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Halifax, Nova Scotia
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Item No. 2
North West Community Council
February 12, 2018

TO: Chair and Members of North West Community Council

SUBMITTED BY: Original Signed

Kelly Denty, Acting Director, Planning & Development

DATE: January 2, 2018

SUBJECT: **Bedford West Water Quality Status Update – Spring & Summer 2017**

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

Monitoring Event Reporting

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. Eutrophication is the process by which lakes naturally accumulate nutrients and biological material. The eutrophication process is typically accelerated through the impacts of human activities, resulting in relatively rapid changes in trophic state, from lower states (fewer nutrients) to higher states (more nutrients), with corresponding changes in appearance, functional uses, and amenity values.

The water quality monitoring program was specified in the Planning Strategy in response to the Municipality's stated desire to "stem the decline of lakes from the accelerated process of eutrophication, and sedimentation and inputs from other urban runoff", as published in the former Regional Municipal Planning Strategy.[1]

The terms of the monitoring program are specified within Development Agreements that have been negotiated in consultation with the Bedford Watershed Advisory Board[2] The Bedford Watershed Advisory Board was dissolved in 2013 and all development agreements for the Bedford West subdivision negotiated since 2013 have been negotiated instead with the Regional Watersheds Advisory Board (RWAB).

All such development agreements have identified the value of 10 micrograms per Litre (µg/L) of Total Phosphorus as a "trigger value", representing the transition point between the second-lowest trophic state (oligotrophic) to the next-highest trophic state (mesotrophic) per Environment Canada criteria (Table 1).

Trophic Status	**TP (µg/L)**
Ultra-oligotrophic	< 4
Oligotrophic	4-10
Mesotrophic	10-20
Meso-eutrophic	20-35
Eutrophic	35-100
Hypereutrophic	> 100

Table 1. Summary of Canadian trophic state trigger ranges. Environment Canada (2004).

In accordance with the terms of Bedford West development agreements, the municipality is required to submit test results to the Developer, the Community Council, and RWAB within three months of being received from the consultant, or immediately, if total phosphorus ("TP") or bacterial results exceed management thresholds identified therein.

Assessment

Contractor reports submitted from spring 2012 through fall 2014 indicated that a high proportion of water quality samples had TP results exceeding the trigger value of 10µg/L (Table 2).

[1] The current Regional Municipal Planning Strategy states this objective as follows: "This Plan will seek to … maintain the existing trophic status of our lakes and waterways to the extent possible".
[2] RWAB assumed the functions previously performed by BWAB since 2013.

Sites	*2012* Spring	*2012* Summer	*2012* Fall	2013 Spring	2013 Summer	2013 Fall	2014 Spring	2014 Summer	2014 Fall	# Exceedences 2013-2014	% Exceedances 2012-2014
KL1	0.037	0.043	0.007	0.007	0.011	0.008	0.011	0.026	0.013	6	66.67%
KL2	0.021	0.059	0.013	0.010	0.020	0.029	0.013	0.039	0.025	8	88.89%
KL3	0.019	0.045	0.007	0.006	0.006	0.012	0.009	0.023	0.148	5	55.56%
KL4	0.022	0.043	0.007	0.006	2.390	0.016	0.022	0.031	0.015	5	55.56%
KL5	0.018	0.040	0.006	0.005	0.013	0.010	0.010	0.026	0.135	5	55.56%
HWY102-1	0.019	0.039	0.020	0.006	0.021	0.022	0.013	0.038	0.031	8	88.89%
HWY102-2	0.021	0.054	0.030	0.014	0.028	0.199	0.028	--	0.201	8	100.00%
LSD	0.022	0.063	0.003	0.007	0.015	0.078	0.100	--	0.031	6	75.00%
LU	0.043	0.036	0.030	0.006	0.027	0.046	0.260	0.028	0.039	8	88.89%
PML1	0.019	--	0.030	0.006	0.007	0.047	0.012	0.030	0.021	6	75.00%
PML2	0.025	--	--	0.006	--	0.026	0.011	0.026	0.018	5	83.33%
									Overall	**70**	**75.27%**

Table 2. Summary of Total Phosphorus results and exceedances from Spring 2012 through Fall 2014

Community Council has subsequently adopted a 3-phase assessment to understand these observations and recommend changes to the Municipality's approach to watershed management in the subject lands as follows:

Phase 1:
Report and discuss the TP exceedance findings with the developer and conduct a detailed assessment of existing water quality data from the Paper Mill Lake watershed to identify trends in Total Phosphorus measurements observed since 2009, considering CCME Guidelines.

Phase 2:
Investigate cause(s) of high TP measurements, considering all significant land uses and activities that have occurred in the Paper Mill Lake watershed since the inception of the monitoring program.

Phase 3:
Determine a course of action with respect to watershed management and future land use development in the area.

DISCUSSION

The purpose of this report is to report the results of the May and August 2017 monitoring events and to update Council on the assessment process regarding TP and water quality monitoring for Bedford West.

Monitoring Event Summary
The monitoring events held in May and August 2017 found that total phosphorus concentrations exceeded the trigger value of 10 micrograms per Litre (10ug/L) at eight (8) of eleven stations monitored in each season.

A summary of TP results observed at all stations during these events is presented below in Table 3. It is important to note that these results only represent water quality at the time that the samples were collected. Notwithstanding, the results indicate whether water quality is trending towards a mesotrophic (or higher) trophic state, and indicate possible sources of excess nutrient contributions.

Sample Station	May 2017 Concentration (µg/L)	May Exceedance	August 2017 Concentration (µg/L)	August Exceedance
KL1	0.010	No	0.010	No
KL2	0.012	Yes	0.028	Yes
KL3	0.006	No	0.009	No
KL4	0.020	Yes	0.008	No
KL5	0.010	No	0.012	Yes
HWY 102-1	0.017	Yes	0.052	Yes
HWY 102-2	0.013	Yes	0.042	Yes
LSD	0.102	Yes	0.059	Yes
LU	0.024	Yes	0.027	Yes
PML1	0.041	Yes	0.036	Yes
PML2	0.018	Yes	0.013	Yes

Table 3. Summary of TP results and exceedances May & August 2017.

Development Agreements in effect for areas now undergoing development authorize the Municipality to direct the selected water quality monitoring consultant (i.e., contractor) to undertake follow-up testing if threshold levels are exceeded. These agreements do not establish the authority for the Municipality to halt development activities

As noted above in Table 2, eight sample stations yielded exceedances of the TP trigger value in each of May and August 2017. A follow-up assessment process is underway regarding previous test results exceeding the 10µg/L trigger value.

Assessment Status Update

Phase 1 was conducted between June and October 2015 through a contract with CBCL. The study for this phase concluded that TP results did appear to be increasing in both lakes, that TP levels during the 2009-2014 phase displayed an increased variation in both lakes, and that there is an occurrence of abnormally high values in the dataset.

Phase 2, conducted between April and October 2016 through a contract with Dalhousie University's Centre for Water Resource Studies (CWRS), consisted of a watershed assessment study of the Papermill Lake watershed. The principal components of this study were to 1) identify the most likely sources and magnitudes of phosphorus loading into the lakes; 2) recommend how HRM should determine the trophic state of the watershed, and 3) propose an alternate water quality monitoring program for Bedford West, to determine if phosphorus loading is increasing over time. CWRS presented their final report to North West Community Council on November 15, 2016. This presentation is available online at the Municipality's website, here: http://legacycontent.halifax.ca/Commcoun/central/documents/161115nwcc1131pres.pdf.

Phase 3 was initiated in January 2017 with a review of CWRS' final report. As noted by CWRS in its presentation to NWCC in November 2016, the three most significant sources of TP to Kearney Lake and Paper Mill Lake are upstream sources (primarily forests), septic systems, and stormwater runoff from residential land uses. The Municipality can only influence two of these three sources - septic systems and residential stormwater runoff.

Presently, staff are contemplating recommending changes to the monitoring strategy for Bedford West to align with CWRS recommendations generated in Phase 2. This work will require consultation with various parties, including other HRM business units, developers, and RWAB. As the details of the monitoring strategy are specified in the individual development agreements, amendments to each agreement will be necessary to implement any changes to the strategy. The process to recommend changes to the strategy is anticipated to be complete within 1 year following which, amendments to the affected development agreements will be presented to NWCC for consideration.

FINANCIAL IMPLICATIONS

There are no financial implications for this report.

COMMUNITY ENGAGEMENT

No community engagement was required for this report.

ATTACHMENTS

Attachment A. Bedford West Water Quality Report Spring 2017.
Attachment B. Bedford West Water Quality Report Summer 2017.

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210

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

Report Approved by: Original Signed
Shannon Miedema, Program Manager, Energy & Environment, 902.490.3665

Attachment A

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September 5, 2017

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, 2017 Spring Sampling Event Bedford West, Bedford, Nova Scotia

SNC-Lavalin Inc. (SLI) is pleased to submit one electronic copy of the final report presenting the results of the 2017 spring surface water quality sampling event for the Bedford West Water Quality Monitoring Program in Bedford, Nova Scotia. It should be noted that HRM's comments received on August 21, 2017 have been properly addressed.

If you require clarifications, please contact the undersigned at 902-492-4544 Ext. 308, or in her absent please contact Michael Smith at 709-368-0118 Ext 54957

Yours truly,

SNC♦LAVALIN INC.

Original Signed

Maria Gutierrez, *BSc., MSc (EnvMang)., OHS Cert.*
Natural Sciences Specialist
Infrastructure Engineering – Eastern Canada
Infrastructure

CC: Michael Smith, Area Lead, Environment, Atlantic, SNCL

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Water Quality Monitoring Program
Bedford West, Bedford, NS

2017 Spring Sampling Event

05 | 09 | 2017 Final Report

Water Quality Monitoring - Spring 2017

Rev. C02 > SLI ref. 631477-0001-T-4E-REP-000-0007

EXECUTIVE SUMMARY

On June 8, 2017 SNC-Lavalin Inc. (SNCL) completed the Bedford West spring 2017 water quality monitoring sampling event on behalf of Halifax Regional Municipality (HRM). The sampling program consisted of collecting surface water samples from eleven (11) water quality sampling stations. Field parameters were recorded and surface water samples were collected for laboratory analyses. The laboratory analysis included the following analysis: inorganics, calculated parameters, standard elements, additional metals and microbiological.

The applicable water quality assessment standards 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); and
- 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 spring 2017 water quality monitoring event, eight (8) stations reported concentrations that exceeded the Total Phosphorous management threshold criteria of 10 µg/L (0.01 mg/L) listed in the HRM RFP14-338.

- KL2 12 µg/L
- KL4 20 µg/L
- HWY 102-1 17 µg/L
- HWY 102-2 13 µg/L
- LSD 12 µg/L
- LU 24 µg/L
- PML-1 41 µg/L
- PML-2 18 µg/L

In addition, the following parameters exceeded the recommended CCME water quality criteria. Detailed information including the water quality sampling station ID(s) and the values/concentrations are outlined in the report:

- Dissolved Oxygen (in situ)
- Ph (in situ)
- Chloride
- Nitrite
- pH
- Turbidity
- Metals (Aluminium, Cadmium, Iron, Lead, and Zinc)

E.coli did not exceed the Heath Canada Guideline of 400 CFU /100 mL at any of the sampling stations.

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1 INTRODUCTION AND BACKGROUND

SNC-Lavalin Inc. (SNCL) 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 in the Bedford West development area has been ongoing since 2009. SNCL was retained by HRM to complete water quality monitoring programs each spring, summer and fall for two years beginning in 2015. The contract was extended for one (1) additional year by HRM in early 2017. The results of the 2017 spring 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 related to the development project in order to detect any impacts on and/or changes to water quality.

The spring 2017 sampling stations are summarized in Table 1 and shown in **Figure 1**.

Table 1: Bedford West Water Quality 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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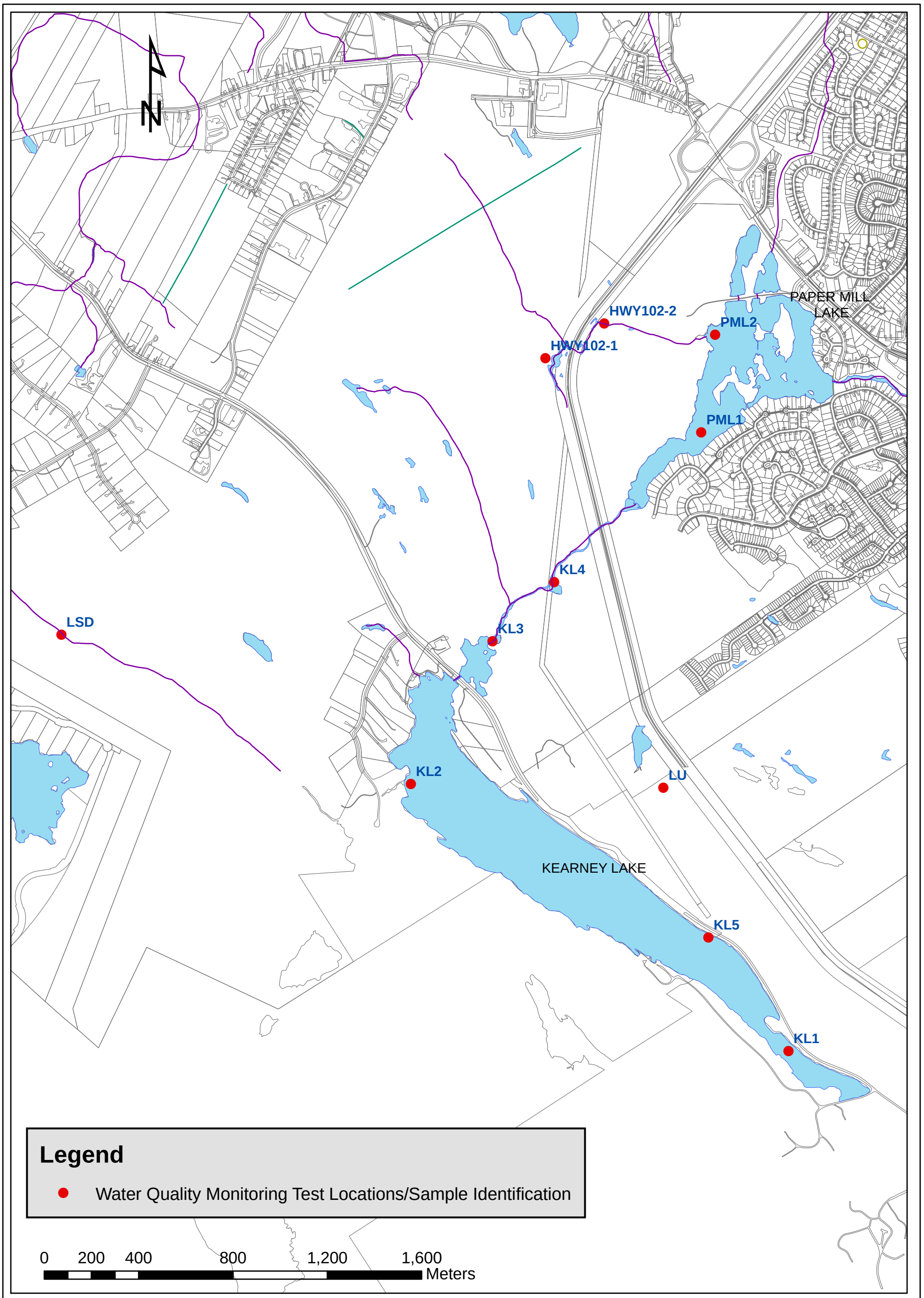
Figure 1: Bedford West Water Quality Sampling Stations



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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 spring 2017 water quality sampling event included the collection of Field Parameters (Group A) and surface water for laboratory analysis of:

- Inorganics (Group B);
- Calculated Parameters (Group C);
- Standard Elements/Metals (Group D);
- Microbiological Analyses (Group E); and
- Additional Metals (Group F)

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)	Standard Metals (D)	Microbiological (E)	Additional Metals (F)
· 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)	· Calcium · Copper · Iron · Magnesium · Manganese · Potassium · Sodium · Zinc	· Chlorophyll A · E. coli · Most Probable Number (MPN) or CFU per 100 mL	· Aluminum · Antimony · Arsenic · Barium · Boron · Cadmium · Chromium · Cobalt · Lead · Molybdenum · Nickel · Selenium · Nickel · Selenium · Silver · Strontium · Thallium · Tin · Titanium · Uranium · Vanadium

All surface water samples, associated field parameters and secchi depth measurements were collected on June 8, 2017.

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Field measurements of pH, dissolved oxygen, specific conductivity, water temperature and air temperature were taken at each station using an YSI 556, instrument serial number R149444. The instrument is calibrated annually by the manufacturer and a pre-calibration was conducted by the provider (Pine Environmental on May 31, 2017) prior to conducting the water quality sampling event. See Appendix A, Instrument Calibration Report.

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.

Water samples and field parameter readings were collected where possible within a depth of 1.0 m below surface. Samples were collected from the shore at all sample locations. Surface water sampling followed SNCL's Standard Operating Procedures (SOP) for surface water sampling. A new pair of nitrile 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

- 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 environmental quality issues, which "triggers" the need for further investigation. According to the 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.
- The Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Aquatic Life – Freshwater (PAL-F) (Version 2015) were used for parameter such as Dissolved Oxygen, pH (in Situ and Laboratory analysis), Chloride, Nitrate, Nitrite, Nitrogen, as well as for total metals (i.e. Aluminum, Arsenic, Boron, Cadmium, Cooper, Iron, Lead, Molybdenum, Nickel, Selenium, Silver, Thallium, Uranium, and Zinc).
- For Total Suspended Solids (TSS), the CCME PAL-F at high flow conditions was applied. The TSS 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 concentrations

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are greater than 250 mg/L, the concentration should not increase more than 10% from background levels.

- The Health Canada guidelines for Canadian Recreational Water Quality (2012, Third Edition) were used for parameters such as Secchi Depth (i.e. the guidelines indicate that the clarity of the water should be sufficiently clear such that a Secchi disk is visible at a minimum depth of 1.2 metres); pH (guideline of 5.0-9.0 pH); Turbidity (limit of 50 Nephelometric Turbidity Units); E. coli (400 MPN/100mL) and Fecal Coliform (400 MPN/mL).
- The 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) for Fresh Water were used for assessment of total metals (i.e. Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Uranium, Vanadium and Zinc).

4 FIELD OBSERVATIONS

The spring 2017 site conditions were recorded for all eleven (11) surface water quality monitoring 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**.

5 FIELD MEASUREMENTS

Field measurements were recorded on field data sheets, which are enclosed in Appendix B and include collection of parameters such as in Situ pH, dissolved Oxygen, water temperature, conductivity and Secchi depth (where applicable).

Field measurements are also summarized in Table 3 attached at the end of Section 6.

Dissolved Oxygen

Four (4) stations exceeded the CCME PAL-F recommended range for dissolved oxygen of 5.5-9.5 mg/L. Concentrations in mg/L were as follows: 9.72 (KL2), 11.35 (LSD), 9.56 (LU) and 10.44 (PLM2).

pH (in Situ)

Two (2) stations exceeded the CCME-PAL-F recommended range of 6.5 - 9.0 pH (in situ) as follows: 6.4 (HWY102-1) and 6.04 (HWY102-2). However, all eleven (11) water quality sampling stations met the Health Canada Guideline for Recreational Water Quality of 5.0 - 9.0 pH

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6 ANALYTICAL RESULTS

Analytical results of the 2017 spring water quality sampling event are summarized in **Table 3** attached at the end of this section. In addition, **Tables 3A** presents the historical water quality results since 2009.

Laboratory certificates of analysis for the spring 2017 event are enclosed in Appendix D.

6.1 TOTAL PHOSPHOROUS

Eight (8) stations reported concentrations that exceeded the management threshold criteria of 10 µg/L (0.01 mg/L) listed in the HRM RFP #14-338. Reported concentrations were as follows:

Station	KL2	KL4	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2
mg/L	0.012	0.020	0.017	0.013	0.102	0.024	0.041	0.018

6.2 GENERAL CHEMISTRY

Chloride: Two (2) stations exceeded the CCME PAL-F recommended value for Chloride of 120 mg/L. Exceedances were as follows: 136 mg/L (HWY-102-2) and 247 mg/L (LU).

