.23	0.19	0.21	0.23	0.15	0.17	0.19	0.11	0.09	0.20	0.11	0.17	0.25	0.17	0.16	0.16	0.14	0.21
Nitrate (N)	mg/L	0.05	--	--	13000		0.15	--	--	0.23	0.19	--	0.23	--	--	0.19	0.11	0.09	0.20	0.11	0.17	0.25	0.17	0.16	0.16	0.14	0.21
Nitrite (N)	mg/L	0.05	--	--	60		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	--	--	19		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	–		--	--	--	--	--	--	--	--	--	0.5	<0.4	0.7	--	1.8	1.1	<0.4	<0.4	<0.4	0.21	0.4	1.0
Total Organic Carbon	mg/L	0.5	--	--	–		2.5	2.6	4.0	3.3	2.6	3.1	3.7	6	5.4	7.5	3.2	4.8	4.2	4.5	4.3	4.4	2.1	4.4	2.8	5.2	5.7
Orthophosphate (as 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	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5-9		6.61	6.75	6.83	6.83	6.93	6.83	6.57	6.57	6.46	6.7	7.0	6.9	6.69	6.96	6.85	6.69	6.91	6.85	6.59	6.94	6.97
Total Calcium (Ca)	mg/L	0.1	--	--	–		6.8	7.7	7.0	6.81	8.00	8.45	6.84	4.93	5.24	5.7	6.8	5.8	6.8	5.1	6.8	6.4	7.9	6.8	6500	7.9	3.7
Total Magnesium (Mg)	mg/L	0.1	--	--	–		1.2	1.3	1.2	1.22	1.24	1.31	1.19	0.86	0.99	1.0	1.2	1.2	1.0	0.8	1.2	1.3	1.2	1.0	920	1.3	1.0
Total Phosphorus (LM depth)	mg/L	0.002	--	--	–	0.01	<0.02	<0.02	<0.002	0.004	<0.002	<0.002	0.007	0.003	0.026	0.022	0.043	0.007	0.006	2.39	0.016	0.022	0.031	0.015	0.006	0.007	0.003
Total Potassium (K)	mg/L	0.1	--	--	–		1	1	1	0.807	0.905	0.968	0.826	0.733	1.130	0.7	1.0	0.9	0.8	0.6	1.2	0.8	1.1	0.9	760	0.9	0.7
Total Sodium (Na)	mg/L	0.1	--	--	–		39	41	37	28.5	34.3	33.9	32.1	21.5	21.1	31.5	34.5	25.2	31.6	20.1	30.7	35.9	38.6	34.1	34	40.0	28.2
Reactive Silica (SiO2)	mg/L	0.5	--	--	–		2.7	2.6	2.6	3.1	2.9	3.1	2.9	2.5	2.7	2.7	2.2	2.6	3.0	2.6	2.5	2.6	2.1	2.5	2.5	2.6	3.0
Total Suspended Solids	mg/L	5	--	--	–		<1	1	<1	<2	<2	<1	2	<1	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	7.0	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	–		11	12	11	10	10	10	9	10	8	7	8	7	7	7	9	9	8	8	7.7	9.0	8
Turbidity (NTU)	NTU	0.1	--	50	–		0.5	1.0	0.3	0.3	0.2	0.8	0.7	0.7	0.4	0.7	0.4	0.8	0.7	2.6	2.1	1.1	0.6	0.8	0.61	0.7	1.2
Conductivity (uS/cm)	µS/cm	1	--	--	–		260	250	230	220	230	250	210	170	160	200	224	183	218	218	204	219	241	218	220	241	235
Calculated Parameters																											
Anion Sum	me/L	N/A	--	--	–		2.23	2.22	2.09	1.91	1.94	1.85	1.88	1.62	1.36	2.04	1.94	1.45	1.68	1.31	1.53	2.47	1.60	2.11	1.88	1.90	1.87
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	–		5	7	7	6	8	7	5	8	7	22	8	<5	<5	<5	<5	30	5	29	<1.0	6.0	7
Calculated TDS	mg/L	1	--	--	–		132	135	125	111	118	116	113	90	81	111	114	87	103	75	97	132	108	117	110	121	102
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	–		<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10
Cation Sum	me/L	N/A	--	--	–		2.16	2.32	2.07	1.70	2.02	2.03	1.86	1.28	1.3	1.78	1.97	1.53	1.84	1.23	1.84	2.04	2.21	1.94	1.91	2.35	1.53
Hardness (CaCO3)	mg/L	1	--	--	–		22	25	22	22	25	27	22	16	17	18.4	21.9	19.4	21.1	16.0	21.9	21.3	24.7	21.1	20	25.1	13.4
Ion Balance (% Difference)	%	N/A	--	--	–		1.59	2.20	0.48	5.82	2.02	4.64	0.53	11.70	2.26	6.6	0.8	2.8	4.5	3.2	9.2	9.5	15.8	4.2	0.79	10.7	10.1
Langelier Index (@ 20C)	N/A	N/A	--	--	–		-3.21	-2.89	-2.84	-2.92	-2.64	-2.75	-3.22	-3.18	-3.31	-2.79	-2.86	-3.22	-3.37	-3.21	-3.21	-2.63	-3.08	-2.45	NC	-2.98	-3.20
Langelier Index (@ 4C)	N/A	N/A	--	--	–		-3.46	-3.14	-3.09	-3.17	-2.89	-3.00	-3.47	-3.43	-3.56	-3.11	-3.18	-3.54	-3.69	-3.53	-3.53	-2.95	-3.40	-2.77	NC	-3.30	-3.52
Saturation pH (@ 20C)	N/A	N/A	--	--	–		9.82	9.64	9.67	9.75	9.57	9.58	9.79	9.75	9.77	9.49	9.86	10.10	10.1	10.2	10.1	9.32	9.99	9.30	NC	9.92	10.2
Saturation pH (@ 4C)	N/A	N/A	--	--	–		10.1	9.9	9.9	10.0	9.8	9.8	10.0	10.0	10.0	9.8	10.2	10.4	10.4	10.5	10.4	9.64	10.3	9.62	NC	10.2	10.5
Metals (ICP-MS)																											
Total Aluminum (Al)	µg/L	5	5	--	5-100		150	--	--	125	29.2	--	231	--	--	188	48	149	141	105	159	236	46	93	160	--	84
Total Antimony (Sb)	µg/L	2	20	--	–		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Barium (Ba)	µg/L	5	1000	--	–		16	--	--	16.6	17.8	--	18.2	--	--	18	17	16	18	10	19	17	19	16	20	--	17
Total Beryllium (Be)	µg/L	2	5.3	--	–		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Bismuth (Bi)	µg/L	2	---	--	–		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		6	--	--	8.6	9.1	--	<50	--	--	6	9	16	7	6	9	8	11	11	<50	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.017		<0.3	--	--	0.031	<0.017	--	0.035	--	--	0.021	<0.017	0.027	0.027	0.017	0.050	0.027	<0.017	<0.017	0.033	--	<0.017
Total Chromium (Cr)	µg/L	1	---	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	6	<1	<1	<1	6	<1	<1	<1.0	--	<1
Total Cobalt (Co)	µg/L	1	10	--	–		<1	--	--	<0.40	<0.40	--	<0.40	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1
Total Copper (Cu)	µg/L	1	2	--	2.0-4.0		<2	--	--	<2.0	2.4	<2.0	2.3	<2.0	<2.0	<2	<2	4	9	<1	1	<1	<1	2	3.2	1	1
Total Iron (Fe)	µg/L	50	300	--	300		86	--	--	82	51	55	119	109	138	129	118	133	213	144	248	129	55	104	100	217	83
Total Lead (Pb)	µg/L	0.5	1	--	1.0-7.0		<0.5	--	--	3.23	<0.50	--	<0.50	--	--	<0.5	<0.5	0.8	0.9	<0.5	<0.5	2.6	<0.5	<0.5	<0.50	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	–		51	--	--	34.5	63.5	29.4	38.5	27.2	29.7	23	34	38	34	77	130	34	29	24	25	78	34
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25-150		3	--	--	2.0	<2.0	--	<2.0	--	--	<2	<2	5	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	3
Total Silver (Ag)	µg/L	0.1	0.1	--	0.1		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	–		34	--	--	33.1	36.7	--	32.7	--	--	25	32	28	32	17	31	31	31	29	30	--	20
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	–		<2	--	--	<2.0	<2.0	--	4.2	--	--	<2	<2	<2	5	<2	<2	<2	<2	<2	<2.0	--	<2
Total Titanium (Ti)	µg/L	2	--	--	–		<2	--	--	<2.0	<2.0	--	<2	--	--	<2	<2	<2	<2	<2	3	2	<2	<2	<2.0	--	<2
Total Uranium (U)	µg/L	0.1	300	--	15		<0.1	--	--	<0.10	<0.10	--	0.1	--	--	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	–		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		14	--	--	10.4	6.9	7	11.3	7.4	7	<5	<5	68	21	<5	9	9	<5	<5	9.6	8	12
MICROBIOLOGICAL																											
Total Coliform	MPN/100mL	1	--	--	–		28	58	--	100	16	75	83	95	--	345	>2420	921	548	>2420	770	308	1550	>2420	---	>2420	281
E. coli	MPN/100mL	1	--	400	–		4	33	--	1	<1	2	5	39	<100	4	<1	4	6	38	<1	<1	1	8	<10	5	1
Fecal Coliform	MPN/ml	--	--	400	–		--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	–		0.78	1.11	1.06	0.92	0.07	0.50	0.60	1.04	1.31	0.52	0.7	0.55	1.34	1.50	0.40	0.44	0.50	1.03	0.55	0.26	1.09
Chlorophyll A - Wellschmeyer method	µg/L	0.05	--	--	–		0.69	0.96	1.11	0.77	0.07	0.41	0.55	0.82	1.07	0.55	0.7	0.74	1.48	1.70	0.39	0.40	0.57	0.95	0.51	0.31	0.55