Nitrite: Nine (9) stations exceeded the CCME PAL-F recommended value for Nitrite of 0.06 mg/L. Exceedances were as follows: 0.12 (KL1), 0.11 (KL3), 0.12 (KL4), 0.12 (KL5), 0.17 (HWY-102-1), 0.20 (HWY102-2), 0.09 (LSD), 0.34 (LU), 0.11 (PML1), and 0.11 (PML2).

pH (Lab): One (1) station exceeded the CCME-PAL-F recommended pH (laboratory) range of 6.5 - 9.0. The exceedance was reported at station HWY102-2 with a value of 6.22 pH

Turbidity: One (1) station exceeded the NSE EQS reference guideline for Turbidity of 50 NTU (Formazin Nephelometric Unit). Station LSD reported a value of 53.8 NTU.

6.3 METALS

Lead: One (1) station exceeded the CCME-PAL-F recommended limit of 1 µg/L. The exceedance was 1.3 µg/L (KL1). The NSE EQS guideline is also 1 µg/L.

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Iron: Two (2) stations exceeded the CCME-PAL-F recommended limit of 300 µg/L. Exceedances were as follows: 369 µg/L (HWY102-2) and 1080 µg/L (LSD). The NSE EQS guideline is also 300 µg/L.

Zinc: One (1) station exceeded the CCME-PAL-F recommended limit of 30 µg/L at station KL1 (58 µg/L). The NSE EQS guideline is also 30 µg/L.

Aluminum: All eleven (11) stations exceeded the CCME PAL-F recommended value for aluminum of 5 - 100 µg/L and the NSE EQS guideline for aluminum of 5 µg/L. Exceedances were as follows:

Station	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2
mg/L	158	185	128	180	156	69	99	731	61	250	215

Cadmium: Ten (10) stations exceeded the NSE EQS reference guideline for cadmium of 0.01 µg/L. Exceedances were as follows:

Station	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1
mg/L	0.058	0.041	0.020	0.021	0.025	0.032	0.019	0.031	0.069	0.041

6.4 MICROBIOLOGICAL

Eleven (11) E.coli samples were collected during the spring 2017 sampling program. E.coli did not exceed the Heath Canada Guideline of 400 CFU /100 mL in any of the samples collected.

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Table 3: Surface Water Quality Monitoring Results

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TABLE 3: Spring 2017 Results and Exceedances, Bedford West Water Quality Sampling Program

Surface Water Locations, Bedford West, Nova Scotia														Guidelines		
Tested Parameters		RDL	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)
Field Data																
Secchi Depth	Meters	--	2.1	1.95	N/A	N/A	2.1	N/A	N/A	N/A	N/A	4.1	2.5	--	minimum of 1.2	--
Water Temp	Celsius	0.1	16.6	15.69	16.1	16.5	16.8	16.40	13.01	15.6	18.22	17.15	17.10	--	--	--
Dissolved Oxygen	mg/L	0.01	8.3	**9.72**	9.0	8.3	8.7	5.77	5.68	**11.35**	**9.56**	6.97	**10.44**	--	--	5.5 - 9.5
pH (in Situ)	pH	N/A	7.5	6.69	7.0	6.9	7.0	**6.4**	**6.04**	6.78	6.8	6.91	6.73	--	5.0-9.0	6.5 - 9.0
Specific Conductance	uS/cm	1	240	78	204.0	213.0	219.0	354	400	150	755	234	242	--	--	--
Inorganic Parameters																
Alkalinity	mg/L	5	<5	5	<5	<5	<5	17	<5	12	13	<5	5	--	--	--
Chloride	mg/L	1	71	20	63	64	65	101	**136**	43	**247**	66	67	--	--	120
True Color	TCU	5	15	46	24	19	18	24	20	25	12	20	18	--	--	--
Nitrate + Nitrite as N	mg/L	0.05	0.20	0.05	0.24	0.27	0.25	0.35	0.20	0.19	1.35	0.28	0.27	--	--	--
Nitrate as N	mg/L	0.05	0.08	<0.05	0.13	0.15	0.13	0.18	<0.05	0.10	1.01	0.17	0.16	--	--	13
Nitrite as N	mg/L	0.05	**0.12**	0.05	**0.11**	**0.12**	**0.12**	**0.17**	**0.20**	**0.09**	**0.34**	**0.11**	**0.11**	--	--	0.06
Ammonia as N	mg/L	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	--	--	18
Total Kjeldahl Nitrogen as N	mg/L	0.4	<0.4	<0.4	<0.4	<0.4	0.4	0.5	<0.4	1.0	0.7	0.5	0.6	--	--	--
Total Organic Carbon	mg/L	0.5	4.5	8.5	5.3	5.1	4.7	7.4	5.4	7.7	6.1	5.7	5.5	--	--	--
Ortho-Phosphate 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	--	--	--
pH			6.64	6.57	6.77	6.75	6.74	6.84	**6.22**	6.92	7.26	6.80	6.86	--	5.0-9.0	6.5 - 9.0
Calcium	mg/L	0.1	8.6	3.6	6.9	7.7	7.4	20.9	13.3	7.1	25.7	8.0	8.1	--	--	--
Magnesium	mg/L	0.1	1.3	1.0	1.0	1.2	1.2	3.0	2.5	1.6	3.8	1.3	1.3	--	--	--
Total Phosphorus	mg/L	0.002	0.010	**0.012**	0.006	**0.020**	0.010	**0.017**	**0.013**	**0.102**	**0.024**	**0.041**	**0.018**	--	--	0.01
Potassium	mg/L	0.1	1.0	0.8	0.8	0.8	0.9	2.0	1.1	1.3	3.2	1.0	0.9	--	--	--
Sodium	mg/L	0.1	44.9	13.8	44.0	37.6	38.9	64.1	68.8	25.2	137	40.9	41.5	--	--	--
Reactive Silica as SiO2	mg/L	0.5	2.0	1.3	2.2	2.3	2.1	1.8	3.1	1.1	4.6	1.9	1.7	--	--	--
Total Suspended Solids	mg/L	5	<5	<5	<5	6	<5	<5	6	138	22	20	<5	--	--	--
Sulphate	mg/L	2	11	3	10	10	10	15	10	4	32	10	10	--	--	--
Turbidity	NTU	0.1	1.4	0.8	1.0	1.3	0.9	1.3	2.4	**53.8**	7.3	3.3	1.9	--	50	--
Conductivity	umho/cm	1	271	93	245	251	248	411	451	178	849	256	259	--	--	--
Calculated Parameters																
Anion Sum	me/L		2.25	0.73	2.00	2.03	2.06	3.53	4.06	1.55	7.99	2.09	2.22	--	--	--
Bicarb. Alkalinity (as CaCO3)	mg/L	5	<5	5	<5	<5	<5	17	<5	12	13	<5	5	--	--	--
Calculated TDS	mg/L	1	139	46	127	123	125	218	233	92	463	129	133	--	--	--
Carb. Alkalinity (as CaCO3)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	--	--	--
Cation sum	me/L		2.54	0.91	2.38	2.17	2.20	4.14	3.92	1.75	7.65	2.35	2.37	--	--	--
Hardness	mg/L		26.8	13.1	21.3	24.2	23.4	64.5	43.5	24.3	79.8	25.3	25.6	--	--	--
% Difference/ Ion Balance (NS)	%		6.1	11.0	8.6	3.2	3.4	8.0	1.8	6.1	2.2	5.8	3.2	--	--	--
Langelier Index (@20C)	NA		-3.33	-3.73	-3.29	-3.26	-3.29	-2.23	-3.58	-2.73	-1.87	-3.20	-3.13	--	--	--
Langelier Index (@ 4C)	NA		-3.65	-4.05	-3.61	-3.58	-3.61	-2.55	-3.90	-3.05	-2.19	-3.52	-3.45	--	--	--
Saturation pH (@ 20C)	NA		9.97	10.3	10.1	10.0	10.0	9.07	9.80	9.65	9.13	10.0	9.99	--	--	--
Saturation pH (@ 4C)	NA		10.3	10.6	10.4	10.3	10.3	9.39	10.1	9.97	9.45	10.3	10.3	--	--	--
Metals (ICP-MS)																
Total Aluminum	ug/L	5	**158**	**185**	**128**	**180**	**156**	**69**	**99**	**731**	**61**	**250**	**215**	5	--	5-100 ug/L (base on pH 6.5)
Total Antimony	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	20	--	--
Total Arsenic	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5.0	--	5
Total Barium	ug/L	5	16	10	17	20	17	130	151	32	132	22	27	1000	--	--
Total Beryllium	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5.3	--	--
Total Bismuth	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	--	--
Total Boron	ug/L	5	<5	<5	7	<5	<5	<5	<5	<5	<5	<5	<5	1200	--	1500
Total Cadmium	ug/L	0.017	**0.058**	**0.041**	**0.020**	**0.021**	**0.025**	**0.032**	**0.019**	**0.031**	**0.069**	**0.041**	<0.017	0.01	--	0.09
Total Chromium	ug/L	1	<1	<1	<1	<1	2	1	<1	<1	<1	<1	<1	---	--	1
Total Cobalt	ug/L	1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	10	--	--
Total Copper	ug/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	--	2 ug/L (based on hardness)
Total Iron	ug/L	50	78	168	125	136	59	151	**369**	**1080**	<50	206	<50	300	--	300
Total Lead	ug/L	0.5	**1.3**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	1	--	1 ug/L (base on hardness)
Total Manganese	ug/L	2	46	39	30	74	24	22	125	436	77	64	85	820	--	--
Total Molybdenum	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	73	--	73
Total Nickel	ug/L	2	15	<2	<2	7	14	12	6	<2	<2	22	4	25	--	25 ug/L (base on hardness)
Total Selenium	ug/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.0	--	1
Total Silver	ug/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	0.1	--	0.25
Total Strontium	ug/L	5	38	15	33	33	32	92	72	28	104	34	35	21000	--	--
Total Thallium	ug/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	0.8	--	0.8
Total Tin	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	--	--
Total Titanium	ug/L	2	<2	<2	<2	<2	<2	<2	<2	14	<2	2	<2	--	--	--
Total Uranium	ug/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	300	--	15
Total Vanadium	ug/L	2	2	<2	<2	<2	<2	<2	2	<2	3	<2	<2	6	--	--
Total Zinc	ug/L	5	**58**	<5	6	13	11	9	14	8	21	11	8	30	--	30
Microbiological Parameters																
Total Coliforms (MPN)	MPN/100 mL	1	299	>2420	687	792	260	914	>2420	534	488	665	1990	--	--	--
E. Coli (MPN)	MPN/100 mL	1	29	31	7	15	<1	12	<1	1	6	6	1	--	400	--
Fecal Coliform			--	--	--	--	--	--	--	--	--	--	--	--	400	--
Chlorophyll A - Acidification Method	ug/L	0.05	1.45	0.99	1.96	2.40	1.09	1.56	1.40	18.67	25.83	4.97	5.31	--	--	--
Chlorophyll A - Welschmeyer Method	ug/L	0.05	2.55	1.86	2.46	3.04	1.28	2.04	1.74	25.84	31.14	6.45	6.60	--	--	--

RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / no parameter tested.
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
Health Canada Guidelines for Canadian Recreational Water Quality (Thrid Edition 2012)
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (Updated 2015)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The guideline value for each respective element was used.
CCME PAL-F Guideline for Ammonia-N vary base on water pH and Temperature. The value is converted to mg/L total ammonia-N by multiplying by 0.8224
CCME Phosphorus Trigger Range (Applied) of 0.01 mg/L

Bold (black shaded)	Concentration exceeds CCME FWAL applicable guideline.
Underlined (black shaded)	Concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality **(Reference Guidelines)**

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (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	2016/05/16	2016/08/16	2016/10/25	2017/06/08
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	9:30	7:50	13:20	8:30
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	1.8	2.1	2.5	2.1
Water Temp	Celsius	--	--	--	--		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	12.8	22.2	11.9	16.6
Dissolved Oxygen	mg/L	--	--	--	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	14.02	10.33	12.06	8.3
pH (In Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	8.29	4.6	6.23	7.5
Specific Conductance	uS/cm	--	--	--	--		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	239	298	212	240
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	5	8	6	<5
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	55	57	45	71
Colour	TCU	5	--	--	--		18	18	16	26	8	21	28	40	45	50	11	20	11	37	20	13	8	23	37	8	22	31	17	18	15
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	0.10	0.15	0.13	0.20
Nitrate (N)	mg/L	0.05	--	--	13		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	0.10	0.08	0.13	0.08
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.07	<0.05	0.12
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.05	0.09	<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	0.7	<0.4	0.6	<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	4.3	3.4	7.3	4.5
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	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.64	7.23	6.81	6.64
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	6.8	8.0	6.3	8.6
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	1.1	1.1	1.2	1.3
Total Phosphorus	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	0.008	0.002	0.011	0.024	0.005	0.008	0.010
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	0.7	0.9	0.8	1.0
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	35.5	32.2	31.0	44.9
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	2.8	2.0	1.6	2.0
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	38	<5	<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	10	10	10	11
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	0.8	1.0	1.3	0.6	1	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	10.6	0.9	2.6	1.4
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	212	270	161	271
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	1.87	1.99	1.61	2.25
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	5	8	6	<5
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	113	115	99	139.00
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	<10	<10	<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	2.03	1.93	1.82	2.54
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	21.5	24.5	20.7	26.80
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	4.1	1.5	6.2	6.10
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	-3.42	-2.56	-3.20	-3.33
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	-3.74	-2.88	-3.52	-3.65
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	10.1	9.79	10.00	9.97
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	10.4	10.1	10.3	10.30
Metals (ICP-MS)																														
Total Aluminum (Al)	ug/L	5	5	--	5 - 100		230	--	--	289	47.8	--	338	--	--	321	43	168	191	120	56	229	42	155	100	--	88	206	--	--	158
Total Antimony (Sb)	ug/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2
Total Arsenic (As)	ug/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2
Total Barium (Ba)	ug/L	5	1000	--	--		16	--	--	18.5	15.9	--	13	--	--	12	15	9	12	7	16	14	20	9	16	--	17	14	--	--	16
Total Beryllium (Be)	ug/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	ug/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Boron (B)	ug/L	5	1200	--	1500		8	--	--	11.4	9.1	--	<50	--	--	<5	11	33	6	10	9	7	22	10	<50	--	<5	8	--	--	<5
Total Cadmium (Cd)	ug/L	0.017	0.01	--	0.09		<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	0.029	--	--	0.058
Total Chromium (Cr)	ug/L	1	---	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	6	<1	<1	<1.0	--	<1	<1	--	--	<1
Total Cobalt (Co)	ug/L	1	10	--	--		1	--	--	0.54	<0.40	--	0.79	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1
Total Copper (Cu)	ug/L	1	2	--	2		<2	--	--	5.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<1	1	1	<1	1	<2.0	<1	2	<1	<1	1	<1
Total Iron (Fe)	ug/L	50	300	--	300		130	--	--	313	62	125	177	162	384	229	137	195	207	132	92	147	124	168	110	157	81	149	62	269	78
Total Lead (Pb)	ug/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	<0.5	--	--	1.3
Total Manganese (Mn)	ug/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	47	23	45	46
Total Molybdenum (Mo)	ug/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Nickel (Ni)	ug/L	2	25	--	25 - 150		5	--	--	3.2	<2.0	--	3.2	--	--	<2	<2	2	2	<2	<2	3	<2	3	<2.0	--	<2	3	--	--	15
Total Selenium (Se)	ug/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1
Total Silver (Ag)	ug/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<0.1
Total Strontium (Sr)	ug/L	5	21000	--	--		46	--	--	39.1	37.7	--	36	--	--	32	41	32	37	33	30	40	45	26	29	--	19	30	--	--	38
Total Thallium (Tl)	ug/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	<0.1	--	--	<0.1
Total Tin (Sn)	ug/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	ug/L	2	--	--	--		11	--	--	6.4	<2.0	--	5.4	--	--	8	<2	3	4	2	<2	2	<2	5	2.3	--	<2	2	--	--	<2
Total Uranium (U)	ug/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	0.1	--	--	<0.1
Total Vanadium (V)	ug/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	2
Total Zinc (Zn)	ug/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	11	<5	19	58
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		200	65	--	>250	63	>250	91	>250	--	2420	>2420	1120	1200	866	488	525	1550	>2420	---	980	122	866	548	>2420	299
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	4	33	99	29
Fecal Coliform	MPN/ml	--	--	400	--		--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--
Chlorophyll A - Acidification method	ug/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	2.76	0.9	2.08	1.45
Chlorophyll A - Welschmeyer method	ug/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	3.48	1.15	2.19	2.55

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (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	2016/05/16	2016/08/16	2016/10/25	2017/06/08
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	10:30	8:30	12:50	10:47
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	2.1	1.83	1.85	1.95
Water Temp	Celsius	--	--	--	--		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	10.73	20.29	10.20	15.69
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.16	8.50	5.70	6.28	4.65	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	7.88	4.21	5.65	9.72
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	7.64	5.97	5.54	6.69
Specific Conductance	uS/cm	--	--	--	--		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	82	117	104	78
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	<5	10	6	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	17	26	30	20
Colour	TCU	5	--	--	--		20	20	20	20	63	95	80	110	120	52	60	94	37	90	71	25	44	168	50	63	61	47	48	93	46
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	<0.05	0.06	0.19	0.05
Nitrate (N)	mg/L	0.05	--	--	13		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	<0.05	<0.05	0.19	<0.05
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.06	<0.05	0.05
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.05	0.06	<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	0.4	0.9	0.5	<0.4
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	6.2	7.0	13.2	8.5
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	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.35	6.87	6.19	6.57
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	2.9	4.5	5.6	3.6
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	0.7	1.1	1.5	1
Total Phosphorus	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	0.009	0.02	0.013	0.012
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	0.9	0.8	1.1	0.8
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	11.5	16.1	17.7	13.8
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	2.0	2.3	4.5	1.3
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	<5	<5	<5	<5
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	4	3	7	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	0.7	2.0	1.9	0.8
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	79	135	125	93
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	0.56	1.00	1.13	0.73
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	<5	10	6	5.00
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	38	59	68	46.00
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	<10	<10	<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	0.76	1.09	1.25	0.91
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	10.1	15.8	20.2	13.10
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	14.9	4.5	5.3	11.00
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	-4.04	-3.04	-3.85	-3.73
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	-4.36	-3.36	-4.17	-4.05
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	10.4	9.91	10.00	10.30
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	10.7	10.2	10.4	10.60
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	180	--	284	187	--	--	185
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	<2	--	--	<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	<2	--	--	<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	10	--	--	10
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	<2	--	<2	<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	<2	--	--	<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	9	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<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	<0.017	--	--	0.041
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	1	--	--	<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	<1	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<1	2	<1	<1	4	<2.0	<1	<1	<1	<1	2	<1
Total Iron (Fe)	µg/L	50	300	--	300		250	--	--	227	403	238	202	418	358	154	541	813	269	528	523	174	723	305	250	641	478	232	1000	290	168
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	<0.5	--	--	<0.5
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	21	109	39	39
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	<2	--	--	<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	<2	--	--	<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	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	12	--	--	15
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	<0.1	--	--	<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	<2	--	--	<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	<2	--	--	<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	<0.1	--	--	<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	<2	--	--	<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	<5	<5	8	<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	>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	4	15	25	31
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	0.30	1.86	0.32	0.99
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	0.43	2.43	0.36	1.86

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (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	2016/05/16	2016/08/16	2016/10/25	2017/06/08
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	11:00	11:30	11:00	9:36
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	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--			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	12.07	21.67	12.50	16.1
Dissolved Oxygen	mg/L	--	--	--	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	9.34	7.72	11.41	9.0
pH (In Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	7.4	6.82	5.58	7.0
Specific Conductance	uS/cm	--	--	--	--		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	213	264	228	204.0
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	<5	9	8	<5
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	54	56	49	63
Colour	TCU	5	--	--	--		22	20	20	28	12	20	31	38	40	57	15	31	19	23	20	16	13	20	34	13	14	29	13	21	24
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	0.14	0.13	0.10	0.24
Nitrate (N)	mg/L	0.05	--	--	13		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	0.14	0.06	0.10	0.13
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.07	<0.05	0.11
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.06	<0.03	<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	<0.4	<0.4	0.4	<0.4
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	4.3	2.7	8.0	5.3
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	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.69	7.28	6.93	6.77
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	6.2	8.3	7.3	6.9
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	1.0	1.3	1.3	1
Total Phosphorus	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	0.15	0.004	0.004	0.002	0.008	0.005	0.004	0.006
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	0.7	1.0	1.0	0.8
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	32.1	37.2	32.8	44
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	2.6	1.8	2.5	2.2
Total Suspended Solids	mg/L	5	--	--	--		<1	1	1	2	<2	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<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	10	10	10	10
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	1.1	1.1	1.0	1
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	206	262	185	245
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	1.74	1.98	1.76	2.00
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	<5	9	8	<5
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	105	120	107	127.00
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	<10	<10	<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	1.55	1.83	2.18	1.94	2.38
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	19.6	26.1	23.6	21.30
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	2.6	4.8	4.9	8.60
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	-3.41	-2.44	-2.89	-3.29
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	-3.73	-2.76	-3.21	-3.61
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	10.1	9.72	9.82	10.10
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	10.4	10.0	10.1	10.40
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	180	--	90	163	--	--	128
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	<2	--	--	<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	<2	--	--	<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	15	--	--	17
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	<2	--	--	<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	<2	--	<2	<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	8	--	--	7
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		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	0.021	--	--	0.02
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	<1	--	--	<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	<1	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		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	2	<1	<1	<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	112	117	99	125
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	<0.5	--	--	<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	31	41	20	30
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	<2	--	--	<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	2	--	--	<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	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	28	--	--	33
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	<0.1	--	--	<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	<2	--	--	<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	<2	--	--	<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	<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	<2	--	--	<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	8	<5	<5	6
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		120	24	--	190	16	58	72	110	--	291	1553	178	345	2420	1300	86	1730	>2420	---	2420	285	548	1990	2420	687
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	2	38	30	7
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	1.63	0.81	2.29	1.96
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	2.00	0.99	2.37	2.46