Notes:

NC - Not Calculable
RDL = Recordable Detection Limit (represents most recent sampling event RDL)
"--" = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated CCME FWAL Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME FWAL calculation equations).
Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September 2009) (Referenced)
Nova Scotia Environment Environmental Quality Standards for Surface Water (Environmental Quality Standards (EQS) for Contaminated Sites (NSE 201/1, Table A2 Reference for Pathway Specific Standards for Surface Water (ug/L) - Fresh Water
Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result (pH, Dissolved Oxygen, Dissolved Chloride, Total Suspended Solids and Turbidity)
Bold = Parameter concentration exceeds NSE EQS Contaminated Sites Regulations - Present Result (Inorganics, Metals)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result (SNC Lavalin)

TABLE 3: Bedford West Water Quality Sampling Program

Fall 2015	Units	RDL (October 2015)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	CCME Phosphorus Trigger Range (Applied)	Kearney Lake												
Sample Sites							KL5												
Sampling Date	yyyy-mm-dd	–					2011/10/17	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2013/08/16	2013/10/16	2014/05/14	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22
Sampling Time	hh:mm	–					9:40	10:52	13:10	12:10	10:03	10:50	13:45	11:30	13:55	10:45	09:00	12:04	12:00
FIELD DATA																			
Secchi Depth	Meters	–	--	1.2	--		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NCC	N/A	2.74
Water Temp	Celsius	0.1	--	--	--		14.7	10.5	26.1	16.6	13.3	22.7	14.7	13.7	22.9	12.8	14.06	25.4	9.4
Dissolved Oxygen	mg/L	0.01	--	--	5.5 - 9.5		9.38	7.88	7.90	8.16	**9.67**	8.89	8.60	**15.83**	7.64	7.91	8.32	8.75	7.63
pH	pH	N/A	--	--	--		6.52	7.76	6.69	6.72	6.20	8.57	6.51	6.79	7.86	6.60	7.82	6.77	7.05
Specific Conductance	uS/cm	1	--	--	--		112	230	229	189.0	219.5	202.1	212.9	472.0	251.0	211.0	0.184	249.8	240.8
INORGANICS																			
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5.4	6	7
Dissolved Chloride (Cl)	mg/L	1	--	--	120		37	55	57	48	58	44	46	61	47	47	59	58	58
Colour	TCU	30	--	--	--		35	43	10	27	10	22	18	14	11	22	35	8	19
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.17	0.19	0.15	0.83	0.21	0.21	0.25	0.16	0.10	0.16	0.16	0.12	0.19
Nitrate (N)	mg/L	0.05	--	--	13000		--	0.19	0.15	0.83	0.21	0.21	0.20	0.16	0.10	0.16	0.16	0.12	0.19
Nitrite (N)	mg/L	0.05	--	--	60		--	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	--	--	19		<0.05	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.050	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	<0.4	2.3	1.0	--	0.6	1.1	<0.4	0.5	1.1	0.31	<0.4	1.8
Total Organic Carbon	mg/L	0.5	--	--	--		4.8	5.8	3.4	4.7	4.0	4.6	7.0	4.3	2.7	4.5	3.1	5.3	5.7
Orthophosphate (as 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	<0.010	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5-9		6.57	6.7	7.1	6.5	6.71	6.93	6.89	6.64	6.84	6.63	6.56	6.90	6.94
Total Calcium (Ca)	mg/L	0.1	--	--	--		5.79	6.1	6.6	5.9	7.1	5.7	6.4	6.5	7.6	7.0	6500	8.0	4.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.05	1.0	1.1	1.2	1.0	1.0	1.1	1.4	1.2	1.0	930	1.3	0.9
Total Phosphorus (1M depth)	mg/L	0.002	--	--	--	**0.01**	0.009	**0.018**	**0.040**	0.006	0.005	**0.013**	**0.010**	**0.010**	**0.026**	**0.14**	0.005	0.005	0.005
Total Potassium (K)	mg/L	0.1	--	--	--		0.858	0.7	0.9	0.8	0.8	0.7	1.1	0.8	1.1	0.9	720	0.09	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		22.0	34.6	32.0	27.7	33.6	19.2	31.3	37.5	40.3	38.3	33	42.6	28.3
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.5	2.7	2.0	2.4	2.7	2.5	2.5	2.7	2.1	2.5	3.3	1.9	2.2
Total Suspended Solids	mg/L	5	--	--	--		1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		9	7	8	8	8	7	8	9	8	8	8	9	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.9	1.1	0.7	0.9	0.7	0.8	0.4	1.1	0.4	0.8	0.71	1.0	1.0
Conductivity (uS/cm)	µS/cm	1	--	--	--		160	215	226	189	232	223	204	228	246	225	220	248	244
Calculated Parameters																			
Anion Sum	me/L	N/A	--	--	--		1.42	2.13	1.95	1.58	1.82	1.52	1.58	2.56	1.50	1.50	1.94	1.95	1.96
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5.4	6	7
Calculated TDS	mg/L	1	--	--	--		84	118	111	96	110	82	98	136	106	103	120	124	106
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.36	1.94	1.85	1.64	1.94	1.23	1.81	2.12	2.27	2.14	1.87	2.40	1.58
Hardness (CaCO3)	mg/L	1	--	--	--		19	19.3	21.0	19.7	21.8	18.4	20.5	22.0	23.9	21.6	20.0	25.3	15.4
Ion Balance (% Difference)	%	N/A	--	--	--		2.16	4.7	2.6	2.0	3.2	10.6	6.7	9.4	20.3	17.5	1.8	10.2	10.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-3.06	-2.79	-2.77	-3.62	-3.33	-3.11	-3.19	-2.64	-3.17	-3.42	-3.24	-3.20	-3.13
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.31	-3.11	-3.09	-3.94	-3.65	-3.43	-3.51	-2.96	-3.49	-3.74	-3.50	-3.34	-3.45
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.63	9.49	9.87	10.1	10.0	10.0	10.1	9.28	10.0	10.0	9.8	9.9	10.1
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.88	9.81	10.2	10.4	10.4	10.4	10.4	9.60	10.3	10.4	10.1	10.2	10.4
Metals (ICP-MS)																			
Total Aluminum (Al)	µg/L	5	5	--	5-100		--	**222**	52	**154**	**136**	58	61	**224**	53	**108**	***192***	--	79
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		--	18	16	15	19	9	16	16	17	17	17	--	19
Total Beryllium (Be)	µg/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		--	6	9	15	7	7	9	7	6	10	<50	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.017		--	**0.022**	**0.027**	**0.029**	**0.024**	<0.017	**0.034**	**0.036**	<0.017	**0.024**	***0.035***	--	**0.332**
Total Chromium (Cr)	µg/L	1	---	--	1		--	<1	<1	5	<1	<1	<1	**6**	<1	<1	<1.0	--	**7**
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1
Total Copper (Cu)	µg/L	1	2	--	2.0-4.0		<2.0	<2	<2	<2	<2	<1	1	<1	<1	5	<2.0	1	<1
Total Iron (Fe)	µg/L	50	300	--	300		175	160	78	120	111	70	79	111	<50	119	100	123	198
Total Lead (Pb)	µg/L	0.5	1	--	1.0-7.0		--	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	1.9	<0.5	0.5	<0.5	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		35.9	30	14	37	35	13	12	40	18	25	34	24	35
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25-150		--	<2	<2	5	<2	<2	<2	2	<2	<2	<2.0	--	3
Total Selenium (Se)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.1		--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		--	27	31	29	31	18	31	31	30	30	29	--	23
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		--	3	<2	<2	<2	<2	<2	<2	<2	2	2.3	--	<2
Total Uranium (U)	µg/L	0.1	300	--	15		--	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	--	0.1
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		9.3	5	<5	**64**	11	7	5	10	<5	10	14	6	12
MICROBIOLOGICAL																			
Total Coliform	MPN/100mL	1	--	--	--		--	461	613	93	461	308	461	42	629	>2470	---	356	163
E. coli	MPN/100mL	1	--	400	--		100	14	2	6	6	6	4	<1	1	17	<10	1	2
Fecal Coliform	MPN/ml	–	--	400	--		--	--	--	--	--	--	--	--	--	--	---	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.91	0.30	1.2	1.09	1.44	2.20	0.64	0.20	0.61	0.9	0.48	1.22	2.71
Chlorophyll A - Wellschmeyer method	µg/L	0.05	--	--	--		0.85	0.33	1.0	1.41	1.59	2.40	0.62	0.20	0.54	0.84	---	1.26	1.44