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (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	2016/05/16	2016/08/16	2016/10/25	2017/06/08
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	11:30	12:00	11:11	9:25
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	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		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	12.23	20.64	12.30	16.5
Dissolved Oxygen	mg/L	--	--	--	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	9.31	9.09	8.8	8.27	5.50	10.110	8.3
pH (In Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	7.32	6.72	6.140	6.9
Specific Conductance	uS/cm	--	--	--	--		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	215	260	228	213.0
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	<5	9	8	<5
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	54	58	49	64
Colour	TCU	5	--	--	--		22	18	20	27	11	20	32	38	43	48	11	20	17	21	20	13	11	28	33	10	12	25	12	22	19
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	0.15	0.21	0.10	0.27
Nitrate (N)	mg/L	0.05	--	--	13		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	0.15	0.14	0.10	0.15
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.07	<0.05	0.12
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.06	<0.03	<0.03	<0.03
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	<0.4	<0.4	0.4	<0.4
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	4.3	3.3	8.1	5.1
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	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.70	7.03	6.89	6.75
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	6.5	7.1	7.3	7.7
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	1.0	1.1	1.3	1.2
Total Phosphorus	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	0.007	0.004	0.007	0.02
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	0.7	0.9	1.0	0.8
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	32.4	41.4	31.1	37.6
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	2.6	2.0	2.4	2.3
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	7	<5	10	6
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	10	10	10	10
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	1.2	1.5	1.6	1.3
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	206	275	185	251
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	1.74	2.04	1.76	2.03
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	<5	9	8	<5
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	106	125	105	123.00
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	<10	<10	<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	1.86	2.28	1.87	2.17
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	20.3	22.3	23.6	24.20
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	3.4	5.5	3.0	3.20
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	-3.38	-2.76	-2.93	-3.26
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	-3.70	-3.08	-3.25	-3.58
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	10.1	9.79	9.82	10.00
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	10.4	10.1	10.1	10.30
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		150	--	--	125	29.2	--	231	--	--	188	48	149	141	106	159	236	46	93	160	--	84	172	--	--	180
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	<2	--	--	<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	<2	--	--	<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	16	--	--	20
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	<2	--	<2	<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	<2	--	--	<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	7	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<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	0.024	--	--	0.021
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	<1	--	--	<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	<1	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	2.4	<2.0	2.3	<2.0	<2.0	<2	<2	4	9	<1	1	<1	<1	2	6.8	1	1	1	<1	<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	122	61	114	136
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	<0.5	--	--	<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	34	58	29	74
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	<2	--	--	<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	2	--	--	7
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	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	28	--	--	33
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	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	5	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	4.2	--	--	<2	<2	<2	<2	<2	3	2	<2	<2	<2.0	--	<2	<2	--	--	<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	0.1	--	--	<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	<2	--	--	<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	7	<5	<5	13
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		28	58	--	100	16	75	83	95	--	345	>2420	921	548	>2420	770	308	1550	>2420	---	>2420	281	488	1730	>2420	792
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	2	35	29	15
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	1.62	0.16	2.18	2.4
Chlorophyll A - Welschmeyer 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	2.09	0.21	2.15	3.04

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	CCME Phosphorus Trigger Range (Applied)	Kearney Lake															
Sample Sites							KLS															
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	2016/05/16	2016/08/16	2016/10/25	2017/06/08
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	10:00	8:00	13:05	9:00
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	2.1	5.3	4.2	2.1
Water Temp	Celsius	--	--	--	--		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	12.22	22.2	12.7	16.8
Dissolved Oxygen	mg/L	--	--	--	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	10.47	8.39	9.92	8.7
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	5.75	5.11	5.72	7.0
Specific Conductance	uS/cm	--	--	--	--		112	230	229	189.0	219.5	202.1	212.9	472.0	251.0	211.0	0.184	249.8	240.8	209	267.0	243.2	219.0
INORGANICS																							
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5.4	6	7	<5	7	9	<5
Dissolved Chloride (Cl)	mg/L	1	--	--	120		37	55	57	48	58	44	46	61	47	47	59	58	58	54	56	53	65.00
Colour	TCU	5	--	--	--		35	43	10	27	10	22	18	14	11	22	35	8	19	27	13	17	18.00
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	0.14	0.19	0.15	0.25
Nitrate (N)	mg/L	0.05	--	--	13		--	0.19	0.15	0.83	0.21	0.21	0.20	0.16	0.10	0.16	0.16	0.12	0.19	0.14	0.09	0.15	0.13
Nitrite (N)	mg/L	0.05	--	--	0.06		--	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	**0.10**	<0.05	**0.12**
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.06	<0.03	<0.03	<0.03
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	0.5	<0.4	0.7	0.40
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	4.4	3.3	7.0	4.70
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	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.66	7.16	7.03	6.74
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	6.3	7.3	8.2	7.40
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	1.0	1.1	1.3	1.20
Total Phosphorus	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	0.004	0.004	0.003	0.010
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	0.7	0.9	1.0	0.90
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	32.5	33.1	33.5	38.90
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	2.7	2.0	2.3	2.10
Total Suspended Solids	mg/L	5	--	--	--		1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	<5	<5	<5	<5	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		9	7	8	8	8	7	8	9	8	8	8	9	8	10	10	10	10.00
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	0.7	1.3	1.2	0.90
Conductivity (uS/cm)	uS/cm	1	--	--	--		160	215	226	189	232	223	204	228	246	225	220	248	244	208	267	196	248.00
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	1.74	1.94	1.89	2.06
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5.4	6	7	<5	7	9	<5
Calculated TDS	mg/L	1	--	--	--		84	118	111	96	110	82	98	136	106	103	120	124	106	105	114	113	125.00
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<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	1.86	1.93	2.01	2.20
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	19.8	22.8	25.8	23.40
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	3.2	0.4	3.0	3.40
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	-3.43	-2.72	-2.69	-3.29
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	-3.75	-3.04	-3.01	-3.61
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	10.1	9.88	9.72	10.00
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	10.4	10.2	10.0	10.30
Metals (ICP-MS)																							
Total Aluminum (Al)	ug/L	5	5	--	5 - 100		--	222	52	154	136	58	61	224	53	108	180	---	79	163	--	--	**156**
Total Antimony (Sb)	ug/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	--	<2
Total Arsenic (As)	ug/L	2	5.0	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	--	<2
Total Barium (Ba)	ug/L	5	1000	--	--		--	18	16	15	19	9	16	16	17	17	17	---	19	14	--	--	17.00
Total Beryllium (Be)	ug/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	<2	<2
Total Bismuth (Bi)	ug/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2
Total Boron (B)	ug/L	5	1200	--	1500		--	6	9	15	7	7	9	7	6	10	<50	---	<5	7	--	--	<5
Total Cadmium (Cd)	ug/L	0.017	0.01	--	0.09		--	0.022	0.027	0.029	0.024	<0.017	0.034	0.036	<0.017	0.024	0.035	---	0.332	0.024	--	--	0.025
Total Chromium (Cr)	ug/L	1	---	--	1		--	<1	<1	5	<1	<1	<1	6	<1	<1	<1.0	---	7	<1	--	--	2.00
Total Cobalt (Co)	ug/L	1	10	--	--		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	---	<1	<1	--	--	<1
Total Copper (Cu)	ug/L	1	2	--	2		<2.0	<2	<2	<2	<2	<1	1	<1	<1	5	<2.0	1	<1	<1	<1	<1	<1
Total Iron (Fe)	ug/L	50	300	--	300		175	160	78	120	111	70	79	111	<50	119	100	123	158	96	55	88	59.00
Total Lead (Pb)	ug/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	<0.5	--	--	<0.5
Total Manganese (Mn)	ug/L	2	820	--	--		35.9	30	14	37	35	13	12	40	18	25	34	24	35	23	15	17	24.00
Total Molybdenum (Mo)	ug/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2
Total Nickel (Ni)	ug/L	2	25	--	25 - 150		--	<2	<2	5	<2	<2	<2	2	<2	<2	<2.0	---	3	3	--	--	14.00
Total Selenium (Se)	ug/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	---	<1	<1	--	--	<1
Total Silver (Ag)	ug/L	0.1	0.1	--	0.25		--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	---	<0.1	<0.1	--	--	<0.1
Total Strontium (Sr)	ug/L	5	21000	--	--		--	27	31	29	31	18	31	31	30	30	29	---	23	28	--	--	32.00
Total Thallium (Tl)	ug/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	<0.1	--	--	<0.1
Total Tin (Sn)	ug/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2
Total Titanium (Ti)	ug/L	2	--	--	--		--	3	<2	<2	<2	<2	<2	<2	<2	2	2.3	---	<2	<2	--	--	<2
Total Uranium (U)	ug/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	0.1	--	--	<0.1
Total Vanadium (V)	ug/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2
Total Zinc (Zn)	ug/L	5	30	--	30		9.3	5	<5	64	11	7	5	10	<5	10	14	6	12	10	<5	<5	11.00
MICROBIOLOGICAL																							
Total Coliform	MPN/100mL	1	--	--	--		--	461	613	93	461	308	461	42	629	>2470	---	356	163	179	517	2420	260.00
E. coli	MPN/100mL	1	--	400	--		100	14	2	6	6	6	4	<1	1	17	<10	1	2	<1	23	44	<1
Fecal Coliform	MPN/ml	--	--	400	--		--	--	--	--	--	--	--	--	--	--	---	---	--	--	--	--	--
Chlorophyll A - Acidification method	ug/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	1.52	1.2	2.32	1.09
Chlorophyll A - Welschmeyer method	ug/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	1.86	1.57	2.34	1.28

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	CCME Phosphorus Trigger Range (Applied)	Highway 102																								
Sample Sites							HWY102-1																								
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	2012/08/15	2012/10/11	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	2016/05/16	2016/08/16	2016/10/25	2017/06/08
Sampling Time	hh:mm	--					07:00	12:45	08:00	13:00	10:20	09:00	13:40	11:00	11:00	14:50	11:00	9:50	14:15	12:22	12:30	12:00	10:10	9:30	13:15	09:20	9:40	14:30	11:00	10:20	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	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
Water Temp	Celsius	--	--	--	--		11.8	18.8	15.7	14.9	19.6	7.4	11.4	17.8	14.6	10.7	21.8	13.6	11.7	19.5	8.9	12.1	19.6	10.2	14.29	20.70	5.40	13.42	19.28	9.20	16.40
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		11.44	5.80	4.34	8.18	4.25	6.05	8.15	3.88	5.34	5.65	1.03	3.83	7.55	3.32	3.10	12.03	2.09	4.54	4.27	3.82	5.03	8.18	10.14	7.35	5.77
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.98	5.35	5.25	6.31	5.26	5.62	5.75	5.77	5.99	8.76	5.73	6.38	6.19	7.10	6.79	6.02	6.63	5.12	6.35	6.24	6.92	7.34	6.14	5.69	6.4
Specific Conductance	uS/cm	--	--	--	--		194	153	104	135	106	109	114	108	89	288	225	155.5	226	173.2	234.0	880.0	337	109	0.393	335.8	251.2	289	353	208.9	354
INORGANICS																															
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		<5	<5	<5	<5	<5	<5	5	11	8	22	25	15	9	23	20	31	28	30	16	21	12	14	27	10	17
Dissolved Chloride (Cl)	mg/L	1	--	--	120		24	38	24	32	25	22	24	19	12	58	48	28	53	31	40	65	57	19	130	67	49	71	87	35	101
Colour	TCU	5	--	--	--		67	68	57	37	89	53	39	65	79	24	65	40	9	65	25	11	31	93	22	27	29	23	37	64	24
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.69	<0.05	1.2	0.69	0.25	1.2	2.61	0.06	0.43	0.51	<0.05	<0.05	<0.05	<0.05	0.53	<0.050	<0.05	0.17	0.05	0.13	0.53	0.35
Nitrate (N)	mg/L	0.05	--	--	13		<0.05	--	--	0.69	<0.05	--	0.69	--	--	2.61	0.06	0.43	0.51	<0.05	<0.05	<0.05	<0.05	0.53	<0.050	<0.05	0.17	0.05	<0.05	0.53	0.18
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.13	<0.05	0.17
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.29	<0.05	<0.05	<0.05	<0.05	0.05	0.1	0.07	0.31	0.19	0.04	<0.03	0.05	0.06	<0.03	0.04	0.03	<0.050	<0.03	0.04	0.06	0.06	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	1.1	1.3	0.6	--	0.6	0.6	0.7	0.6	<0.4	0.34	0.50	0.6	0.7	1.2	0.7	0.5
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	10	7.7	4.7	11	6.3	4.5	7.2	7.4	5.5	10.0	7.0	5.1	10.1	17.7	4.1	7.7	9.0	2.7	14.6	8.4	4.5	8.0	11.5	7.4
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	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		4.54	5.24	5.40	5.48	6.24	5.31	6.42	6.55	6.28	6.4	6.9	6.8	6.86	6.87	6.73	6.56	7.49	5.90	6.61	7.46	6.80	6.87	7.03	6.45	6.8
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.7	1.8	1.6	4.93	3.34	5.09	4.9	5.21	5.55	12.5	11.7	7.5	11.1	10.5	13.9	7.2	23.3	2.2	18000	18.0	12.4	12.9	25.8	9.9	20.9
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.3	0.5	0.5	1.08	0.79	1.09	0.91	0.92	1.19	1.7	2.0	1.4	1.4	1.5	2.3	1.6	3.2	0.6	2400	2.7	2.3	1.7	2.7	1.7	3.0
Total Phosphorus	mg/L	0.002	--	--	--	0.01	0.07	0.14	0.020	0.006	0.007	0.011	0.009	0.012	0.010	0.019	0.039	0.02	0.006	0.021	0.022	0.013	0.038	0.03	0.007	0.020	0.002	0.005	0.038	0.009	0.017
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	1.2	0.7	1.140	1.630	1.310	1.100	1.500	1.880	1.6	2.5	1.5	1.3	1.7	2.4	1.2	2.5	0.7	2000	2.1	1.5	1.4	1.9	1.7	2.0
Total Sodium (Na)	mg/L	0.1	--	--	--		15	25	13	15.9	14.5	14.6	14.8	10.2	8.26	36.3	27.7	14.6	30.8	15.0	20.5	39.1	38.7	18.6	64	37.7	28.8	45.4	43.8	24.8	64.1
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.5	2.2	2.0	1.1	3.8	5.1	2.8	5.2	4.6	4.1	6.1	5.1	3.1	5.1	5.8	1.7	7.1	4.7	2.1	4.9	4.8	1.4	6.3	4.6	1.8
Total Suspended Solids	mg/L	5	--	--	--		7	80	2	<2	11	<2	<1	1	<1	9	6	<5	<5	<5	<5	6	<5	<5	<1.0	<5	<5	<5	<5	10	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		5	3	3	8	<2	8	10	8	10	14	8	9	12	8	12	10	7	6	13	9	14	14	14	18	15.0
Turbidity (NTU)	NTU	0.1	--	50	--		14.0	35	0.9	1.4	1.2	0.6	0.4	0.6	1.1	0.9	1.9	0.9	0.5	1.6	0.5	0.7	1.6	0.9	0.59	0.9	0.8	1.0	4.1	1.0	1.3
Conductivity (uS/cm)	µS/cm	1	--	--	--		100	140	92	130	100	110	110	100	88	263	231	143	243	188	218	252	338	112	470	324	244	289	440	167	411
Calculated Parameters																															
Anion Sum	me/L	N/A	--	--	--		0.77	1.12	0.73	1.11	0.71	0.88	1.03	0.95	0.80	2.55	2.02	1.31	1.96	1.50	1.78	2.66	2.31	1.30	4.20	2.50	1.93	2.58	3.29	1.60	3.53
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		<1	<1	<1	<1	<1	<1	5	11	8	22	25	15	9	23	20	31	28	30	16	21	12	14	27	10	17.00
Calculated TDS	mg/L	1	--	--	--		50	73	45	67	50	63	65	58	54	150	117	73	117	83	104	143	150	68	240	151	116	155	193	100	218.00
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	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		0.84	1.32	0.74	1.06	0.93	1.02	1.00	0.83	0.80	2.43	6.04	1.19	2.06	1.40	1.87	2.25	3.22	1.04	3.94	2.88	2.11	2.81	3.51	1.79	4.14
Hardness (CaCO3)	mg/L	N/A	--	--	--		6	6	6	17	12	17	16	17	19	38.2	37.5	24.5	33.5	32.4	44.2	24.6	71.4	8.0	55.0	56.1	40.4	39.2	75.5	31.7	64.50
Ion Balance (% Difference)	%	N/A	--	--	--		4.35	8.20	0.68	2.30	13.40	7.37	1.48	6.74	0.00	2.6	1.9	4.6	2.4	3.5	2.6	8.4	16.4	11.2	3.19	7.1	4.7	4.4	3.1	5.7	8.00
Langelier Index (@ 20C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	-3.50	-2.99	-3.36	-2.77	-2.23	-2.72	-2.73	-2.33	-2.41	-2.69	-1.30	-3.85	-2.32	-1.57	-2.62	-2.48	-1.74	-3.14	-2.23
Langelier Index (@ 4C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	-3.75	-3.25	-3.61	-3.09	-2.55	-3.04	-3.05	-2.65	-2.73	-3.01	-1.62	-4.17	-2.57	-1.89	-2.94	-2.80	-2.06	-3.46	-2.55
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	9.92	9.54	9.64	9.17	9.13	9.52	9.59	9.20	9.14	9.25	8.79	9.75	8.93	9.03	9.42	9.35	8.77	9.59	9.07
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	10.20	9.80	9.89	9.49	9.45	9.84	9.91	9.52	9.46	9.57	9.11	10.1	9.18	9.35	9.74	9.67	9.09	9.91	9.39
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		510	--	--	169	192	--	205	--	--	134	183	146	86	145	150	187	83	310	51	--	52	81	--	--	69
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	<2	--	--	<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	<2	--	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		22	--	--	52.9	36.9	--	37.3	--	--	58	284	42	57	57	80	46	142	17	130	--	86	79	--	--	130
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	<2	--	<2	<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	<2	--	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		<5	--	--	11.4	10.9	--	<50	--	--	12	18	13	10	10	11	9	14	11	<50	--	<5	10	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.043	<0.017	--	0.023	--	--	0.034	0.021	<0.017	<0.017	<0.017	0.040	0.022	<0.017	0.022	0.024	--	<0.017	<0.017	--	--	0.032
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	8	<1	<1	<1.0	--	<1	<1	--	--	1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.50	0.46	--	<0.40	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	3.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	3	<2	<1	2	<1	<1	2	<2.0	<1	1	<1	<1	2	<1
Total Iron (Fe)	µg/L	50	300	--	300		720	--	--	146	637	150	107	209	219	102	1380	255	111	938	446	147	820	290	140	1280	138	144	766	228	151
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		1.6	--	--	2.37	0.56	--	<0.50	--	--	<0.5	0.7	<0.5	<0.5	<0.5	0.6	2.6	<0.5	0.6	<0.50	--	<0.5	<0.5	--	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		40	--	--	55.3	39.0	67.0	28.1	21.0	31.3	34	79	28	23	45	31	56	122	61	28	95	22	19	78	38	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	<2	--	--	<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	<2	--	--	12
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	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		11	--	--	29.1	19.7	--	24.3	--	--	48	58	36	52	47	62	38	103	13	85	--	39	58	--	--	92
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	<0.1	--	--	<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	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		6	--	--	<2.0	<2.0	--	3.5	--	--	<2	3	<2	<2	<2	4	2	<2	<2	<2.0	--	<2	<2	--	--	<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	<0.1	--	--	<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	<2	--	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		21	--	--	16.4	6.9	6.9	<5.0	<5.0	6.9	<5	6	<5	<5	<5	10	10	<5	7	11	<5	<5	<5	<5	6	9
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		84	>250	--	>250	>250	180	120	180	--	687	>2420	>2420	1550	>2420	1553	120	>2420	>2420	---	>2420	659	>2420	>2420		914
E. coli	MPN/100mL	1	--	400	--		54	>250	--	12	17	5	1	78	<100	3	68	145	4	9	5	3	179	3	20	25	2	<1	86		12
Fecal Coliform	MPN/ml	--	--	400	--		--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--		--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		15.40	19.29	0.70	18.12	1.61	8.45	0.93	0.58	0.69	0.53	2.59	0.81	1.27	14.70	1.99	0.25	1.10	1.22	0.5	7.27	0.36	0.94	51.51	0.33	1.56
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		17.50	19.60	0.84	17.62	1.68	7.52	0.84	0.56	0.65	0.59	2.89	1.05	1.45	15.80	2.20	0.82	1.11	1.38	0.55	6.79	0.23	1.30	60.68	0.43	2.04