Notes:

NC - Not Calculable
RDL = Recordable Detection Limit (represents most recent sampling event RDL)
" – " = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)
CCME FWAL Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME FWAL calculation equations). The largest guideline
Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September 2009) (Referenced)
Nova Scotia Environment Environmental Quality Standards for Surface Water (Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table A2 Reference for Pathway Specific Standards for Surface Water (ug/L) - Fresh Water
Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result (pH, Dissolved Oxygen, Dissolved Chloride, Total Suspended Solids and Turbidity)
Bold = Parameter concentration exceeds NSE EQS Contaminated Sites Regulations - Present Result (Inorganics, Metals)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result (SNC Lavalin)

TABLE 4: Fall 2015 Statistical Presentation of Key Water Quality Parameters - Bedford West Water Quality Sampling Program

Station 1					
KL-1	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	11	< 2	13	8	8
Chloride (mg/L)	58	33	64	50	51
Lab pH	6.99	6.35	6.99	6.79	6.73
Total Suspended Solids (mg/L)	<5.0	<1	5	5	3.86
Conductivity (uS/cm)	244	140	250	230	215
Chloropylla-A (µg/L)	1.79	0.84	1.79	1.19	1.26

Number of Samples = 7

Station 2					
KL-2	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	8	8	29	13	17
Chloride (mg/L)	12	10	48	12	18
pH	6.28	6.05	6.85	6.28	6.31
Total Suspended Solids (mg/L)	17	<1	103	5	19.6
Conductivity (uS/cm)	73	54	212	66	89.3
Chloropylla-A (µg/L)	0.46	0.07	1.97	0.46	0.69

Number of Samples = 7

Station 3					
KL-3	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	<2	<2	148	7	27
Chloride (mg/L)	56	37	60	46	49
pH	6.94	6.38	6.94	6.86	6.77
Total Suspended Solids (mg/L)	<5	<1	<5	5	3.29
Conductivity (uS/cm)	238	160	240	216	209
Chloropylla-A (µg/L)	1.34	0.51	1.34	1.18	0.99

Number of Samples = 7

Station 4					
KL-4	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	3	3	26	15	13
Chloride (mg/L)	55	37	60	48	49
pH	6.97	6.46	6.97	6.85	6.81
Total Suspended Solids (mg/L)	<5	<1	<5	5	3.43
Conductivity (uS/cm)	235	160	250	218	211
Chloropylla-A (µg/L)	1.09	0.4	1.31	1.03	0.85

Number of Samples = 7

Note: The analytical results for Total Phosphorus (TP) and Total Suspended Solids (TSS) included values less than the laboratory RDL. When calculating the median and average we set the "<RDL" values to the RDL. This allowed the median and average to take into account all data points, and took a conservative route as we cannot assume the values were zero.

Station 5					
KL-5	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	5	5	135	9	33
Chloride (mg/L)	58	37	58	47	47
pH	6.94	6.5	6.94	6.63	6.71
Total Suspended Solids (mg/L)	<5	1	<5	5	4.2
Conductivity (uS/cm)	244	160	244	204	204
Chloropylla-A (µg/L)	2.71	0.64	2.71	0.91	1.25

Number of Samples = 5

Station 6					
HWY102-1	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	2	2	31	20	17
Chloride (mg/L)	49	12	49	24	28
pH	6.8	5.31	6.8	6.28	6.17
Total Suspended Solids (mg/L)	<5	<1	<5	5	3.57
Conductivity (uS/cm)	244	88	244	112	144
Chloropylla-A (µg/L)	0.36	0.36	8.45	0.81	2.03

Number of Samples = 7

Station 7					
HWY102-2	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	12	3	201	34	74
Chloride (mg/L)	78	17	83	45	47
pH	6.18	5.47	6.8	6.3	6.2
Total Suspended Solids (mg/L)	15	3	194	14	42.6
Conductivity (uS/cm)	315	94	315	194	204
Chloropylla-A (µg/L)	6.24	0.25	48.17	1.9	11.28

Number of Samples = 7

Station 8					
LSD	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	95	3	95	14	34
Chloride (mg/L)	26	22	31	23	25
pH	6.68	6.49	6.93	6.68	6.7
Total Suspended Solids (mg/L)	69	5	69	8	17.4
Conductivity (uS/cm)	136	105	140	110	119
Chloropylla-A (µg/L)	5.12	0.13	5.12	1.41	1.98

Number of Samples = 7

Note: The analytical results for Total Phosphorus (TP) and Total Suspended Solids (TSS) included values less than the laboratory RDL. When calculating the median and average we set the "<RDL" values to the RDL. This allowed the median and average to take into account all data points, and took a conservative route as we cannot assume the values were zero.