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL F (Applied)	CCME Phosphorus Trigger Range (Applied)	Highway 102																							
Sample Sites							HWY102-2																							
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	2012/08/15	2012/10/11	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	2016/05/16	2016/08/16	2016/10/25	2107/06/08
Sampling Time	hh:mm	--					12:30	12:15	12:30	12:40	09:30	12:30	11:20	15:00	15:30	11:20	12:20	10:35	10:40	10:00	10:22	12:15	14:25	10:07	11:00	12:58	14:30	12:50	12:45	10:40	11:45
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	NCC	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		16.7	19.2	16.4	17.2	17.0	8.7	10.8	24.2	15.1	7.8	23.7	14.3	11.5	22.0	10.7	11.4	--	10.4	12.7	23.7	9.3	13.41	20.43	10.20	13.01
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.01	5.90	4.80	4.91	2.45	2.99	6.92	7.03	5.09	3.73	13.1	3.28	6.30	1.57	4.20	10.50	--	9.25	4.24	6.11	5.28	6.77	7.06	6.8	5.68
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.57	5.71	5.40	6.33	5.86	5.64	6.22	5.89	5.29	7.3	6.37	6.72	6.01	6.92	5.40	5.40	--	5.85	6.45	6.04	5.96	5.86	6.19	5.36	6.04
Specific Conductance	uS/cm	--	--	--	--		37	457	162	415	167	101.2	92.2	123.1	96	225	226	159.1	288	188.5	204.4	204.4	--	174	0.411	699	197.6	968	838	219.2	400
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		<5	<5	7	6	5	<5	<5	5	<5	17	7	<5	6	14	7	30	--	8	7.5	5	<5	13	21	6	<5
Dissolved Chloride (Cl)	mg/L	1	--	--	120		21	82	83	170	41	18	21	21	17	63	109	45	71	50	52	113	--	34	260	178	78	236	226	48	136
Colour	TCU	5	--	--	--		120	190	91	96	160	68	65	98	77	32	100	70	11	61	36	13	--	85	17	9	8	14	39	86	20
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.10	<0.05	0.62	0.26	1.8	3.2	1.54	<0.05	0.14	0.17	<0.05	<0.05	<0.05	--	0.12	<0.050	<0.05	0.15	0.21	0.23	0.11	0.2
Nitrate (N)	mg/L	0.05	--	--	13		<0.05	--	--	0.10	<0.05	--	0.26	--	--	1.54	<0.05	0.14	0.17	<0.05	<0.05	<0.05	--	0.12	<0.050	<0.05	0.15	<0.05	<0.05	0.11	<0.05
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.010	<0.05	<0.05	0.21	0.23	<0.05	0.20
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.06	<0.05	<0.05	0.20	<0.05	<0.05	0.30	0.08	0.09	<0.03	<0.03	<0.03	0.17	0.09	<0.03	--	<0.03	0.056	0.19	0.05	0.14	0.37	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.6	1.1	0.5	--	0.7	2.0	15.3	--	<0.4	0.33	62.6	2.0	24.3	2.1	0.6	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		8.5	13	13	7.2	14	7.4	5.7	9.2	8.4	7.0	15.8	11.2	6.1	10.6	5.1	17.4	--	8.0	3.0	29.0	9.9	79.3	11.1	13.4	5.4
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		5.43	5.96	6.30	6.05	6.32	5.47	5.93	6.18	5.92	5.9	6.7	6.8	6.61	6.59	6.34	7.20	--	6.40	6.12	6.64	6.18	6.46	6.80	6.15	6.22
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.6	4.0	4.8	7.44	3.84	4.01	3.07	2.22	3.80	7.0	8.4	5.6	7.6	8.5	8.2	14.1	--	9.5	20000	33.3	9.8	23.9	23.8	8.6	13.3
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.4	0.7	0.9	0.96	0.59	1.00	0.68	0.68	1.38	1.2	1.4	1.2	1.2	1.3	2.2	3.1	--	1.8	2500	32.7	2.2	3.2	2.5	1.7	2.5
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	0.04	0.034	0.010	0.028	0.003	0.009	0.019	0.041	0.021	0.054	0.03	0.014	0.028	0.199	0.028	--	0.20	0.01	1.56	0.012	0.222	0.034	0.012	0.013
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	0.8	1.1	0.984	0.956	1.390	0.844	1.310	1.880	1.2	1.7	1.6	1.3	1.5	2.5	2.9	--	1.7	1900	12.5	1.1	4.0	2.1	1.4	1.1
Total Sodium (Na)	mg/L	0.1	--	--	--		15	51	55	83.7	32.0	12.1	13.3	13.1	13.3	41.5	63.6	20.4	39.0	19.1	34.5	69.6	--	24.0	150	124	36.8	149.0	124	26.4	68.8
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.2	4.4	4.0	3.0	6.4	5.4	2.5	6.5	6.7	4.1	6.9	5.8	1.6	6.2	6.6	1.6	--	5.9	2.3	7.2	5.6	2.8	9.0	4.5	3.1
Total Suspended Solids	mg/L	5	--	--	--		<2	58	62	34	27	3	<1	10	14	<5	39	<5	<5	<5	194	34	--	<5	2	3000	15	342	69	<5	6
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		<2	3	8	11	<2	7	5	5	8	12	6	10	10	9	10	12	--	8	15	7	8	22	21	8	10
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	3.8	4.2	2.6	3.1	0.5	0.4	1.2 (1)	3.9	0.6	10.8	2	1.5	3.3	144	1.1	--	1.1	1.2	1490	9.9	131	54	1.1	2.4
Conductivity (uS/cm)	µS/cm	1	--	--	--		85	290	310	590	160	94	91	100	110	263	403	179	295	203	223	433	--	194	920	662	315	817	952	177	451
Calculated Parameters																														
Anion Sum	me/L	N/A	--	--	--		0.60	2.37	2.62	5.13	1.27	0.70	0.73	0.91	0.86	2.48	3.34	1.49	2.34	1.88	1.81	4.04	--	1.29	7.88	5.27	2.38	7.39	7.25	1.65	4.06
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		<1	<1	7	6	5	<1	<1	5	<1	17	7	<5	6	14	7	30	--	8	7.5	5	<5	13	21	6	<5
Calculated TDS	mg/L	1	--	--	--		42	150	165	282	93	52	48	62	67	143	200	86	135	100	145	235	--	85	460	712	138	473	422	99	233
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	<1.0	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		0.81	2.65	2.89	4.17	1.81	0.86	0.82	0.83	0.97	2.32	2.10	1.40	2.24	1.50	3.50	4.17	--	1.76	7.87	29.1	2.35	9.27	7.23	1.80	3.92
Hardness (CaCO3)	mg/L	N/A	--	--	--		6	13	16	23	12	14	11	8	15	22.4	26.7	18.9	23.9	26.6	29.5	48.0	--	31.1	59.0	218	33.5	72.9	69.7	28.5	43.5
Ion Balance (% Difference)	%	N/A	--	--	--		14.90	5.58	4.90	10.30	17.50	10.30	5.81	4.60	6.01	3.3	3.6	3.1	2.3	11.3	31.7	1.6	--	15.1	0.0600	69.4	0.5	11.3	0.1	4.3	1.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		NC	NC	-3.57	-3.72	-3.70	NC	NC	-4.07	NC	-3.63	-3.15	-3.34	-3.33	-2.92	-3.50	-1.80	--	-3.30	-3.18	-2.81	-3.73	-2.70	-2.15	-3.72	-3.58
Langelier Index (@ 4C)	N/A	N/A	--	--	--		NC	NC	-3.82	-3.97	-3.95	NC	NC	-4.32	NC	-3.95	-3.47	-3.66	-3.65	-3.24	-3.82	-2.12	--	-3.62	-3.42	-3.13	-4.05	-3.02	-2.47	-4.04	-3.9
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	NC	9.87	9.77	10.00	NC	NC	10.30	NC	9.53	9.85	10.10	9.94	9.51	9.84	9.00	--	9.70	9.29	9.45	9.91	9.16	8.95	9.87	9.8
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	NC	10.10	10.00	10.30	NC	NC	10.50	NC	9.85	10.2	10.5	10.3	9.83	10.2	9.32	--	10.0	9.54	9.77	10.2	9.5	9.27	10.20	10.1
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		270	--	--	189	368	--	260	--	--	145	466	259	130	138	2760	400	--	216	100	--	129	3880	--	--	99
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	2.1	--	<1.0	--	--	<2	<2	<2	<2	<2	6	<2	--	<2	<1.0	--	<2	3	--	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		20	--	--	53.1	27.7	--	26.6	--	--	49	74	33	44	43	213	381	--	63	140	--	147	762	--	--	151
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		<5	--	--	7.9	7.8	--	<50	--	--	10	17	15	9	10	13	11	--	12	<50	--	<5	9	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.051	<0.017	--	<0.017	--	--	0.037	0.031	0.032	0.019	<0.017	0.096	0.051	--	0.019	0.100	--	<0.017	0.778	--	--	0.019
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	1.0	--	<1.0	--	--	<1	<1	<1	<1	1	9	2	--	<1	<1.0	--	<1	8	--	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.66	0.77	--	<0.40	--	--	<1	1	1	<1	1	3	1	--	<1	1.8	--	3	4	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	2.0	<2.0	<2.0	<2.0	2.5	2.8	<2	3	3	<2	1	12	4	--	2	<2.0	404	2	13	<1	2	<1
Total Iron (Fe)	µg/L	50	300	--	300		880	--	--	1380	3850	303	229	897	1110	214	5210	1550	383	1720	28400	1660	--	485	960	217000	714	21300	7380	375	369
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		1.9	--	--	1.61	2.70	--	0.59	--	--	<0.5	5.2	2.1	0.6	0.7	19.4	3.5	--	1.0	<0.50	--	0.6	39.7	--	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		110	--	--	387	135	52.9	40.5	106	176	78	219	207	83	173	327	212	--	93	470	2800	303	586	359	71	125
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	4	2	--	<2	<2.0	--	<2	8	--	--	6
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	--	<1	<1.0	--	<1	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		11	--	--	37.4	21.1	--	16.9	--	--	33	45	31	39	40	45	75	--	43	96	--	38	96	--	--	72
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	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		4	--	--	<2.0	6.4	--	4.9	--	--	<2	10	4	4	<2	60	9	--	6	<2.0	--	<2	41	--	--	<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	<0.10	--	<0.1	0.2	--	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	2	<2	<2	<2	11	<2	--	<2	<2.0	--	<2	18	--	--	2
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	13.6	12.3	9.3	5.5	9	12.5	<5	7	12	12	<5	46	36	--	17	27	1210	10	170	22	11	14
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		28	>250	--	>250	75	41	110	>250	--	1553	>2420	>2420	2420	1990	>2420	687	--	>2420	---	>2420	328	>2420	>2420	>2420	>2420
E. coli	MPN/100mL	1	--	400	--		4	230	--	9	5	<1	7	>250	<100	<1	16	50	111	9	4	<1	--	<1	<10	201	2	1	20	11	<1
Fecal Coliform	MPN/ml	--	--	400	--		--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.90	82.63	48.17	0.85	16.36	0.25	0.97	4.91	1.9	2.07	21.03	0.33	2.41	1.10	21.62	10.34	--	0.46	0.53	119.14	6.24	539.78	54.98	0.43	1.4
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.91	81.20	52.50	0.85	17.35	0.23	0.87	4.49	2.15	2.27	17.26	0.50	3.02	1.30	27.02	11.09	--	0.55	0.58	129.77	2.23	793.90	73.67	0.56	1.74

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	CCME Phosphorus Trigger Range (Applied)	Lake Shore Drive																							
Sample Sites							LSD																							
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	2011/10/17	2012/05/01	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08
Sampling Time	hh:mm	--					12:00	09:30	11:45	09:00	11:28	10:00	08:45	13:20	9:00	9:15	13:00	9:10	08:40	15:30	11:55	9:30	12:45	13:30	09:50	16:02	13:40	15:00	12:10	12:25	10:20
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	NCC	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		13.1	16.7	15.3	13.4	21.3	7.3	10.2	21.0	12.0	5.7	25.7	13.4	7.7	20.2	8.8	8.9	--	10.48	12.52	24.3	5.8	13.17	24.01	9.40	15.6
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.84	5.70	5.50	8.60	5.41	8.47	9.44	7.87	8.16	4.06	2.69	7.58	8.77	7.26	7.60	14.78	--	7.22	6.26	7.25	7.21	8.22	1.86	8.67	11.35
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.88	6.74	6.34	6.42	6.64	6.17	7.09	6.88	6.63	8.22	7.16	6.92	5.19	7.28	6.23	7.02	--	6.31	6.88	6.34	6.48	6.63	6.16	6.25	6.78
Specific Conductance	uS/cm	--	--	--	--		723	210	168	218	203	110	146	126	112	62	177.5	116.7	123.6	132.5	147.8	180.0	--	111	0.119	155.3	132.3	162	254	162.2	150
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		13	16	12	13	21	9	9	15	12	21	14	11	8	20	11	35	--	10	11	7	9	11	22	8	12
Dissolved Chloride (Cl)	mg/L	1	--	--	120		41	34	31	49	45	25	38	27	22	22	33	23	39	32	23	29	--	23	32	27	26	39	45	31	43
Colour	TCU	5	--	--	--		32	27	37	20	26	33	32	41	49	13	20	40	10	21	25	9	--	31	20	11	26	25	26	24	25
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.14	0.14	0.06	0.23	0.10	0.12	0.25	0.17	0.09	0.13	0.80	<0.05	0.18	0.20	<0.05	0.09	--	0.11	0.15	0.25	0.30	0.08	0.08	<0.05	0.19
Nitrate (N)	mg/L	0.05	--	--	13		0.14	--	--	0.23	0.10	--	0.25	--	--	0.13	0.80	<0.05	0.18	0.20	<0.05	0.09	--	0.11	0.15	0.16	0.30	0.08	0.08	<0.05	0.10
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.010	0.09	<0.05	<0.05	<0.05	<0.05	0.09
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.06	0.03	<0.03	<0.03	<0.03	0.03	0.03	0.04	--	<0.03	<0.050	0.11	<0.03	0.06	0.10	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.5	3.5	0.5	--	0.7	3.0	1.0	--	<0.4	0.29	77.4	2.8	2.2	11.8	0.5	1
Total Organic Carbon	mg/L	0.5	--	--	--		5.0	3.8	6.8	3.7	6.0	5.3	4.7	7.1	7.5	3.1	8.0	7.7	4.7	6.3	6.9	5.2	--	8.1	3.2	14.1	9.9	5.5	14.0	8.9	7.7
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.69	6.69	6.93	7.10	7.30	6.67	6.72	6.79	6.49	6.2	6.9	6.9	6.94	6.95	6.49	6.47	--	6.72	7.02	6.59	6.68	6.65	7.01	6.38	6.92
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.9	5.4	7.99	10.5	5.29	5.9	5.14	5.04	2.6	18.1	5.1	6.4	6.0	5.6	5.4	--	5.1	6100	52.2	5.4	6.6	9.9	4.8	7.1
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.4	1.6	1.3	1.99	2.14	1.15	1.25	1.19	1.23	0.7	3.3	1.4	1.2	1.4	1.6	1.5	--	1.1	1300	23.0	1.5	1.4	1.8	1.3	1.6
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	0.03	0.009	0.018	0.100	0.009	0.018	0.028	0.014	0.022	0.063	0.003	0.007	0.015	0.078	0.100	--	0.03	0.011	0.501	0.095	1.25	0.02	0.012	0.102
Total Potassium (K)	mg/L	0.1	--	--	--		1.2	1.1	1.3	1.180	1.210	1.030	1.070	0.960	1.240	0.6	1.9	1.3	1.2	1.1	1.4	1.1	--	1.1	1100	9.7	1.0	1.2	1.3	1.1	1.3
Total Sodium (Na)	mg/L	0.1	--	--	--		24	21	18	24.8	26.9	15.2	23.2	14.3	13.8	11.3	18.6	15.2	21.9	26.6	14.6	23.4	--	18.1	19	24.4	13.4	25.1	23.4	19.7	25.2
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		3.1	4.2	4.0	3.2	3.4	4.3	2.6	3.9	3.8	3.1	2.9	4.9	2.6	3.9	5.0	2.9	--	4.2	2.4	4.2	4.4	1.6	3.3	3.5	1.1
Total Suspended Solids	mg/L	5	--	--	--		16	98	5	6	110	7	4	77	5	<5	16	19	<5	17	9	51	--	8	4.6	719	69	93	9020	15	138
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		6	4	5	7	3	4	6	4	4	5	5	5	6	7	5	5	--	4	4.8	<2	3	5	6	7	4
Turbidity (NTU)	NTU	0.1	--	50	--		0.6	12	2.5	12	6.2	1	0.6	2.5	1.7	6.7	283	2.1	1.1	31.6	82.6	6.6	--	1.4	1.2	4430	5.4	65	206	7.9	53.8
Conductivity (uS/cm)	µS/cm	1	--	--	--		170	150	140	200	200	110	150	130	110	96	161	110	168	136	105	122	--	125	140	129	136	160	236	133	178
Calculated Parameters																														
Anion Sum	me/L	N/A	--	--	--		1.56	0.82	1.22	1.80	1.77	0.97	1.39	1.14	0.96	1.15	1.37	0.97	1.40	1.46	0.97	1.63	--	0.94	1.22	0.92	1.00	1.43	1.84	1.18	1.55
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		13	8	12	13	21	9	9	15	12	21	14	11	8	20	11	35	--	10	11	7	9	11	22	8	12
Calculated TDS	mg/L	1	--	--	--		92	55	74	104	107	62	84	66	60	56	163	58	82	87	66	88	--	59	74	498	65	91	107	70	92
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	<1.0	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.53	0.99	1.20	1.69	1.94	1.05	1.44	1.02	1.00	0.76	3.59	1.10	1.43	1.62	1.62	1.52	--	1.19	1.28	31.0	1.42	1.94	2.04	1.27	1.75
Hardness (CaCO3)	mg/L	N/A	--	--	--		22	15	19	28	35	18	20	18	18	9.4	58.8	18.5	20.9	20.7	20.6	19.7	--	17.3	21.0	225	19.7	22.2	32.1	17.3	24.3
Ion Balance (% Difference)	%	N/A	--	--	--		0.97	9.39	0.83	3.15	4.58	3.96	1.77	5.56	2.04	20.7	63.0	6.1	1.0	5.2	25.0	3.4	--	11.8	2.4	94.2	17.5	15.2	5.3	3.8	6.1
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-2.74	-3.20	-2.60	-2.22	-1.71	-2.99	-2.88	-2.64	-3.05	-3.62	-2.30	-2.91	-2.93	-2.55	-3.29	-2.84	--	-3.14	-2.50	-2.50	-3.20	-2.97	-2.24	-3.61	-2.73
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-2.99	-3.45	-2.85	-2.47	-1.96	-3.24	-3.13	-2.89	-3.31	-3.94	-2.62	-3.23	-3.25	-2.87	-3.61	-3.16	--	-3.46	-2.75	-2.82	-3.52	-3.29	-2.56	-3.93	-3.05
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.43	9.78	9.53	9.32	9.01	9.66	9.60	9.43	9.54	9.82	9.20	9.81	9.87	9.50	9.78	9.31	--	9.86	9.51	9.09	9.88	9.72	9.25	9.99	9.65
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.68	10.00	9.78	9.57	9.26	9.91	9.85	9.68	9.80	10.10	9.52	10.10	10.20	9.82	10.1	9.63	--	10.2	9.77	9.41	10.2	10.0	9.57	10.30	9.97
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		99	--	--	349	189	--	217	--	--	490	19200	186	131	93	3420	487	--	141	120	--	1960	2150	--	--	731
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	8	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		14	--	--	15.3	19.2	--	13.9	--	--	11	86	12	12	7	24	15	--	11	12	--	27	34	--	--	32
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		13	--	--	41.4	21.6	--	<50	--	--	6	24	16	10	15	15	14	--	16	<50	--	<5	12	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.018	<0.017	--	<0.017	--	--	0.029	1.050	0.023	<0.017	<0.017	0.073	0.032	--	<0.017	0.011	--	<0.017	0.120	--	--	0.031
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	11	<1	<1	<1	2	<1	--	<1	<1.0	--	3	2	--	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	<0.40	0.88	--	<0.40	--	--	<1	34	<1	<1	<1	1	<1	--	<1	<0.40	--	4	4	--	--	1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	22	2	<2	1	12	2	<1	3	<2.0	183	6	3	<1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		180	--	--	554	965	120	211	388	384	161	38900	312	236	254	4200	593	--	363	230	176000	4570	2790	2190	303	1080
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	3.02	0.54	--	<0.50	--	--	0.6	82.4	<0.5	<0.5	<0.5	5.2	0.5	--	<0.5	<0.50	--	5.9	4.3	--	--	0.6
Total Manganese (Mn)	µg/L	2	820	--	--		51	--	--	113	632	22.8	30.2	53.4	38.5	26	13200	67	71	81	124	140	--	60	130	13800	985	921	2420	75	436
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	13	<2	<2	<2	2	<2	--	<2	<2.0	--	5	2	--	--	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	2	<1	<1	<1	<1	<1	--	<1	<1.0	--	<1	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		30	--	--	36.3	42.1	--	24.4	--	--	12	82	22	24	24	25	26	--	19	25	--	16	29	--	--	28
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	7.2	4.1	--	5.3	--	--	3	405	4	<2	2	36	6	--	3	3.3	--	41	30	--	--	14
Total Uranium (U)	µg/L	0.1	300	--	15		<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	1.6	<0.1	<0.1	<0.1	0.1	<0.1	--	<0.1	<0.10	--	0.2	0.2	--	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	30	<2	<2	<2	2	<2	--	<2	<2.0	--	6	4	--	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		7	--	--	7.2	6.7	<5.0	<5.0	<5.0	5	<5	110	7	6	<5	15	<5	--	<5	<5.0	799	11	17	14	<5	8
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		53	>250	--	>250	>250	280	85	>250	--	1414	>2420	>2420	1990	>2420	>2420	1203	--	8	---	>2420	>2420	>2420	>2420	>2420	534
E. coli	MPN/100mL	1	--	400	--		22	24	--	4	45	6	10	>250	<100	2	26	10	10	20	2	<1	--	>2420	<10	16	17	9	30	16	1
Fecal Coliform	MPN/ml	--	--	400	--		--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.46	10.70	4.68	1.21	6.64	0.21	1.19	1.93	1.41	1.88	6.62	0.13	<0.50	1.6	2.02	1.91	--	0.32	1.02	90.33	5.12	8.22	127.14	0.38	18.67
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		1.85	11.10	5.62	1.32	7.71	0.19	1.07	1.73	1.18	2.28	7.58	0.22	<0.50	2	2.98	1.91	--	0.33	1.07	121.83	4.62	13.77	185.98	0.48	25.84

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	CCME Phosphorus Trigger Range (Applied)	Larry Uteck Blvd														
Sample Sites							LU														
Sampling Date	yyyy-mm-dd	--					2011/10/17	2012/05/01	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08
Sampling Time	hh:mm	--					10:30	15:20	11:30	10:10	14:30	14:30	13:00	11:45	10:45	9:54	13:45	10:23	10:05	12:20	11:20	11:45	11:25
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	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		11.3	12.8	27.3	14.6	13.9	18.3	10.9	15.0	22.8	10.2	16.06	23.40	8.20	13.32	21.91	11.60	18.22
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		4.24	6.17	8.2	9.04	10.15	8.29	4.50	11.96	8.08	7.55	7.28	9.49	8.50	8.75	16.62	9.68	9.56
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.07	7.82	6.65	6.78	6.39	7.49	5.45	6.50	7.23	6.17	6.57	6.80	6.99	7.17	6.24	6.23	6.8
Specific Conductance	uS/cm	--	--	--	--		203	955	480	262	670	320	845.0	999.0	611.0	371.0	0.646	569	436.2	588.0	574	483.4	755
INORGANICS																							
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		12	14	14	14	6	22	7	30	21	<5	13	16	13	13	27	14	13
Dissolved Chloride (Cl)	mg/L	1	--	--	120		34	224	116	52	190	99	258	243	104	70	210	132	93	154	164	92	247
Colour	TCU	5	--	--	--		94	18	14	18	7	7	19	6	8	18	8.4	8	6	17	13	26	12
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.61	1.00	0.64	1.89	1.11	2.57	0.34	1.22	0.47	1.97	0.53	0.59	1.63	1.01	0.47	2.61	1.35
Nitrate (N)	mg/L	0.05	--	--	13		--	1.00	0.64	1.89	1.11	2.57	0.34	1.22	0.47	1.97	0.53	0.59	1.63	1.01	0.41	2.61	1.01
Nitrite (N)	mg/L	0.05	--	--	0.06		--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.06	<0.05	0.34
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		0.06	0.04	0.16	<0.03	<0.03	0.04	0.04	0.05	<0.03	<0.03	<0.050	0.05	<0.03	0.05	0.05	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	0.4	4.2	0.7	--	0.5	<0.4	1.2	1.7	<0.4	0.3	8.0	0.7	1.2	1.1	0.6	0.7
Total Organic Carbon	mg/L	0.5	--	--	--		11.0	3.7	22.8	4.8	3.1	4.5	2.9	6.9	4.7	4.7	2.2	7.6	6.5	3.9	5.3	7.6	6.1
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	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.43	6.7	7.2	7.2	6.92	7.11	6.49	6.42	7.42	6.41	6.95	7.30	7.15	6.94	7.42	6.96	7.26
Total Calcium (Ca)	mg/L	0.1	--	--	--		7.63	30.7	22.1	14.5	22.0	17.6	21.8	23.9	27.6	12.6	27000	20.3	15.9	20.6	17.2	17.9	25.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		2.34	4.2	3.6	2.2	2.8	2.7	4.0	4.2	3.8	2.2	3800	3.4	1.9	2.9	3.4	2.6	3.8
Total Phosphorus	mg/L	0.002	--	--	--	0.01	0.034	0.043	0.036	0.030	0.006	0.027	0.046	0.260	0.028	0.04	0.007	0.009	0.011	0.029	0.011	0.012	0.024
Total Potassium (K)	mg/L	0.1	--	--	--		2.110	3.2	3.6	2.5	2.6	2.8	2.9	3.1	3.7	3.0	3300	2.8	1.6	2.8	2.6	2.7	3.2
Total Sodium (Na)	mg/L	0.1	--	--	--		22.7	124	62.2	32.3	95.1	51.7	170	147	88.1	62.7	110	102	57.8	96.4	81.1	65.6	137
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		6.9	4.9	0.7	6.3	5.1	8.6	7.0	2.1	2.5	6.9	3.6	4.9	6.9	4.2	1.3	6.7	4.6
Total Suspended Solids	mg/L	5	--	--	--		13	5	165	<5	<5	<5	<5	626	<5	<5	<1.0	<5	6	29	<5	<5	22
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		21	26	25	23	26	29	33	29	20	27	27	31	30	28	23	41	32
Turbidity (NTU)	NTU	0.1	--	50	--		3.3	4.1	23.0	2.3	1.8	1.6	0.7	42.7	10.1	1.6	0.3	2.8	2.4	15.8	3.0	3.3	7.3
Conductivity (uS/cm)	µS/cm	1	--	--	--		190	813	482	255	732	433	840	819	605	394	790	575	462	582	739	371	849
Calculated Parameters																							
Anion Sum	me/L	N/A	--	--	--		1.69	7.21	4.12	2.36	6.10	4.02	8.13	8.15	3.80	2.68	6.77	4.73	3.62	5.26	5.68	3.91	7.99
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		12	14	14	14	6	22	7	30	21	<5	13	16	13	13	27	14	13
Calculated TDS	mg/L	1	--	--	--		109	426	246	144	347	229	496	477	262	187	400	305	216	321	310	242	463
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.70	7.40	4.30	2.43	5.55	3.51	8.90	8.24	5.64	3.64	6.69	5.86	3.52	5.78	4.76	4.06	7.65
Hardness (CaCO3)	mg/L	N/A	--	--	--		29	94.0	70.0	45.3	66.5	55.1	70.9	77.0	84.6	40.5	84	64.7	47.5	63.4	56.9	55.4	79.8
Ion Balance (% Difference)	%	N/A	--	--	--		0.29	1.3	2.2	1.4	4.7	6.8	4.5	0.6	19.4	15.2	0.59	10.6	1.4	4.7	8.8	1.8	2.2
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-2.95	-2.32	-1.94	-2.10	-2.60	-1.93	-2.98	-2.38	-1.45	-3.41	-1.95	-1.82	-2.16	-2.27	-1.55	-2.27	-1.87
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.20	-2.64	-2.26	-2.42	-2.92	-2.25	-3.30	-2.70	-1.77	-3.73	-2.20	-2.14	-2.48	-2.59	-1.87	-2.59	-2.19
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.38	9.02	9.14	9.30	9.52	9.04	9.47	8.80	8.87	9.82	8.90	9.12	9.31	9.21	8.97	9.23	9.13
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.63	9.34	9.46	9.62	9.84	9.36	9.79	9.12	9.19	10.1	9.15	9.44	9.63	9.53	9.29	9.55	9.45
Metals (ICP-MS)																							
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		--	218	227	252	107	447	31	1400	46	109	59	--	66	1420	--	--	61
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		--	225	201	116	133	134	119	185	157	80	150	--	111	127	--	--	132
Total Beryllium (Be)	µg/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		--	11	17	22	10	22	18	22	20	21	<50	--	9	14	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		--	0.538	0.171	0.168	0.300	0.236	0.148	0.171	0.031	0.079	0.150	--	0.176	0.426	--	--	0.069
Total Chromium (Cr)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	1	<1	<1	<1	<1	<1.0	--	<1	3	--	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	2	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		2.9	<2	3	16	2	6	2	2	<1	4	2.1	3	3	10	<1	3	<1
Total Iron (Fe)	µg/L	50	300	--	300		2150	347	1320	500	194	890	157	2000	207	229	170	671	171	1940	374	223	<50
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		--	0.8	0.7	1.0	<0.5	1.4	<0.5	1.8	<0.5	<0.5	<0.50	--	<0.5	3.4	--	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		129	182	485	120	87	89	26	71	182	36	110	371	61	444	148	35	77
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		--	<2	<2	<2	<2	<2	<2	3	<2	<2	<2.0	--	<2	3	--	--	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		--	112	94	60	93	90	96	116	111	54	120	--	43	89	--	--	104
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	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		--	4	3	7	3	11	2	22	<2	3	<2.0	--	<2	31	--	--	<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	<0.10	--	<0.1	0.2	--	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	4	--	--	3
Total Zinc (Zn)	µg/L	5	30	--	30		9	79	92	39	57	49	26	17	8	23	27	17	16	64	7	52	21
MICROBIOLOGICAL																							
Total Coliform	MPN/100mL	1	--	--	--		--	>2420	>2420	2420	866	>2420	866	>2420	961	>2420	---	>2420	>2420	>2420	>2420	>2420	488
E. coli	MPN/100mL	1	--	400	--		<100	<1	2	19	3	86	<1	<1	7	1730	<10	19	6	<1	40	50	6
Fecal Coliform	MPN/ml	--	--	400	--		--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.99	2.44	32.52	1.80	1.54	2.30	0.12	99.13	2.54	0.96	0.69	3.14	4.94	5.43	4.57	1.55	25.83
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		2.08	2.71	31.31	2.15	1.77	2.50	0.11	98.00	2.51	0.96	0.68	3.10	2.71	6.73	5.23	1.61	31.14

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
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TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	CCME Phosphorus Trigger Range (Applied)	Paper Mill Lake																						
Sample Sites							PML1																						
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	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08
Sampling Time	hh:mm	--					13:45	13:00	13:00	13:35	15:15	13:00	13:00	16:50	17:00	12:50	--	10:55	10:51	11:35	10:45	10:30	14:45	12:35	12:45	08:45	8:20	13:15	9:30	9:15	13:40
FIELD DATA																														
Secchi Depth	Meters	--	--	1.2	--		3.2	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	NCC	N/A	2.91	2.65	4.15	3.79	4.1
Water Temp	Celsius	--	--	--	--		15.7	17.1	16.2	13.2	22.7	9.1	10.3	22.1	13.6	8.3	--	14.9	11.6	22.5	12.3	12.1	23.6	12.4	15.13	24.0	9.3	12.8	21.58	12.10	17.15
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.56	8.10	6.90	8.76	7.83	10.43	10.39	8.17	9.54	8.41	--	8.60	9.98	7.65	9.90	12.08	7.49	8.06	7.16	8.04	8.63	8.84	6.53	12.96	6.97
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.39	6.57	6.64	7.06	7.35	5.89	6.28	6.20	6.11	7.58	--	6.63	6.39	7.20	6.32	6.60	7.42	6.60	6.90	6.34	7.98	7.57	5.94	4.63	6.91
Specific Conductance	uS/cm	--	--	--	--		561	279	223	265	234	125	177	174	106	366	--	186.4	215.1	199.0	250.5	431.0	263.0	210.0	0.197	432.1	289.1	231.0	289	234.3	234
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		6	7	7	7	9	5	6	7	7	20	--	<5	<5	6	7	31	7	7	5.2	6	6	<5	8	7	<5
Dissolved Chloride (Cl)	mg/L	1	--	--	120		39	64	58	67	61	24	44	43	18	55	--	45	57	57	48	63	50	46	65	57	56	59	67	50	66
Colour	TCU	5	--	--	--		54	15	21	19	12	57	32	38	65	38	--	29	8	15	11	17	10	30	31	7	15	18	16	20	20
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.49	0.10	0.17	0.42	0.27	0.66	0.55	0.15	0.62	0.22	--	0.14	0.21	0.18	0.18	0.22	0.24	0.18	0.18	0.14	0.24	0.19	0.09	0.16	0.28
Nitrate (N)	mg/L	0.05	--	--	13		0.49	--	--	0.42	0.27	--	0.55	--	--	0.22	--	0.14	0.21	0.18	0.18	0.22	0.24	0.18	0.18	0.14	0.24	0.19	<0.05	0.16	0.17
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.09	<0.05	0.11
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.06	--	<0.03	<0.03	0.04	<0.03	0.04	<0.03	<0.03	<0.050	<0.03	0.03	0.06	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	--	0.4	--	0.4	0.8	0.4	0.4	<5	0.49	1.20	6.0	2.6	3.4	0.4	0.5
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	3.6	4.7	0.7	3.3	6.7	4.6	5	8.3	5.7	--	5.3	4.2	4.1	5.1	4.0	2.0	4.4	2.7	5.4	5.8	7.1	6.1	8.7	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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.36	6.75	6.79	6.63	7.04	6.58	6.54	6.83	6.67	6.6	--	6.8	6.71	6.92	6.88	6.66	7.00	6.64	6.67	6.95	6.84	6.36	6.86	6.87	6.8
Total Calcium (Ca)	mg/L	0.1	--	--	--		4.5	6.9	6.4	8.37	9.02	5.90	6.02	4.99	4.64	6.0	--	6.0	6.8	6.6	6.9	6.9	9.1	7.0	6900	7.8	4.8	7.9	10.5	7.6	8
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.6	1.1	1.0	1.25	1.22	0.82	0.98	0.89	0.85	1.0	--	1.1	1.0	0.9	1.5	1.3	1.4	1.0	970	1.4	0.9	1.5	1.8	1.3	1.3
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	<0.02	0.002	0.018	0.002	<0.002	0.014	0.011	0.030	0.019	--	0.03	0.006	0.007	0.047	0.012	0.030	0.02	0.005	0.060	0.018	0.173	0.104	0.013	0.041
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	0.9	0.9	1.160	1.060	1.340	1.230	0.771	1.430	0.8	--	1.0	0.8	1.0	1.5	0.9	1.3	0.9	800	1.0	0.6	1.0	1.3	1.1	1
Total Sodium (Na)	mg/L	0.1	--	--	--		25	38	34	35.2	40.2	18.4	26.8	22.8	13.7	33.6	--	29.8	35.3	28.5	32.2	38.1	41.6	33.7	35	38.6	25.6	37.6	35.1	32.1	40.9
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		4.5	2.6	2.8	3.8	3.4	5.9	3.7	2.6	5.4	2.9	--	3.2	2.8	2.6	2.6	2.5	2.3	2.7	2.4	2.4	2.5	2.5	0.8	2.7	1.9
Total Suspended Solids	mg/L	5	--	--	--		<2	3	9	7	<2	<1	1	<2	5	9	--	6	<5	<5	23	6	<5	<5	1	149	6	531	10	18	20
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		13	11	11	13	12	12	12	10	12	7	--	10	8	10	10	10	8	8	7.8	9	8	11	11	11	10
Turbidity (NTU)	NTU	0.1	--	50	--		0.4	0.5	0.6	8.2	0.9	0.5	0.6	1	1.2	0.7	--	1	0.7	1.1	19.2	1.4	0.9	1.5	0.45	3.8	24.2	199.0	112.0	2.6	3.3
Conductivity (uS/cm)	µS/cm	1	--	--	--		170	250	230	260	250	130	180	170	100	214	--	179	227	218	209	230	261	224	240	246	241	224	310	189	256
Calculated Parameters																														
Anion Sum	me/L	N/A	--	--	--		1.51	2.18	1.99	2.34	2.15	1.09	1.62	1.56	0.92	2.11	--	1.49	1.79	1.95	1.71	2.62	1.73	1.62	2.11	1.93	1.88	1.91	2.29	1.79	2.09
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		6	7	7	7	9	5	6	7	7	20	--	<5	<5	6	7	31	7	7	5.2	6	6	<5	8	7	<5
Calculated TDS	mg/L	1	--	--	--		93	129	118	137	134	75	100	90	63	117	--	95	110	109	115	140	117	102	120	126	109	141	148	108	129
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	<1.0	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.40	2.11	1.89	2.11	2.33	1.20	1.58	1.35	0.95	1.89	--	1.78	2.00	1.69	2.56	2.18	2.45	1.94	1.98	2.61	1.93	3.54	3.33	1.93	2.35
Hardness (CaCO3)	mg/L	N/A	--	--	--		14	22	20	26	28	18	19	16	15	19.1	--	19.5	21.1	20.2	23.4	22.6	28.5	21.6	21.0	25.2	15.7	25.9	33.6	24.3	25.3
Ion Balance (% Difference)	%	N/A	--	--	--		3.78	1.63	2.58	5.17	4.02	4.80	1.25	7.22	1.60	5.5	--	9.0	5.5	7.0	19.8	9.2	17.0	9.2	3.2	15.2	1.2	30.0	18.6	3.8	5.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-3.57	-2.90	-2.94	-2.96	-2.43	-3.25	-3.27	-2.94	-3.13	-2.91	--	-3.31	-3.35	-3.07	-3.03	-2.61	-2.79	-3.26	-3.13	-2.98	-3.29	-3.65	-2.82	-2.99	-3.2
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.82	-3.15	-3.19	-3.21	-2.68	-3.50	-3.53	-3.19	-3.38	-3.23	--	-3.63	-3.67	-3.39	-3.35	-2.93	-3.11	-3.58	-3.38	-3.30	-3.61	-3.97	-3.14	-3.31	-3.52
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.93	9.65	9.73	9.59	9.47	9.83	9.81	9.77	9.80	9.51	--	10.10	10.1	9.99	9.91	9.27	9.79	9.90	9.80	9.93	10.1	10.0	9.68	9.86	10
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.20	9.90	9.98	9.84	9.72	10.10	10.10	10.00	10.10	9.83	--	10.40	10.4	10.3	10.2	9.59	10.1	10.2	10.1	10.2	10.5	10.3	10.0	10.2	10.3
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		260	--	--	665	45.9	--	233	--	--	177	--	306	141	103	3920	305	129	142	140	--	2320	7690	--	--	250
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<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	<1.0	--	<2	4	--	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		23	--	--	35.3	24.4	--	26.6	--	--	22	--	19	20	12	40	23	23	18	21	--	34	60	--	--	22
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	11.3	8.6	--	<50	--	--	6	--	9	6	8	9	8	13	11	<50	--	<5	10	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.032	<0.017	--	<0.017	--	--	<0.017	--	0.066	0.021	0.018	0.430	<0.017	0.020	<0.017	0.025	--	0.146	0.227	--	--	0.041
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	<1	<1	<1	3	<1	<1	<1	<1.0	--	2	6	--	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.96	<0.40	--	<0.40	--	--	<1	--	2	<1	<1	9	<1	<1	<1	<0.40	--	3	6	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	2.0	<2.0	<2.0	4.0	<2.0	2.3	<2	--	<2	<2	1	6	1	<1	2	<2.0	3	4	10	<1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		140	--	--	837	89	161	141	315	528	137	--	742	130	205	5300	239	296	182	93	4460	6020	13600	8250	171	206
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	1.73	<0.50	--	<0.50	--	--	<0.5	--	0.9	<0.5	<0.5	13.5	0.9	<0.5	<0.5	<0.50	--	6.3	13.9	--	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		17	--	--	142	68.9	41.3	14.4	128	62.4	48	--	214	33	58	693	54	260	49	34	296	278	424	281	53	64
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	2	<2	<2	9	<2	<2	<2	<2.0	--	5	7	--	--	22
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	<1	<1	<1	<1	<1	<1	<1	<1.0	--	1	1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		18	--	--	36.3	37.1	--	25	--	--	26	--	30	31	25	34	35	37	30	32	--	22	40	--	--	34
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	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	7.8	<2.0	--	3.9	--	--	<2	--	4	<2	<2	65	4	<2	3	<2.0	--	25	106	--	--	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	0.6	<0.1	<0.1	<0.1	<0.10	--	0.6	0.9	--	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	10	<2	<2	<2	<2.0	--	7	16	--	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	10.0	5.4	5.7	6.3	6.2	5.4	<5	--	13	8	<5	62	<5	<5	6	11	13	12	34	20	<5	11
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		200	73	--	>250	>250	>250	85	>250	--	411	--	2420	866	1730	1011	613	2420	>2420	---	>2420	>2420	>2420	1410	>2420	665
E. coli	MPN/100mL	1	--	400	--		33	45	--	19	>250	2	2	34	<100	2	--	20	12	4	6	6	10	10	<10	3	6	>2420	34	10	6
Fecal Coliform	MPN/ml	--	--	400	--		--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--			--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.62	2.31	0.57	0.82	1.12	0.07	2.85	0.86	0.15	1.03	--	0.69	1.17	1.10	5.07	0.67	0.64	0.91	0.57	8.84	4.67	8.00	4.71	1.7	4.97
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.64	2.21	0.64	0.74	1.04	0.06	2.75	0.76	0.15	1.10	--	0.91	1.37	1.10	6.39	0.65	0.65	0.87	0.54	9.54	3.69	12.31	10.82	1.76	6.45