Station 9					
LU	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	11	11	46	34	32
Chloride (mg/L)	93	34	258	70	101
pH	7.15	6.41	7.2	6.49	6.74
Total Suspended Solids (mg/L)	6	<5	13	5.5	7.25
Conductivity (uS/cm)	462	190	840	394	428
Chloropylla-A (µg/L)	4.94	0.12	4.94	1.8	1.96

Number of Samples = 5

Station 10					
PML1	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	18	2	47	21	21
Chloride (mg/L)	56	18	58	46	42
pH	6.84	6.58	6.88	6.79	6.74
Total Suspended Solids (mg/L)	6	<1	23	6	7.86
Conductivity (uS/cm)	241	100	241	209	188
Chloropylla-A (µg/L)	4.67	0.07	5.07	0.69	1.73

Number of Samples = 7

Station 11					
PML2	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phospophorous (µg/L)	8	<2	26	7.5	10.5
Chloride (mg/L)	57	34	64	54	51
pH	6.98	6.6	6.98	6.8	6.79
Total Suspended Solids (mg/L)	<5	<1	11	5	4.67
Conductivity (uS/cm)	246	150	277	221	221
Chloropylla-A (µg/L)	1.5	0.25	1.5	0.66	0.82

Number of Samples = 6

Note: The analytical results for Total Phosphorus (TP) and Total Suspended Solids (TSS) included values less than the laboratory RDL. When calculating the median and average we set the "<RDL" values to the RDL. This allowed the median and average to take into account all data points, and took a conservative route as we cannot assume the values were zero.

SNC·LAVALIN

Appendix A

Laboratory Certificate of Analysis

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: **SNC Lavalin Inc.**
5657 SPRING GARDEN RD, SUITE 200
HALIFAX , NS B3J3R4
(902) 492-4544

ATTENTION TO: **Ryan Flinn**

PROJECT: **Bedford West: Water Sampling**

AGAT WORK ORDER: **15X033615**

WATER ANALYSIS REVIEWED BY: **Laura Baker, Inorganics Data Reporter**

DATE REPORTED: **Oct 29, 2015**

PAGES (INCLUDING COVER): **12**

VERSION*: **1**

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*NOTES

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

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Certificate of Analysis

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2015-10-22

DATE REPORTED: 2015-10-29

SAMPLE DESCRIPTION:				KL-1	KL-2	KL-3	KL-4	KL-5	HWY-102-1	HWY-102-2
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015
Parameter	Unit	G / S	RDL	7111784	7111863	7111877	7111891	7111907	7111916	7111925
Alkalinity	mg/L		5	7	<5	6	7	7	12	<5
Chloride	mg/L		1	58	12	56	55	58	49	78
True Color	TCU		5	22	61	14	12	19	29	8
Nitrate + Nitrite as N	mg/L		0.05	0.17	<0.05	0.21	0.21	0.19	0.17	0.15
Nitrate as N	mg/L		0.05	0.17	<0.05	0.21	0.21	0.19	0.17	0.15
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	<0.03	<0.03	0.04	0.04	0.04	0.05
Total Organic Carbon	mg/L		0.5	5.5	14.0	5.8	5.7	5.7	8.4	9.9
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH				6.99	6.28	6.94	6.97	6.94	6.80	6.18
Total Calcium	mg/L		0.1	6.1	1.1	5.2	3.7	4.7	12.4	9.8
Total Magnesium	mg/L		0.1	0.9	0.7	0.9	1.0	0.9	2.3	2.2
Total Phosphorus	mg/L		0.002	0.011	0.008	0.002	0.003	0.005	0.002	0.012
Total Potassium	mg/L		0.1	0.7	0.6	0.7	0.7	0.7	1.5	1.1
Total Sodium	mg/L		0.1	39.8	6.6	27.1	28.2	28.3	28.8	36.8
Reactive Silica as SiO2	mg/L		0.5	2.7	5.1	2.6	3.0	2.2	4.8	5.6
Total Suspended Solids	mg/L		5	<5	17	<5	<5	<5	<5	15
Sulphate	mg/L		2	8	3	8	8	8	14	8
Turbidity	NTU		0.1	1.1	6.2	0.7	1.2	1.0	0.8	9.9
Electrical Conductivity	umho/cm		1	244	73	238	235	244	244	315
Anion Sum	me/L			1.95	0.40	1.88	1.87	1.96	1.93	2.38
Bicarb. Alkalinity (as CaCO3)	mg/L		5	7	<5	6	7	7	12	<5
Calculated TDS	mg/L		1	119	25	103	102	106	116	138
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	<10	<10	<10
Cation sum	me/L			2.14	0.47	1.55	1.53	1.58	2.11	2.35
Hardness	mg/L			18.9	5.6	16.7	13.4	15.4	40.4	33.5
% Difference/ Ion Balance (NS)	%			4.5	7.5	9.8	10.1	10.8	4.7	0.5
Langelier Index (@20C)	NA			-2.97	-4.51	-3.15	-3.20	-3.13	-2.62	-3.73
Langelier Index (@ 4C)	NA			-3.29	-4.83	-3.47	-3.52	-3.45	-2.94	-4.05
Saturation pH (@ 20C)	NA			9.96	10.8	10.1	10.2	10.1	9.42	9.91

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Certificate of Analysis

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2015-10-22

DATE REPORTED: 2015-10-29

SAMPLE DESCRIPTION:				KL-1	KL-2	KL-3	KL-4	KL-5	HWY-102-1	HWY-102-2
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015
Parameter	Unit	G / S	RDL	7111784	7111863	7111877	7111891	7111907	7111916	7111925
Saturation pH (@ 4C)	NA			10.3	11.1	10.4	10.5	10.4	9.74	10.2
Total Aluminum	ug/L		5	88	284	90	84	79	52	129
Total Antimony	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Arsenic	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Barium	ug/L		5	17	9	19	17	19	86	147
Total Beryllium	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Bismuth	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Boron	ug/L		5	<5	<5	<5	<5	<5	<5	<5
Total Cadmium	ug/L		0.017	0.187	0.176	<0.017	<0.017	0.332	<0.017	<0.017
Total Chromium	ug/L		1	<1	<1	<1	<1	7	<1	<1
Total Cobalt	ug/L		1	<1	<1	<1	<1	<1	<1	3
Total Copper	ug/L		1	2	<1	<1	1	<1	1	2
Total Iron	ug/L		50	81	478	115	83	158	138	714
Total Lead	ug/L		0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.6
Total Manganese	ug/L		2	22	57	24	34	35	22	303
Total Molybdenum	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L		2	<2	<2	<2	<2	3	<2	<2
Total Selenium	ug/L		1	<1	<1	<1	3	<1	<1	<1
Total Silver	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L		5	19	8	21	20	23	39	38
Total Thallium	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Titanium	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Uranium	ug/L		0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1
Total Vanadium	ug/L		2	<2	<2	<2	<2	<2	<2	<2
Total Zinc	ug/L		5	<5	<5	8	12	12	<5	10
Total Coliforms (MPN)	MPN/100 mL		1	122	>2420	285	281	163	659	328
E. Coli (MPN)	MPN/100 mL		1	6	5	6	1	2	2	2
Chlorophyll A - Acidification Method	ug/L		0.05	1.79	0.46	1.34	1.09	2.71	0.36	6.24

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SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2015-10-22