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F 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 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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 3A: Historical Data - Bedford West Water Quality Sampling Program

Spring 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL F (Applied)	CCME Phosphorus Trigger Range (Applied)	Paper Mill Lake																						
Sample Sites							PML2																						
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	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08
Sampling Time	hh:mm	--					13:15	13:40	13:45	14:30	16:20	13:00	12:40	16:20	16:15	13:16	--	--	13:40	10:45	11:20	11:00	9:20	8:30	11:30	13:45	9:08	13:45	10:00	9:50	14:30
FIELD DATA																														
Secchi Depth	Meters	--	--	1.2	--		2.8	2.2	2.3	N/A	3.0	2.0	2.2	2.3	2.2	2.35	--	--	3.20	--	N/A	N/A	N/A	3.1	NCC	N/A	2.41	2.7	2.3	2.55	2.5
Water Temp	Celsius	--	--	--	--		14.8	24.2	19.7	17.8	25.3	10.1	10.9	23.1	15.2	11.6	--	--	14.8	--	12.6	14.4	21.1	12.1	15.09	27.0	9.0	13.8	22.09	11.80	17.10
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.20	8.30	8.40	8.78	8.09	10.58	9.88	8.7	8.94	7.75	--	--	9.26	--	8.90	12.44	6.95	7.92	8.06	9.76	8.28	8.55	7.69	10.31	10.44
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.36	6.82	6.84	7.09	7.39	6.53	6.31	6.67	6.13	8.61	--	--	6.49	--	6.13	6.50	7.22	5.92	6.56	6.76	7.25	7.57	5.93	5.37	6.73
Specific Conductance	uS/cm	--	--	--	--		267	264	241	237	234	201	159	173	156	231	--	--	234	--	250.5	966.0	266.0	215.0	0.214	255.6	454.9	264	298	230.3	242
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		5	7	7	6	8	7	<5	8	7	21	--	--	<5	--	8	32	10	26	<5.0	5	7	7	10	8	5
Dissolved Chloride (Cl)	mg/L	1	--	--	120		63	63	58	62	58	50	44	43	34	55	--	--	63	--	64	245	50	42	69	59	57	67	67	50	67
Colour	TCU	5	--	--	--		22	17	19	20	13	23	35	38	48	39	--	--	18	--	8	6	7	31	26	10	9	22	13	22	18
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.14	0.07	0.09	0.19	0.11	0.23	0.33	0.14	0.22	0.24	--	--	0.22	--	<0.05	0.13	0.18	0.18	0.11	0.32	0.23	0.10	0.11	0.18	0.27
Nitrate (N)	mg/L	0.05	--	--	13		0.14	--	--	0.19	0.11	--	0.33	--	--	0.24	--	--	0.22	--	<0.05	0.13	0.18	0.18	0.11	0.17	0.23	0.10	<0.05	0.18	0.16
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	--	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.010	0.15	<0.05	<0.05	0.11	<0.05	0.11
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	--	--	0.03	--	0.23	0.05	0.03	<0.03	<0.050	<0.03	<0.03	0.05	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	--	--	--	--	1.7	<0.4	0.4	<5	0.23	1.20	3.0	0.6	<0.4	0.5	0.6
Total Organic Carbon	mg/L	0.5	--	--	--		3.6	2.6	4.5	3.2	3.4	3.6	4	6	5.6	5.9	--	--	4.4	--	4.0	2.7	2.4	5.8	2.8	6.0	6.1	4.0	3.6	8.3	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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.50	6.81	6.82	6.66	7.02	6.83	6.37	6.60	6.60	6.6	--	--	6.68	--	6.73	7.13	7.04	6.77	6.64	6.98	6.98	6.83	7.23	6.93	6.86
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.1	7.1	6.1	7.17	7.69	7.96	5.30	4.76	5.04	6.1	--	--	6.7	--	7.7	19.2	8.8	6.9	7300	8.2	6.2	8.9	8.1	7.4	8.1
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.25	1.17	1.20	0.93	0.86	0.90	1.0	--	--	1.0	--	1.4	1.7	1.4	1.0	1000	1.3	1.2	1.2	1.2	1.3	1.3
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	<0.02	0.002	0.010	0.002	<0.002	0.009	0.009	0.007	0.025	--	--	0.006	--	0.026	0.011	0.026	0.02	0.008	0.012	0.008	0.012	0.003	0.005	0.018
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.0	0.9	0.984	0.900	1.020	0.861	0.801	0.968	0.8	--	--	0.8	--	1.3	1.4	1.2	1.1	830	1.0	0.9	1.0	1.0	1.1	0.9
Total Sodium (Na)	mg/L	0.1	--	--	--		35	40	34	31.1	35.1	30.8	25.7	21.3	20.9	34.6	--	--	37.5	--	42.0	133	42.6	33.9	38	43.3	31.3	42.9	37.5	32.1	41.5
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.6	2.5	2.3	2.6	2.3	3.3	2.9	2.5	3	2.8	--	--	2.7	--	4.2	2.4	2.3	2.9	1.9	1.8	2.8	2.3	0.6	2.6	1.7
Total Suspended Solids	mg/L	5	--	--	--		2	3	<1	15	<2	11	<1	8	<1	<5	--	--	<5	--	<5	16	<5	<5	1	<5	<5	45	<5	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		11	11	11	10	10	10	9	10	9	7	--	--	9	--	11	27	7	7	8	9	9	12	7	10	10
Turbidity (NTU)	NTU	0.1	--	50	--		0.8	0.7	0.6	1.0	0.8	0.4	0.4	3.4	0.5	0.7	--	--	1	--	3.3	2.6	0.7	1	0.88	1.9	1.3	9.4	1.1	1.4	1.9
Conductivity (uS/cm)	µS/cm	1	--	--	--		240	250	230	230	230	210	170	170	150	213	--	--	254	--	277	777	273	212	260	251	246	263	319	190	259
Calculated Parameters																														
Anion Sum	me/L	N/A	--	--	--		2.11	2.17	1.99	2.07	2.01	1.77	1.46	1.58	1.30	2.13	--	--	1.98	--	2.19	8.12	1.77	1.86	2.13	1.97	1.95	2.29	2.24	1.79	2.22
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		5	7	7	6	8	7	<1	8	7	21	--	--	<5	--	8	32	10	26	<1.0	5	7	7	10	8	5
Calculated TDS	mg/L	1	--	--	--		123	131	117	120	120	110	91	89	79	119	--	--	119	--	137	448	118	109	130	127	112	139	129	108	133
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	--	--	<10	--	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.94	2.23	1.88	1.88	2.03	1.86	1.48	1.28	1.27	1.94	--	--	2.09	--	2.55	6.96	2.47	1.95	2.14	2.44	1.84	2.53	2.17	1.92	2.37
Hardness (CaCO3)	mg/L	N/A	--	--	--		20	22	20	23	24	25	17	15	16	19.3	--	--	20.8	--	25.0	54.9	27.7	21.3	23.0	25.8	20.4	27.2	25.2	23.8	25.6
Ion Balance (% Difference)	%	N/A	--	--	--		4.20	1.36	2.84	4.81	0.50	2.48	0.68	10.50	1.17	4.8	--	--	2.8	--	7.5	7.7	16.5	2.2	0.23	10.6	3.0	5.1	1.7	3.4	3.2
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-3.33	-2.83	-2.93	-3.06	-2.55	-2.80	NC	-3.18	-3.17	-2.89	--	--	-3.39	--	-3.08	-1.73	-2.61	-2.57	NC	-3.00	-2.97	-2.98	-2.46	-2.89	-3.13
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.59	-3.08	-3.18	-3.31	-2.80	-3.05	NC	-3.43	-3.42	-3.21	--	--	-3.71	--	-3.40	-2.05	-2.93	-2.89	NC	-3.32	-3.29	-3.30	-2.78	-3.21	-3.45
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.83	9.64	9.75	9.72	9.57	9.63	NC	9.78	9.77	9.49	--	--	10.1	--	9.81	8.86	9.65	9.34	NC	9.98	9.95	9.81	9.69	9.82	9.99
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.10	9.89	10.00	9.97	9.82	9.88	NC	10.00	10.00	9.81	--	--	10.4	--	10.1	9.18	9.97	9.66	NC	10.3	10.3	10.1	10.0	10.1	10.3
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		130	--	--	1030	55.8	--	202	--	--	189	--	--	131	--	107	181	52	122	130	--	278	610	--	--	215
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	23.0	12.2	--	23	--	--	22	--	--	22	--	37	50	27	19	25	--	24	35	--	--	27
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Boron (B)	µg/L	5	1200	--	1500		5	--	--	8.2	8.8	--	<50	--	--	6	--	--	6	--	9	7	13	11	<50	--	<5	8	--	--	<5
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.037	<0.017	--	0.028	--	--	0.023	--	--	0.039	--	0.060	0.062	0.019	0.018	0.023	--	0.145	0.042	--	--	<0.017
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	--	<1	--	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.65	<0.40	--	<0.40	--	--	<1	--	--	<1	--	2	<1	<1	<1	<0.40	--	<1	<1	--	--	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	3.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2	--	--	<2	--	1380	1	<1	2	<2.0	2	2	<1	<1	1	<1
Total Iron (Fe)	µg/L	50	300	--	300		100	--	--	1090	151	76	143	699	181	178	--	--	181	--	1760	264	316	134	170	334	368	647	174	123	<50
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	2.39	<0.50	--	<0.50	--	--	<0.5	--	--	<0.5	--	49.7	0.7	<0.5	<0.5	<0.50	--	0.5	1.1	--	--	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		58	--	--	159	81.0	28.0	33.8	88.6	30.6	22	--	--	87	--	866	206	278	24	43	67	61	109	36	23	85
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		2	--	--	2.2	<2.0	--	<2.0	--	--	<2	--	--	<2	--	3	<2	<2	<2	<2.0	--	2	<2	--	--	4
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	--	<1	--	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	--	<0.1	--	0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		30	--	--	34.7	32.8	--	25.7	--	--	27	--	--	31	--	35	68	37	29	34	--	21	38	--	--	35
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	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	3	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	21.3	<2.0	--	3.6	--	--	<2	--	--	<2	--	2	3	<2	<2	2.1	--	4	7	--	--	<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	<0.10	--	<0.1	<0.1	--	--	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	18.3	<5.0	5.8	6.6	7.5	10	8	--	--	11	--	762	<5	<5	5	14	<5	8	7	<5	<5	8
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		49	40	--	>250	46	97	64	>250	--	261	--	--	1410	--	411	291	517	>2420	---	>2420	1120	687	>2420	>2420	1990
E. coli	MPN/100mL	1	--	400	--		10	31	--	69	<1	6	17	>250	<100	1	--	--	12	--	2	<1	3	16	<0.10	5	2	4	47	30	1
Fecal Coliform	MPN/ml	--	--	400	--		--	--	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.15	1.36	0.59	3.50	1.54	0.53	0.55	2.48	1.33	0.76	--	--	1.18	--	0.25	0.99	0.48	0.72	1.67	4.79	1.50	3.82	1.09	2.02	5.31
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		1.22	1.33	0.66	3.39	1.51	0.42	0.51	2.26	1.13	0.76	--	--	1.34	--	0.27	1.13	0.44	0.70	1.56	4.59	0.74	5.04	1.42	2.12	6.60

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F 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 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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

7 STATISTICAL PRESENTATION

Table 4 attached at the end of this section provides seasonal (i.e. spring) statistics for below six (6) key water quality parameters at the eleven (11) water quality sampling stations, representing water quality data from 2009 to June 2017:

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

It should be noted that where analytical results were found to be less than the laboratory Reportable Detection Limit (<RDL), the statistics (minimum, maximum, media and average) were based on half the reportable detection limit (1/2 RDL value), which is the approach used by HRM.

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TABLE 4: Statistical Presentation of Spring Results, Bedford West Water Quality Sampling Program

KL-1	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.010	0.007	0.037	0.010	0.014
Chloride (mg/L)	1	71.0	55.0	81.0	66.0	68.2
Lab pH	N/A	6.6	6.5	6.9	6.7	6.7
Total Suspended Solids (mg/L)	5	<5	0.5	38.0	2.5	6.2
Conductivity (umho/cm)	1	271.0	212.0	310.0	259.0	259.8
Chlorophyll-A (µg/L)	0.05	1.5	0.4	2.8	0.8	1.1

KL-2	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.012	0.008	0.021	0.012	0.014
Chloride (mg/L)	1	20.0	15.0	48.0	19.0	24.7
Lab pH	N/A	6.6	6.3	6.9	6.5	6.5
Total Suspended Solids (mg/L)	5	<5	0.5	103.0	2.5	24.4
Conductivity (umho/cm)	1	93.0	64.0	212.0	83.0	108.9
Chlorophyll-A (µg/L)	0.05	1.0	0.1	1.0	0.5	0.5

KL-3	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.006	0.004	0.019	0.008	0.008
Chloride (mg/L)	1	63.0	50.0	66.0	56.0	57.3
Lab pH	N/A	6.8	6.4	6.8	6.7	6.6
Total Suspended Solids (mg/L)	5	<5	0.5	2.8	2.5	2.0
Conductivity (umho/cm)	1	245.0	197.0	250.0	220.0	221.7
Chlorophyll-A (µg/L)	0.05	2.0	0.5	2.0	1.0	1.1

KL-4	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.020	0.004	0.022	0.007	0.012
Chloride (mg/L)	1	64.0	51.0	67.0	56.0	58.0
Lab pH	N/A	6.8	6.6	6.8	6.7	6.7
Total Suspended Solids (mg/L)	5	6.0	0.5	7.0	2.5	2.7
Conductivity (umho/cm)	1	251.0	200.0	260.0	219.0	222.7
Chlorophyll-A (µg/L)	0.05	2.4	0.4	2.4	0.8	1.0

KL-5	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.010	0.004	0.018	0.008	0.009
Chloride (mg/L)	1	65.0	54.0	65.0	58.5	58.7
Lab pH	N/A	6.7	6.6	6.7	6.7	6.7
Total Suspended Solids (mg/L)	5	<5	0.5	2.5	2.5	2.2
Conductivity (umho/cm)	1	248.0	208.0	248.0	224.0	225.2
Chlorophyll-A (µg/L)	0.05	1.1	0.2	1.5	0.8	0.8

HWY 102-1	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.017	0.006	0.070	0.011	0.018
Chloride (mg/L)	1	101.0	24.0	130.0	55.5	60.9
Lab pH	N/A	6.8	4.5	6.9	6.5	6.2
Total Suspended Solids (mg/L)	5	<5	0.5	9.0	2.5	3.6
Conductivity (umho/cm)	1	411.0	100.0	470.0	247.5	247.4
Chlorophyll-A (µg/L)	0.05	1.6	0.3	18.1	1.1	4.8

HWY 102-2	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.013	0.009	0.222	0.013	0.037
Chloride (mg/L)	1	136.0	21.0	260.0	113.0	121.2
Lab pH	N/A	6.2	5.4	7.2	6.1	6.2
Total Suspended Solids (mg/L)	5	6.0	0.5	342.0	2.5	47.2
Conductivity (umho/cm)	1	451.0	85.0	920.0	433.0	438.3
Chlorophyll-A (µg/L)	0.05	1.4	0.5	539.8	1.4	62.1

LSD	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.102	0.007	1.250	0.018	0.171
Chloride (mg/L)	1	43.0	22.0	49.0	39.0	36.9
Lab pH	N/A	6.9	6.2	7.1	6.7	6.7
Total Suspended Solids (mg/L)	5	138.0	2.5	138.0	6.0	35.3
Conductivity (umho/cm)	1	178.0	96.0	200.0	160.0	153.8
Chlorophyll-A (µg/L)	0.05	18.7	0.0	18.7	1.5	4.0

LU	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.024	0.006	0.260	0.027	0.062
Chloride (mg/L)	1	247.0	154.0	247.0	217.0	211.3
Lab pH	N/A	7.3	6.4	7.3	6.9	6.9
Total Suspended Solids (mg/L)	5	22.0	0.5	626.0	13.5	114.2
Conductivity (umho/cm)	1	849.0	582.0	849.0	801.5	764.2
Chlorophyll-A (µg/L)	0.05	25.8	0.7	99.1	3.9	22.5

PML1	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.041	0.005	0.173	0.014	0.033
Chloride (mg/L)	1	66.0	39.0	67.0	59.0	57.2
Lab pH	N/A	6.8	6.4	6.8	6.6	6.6
Total Suspended Solids (mg/L)	5	20.0	0.5	531.0	6.0	64.2
Conductivity (umho/cm)	1	256.0	170.0	260.0	227.0	222.3
Chlorophyll-A (µg/L)	0.05	5.0	0.6	8.0	1.0	2.3

PML2	RDL (June 8-2017)	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.018	0.006	0.025	0.010	0.012
Chloride (mg/L)	1	67.0	44.0	245.0	63.0	81.7
Lab pH	N/A	6.9	6.4	7.1	6.7	6.7
Total Suspended Solids (mg/L)	5	<5	0.5	45.0	2.5	9.7
Conductivity (umho/cm)	1	259.0	170.0	777.0	254.0	296.2
Chlorophyll-A (µg/L)	0.05	5.3	0.6	5.3	1.2	2.1

Notes:

RDL: Laboratory Reportable Detection Limit

N/A: No applicable

8 GRAPHS

Appendix E includes seasonal (i.e. spring) and yearly graphs that illustrate water quality data from 2009 to June 2017 of below six (6) key water quality parameters at each of the eleven (11) water quality monitoring stations:

- Dissolved chloride (mg/L),
- pH,
- Total phosphorus (mg/L),
- Total suspended solids (mg/L),
- Conductivity (µS/cm) and
- Chlorophyll A (µg/L)

The graphs allow for comparison between water quality sampling stations and identification of concentration increases (i.e. above applicable CCME guidelines). As many parameters show seasonal concentration fluctuations, the water quality data was also graphed showing only the concentrations for a given season (i.e. spring).

It should be noted that where results were found to be less than the laboratory Reportable Detection Limit (<RDL), they were graphed as half the reportable detection limit ($^1/_2$ RDL value) as a conservative approach.

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9 CONCLUSIONS

The spring 2017 water quality monitoring program included collection of surface water samples at eleven (11) water quality sampling 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 in Situ pH, water temperature, dissolved oxygen, conductivity, Secchi depth (where applicable), air temperature, cloud cover and wildlife sightings.

9.1 Total Phosphorous

During the 2017 spring water quality monitoring event, eight (8) stations reported concentrations that exceeded the HRM Total Phosphorous management threshold criteria of 10 µg/L (0.01 mg/L) as follows.

- KL2 12 µg/L
- KL4 20 µg/L
- HWY 102-1 17 µg/L
- HWY 102-2 13 µg/L
- LSD 12 µg/L
- LU 24 µg/L
- PML-1 41 µg/L
- PML-2 18 µg/L

9.2 General Chemistry and Metals

The following parameters exceeded the recommended Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (Edition 2015) and/or the Nova Scotia Environment (NSE) Environmental Quality Standards (EQS) for Surface Water, EQS for Contaminated Sites (NSE 2014):

- Chloride: Two stations (HWY-102-2 and LU) exceeded the CCME PAL-F recommended value of 120 mg/L
- Nitrite: Nine stations (KL1, KL3, KL4, KL5, HWY-102-1, HWY102-2, LSD, LU, PML1 and PML2) exceeded the CCME PAL-F recommended value of 0.06 mg/L
- pH: One station (HWY102-2) exceeded the CCME-PAL-F recommended pH range of 6.5 - 9.0.
- Turbidity: One station (LSD) exceeded the NSE EQS reference guideline of 50 NTU.
- Lead: One station (KL1) exceeded the CCME-PAL-F and NSE EQS guideline of 1 µg/L

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- Iron: Two stations (HWY102-2 and LSD) exceeded the CCME-PAL-F and NSE EQS guideline of 300 µg/L
- Zinc: One station (KL1) exceeded the CCME-PAL-F and NSE EQS guideline of 30 µg/L
- Aluminum: All eleven stations exceeded the CCME PAL-F recommended value of 5 - 100 µg/L and the NSE EQS guideline of 5 µg/L.
- Cadmium: Ten stations exceeded the NSE EQS reference guideline for cadmium of 0.01 µg/L

9.3 Microbiological

Laboratory results for E.coli did not report exceedances of the Health Canada Guidelines for Canadian Recreational Water Quality of 400 CFU/100mL in any of the eleven (11) sampling stations.

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10 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 (µg/L) – Fresh Water

11 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SNC-Lavalin Inc (SNCL) 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 SNCL 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 SNCL.

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 SNCL and the Client. The data reported, findings, observations and conclusions expressed are limited by the Scope of Work. SNCL is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SNCL does not warranty the accuracy of information provided by third party sources.

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Appendix A

Instrument Calibration Report

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

6380 Tomken Road, Unit 1 & 2
Mississauga, ONTARIO L5T1Y4
Toll-free: (866) 688-0388

Pine Environmental Services, Inc.

Instrument ID R149444
Description YSI 556
Calibrated 5/31/2017 4:55:10PM

Manufacturer YSI
Model Number 556
Serial Number/ Lot Number 12J101177
Location Ontario
Department

State Certified
Status Pass
Temp °C 23
Humidity % 50

Calibration Specifications

Group # 1
Group Name PH
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
7.00 / 7.00	PH	7.00	PH	7.00	7.00	0.00%	Pass
4.00 / 4.00	PH	4.00	PH	4.00	4.00	0.00%	Pass
10.00 / 10.00	PH	10.00	PH	10.00	10.00	0.00%	Pass

Group # 2
Group Name Conductivity
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.000

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
1.413 / 1.413	ms/cm	1.413	ms/cm	1.413	1.413	0.00%	Pass

Group # 3
Group Name Redox (ORP)
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
240.0 / 240.0	mv	240.0	mv	240.0	240.0	0.00%	Pass

Group # 4
Group Name Disolved Oxygen Span
Stated Accy Pct of Reading
Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	%	100.0	%	100.0	100.0	0.00%	Pass

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC

6380 Tomken Road, Unit 1 & 2
Mississauga, ONTARIO L5T1Y4
Toll-free: (866) 688-0388

Pine Environmental Services, Inc.

Instrument ID R149444
Description YSI 556
Calibrated 5/31/2017 4:55:10PM

Calibration Result Calibration Successful
Who Calibrated Kevin Grant

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

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Appendix B

Field Reports

FIELD REPORT – SPRING 2017

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:	Sunny
Air Temperature:	16
Cloud Cover :	None
Wildlife Sightings:	None
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):	June 8, 2017
Time (hh:mm):	8:30 am
Sample Depth (m):	1 m
pH:	7.47
Dissolved Oxygen (mg/L):	8.27
Secchi Depth (m):	2.05 m
Water Temperature (degrees Celsius):	16.55
Conductivity (µs/cm):	240 µs/cm

Additional Comments / Notes

Probe used during this sampling event: YSI 556. Instrument ID R149444. Calibration Date 5/31/2017.

Sechhi Depth: 2.05 m visibility on bottom.

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	18
Cloud Cover:	None
Wildlife Sightings:	None
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):	June 8, 2017
Time (hh:mm):	10:47
Sample Depth (m):	<1 m (approx 0.4 m)
pH:	6.69
Dissolved Oxygen (mg/L):	9.72
Secchi Depth (m):	1.95 m
Water Temperature (degrees Celsius):	15.69
Conductivity (µs/cm):	78

Additional Comments / Notes

Strong septic odor.
Sample taken on the left side of the culvert (downstream side).
Sechhi depth taking on the lake side: 2.05 m visibility on bottom.

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	16
Cloud Cover:	None
Wildlife Sightings:	Couple of blue rays; ducks (family of 7), small fishes
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 205 metres 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):	June 8, 2017
Time (hh:mm):	9:36
Sample Depth (m):	<1 m (approx 0.4 m)
pH:	7.02
Dissolved Oxygen (mg/L):	9.0
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	16.06
Conductivity (µs/cm):	204

Additional Comments / Notes

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	16
Cloud Cover:	None
Wildlife Sightings:	None
Site Accessibility: Yes, Accessible	Via the extended road at the end of Weybridge Ln.
Site Access Detail:	At 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):	June 8, 2017
Time (hh:mm):	9:25
Sample Depth (m):	<1 m (approx 0.4 m)
pH:	6.9
Dissolved Oxygen (mg/L):	8.33
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	16.5
Conductivity (µs/cm):	213

Additional Comments / Notes

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	16
Cloud Cover:	None
Wildlife Sightings:	None
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 structures). 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):	June 8, 2016
Time (hh:mm):	9 am
Sample Depth (m):	<1 m (approx 0.4 m)
pH:	7
Dissolved Oxygen (mg/L):	8.7
Secchi Depth (m):	2.1 m
Water Temperature (degrees Celsius):	16.8
Conductivity (µs/cm):	219

Additional Comments / Notes

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	25
Cloud Cover:	None
Wildlife Sightings:	None
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):	June 8, 2017
Time (hh:mm):	12:00 p.m.
Sample Depth (m):	<1 m (approx 0.4 m)
pH:	6.4
Dissolved Oxygen (mg/L):	5.77
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	16.4
Conductivity (µs/cm):	354

Additional Comments / Notes

Light unknown substance smell during sample collection.

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	24
Cloud Cover:	None
Wildlife Sightings:	None
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:	June 8, 2017
Time (hh:mm):	11:45 a.m.
Sample Depth (m):	<1 m (approx 0.2 m)
pH:	6.04
Dissolved Oxygen (mg/L):	5.68
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	13.01
Conductivity (µs/cm):	400

Additional Comments / Notes

Light septic odor was perceived.

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	18
Cloud Cover:	None
Wildlife Sightings:	None
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

Date (d.m.y):	June 8, 2017
Time (hh:mm):	10:20 a.m.
Sample Depth (m):	< 1m (approx 0.3 m)
pH:	6.78
Dissolved Oxygen (mg/L):	11.35
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	15.6
Conductivity (µs/cm):	150

Additional Comments / Notes

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	21
Cloud Cover:	None
Wildlife Sightings:	None
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

Date (d.m.y):	June 8, 2017
Time (hh:mm):	11:25 a.m.
Sample Depth (m):	<1m (approx 0.2 m)
pH:	6.8
Dissolved Oxygen (mg/L):	9.56
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	18.22
Conductivity (µs/cm):	755

Additional Comments / Notes

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	24
Cloud Cover:	None
Wildlife Sightings:	None
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):	June 8, 2017
Time (hh:mm):	1:40 p.m.
Sample Depth (m):	1m
pH:	6.91
Dissolved Oxygen (mg/L):	6.97
Secchi Depth (m):	4.1 m
Water Temperature (degrees Celsius):	17.15
Conductivity (µs/cm):	234

Additional Comments / Notes

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FIELD REPORT – SPRING 2017

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:	Alex Hayes	

Site Conditions

Weather:	Sunny
Air Temperature:	27
Cloud Cover:	None
Wildlife Sightings:	None
Site Accessibility: Yes, Accessible	Via Lake Dr., off Hammonds Plains Rd.
Site Access Detail:	Follow pathway along lake bank to small clearing, use GPS to find exact sample location. Travel over small ridge to reach lake and sample at edge.

Field Parameter Data

	Remarks
Date (d.m.y):	June 8, 2017
Time (hh:mm):	2:30 p.m.
Sample Depth (m):	1 m
pH:	6.73
Dissolved Oxygen (mg/L):	10.44
Secchi Depth (m):	2.5
Water Temperature (degrees Celsius):	17.1
Conductivity (µs/cm):	242

Additional Comments / Notes

Secchi depth at 2.5 visibility on bottom.

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Appendix C

Site Photographs

Photo 1: KL1 Kearney Lake Sample Location

Photo 2: KL2 Kearney Lake Sample Location.

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Photo 3: KL3 Kearney Lake Sample Location

Photo 4: KL4 Kearney Lake Sample Location

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Photo 5: KL5 Kearney Lake Sample Location

Photo 6: HWY 102-1 Sample Location

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Photo 7: HWY102-2 Sample Location

Photo 8: LSD Lake Shore Drive Sample Location

© 2017 SNC-Lavalin Inc.
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Photo 9: LU Larry Uteck Sample Location

Photo 10: PML-1 Paper Mill Lake Sample Location

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Photo 11: PML-2 Paper Mill Lake Sample Location

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Appendix D

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: Maria Gutierrez

PROJECT: 631477

AGAT WORK ORDER: 17X215454

WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

DATE REPORTED: Jun 14, 2017

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
VERSION 1:Partial report for micro bacterial analysis. Issued, June 14, 2017.

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

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

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Certificate of Analysis

AGAT WORK ORDER: 17X215454

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2017-06-08

DATE REPORTED: 2017-06-14

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08
Parameter	Unit	G / S	RDL	8389003	8389004	8389011	8389018	8389025	8389032	8389039	8389046
Alkalinity	mg/L		5	<5	5	<5	<5	<5	17	<5	12
Chloride	mg/L		1	71	20	63	64	65	101	136	43
True Color	TCU		5	15	46	24	19	18	24	20	25
Nitrate + Nitrite as N	mg/L		0.05	0.20	0.05	0.24	0.27	0.25	0.35	0.20	0.19
Nitrate as N	mg/L		0.05	0.08	<0.05	0.13	0.15	0.13	0.18	<0.05	0.10
Nitrite as N	mg/L		0.05	0.12	0.05	0.11	0.12	0.12	0.17	0.20	0.09
Ammonia as N	mg/L		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	4.5	8.5	5.3	5.1	4.7	7.4	5.4	7.7
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH				6.64	6.57	6.77	6.75	6.74	6.84	6.22	6.92
Calcium	mg/L		0.1	8.6	3.6	6.9	7.7	7.4	20.9	13.3	7.1
Magnesium	mg/L		0.1	1.3	1.0	1.0	1.2	1.2	3.0	2.5	1.6
Total Phosphorus	mg/L		0.002	0.010	0.012	0.006	0.020	0.010	0.017	0.013	0.102
Potassium	mg/L		0.1	1.0	0.8	0.8	0.8	0.9	2.0	1.1	1.3
Sodium	mg/L		0.1	44.9	13.8	44.0	37.6	38.9	64.1	68.8	25.2
Reactive Silica as SiO2	mg/L		0.5	2.0	1.3	2.2	2.3	2.1	1.8	3.1	1.1
Total Suspended Solids	mg/L		5	<5	<5	<5	6	<5	<5	6	138
Sulphate	mg/L		2	11	3	10	10	10	15	10	4
Turbidity	NTU		0.1	1.4	0.8	1.0	1.3	0.9	1.3	2.4	53.8
Electrical Conductivity	umho/cm		1	271	93	245	251	248	411	451	178
Anion Sum	me/L			2.25	0.73	2.00	2.03	2.06	3.53	4.06	1.55
Bicarb. Alkalinity (as CaCO3)	mg/L		5	<5	5	<5	<5	<5	17	<5	12
Calculated TDS	mg/L		1	139	46	127	123	125	218	233	92
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
Cation sum	me/L			2.54	0.91	2.38	2.17	2.20	4.14	3.92	1.75
Hardness	mg/L			26.8	13.1	21.3	24.2	23.4	64.5	43.5	24.3
% Difference/ Ion Balance (NS)	%			6.1	11.0	8.6	3.2	3.4	8.0	1.8	6.1
Langelier Index (@20C)	NA			-3.33	-3.73	-3.29	-3.26	-3.29	-2.23	-3.58	-2.73
Langelier Index (@ 4C)	NA			-3.65	-4.05	-3.61	-3.58	-3.61	-2.55	-3.90	-3.05
Saturation pH (@ 20C)	NA			9.97	10.3	10.1	10.0	10.0	9.07	9.80	9.65

Certified By: Original Signed

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Certificate of Analysis

AGAT WORK ORDER: 17X215454

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2017-06-08

DATE REPORTED: 2017-06-14

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08
Parameter	Unit	G / S	RDL	8389003	8389004	8389011	8389018	8389025	8389032	8389039	8389046
Saturation pH (@ 4C)	NA			10.3	10.6	10.4	10.3	10.3	9.39	10.1	9.97
Total Aluminum	ug/L		5	158	185	128	180	156	69	99	731
Total Antimony	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Arsenic	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Barium	ug/L		5	16	10	17	20	17	130	151	32
Total Beryllium	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Bismuth	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron	ug/L		5	<5	<5	7	<5	<5	<5	<5	<5
Total Cadmium	ug/L		0.017	0.058	0.041	0.020	0.021	0.025	0.032	0.019	0.031
Total Chromium	ug/L		1	<1	<1	<1	<1	2	1	<1	<1
Total Cobalt	ug/L		1	<1	<1	<1	<1	<1	<1	<1	1
Total Copper	ug/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Total Iron	ug/L		50	78	168	125	136	59	151	369	1080
Total Lead	ug/L		0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
Total Manganese	ug/L		2	46	39	30	74	24	22	125	436
Total Molybdenum	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L		2	15	<2	<2	7	14	12	6	<2
Total Selenium	ug/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Total Silver	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L		5	38	15	33	33	32	92	72	28
Total Thallium	ug/L		0.1	<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	<2
Total Titanium	ug/L		2	<2	<2	<2	<2	<2	<2	<2	14
Total Uranium	ug/L		0.1	<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	<2
Total Zinc	ug/L		5	58	<5	6	13	11	9	14	8
Total Coliforms (MPN)	MPN/100 mL		1	299	>2420	687	792	260	914	>2420	534
E. Coli (MPN)	MPN/100 mL		1	29	31	7	15	<1	12	<1	1
Chlorophyll A - Acidification Method	ug/L		0.05	Y	Y	Y	Y	Y	Y	Y	Y

Certified By: Original Signed

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Certificate of Analysis

AGAT WORK ORDER: 17X215454

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2017-06-08

DATE REPORTED: 2017-06-14

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08	2017-06-08
Parameter	Unit	G / S	RDL	8389003	8389004	8389011	8389018	8389025	8389032	8389039	8389046
Chlorophyll A - Welschmeyer Method	ug/L		0.05	Y	Y	Y	Y	Y	Y	Y	Y
Total Kjeldahl Nitrogen as N	mg/L		0.4	<0.4	<0.4	<0.4	<0.4	0.4	0.5	<0.4	1.0

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SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2017-06-08

DATE REPORTED: 2017-06-14

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-06-08	2017-06-08	2017-06-08
Parameter	Unit	G / S	RDL	8389053	8389060	8389067
Alkalinity	mg/L		5	13	<5	5
Chloride	mg/L		1	247	66	67
True Color	TCU		5	12	20	18
Nitrate + Nitrite as N	mg/L		0.05	1.35	0.28	0.27
Nitrate as N	mg/L		0.05	1.01	0.17	0.16
Nitrite as N	mg/L		0.05	0.34	0.11	0.11
Ammonia as N	mg/L		0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	6.1	5.7	5.5
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01
pH				7.26	6.80	6.86
Calcium	mg/L		0.1	25.7	8.0	8.1
Magnesium	mg/L		0.1	3.8	1.3	1.3
Total Phosphorus	mg/L		0.002	0.024	0.041	0.018
Potassium	mg/L		0.1	3.2	1.0	0.9
Sodium	mg/L		0.1	137	40.9	41.5
Reactive Silica as SiO2	mg/L		0.5	4.6	1.9	1.7
Total Suspended Solids	mg/L		5	22	20	<5
Sulphate	mg/L		2	32	10	10
Turbidity	NTU		0.1	7.3	3.3	1.9
Electrical Conductivity	umho/cm		1	849	256	259
Anion Sum	me/L			7.99	2.09	2.22
Bicarb. Alkalinity (as CaCO3)	mg/L		5	13	<5	5
Calculated TDS	mg/L		1	463	129	133
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10
Cation sum	me/L			7.65	2.35	2.37
Hardness	mg/L			79.8	25.3	25.6
% Difference/ Ion Balance (NS)	%			2.2	5.8	3.2
Langelier Index (@20C)	NA			-1.87	-3.20	-3.13
Langelier Index (@ 4C)	NA			-2.19	-3.52	-3.45
Saturation pH (@ 20C)	NA			9.13	10.0	9.99

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Certificate of Analysis

AGAT WORK ORDER: 17X215454

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2017-06-08

DATE REPORTED: 2017-06-14

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-06-08	2017-06-08	2017-06-08
Parameter	Unit	G / S	RDL	8389053	8389060	8389067
Saturation pH (@ 4C)	NA			9.45	10.3	10.3
Total Aluminum	ug/L		5	61	250	215
Total Antimony	ug/L		2	<2	<2	<2
Total Arsenic	ug/L		2	<2	<2	<2
Total Barium	ug/L		5	132	22	27
Total Beryllium	ug/L		2	<2	<2	<2
Total Bismuth	ug/L		2	<2	<2	<2
Total Boron	ug/L		5	<5	<5	<5
Total Cadmium	ug/L		0.017	0.069	0.041	<0.017
Total Chromium	ug/L		1	<1	<1	<1
Total Cobalt	ug/L		1	<1	<1	<1
Total Copper	ug/L		1	<1	<1	<1
Total Iron	ug/L		50	<50	206	<50
Total Lead	ug/L		0.5	<0.5	<0.5	<0.5
Total Manganese	ug/L		2	77	64	85
Total Molybdenum	ug/L		2	<2	<2	<2
Total Nickel	ug/L		2	<2	22	4
Total Selenium	ug/L		1	<1	<1	<1
Total Silver	ug/L		0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L		5	104	34	35
Total Thallium	ug/L		0.1	<0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2	<2
Total Titanium	ug/L		2	<2	2	<2
Total Uranium	ug/L		0.1	<0.1	<0.1	<0.1
Total Vanadium	ug/L		2	3	<2	<2
Total Zinc	ug/L		5	21	11	8
Total Coliforms (MPN)	MPN/100 mL		1	488	665	1990
E. Coli (MPN)	MPN/100 mL		1	6	6	1
Chlorophyll A - Acidification Method	ug/L		0.05	Y	Y	Y

Certified By: Original Signed

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Certificate of Analysis

AGAT WORK ORDER: 17X215454

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2017-06-08

DATE REPORTED: 2017-06-14

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-06-08	2017-06-08	2017-06-08
Parameter	Unit	G / S	RDL	8389053	8389060	8389067
Chlorophyll A - Welschmeyer Method	ug/L		0.05	Y	Y	Y
Total Kjeldahl Nitrogen as N	mg/L		0.4	0.7	0.5	0.6

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

8389003-8389067 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.