DATE REPORTED: 2015-10-29

		SAMPLE DESCRIPTION:		KL-1	KL-2	KL-3	KL-4	KL-5	HWY-102-1	HWY-102-2
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015	10/22/2015
Parameter	Unit	G / S	RDL	7111784	7111863	7111877	7111891	7111907	7111916	7111925
Chlorophyll A - Welschmeyer Method	ug/L		0.05	0.95	0.26	0.69	0.55	1.44	0.23	2.23
Total Kjeldahl Nitrogen as N	mg/L		0.4	0.4	0.8	0.9	1.0	1.8	0.6	2.0
Total Dissolved Solids	mg/L		5	126	64	128	122	128	146	188

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DATE RECEIVED: 2015-10-22

DATE REPORTED: 2015-10-29

		SAMPLE DESCRIPTION:		LSD		LU	PML-1	PML-2
		SAMPLE TYPE:		Water		Water	Water	Water
		DATE SAMPLED:		10/22/2015		10/22/2015	10/22/2015	10/22/2015
Parameter	Unit	G / S	RDL	7111943	RDL	7111967	7111974	7111987
Alkalinity	mg/L		5	9	5	13	6	7
Chloride	mg/L		1	26	1	93	56	57
True Color	TCU		5	26	5	6	15	9
Nitrate + Nitrite as N	mg/L		0.05	0.30	0.05	1.63	0.24	0.23
Nitrate as N	mg/L		0.05	0.30	0.05	1.63	0.24	0.23
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	0.03	<0.03	0.03	<0.03
Total Organic Carbon	mg/L		0.5	9.9	0.5	6.5	5.8	6.1
Ortho-Phosphate as P	mg/L		0.01	<0.01	0.01	<0.01	<0.01	<0.01
pH				6.68		7.15	6.84	6.98
Total Calcium	mg/L		0.1	5.4	0.1	15.9	4.8	6.2
Total Magnesium	mg/L		0.1	1.5	0.1	1.9	0.9	1.2
Total Phosphorus	mg/L		0.004	0.095	0.002	0.011	0.018	0.008
Total Potassium	mg/L		0.1	1.0	0.1	1.6	0.6	0.9
Total Sodium	mg/L		0.1	13.4	0.1	57.8	25.6	31.3
Reactive Silica as SiO2	mg/L		0.5	4.4	0.5	6.9	2.5	2.8
Total Suspended Solids	mg/L		5	69	5	6	6	<5
Sulphate	mg/L		2	3	2	30	8	9
Turbidity	NTU		0.1	5.4	0.1	2.4	24.2	1.3
Electrical Conductivity	umho/cm		1	136	1	462	241	246
Anion Sum	me/L			1.00		3.62	1.88	1.95
Bicarb. Alkalinity (as CaCO3)	mg/L		5	9	5	13	6	7
Calculated TDS	mg/L		1	65	1	216	109	112
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	10	<10	<10	<10
Cation sum	me/L			1.42		3.52	1.93	1.84
Hardness	mg/L			19.7		47.5	15.7	20.4
% Difference/ Ion Balance (NS)	%			17.5		1.4	1.2	3.0
Langelier Index (@20C)	NA			-3.20		-2.16	-3.29	-2.97
Langelier Index (@ 4C)	NA			-3.52		-2.48	-3.61	-3.29
Saturation pH (@ 20C)	NA			9.88		9.31	10.1	9.95

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CLIENT NAME: SNC Lavalin Inc.

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SAMPLING SITE:

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SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2015-10-22

DATE REPORTED: 2015-10-29

		SAMPLE DESCRIPTION:		LSD		LU	PML-1	PML-2
		SAMPLE TYPE:		Water		Water	Water	Water
		DATE SAMPLED:		10/22/2015		10/22/2015	10/22/2015	10/22/2015
Parameter	Unit	G / S	RDL	7111943	RDL	7111967	7111974	7111987
Saturation pH (@ 4C)	NA			10.2		9.63	10.5	10.3
Total Aluminum	ug/L		5	1960	5	66	2320	278
Total Antimony	ug/L		2	<2	2	<2	<2	<2
Total Arsenic	ug/L		2	<2	2	<2	<2	<2
Total Barium	ug/L		5	27	5	111	34	24
Total Beryllium	ug/L		2	<2	2	<2	<2	<2
Total Bismuth	ug/L		2	<2	2	<2	<2	<2
Total Boron	ug/L		5	<5	5	9	<5	<5
Total Cadmium	ug/L		0.017	<0.017	0.017	0.176	0.146	0.145
Total Chromium	ug/L		1	3	1	<1	2	<1
Total Cobalt	ug/L		1	4	1	<1	3	<1
Total Copper	ug/L		1	6	1	3	4	2
Total Iron	ug/L		50	4570	50	171	6020	368
Total Lead	ug/L		0.5	5.9	0.5	<0.5	6.3	0.5
Total Manganese	ug/L		2	985	2	61	278	61
Total Molybdenum	ug/L		2	<2	2	<2	<2	<2
Total Nickel	ug/L		2	5	2	<2	5	2
Total Selenium	ug/L		1	<1	1	<1	1	<1
Total Silver	ug/L		0.1	<0.1	0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L		5	16	5	43	22	21
Total Thallium	ug/L		0.1	<0.1	0.1	<0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	2	<2	<2	<2
Total Titanium	ug/L		2	41	2	<2	25	4
Total Uranium	ug/L		0.1	0.2	0.1	<0.1	0.6	<0.1
Total Vanadium	ug/L		2	6	2	<2	7	<2
Total Zinc	ug/L		5	11	5	16	12	8
Total Coliforms (MPN)	MPN/100 mL		1	>2420	1	>2420	>2420	1120
E. Coli (MPN)	MPN/100 mL		1	17	1	6	6	2
Chlorophyll A - Acidification Method	ug/L		0.05	5.12	0.05	4.94	4.67	1.50

Original Signed

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2015-10-22

DATE REPORTED: 2015-10-29

		SAMPLE DESCRIPTION:		LSD		LU	PML-1	PML-2
		SAMPLE TYPE:		Water		Water	Water	Water
		DATE SAMPLED:		10/22/2015		10/22/2015	10/22/2015	10/22/2015
Parameter	Unit	G / S	RDL	7111943	RDL	7111967	7111974	7111987
Chlorophyll A - Welschmeyer Method	ug/L		0.05	4.62	0.05	2.71	3.69	0.74
Total Kjeldahl Nitrogen as N	mg/L		0.4	2.8	0.4	0.7	6.0	3.0
Total Dissolved Solids	mg/L		5	88	5	242	134	140

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

7111863 When the cation and anion sums are below 1 me/L, the acceptable criteria is less than 0.3me/L.

7111907 Ion Balance is biased high, contributing parameters have been confirmed.

7111943 Ion Balance is biased high, contributing parameters have been confirmed.

Original Signed

Certified By:

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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Oct 29, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
SNC-Lavalin Bedford West Custom Inorganics Package															
Alkalinity	7111784	7111784	7	6	NA	< 5	90%	80%	120%	NA	80%	120%	NA	80%	120%
Chloride	7111831		76	78	2.6%	< 1	92%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1	7110592	<5	<5	NA	< 5	120%	80%	120%		80%	120%		80%	120%
Nitrate as N	7111831		<0.05	<0.05	NA	< 0.05	98%	80%	120%	NA	80%	120%	102%	80%	120%
Nitrite as N	7111831		<0.05	<0.05	NA	< 0.05	98%	80%	120%	NA	80%	120%	115%	80%	120%
Ammonia as N	1	7111891	0.04	0.05	NA	< 0.03	97%	80%	120%		80%	120%	100%	80%	120%
Total Organic Carbon	1	7111784	5.5	5.6	1.8%	< 0.5	103%	80%	120%		80%	120%	112%	80%	120%
Ortho-Phosphate as P	1	7111784	<0.01	<0.01	NA	< 0.01	102%	80%	120%		80%	120%	101%	80%	120%
pH	7111784	7111784	6.99	6.91	1.2%	<	101%	80%	120%	NA	80%	120%	NA	80%	120%
Total Calcium	1023201		41.7	53.7	25.2%	< 0.1	80%	80%	120%	89%	80%	120%	80%	70%	130%
Total Magnesium	1023201		6.0	8.3	32.2%	< 0.1	95%	80%	120%	80%	80%	120%	82%	80%	120%
Total Phosphorus	7111784	7111784	0.011	0.008	NA	< 0.002	99%	90%	110%	102%	90%	110%	102%	80%	120%
Total Potassium	1023201		3.63	4.89	29.6%	< 0.1	87%	80%	120%	80%	80%	120%	78%	70%	130%
Total Sodium	1023201		46.1	63.0	31.0%	< 0.1	86%	80%	120%	85%	80%	120%	92%	70%	130%
Reactive Silica as SiO2	1	7111891	3.0	3.3	9.5%	< 0.5	109%	80%	120%		80%	120%	94%	80%	120%
Total Suspended Solids	1	0063	< 5	< 5	NA	< 5	98%	80%	120%		120%	120%	103%	80%	120%
Sulphate	7111831		28	28	0.0%	< 2	87%	80%	120%	NA	80%	120%	NA	80%	120%
Turbidity	1	7111916	0.8	0.8	0.0%	< 0.1	95%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	7111784	7111784	244	244	0.0%	< 1	102%	80%	120%	NA	80%	120%	NA	80%	120%
Bicarb. Alkalinity (as CaCO3)	7111784	7111784	7	6	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	7111784	7111784	<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	1023201		15	23	NA	< 5	82%	80%	120%	80%	80%	120%	70%	70%	130%
Total Antimony	1023201		< 2	< 2	NA	< 2	80%	80%	120%	96%	80%	120%	103%	70%	130%
Total Arsenic	1023201		< 2	< 2	NA	< 2	120%	80%	120%	117%	80%	120%	130%	70%	130%
Total Barium	1023201		115	122	5.9%	< 5	92%	80%	120%	102%	80%	120%	122%	70%	130%
Total Beryllium	1023201		< 2	< 2	NA	< 2	108%	80%	120%	89%	80%	120%	107%	70%	130%
Total Bismuth	1023201		< 2	< 2	NA	< 2	97%	80%	120%	98%	80%	120%	95%	70%	130%
Total Boron	1023201		28	28	0.0%	< 5	80%	80%	120%	98%	80%	120%	93%	70%	130%
Total Cadmium	1023201		0.083	0.085	NA	< 0.017	82%	80%	120%	120%	80%	120%	75%	70%	130%
Total Chromium	1023201		< 1	< 1	NA	< 1	115%	80%	120%	92%	80%	120%	NA	70%	130%
Total Cobalt	1023201		< 1	< 1	NA	< 1	120%	80%	120%	109%	80%	120%	89%	70%	130%
Total Copper	1023201		1	1	NA	< 1	120%	80%	120%	120%	80%	120%	91%	70%	130%
Total Iron	1023201		< 50	52	NA	< 50	120%	80%	120%	116%	80%	120%	125%	70%	130%
Total Lead	1023201		< 0.5	< 0.5	NA	< 0.5	99%	80%	120%	101%	80%	120%	97%	70%	130%
Total Manganese	1023201		47	54	13.9%	< 2	120%	80%	120%	120%	80%	120%	99%	70%	130%
Total Molybdenum	1023201		< 2	< 2	NA	< 2	80%	80%	120%	80%	80%	120%	91%	70%	130%
Total Nickel	1023201		< 2	< 2	NA	< 2	113%	80%	120%	120%	80%	120%	122%	70%	130%
Total Selenium	1023201		< 1	< 1	NA	< 1	82%	80%	120%	80%	80%	120%	89%	70%	130%
Total Silver	1023201		< 0.1	< 0.1	NA	< 0.1	99%	80%	120%	98%	80%	120%	77%	70%	130%

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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Oct 29, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Strontium	1023201		143	165	14.3%	< 5	80%	80%	120%	80%	80%	120%	85%	70%	130%
Total Thallium	1023201		< 0.1	< 0.1	NA	< 0.1	99%	80%	120%	100%	80%	120%	96%	70%	130%
Total Tin	1023201		< 2	< 2	NA	< 2	92%	80%	120%	109%	80%	120%	98%	70%	130%
Total Titanium	1023201		< 2	< 2	NA	< 2	110%	80%	120%	120%	80%	120%	85%	70%	130%
Total Uranium	1023201		0.8	0.8	0.0%	< 0.1	120%	80%	120%	120%	80%	120%	121%	70%	130%
Total Vanadium	1023201		< 2	< 2	NA	< 2	120%	80%	120%	120%	80%	120%	119%	70%	130%
Total Zinc	1023201		< 5	< 5	NA	< 5	120%	80%	120%	120%	80%	120%	94%	70%	130%
Total Kjeldahl Nitrogen as N	1	7111891	1.0	1.0	NA	< 0.4	94%	80%	120%		80%	120%	90%	80%	120%
Total Dissolved Solids	1	0329	134	144	7.2%	< 5	98%	80%	120%		120%	120%		80%	120%

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

SNC-Lavalin Bedford West Custom Inorganics Package

Turbidity	1	7110727	0.6	0.6	0.0%	< 0.1	95%	80%	120%		80%	120%		80%	120%

Certified By: Original Signed

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
Chloride	INORG-121-6005	SM 4110 B	IC
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH3 G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
pH	INOR-121-6001	SM 4500 H+B	PC-TITRATE
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorus	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Reactive Silica as SiO2	INORG-121-6028	SM 4110 B	COLORIMETER
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC
Sulphate	INORG-121-6005	SM 4110 B	IC
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS		SM 1030E	CALCULATION
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Cation sum	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 15X033615

PROJECT: Bedford West: Water Sampling

ATTENTION TO: Ryan Flinn

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Coliforms (MPN)	MIC-121-7000	Based on SM 9223B	INCUBATOR
E. Coli (MPN)	MIC-121-7000	Based on SM 9223B	INCUBATOR
Chlorophyll A - Acidification Method	Subcontracted	Subcontracted	
Chlorophyll A - Welschmeyer Method	Subcontracted	Subcontracted	ICP-MS
Total Kjeldahl Nitrogen as N	INOR-121-6020	SM 4500 NORG D	COLORIMETER
Total Dissolved Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC

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Chain of Custody Record

Laboratory Use Only
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: 8°
Hold Time:
AGAT Job Number: 15x033615
Notes:

Report Information
Company: SNC-Lavalin
Contact: Ryan Flinn
Address: 5657 SPRING GARDEN ROAD, HALIFAX NS. B3J 3R4 (SUITE 200)
Phone: (902) 492.4544 Fax:
Client Project #: BEDFORD WEST : WATER SAMPLING
AGAT Quotation: 15 - 1718
Please Note: If quotation number is not provided client will be billed full price for analysis

Report Information (Please print):
1. Name: Ryan Flinn
Email: Ryan.Flinn@snclavalin.com
2. Name: MARIA GUTIERREZ
Email: MARIA.GUTIERREZ@SNCLAVALIN.COM

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days
Date Required:

Invoice To Same Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/Credit Card#:

Regulatory Requirements (Check):
☐ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ CDWQ
☐ Industrial ☐ NSESQ-Cont. Sites
☐ Commercial ☐ HRM 101
☐ Res/Park ☐ Storm Water
☐ Agricultural ☐ Waste Water
☐ FWAL
☐ Sediment ☐ Other

Drinking Water Sample: ☑ Yes ☐ No
Reg. No.:

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments – Site/Sample Info. Sample Containment	Field Filtered/Preserved	Standard Water Analysis	Metals: ☑ Total ☐ Diss ☐ Available	Mercury	☐ BOD ☐ CBOD	pH	☑ TSS ☑ TDS ☐ VSS	TKN	Total Phosphorus	Phenols	Tier 1: TPH/BTEX (PIRI) ☐ low level	Tier 2: TPH/BTEX Fractionation	CCME-CWS TPH/BTEX	VOC	THM	HAA	PAH	PCB	TC + EC ☐ P/A ☑ MPN ☐ MF	☐ HPC ☐ Pseudomonas	Fecal Coliform ☐ MPN ☐ MF	Other: Chlorophyll A	Other: Low Level TP - Miss.	Hazardous (Y/N)
KL-1	OCT 22nd/15 : 12:30pm	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
KL-2	OCT 22nd/15 : 1:05pm	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
KL-3	OCT 22nd/15 : 10:40am	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
KL4	OCT 22nd/15 : 11:15am	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
KL-5	OCT 22nd/15 : 12:00pm	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
HWY-102-1	OCT 22nd/15 : 9:40pm	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
HWY-102-2	OCT 22nd/15 : 2:30pm	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
LSD	OCT 22nd/15 : 1:40 pm	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
LU	OCT 22nd/15 : 10:05am	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
PML-1	OCT 22nd/15 : 8:22am	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	
PML-2	OCT 22nd/15 : 9:08am	Surface Water				✓	✓			✓	✓	✓											✓			✓	✓	

Sampler	Date/Time	Samples Relinquished By (Print Name)	Date/Time	Samples Received By (Print Name)	Date/Time
Original Signed	22 OCT 2015	Original Signed	22-OCT.		
Original Signed	14:55	Original Signed	14:55.		

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page ___ of ___
N°:

SNC·LAVALIN

Appendix B

Field Reports Fall 2015

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Kearney Lake	**Site ID: KL1**	
Watercourse: Kearney Lake	**Location:** Kearney Lake Road	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0445718E, 4948496N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy with sunny breaks
Air Temperature:	8^{O}
Cloud Cover :	80%
Wildlife Sightings:	---
Site Accessibility: Yes, Accessible	Off Kearney Lake Road
Site Access Detail:	Sample taken off the end of dock at Kearney Lake beach. Parked in public parking of Hamshaw Dr. and walked down to beach area.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	12:30
Sample Depth (m):	0.5 meters
pH:	7.02
Dissolved Oxygen (mg/L):	7.38
Secchi Depth (m):	2.21 meters (Taken Oct. 23rd – Visible to bottom) Weather: Sun & cloud
Water Temperature (degrees Celsius):	9.4^{O}
Conductivity (µs/cm):	238.5

Additional Comments / Notes

- Water clear
- No odor

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Kearney Lake	**Site ID: KL2**	
Watercourse: Kearney Lake	**Location:** Kearney Lake Road	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0443942E, 4949803N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy with sunny breaks
Air Temperature:	9^{O}
Cloud Cover:	80%
Wildlife Sightings:	Fish surfaced/ birds (crows)
Site Accessibility: Yes, Accessible	Off Colin's Rd.
Site Access Detail:	Sample taken on the lake side of the culvert between residential buildings 20 and 28. Walked down rock to left of culvert. Note: Sample when standing downstream of bottle.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	1:05
Sample Depth (m):	0.4m
pH:	6.43
Dissolved Oxygen (mg/L):	7.14
Secchi Depth (m):	1.27 meters (Taken Oct. 23rd- Visible to bottom) Weather: Sun & cloud
Water Temperature (degrees Celsius):	8.1^{O}
Conductivity (µs/cm):	73.6

Additional Comments / Notes

- Lots of downstream flow
- Clear water
- No odor
- Build up of brush in front of culvert (beaver dam like)

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Kearney Lake Run		**Site ID: KL3**
Watercourse: Kearney Lake Run		**Location:** Kearney Lake Road
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0444390E, 4950406N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	5^{O}
Cloud Cover:	90%
Wildlife Sightings:	Birds (crows)
Site Accessibility: Yes, Accessible	Off walking trail from Amesbury Gate Rd.
Site Access Detail:	Access to site is via a walking path clearly evident off of Amesbury Gate Rd. (off Larry Uteck Blvd.) roughly 205m down road on left. Walk down path, follow gravel walkway down hill and take sample at the low point facing the dam. Look for large rock outcrop on right.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	10:40
Sample Depth (m):	0.3-0.4 meters
pH:	7.17
Dissolved Oxygen (mg/L):	8.65
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	8.4^{O}
Conductivity (µs/cm):	236.6

Additional Comments / Notes

- Clear water with lots of flow from dam (noted in photo log)
- Water level appears to be the same as summer event

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Kearney Lake Run	**Site ID: KL4**	
Watercourse: Kearney Lake Run	**Location:** Kearney Lake Road	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0444463E, 4950571N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	7^{O}
Cloud Cover:	90%
Wildlife Sightings:	Few smaller birds
Site Accessibility: Yes, Accessible	Via the extended road at the end of Weybridge Ln.
Site Access Detail:	If Weybridge, go to end of extended road on right and walk and take sample above the rocky area at the base of the wider, slow moving section of the river.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	11:15am
Sample Depth (m):	0.4-0.5 meters
pH:	7.09
Dissolved Oxygen (mg/L):	8.8
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	9.5^{O}
Conductivity (µs/cm):	232.4

Additional Comments / Notes

- River had good flow, there was no smell to the water
- Water appeared clean

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 9
Client:	Halifax Regional Municipality	
Site: Kearney Lake	**Site ID: KL5**	
Watercourse: Kearney Lake	**Location:** Kearney Lake Road	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 4949142E, 445280N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	8^{O}
Cloud Cover:	85%
Wildlife Sightings:	Birds (crows)
Site Accessibility: Yes, Accessible	Along Kearney Lake Road
Site Access Detail:	Easily accessible, sample location is directly off the Kearney Lake Road on a rocky outcrop supporting a power line pole (two pole structure). Slow truck down carefully, turn hazard lights on. Samples were taken on left front of outcrop facing lake.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	12:00pm
Sample Depth (m):	0.4 meters
pH:	7.05
Dissolved Oxygen (mg/L):	7.63
Secchi Depth (m):	___2.74_____ meters (Taken Oct. 23rd) Weather: Sun & cloud
Water Temperature (degrees Celsius):	9.4^{O}
Conductivity (µs/cm):	240.8

Additional Comments / Notes

- Water looked clean
- No odor
- Limited wildlife

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Highway 102	**Site ID: HWY 102-1**	
Watercourse: Marsh area	**Location:** Highway 102, south of exit 3	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0444708E, 4951644N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	4^{O}
Cloud Cover:	95%
Wildlife Sightings:	Dead turtle/ Crows
Site Accessibility: Yes, Accessible	Off Highway 102 Park before guardrail.
Site Access Detail:	Carefully slow truck down while pulling off highway 102. Park truck with hazard lights on before the start of the guardrail. Walk along outside of guardrail (for approximately 150m). Site is on right fed by a swampy bog area. Samples were taken in front of culvert. There is a concrete pad to step on to take samples. Sample while standing downstream.

Field Parameter Data

	Remarks
Date (d.m.y):	22 .10.2015
Time (hh:mm):	9:40am
Sample Depth (m):	0.4 meters
pH:	6.92
Dissolved Oxygen (mg/L):	5.03
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	5.4^{O}
Conductivity (µs/cm):	252.2

Additional Comments / Notes

- Water seems to have a significant amount of algae in comparison to the summer event
- There is also a bit of an odor and inflow to culvert is limited

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Highway 102	**Site ID: HWY 102-2**	
Watercourse: Marsh area	**Location:** HWY 102, south of exit 3	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0444829E, 4951778N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy with sunny breaks
Air Temperature:	11^{O}
Cloud Cover:	85%
Wildlife Sightings:	Small birds
Site Accessibility: Yes, Accessible	Off Highway 102 (Small gravel drive way- *Back in)
Site Access Detail:	Travel along Highway 102 toward Bedford NS. Site is on right easily to identify based on swamp/bog. Carefully slow truck down with hazard lights flashing. There is a small driveway to park truck. Pull a head of driveway and when lanes are clear back truck down into spot. Take samples in water body in front of culvert.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	2:30
Sample Depth (m):	0.3-0.4 meters
pH:	5.96
Dissolved Oxygen (mg/L):	5.28
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	9.3^{O}
Conductivity (µs/cm):	197.6

Additional Comments / Notes

- 90% of sample area (water pond) was covered in dark green algae
- No water flow
- No odor

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Lake Shore Drive		**Site ID: LSD**
Watercourse: Marsh @ Lakeshore Dr.		**Location:** Kingswood Subdivision
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0442583E, 4950431N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy with sunny breaks
Air Temperature:	10^{O}
Cloud Cover:	80%
Wildlife Sightings:	Birds (crows) / water bugs
Site Accessibility: Yes, Accessible	Via Lakeshore Drive in Kingswood Subdivision
Site Access Detail:	Take Kingswood Drive off Hammonds Plains Road. Travel down to Diana Drive on left go to end and take a left on Lakeshore drive. Travel approximately 1.0 km. There will be a clearing on left down to power lines. Drive truck (4X4) down until larger clearing is reached and park. Continue (walk) down hill to ATV pathway on left. Follow pathway for approximately 250m. Sample location is on right (river with a lot of vegetation throughout)

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	1:40pm
Sample Depth (m):	0.3-0.4 meters
pH:	6.48
Dissolved Oxygen (mg/L):	7.21
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	5.8^{O}
Conductivity (µs/cm):	132.3

Additional Comments / Notes

- First location water bugs were observed
- Clear water
- Limited water flow
- No odor

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 9
Client:	Halifax Regional Municipality	
Site: Larry Uteck Blvd.		**Site ID: LU**
Watercourse: Pond		**Location:** Larry Uteck off-ramp
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0444954E, 4949891N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	5^{O}
Cloud Cover:	90%
Wildlife Sightings:	----
Site Accessibility: Yes, Accessible	From Larry Uteck Blvd.
Site Access Detail:	Take Larry Uteck off ramp and continue down Larry Uteck Blvd. for approximately 320m. Park truck safely on grassy clearing on left. Sample location is at shore line of lake across road. Take walking pathway to wooded area and travel approximately 80m to lake shore. Avoid walking through the bog area on right.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	10:05am
Sample Depth (m):	0.3 meters
pH:	6.99
Dissolved Oxygen (mg/L):	8.5
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	8.2^{O}
Conductivity (µs/cm):	436.2

Additional Comments / Notes

- Water is clear, but has odor
- Bog (to lake) was more saturated than summer event, expect worse in spring
- No presence of algae

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Paper Mill Lake	**Site ID: PML1**	
Watercourse: Paper Mill Lake	**Location:** Moirs Mill Subdivision	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0445129E, 4951154N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	4^{O}
Cloud Cover:	95%
Wildlife Sightings:	Birds (crows)
Site Accessibility: Yes, Accessible	Travel down Ahmadi Cr. approximately 340m (around second bend in road). Park truck in front of Halifax Water station and carefully walk down rock wall on left. At the bottom locate the small stream and continue along the left and side facing lake. Sample location is a small clearing to the left at the mouth of the river.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	8:20am
Sample Depth (m):	0.3-0.4 meters
pH:	7.98
Dissolved Oxygen (mg/L):	8.63
Secchi Depth (m):	___2.91_____ meters (Taken Oct. 23rd) Weather: Sun & cloud
Water Temperature (degrees Celsius):	9.3^{O}
Conductivity (µs/cm):	289.1

Additional Comments / Notes

- Water level appeared to be higher than summer sampling event

FIELD REPORT – OCTOBER 2015

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 2, 3, 4, 5
Client:	Halifax Regional Municipality	
Site: Paper Mill Lake	**Site ID: PML2**	
Watercourse: Paper Mill Lake	**Location:** Moirs Mill Subdivision	
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 0445363E, 4951740N (UTM, NAD83)	
SNC Field Personnel:	Ryan Flinn	

Site Conditions

Weather:	Cloudy
Air Temperature:	5^{O}
Cloud Cover:	99%
Wildlife Sightings:	Birds (crows)
Site Accessibility: Yes, Accessible	Via Lake Dr., off Hammonds Plains Rd.
Site Access Detail:	Park truck in parking zone on lake drive around the first road bend. Launch boat from nearest lake access. For sampling walk down walking path off road bend down to clearing. Follow GPS around lake shore to sample location.

Field Parameter Data

	Remarks
Date (d.m.y):	22.10.2015
Time (hh:mm):	9:08am
Sample Depth (m):	0.4 meters
pH:	7.25
Dissolved Oxygen (mg/L):	8.28
Secchi Depth (m):	2.41 meters (Taken Oct. 23rd) Weather: Sun & cloud
Water Temperature (degrees Celsius):	9^{O}
Conductivity (µs/cm):	454.9

Additional Comments / Notes

- Water clear with no odor
- Sample location: Lake bottom more “rocky” than PML 1

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Appendix C

Site Photographs Fall 2015

Photo 1: PML-1 Paper Mill Lake Sample Location

Photo 2: HWY 102-1 Sample Location

Photo 3: LU Larry Uteck Sample Location

Photo 4: KL4 Kearney Lake Sample Location

Photo 5: KL3 Kearney Lake Sample Location

Photo 6: KL5 Kearney Lake Sample Location

Photo 7: HWY102-2 Sample Location

Photo 8: KL1 Kearney Lake Sample Location

Photo 9: KL2 Kearney Lake Sample Location

Photo 10: LSD Lake Shore Drive Sample Location

Attachment B. Summary of Total Phosphorus Results, Summer 2013 - October 2015

Sites	2013 Summer	2013 Fall	2014 Spring	2014 Summer	2014 Fall	2015 Spring	2015 August	2015 September	2016 October
KL1	11	8	11	26	13	8	2	21	11
KL2	20	29	13	39	25	8	12	28	8
KL3	6	12	9	23	148	4	4	20	2
KL4	2390	16	22	31	15	6	7	21	3
KL5	13	10	10	26	135	5	5	21	5
HWY102-1	21	22	13	38	31	7	20	28	2
HWY102-2	28	199	28	--	201	10	1560	35	12
LSD	15	78	100	--	31	11	501	32	95
LU	27	46	260	28	39	7	9	32	11
PML1	7	47	12	30	21	5	60	23	18
PML2	--	26	11	26	18	8	12	23	8

Seasonal Summary: # Exceedences	8	9	9	9	11	2	6	11	5
Seasonal Summary: % total	80%	82%	82%	100%	100%	18%	55%	100%	45%

Notes

1. Cells marked in grey indicate that measured Total Phosphorus results exceeded 10mg/L during the corresponding monitoring event.

2. Cells marked '--' indicate that the correspoinding site was not monitored during the season.

Legend

- oligotrophic (0-10 µg/100mL): lowest trophic status, below notification threshold
- mesotrophic (10-20 µg/100mL): trophic status immediately above threshold
- mesoeutrophic (20-35 µg/100mL): trophic status two steps above threshold
- eutrophic (35-100 µg/100mL): trophic status three steps above threshold
- hypereutrophic (≥100 µg/100mL): highest trophic status, four steps above threshold