Certified By: Original Signed

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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X215454

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Jun 14, 2017			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	8451904		5	<5	NA	< 5	86%	80%	120%	NA	80%	120%	NA	80%	120%
Chloride	8420955		34	35	2.2%	< 1	102%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1	8455410	6	7	NA	< 5	110%	80%	120%		80%	120%		80%	120%
Nitrate as N	8420955		0.10	<0.05	NA	< 0.05	93%	80%	120%	NA	80%	120%	113%	80%	120%
Nitrite as N	8420955		0.07	0.07	NA	< 0.05	96%	80%	120%	NA	80%	120%	83%	80%	120%
Ammonia as N	1	8444059	<0.05	<0.05	NA	< 0.03	103%	80%	120%		80%	120%	85%	80%	120%
Total Organic Carbon	1	8455834	0.7	0.9	NA	< 0.5	113%	80%	120%		80%	120%	86%	80%	120%
Ortho-Phosphate as P	1	8457808	<0.01	<0.01	NA	< 0.01	85%	80%	120%		80%	120%	104%	80%	120%
pH	8451904		5.80	5.73	1.2%	<	101%	80%	120%	NA	80%	120%	NA	80%	120%
Calcium	6092017		0.1	0.1	NA	< 0.1	111%	80%	120%	103%	80%	120%	99%	70%	130%
Magnesium	6092017		< 0.1	< 0.1	NA	< 0.1	111%	80%	120%	102%	80%	120%	95%	80%	120%
Total Phosphorus	8389003	8389003	0.010	0.011	9.5%	< 0.002	99%	90%	110%	93%	90%	110%	104%	80%	120%
Potassium	6092017		0.1	0.1	NA	< 0.1	112%	80%	120%	103%	80%	120%	101%	70%	130%
Sodium	6092017		71.5	73.0	2.1%	< 0.1	111%	80%	120%	104%	80%	120%	100%	70%	130%
Reactive Silica as SiO2	1	8457808	11.2	11.2	0.0%	< 0.5	105%	80%	120%		80%	120%	88%	80%	120%
Total Suspended Solids	1	8451904	312	360	14	< 5	102%	80%	120%				117%	80%	120%
Sulphate	8420955		5	5	NA	< 2	110%	80%	120%	NA	80%	120%	98%	80%	120%
Turbidity	1	8455357	0.9	0.9	0.0%	< 0.1	104%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	8451904		398	392	1.6%	< 1	102%	80%	120%	NA	80%	120%	NA	80%	120%
Bicarb. Alkalinity (as CaCO3)	8451904		5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	8451904		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	6092017		< 5	< 5	NA	< 5	116%	80%	120%	105%	80%	120%	95%	70%	130%
Total Antimony	6092017		< 2	< 2	NA	< 2	90%	80%	120%	84%	80%	120%	94%	70%	130%
Total Arsenic	6092017		< 2	< 2	NA	< 2	100%	80%	120%	95%	80%	120%	99%	70%	130%
Total Barium	6092017		< 5	< 5	NA	< 5	102%	80%	120%	96%	80%	120%	96%	70%	130%
Total Beryllium	6092017		< 2	< 2	NA	< 2	102%	80%	120%	97%	80%	120%	104%	70%	130%
Total Bismuth	6092017		< 2	< 2	NA	< 2	106%	80%	120%	105%	80%	120%	102%	70%	130%
Total Boron	6092017		64	64	0.0%	< 5	108%	80%	120%	100%	80%	120%	108%	70%	130%
Total Cadmium	6092017		< 0.017	< 0.017	NA	< 0.017	98%	80%	120%	94%	80%	120%	97%	70%	130%
Total Chromium	6092017		< 1	< 1	NA	< 1	100%	80%	120%	92%	80%	120%	108%	70%	130%
Total Cobalt	6092017		< 1	< 1	NA	< 1	100%	80%	120%	97%	80%	120%	112%	70%	130%
Total Copper	6092017		4	3	NA	< 1	102%	80%	120%	98%	80%	120%	83%	70%	130%
Total Iron	6092017		< 50	< 50	NA	< 50	100%	80%	120%	99%	80%	120%	112%	70%	130%
Total Lead	6092017		0.54	0.67	NA	< 0.5	113%	80%	120%	107%	80%	120%	99%	70%	130%
Total Manganese	6092017		< 2	< 2	NA	< 2	102%	80%	120%	95%	80%	120%	115%	70%	130%
Total Molybdenum	6092017		5	5	NA	< 2	97%	80%	120%	93%	80%	120%	115%	70%	130%
Total Nickel	6092017		< 2	< 2	NA	< 2	102%	80%	120%	99%	80%	120%	111%	70%	130%
Total Selenium	6092017		< 1	< 1	NA	< 1	99%	80%	120%	96%	80%	120%	96%	70%	130%
Total Silver	6092017		< 0.1	< 0.1	NA	< 0.1	103%	80%	120%	100%	80%	120%	103%	70%	130%

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested

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

Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X215454

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Jun 14, 2017			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	6092017		< 5	< 5	NA	< 5	100%	80%	120%	95%	80%	120%	112%	70%	130%
Total Thallium	6092017		< 0.1	< 0.1	NA	< 0.1	107%	80%	120%	104%	80%	120%	109%	70%	130%
Total Tin	6092017		< 2	< 2	NA	< 2	100%	80%	120%	95%	80%	120%	102%	70%	130%
Total Titanium	6092017		< 2	< 2	NA	< 2	108%	80%	120%	101%	80%	120%	99%	70%	130%
Total Uranium	6092017		2.2	2.3	4.4%	< 0.1	102%	80%	120%	96%	80%	120%	119%	70%	130%
Total Vanadium	6092017		< 2	< 2	NA	< 2	95%	80%	120%	90%	80%	120%	110%	70%	130%
Total Zinc	6092017		< 5	< 5	NA	< 5	95%	80%	120%	95%	80%	120%	96%	70%	130%
Total Kjeldahl Nitrogen as N	1	8451322	<0.4	<0.4	NA	< 0.4	103%	80%	120%		80%	120%	104%	80%	120%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

SNC-Lavalin Bedford West Custom Inorganics Package

Potassium						< 0.1		80%	120%		80%	120%		70%	130%
Sodium						< 0.1		80%	120%		80%	120%		70%	130%
Total Aluminum						< 5		80%	120%		80%	120%		70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By: Original Signed

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Dartmouth, Nova Scotia
CANADA B3B 1M2
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FAX (902)468-8924
http://www.agatlabs.com

Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X215454

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

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
Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorus	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER
Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
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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CANADA B3B 1M2
TEL (902)468-8718
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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X215454

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

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

Results relate only to the items tested and to all the items tested

AGAT Laboratories

Unit 122 - 11 Morris Dr.
Dartmouth, Nova Scotia
B3B 1M2
http://webearth.agatlabs.com

Phone: 902-468-8718
Fax: 902-468-8924
www.agatlabs.com

Laboratory use Only
Arrival Condition: ☐ Good ☐ Poor (complete 'notes')
Arrival Temperature: 20° AGAT Job Number: 17X-2154454
Notes:

Drinking Water Sample (y/n): N Reg. No.
Waterworks Number:

Report To:
Company: SNC Lavalin
Contact: ~~Crystal Cumming~~ Maria Gutierrez
Address: 5657 Spring Garden Road
Halifax, NS B3J 3R4
Phone: 902 492 4544 FAX:
PO#:
AGAT Quotation: 15-1718
Client Project #: 631477

Invoice to: Same (Y/N) - Circle
Company: SNC Lavalin
Contact: payables@snclavalin.com
Address:
Phone: Fax:
PO#/Credit Card #:

Report Information
1. Name: ~~Crystal Cumming~~ Maria Gutierrez
Email: RYAN.FLINN
2. Name: Ryan Flinn/Maria Gutierrez
Email:

Regulatory Requirements (Check):
☐ List Guidelines on Report ☐ Do Not List Guidelines on Report
☐ PIRI
Site Info (check all that apply):
☐ Tier 1 ☐ Res ☐ Pot. ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☑ CCME ☐ CDWQ
☐ Ind ☐ NSDFOSP
☐ Com ☐ HRM 101
☐ Res/P Storm Water
☐ Ag ☐ HRM 101
☐ FWAL Waste Water
☐ Sediment
☐ Other

Report Format
☐ Single PDF sample per page
■ Multiple PDF samples per page
■ Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT: ■ 5 - 7 days
Rush TAT: ☐ 1 day ☐ 2 days ☐ 3 - 4 days
Date Required:
Time Required:

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/ Preserved	Standard Water Analysis	Metals (Spring Quarterly Only)	(Circle-Total, Diss or Available)	Mercury	TKN	pH	TSS	TP- Low Level 0.002mg/L-Mississauga	Anions	Total Phosphorus	Phenols	TPH/BTEX (PIRI) Tier 1	TPH/BTEX-Fractionation Tier 2	VOC	THM	PAH	Chlorophyll A (Sub to DAL)	E. coli by MPN	Hazardous (Y/N)	Lab Sample #
KL1	June 8/17 8:30AM	water	7			X	X	T		X		X	X									X	X		
KL2	10:37AM	water	7			X	X	T		X		X	X									X	X		
KL3	9:16AM	water	7			X	X	T		X		X	X									X	X		
KL4	9:25AM	water	7			X	X	T		X		X	X									X	X		
KL5	9:00AM	water	7			X	X	T		X		X	X									X	X		
HWY-102-1	12 PM	water	7			X	X	T		X		X	X									X	X		
HWY-102-2	11:45AM	water	7			X	X	T		X		X	X									X	X		
LSD	10:20AM	water	7			X	X	T		X		X	X									X	X		
LU	11:25AM	water	7			X	X	T		X		X	X									X	X		
PML-1	1:40PM	water	7			X	X	T		X		X	X									X	X		
PML-2	2:30PM	water	7			X	X	T		X		X	X									X	X		

Sample Relinquished By (print name & sign) [redacted] Date/Time June 8/17 3:15 Samples Received By (print name and sign) [redacted] Date/Time 15:15

Sample Relinquished By (print name & sign) [redacted] Date/Time June 8/17 Samples Received By (print name and sign) [redacted] Date/Time OK June

Special Instructions
SNC Bedford West Package
Page of

Dalhousie University
Department of Oceanography
Halifax, N.S.
B3H 4R2

12-Jun-17 AGAT Laboratories, 11 Morris Dr. Unit 122, Dartmouth, NS, B3B 1M2

Attention: Amanda Morrison
Re: Determination of chlorophyll a in algae by fluorescence

AGAT Job#: 17X215454
PO#: 107799

Acidification Technique:

Sample ID	Chl a (µg/L)
KL1:8389003G	1.45
KL2:8389004G	0.99
KL3:8389011G	1.96
KL4:8389018G	2.40
KL5:8389025G	1.09
HWY-102-1:8389032G	1.56
HWY-102-2:8389039G	1.40
LSD:8389046G	18.67
LU:8389053G	25.83
PML-1:8389060G	4.97
PML-2:8389067G	5.31

Welschmeyer Technique:

Sample ID	Chl a (µg/L)
KL1:8389003G	2.55
KL2:8389004G	1.86
KL3:8389011G	2.46
KL4:8389018G	3.04
KL5:8389025G	1.28
HWY-102-1:8389032G	2.04
HWY-102-2:8389039G	1.74
LSD:8389046G	25.84
LU:8389053G	31.14

phone: (902)494-6663 **fax: (902)494-2039**

PML-1:8389060G PML-2:8389067G	6.45 6.60

- **CHl a = chlorophyll a**
- **An underestimation of chl a occurs by the fluorescence acidification technique in the presence of Chl b. Since chl b containing chlorophytes are often present in freshwater ecosystems another technique (welschmeyer) was also employed.**
- **Reference for Welschmeyer technique Limnol. Oceanogr., 39(8) 1994, 1985-1992**

Received: 09-Jun-17
Completed: 10-Jun-17

Original Signed

Shannah Rastin

phone: (902)494-6663 **fax: (902)494-2039**

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Appendix E

Graphs

Figure 1 - Dissolved chloride concentrations

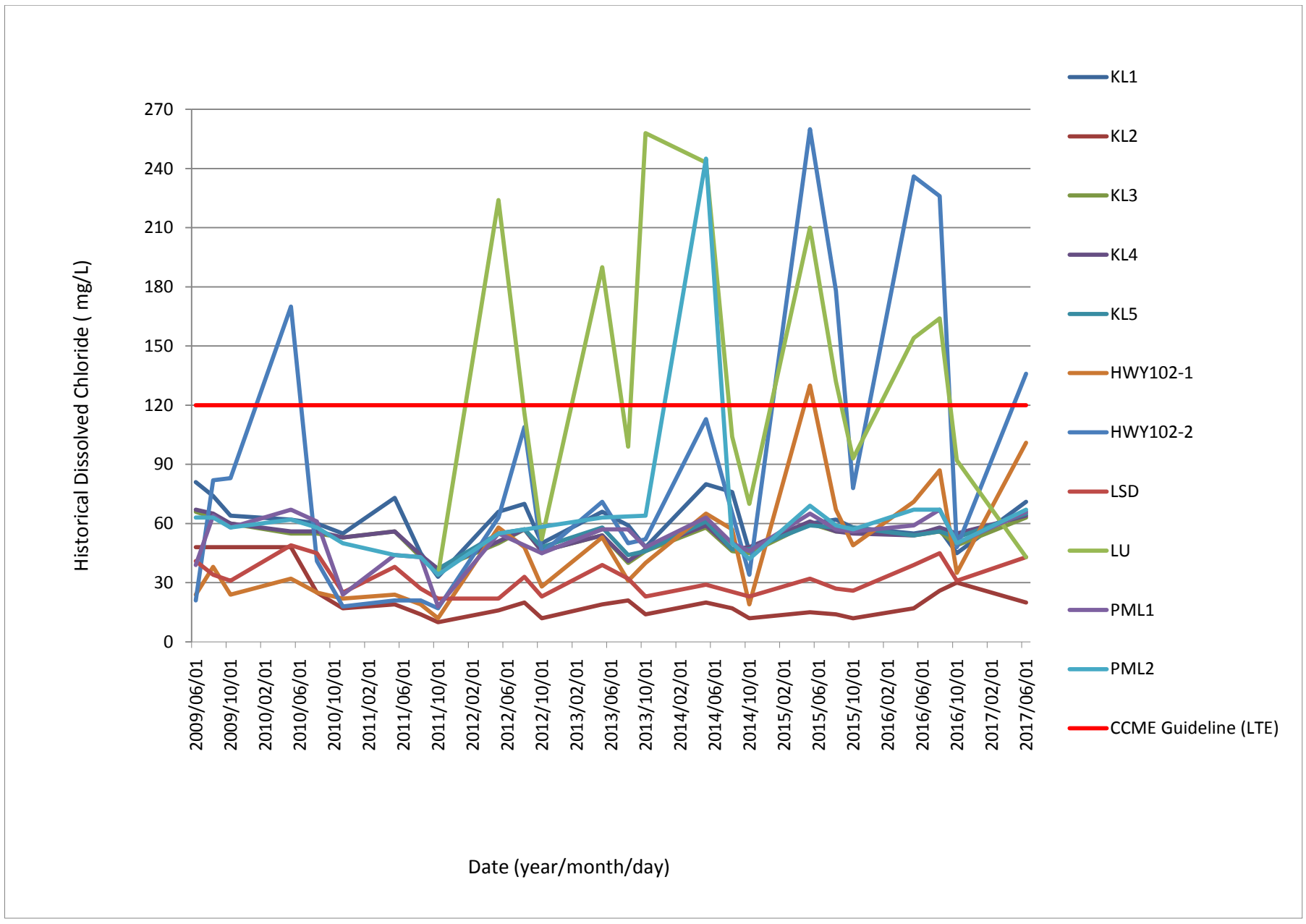


Figure 2 – Seasonal dissolved chloride concentrations

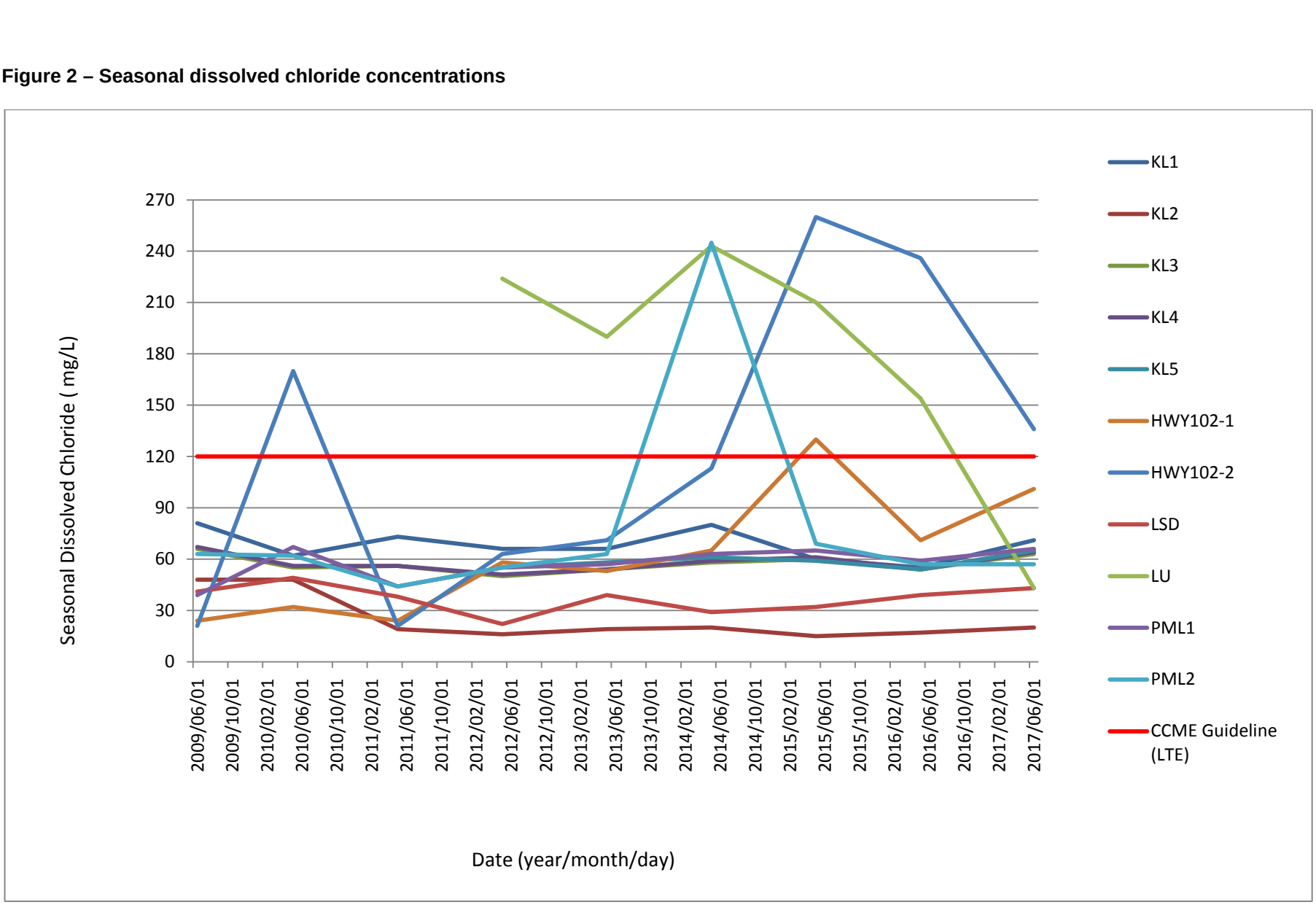


Figure 3 – pH

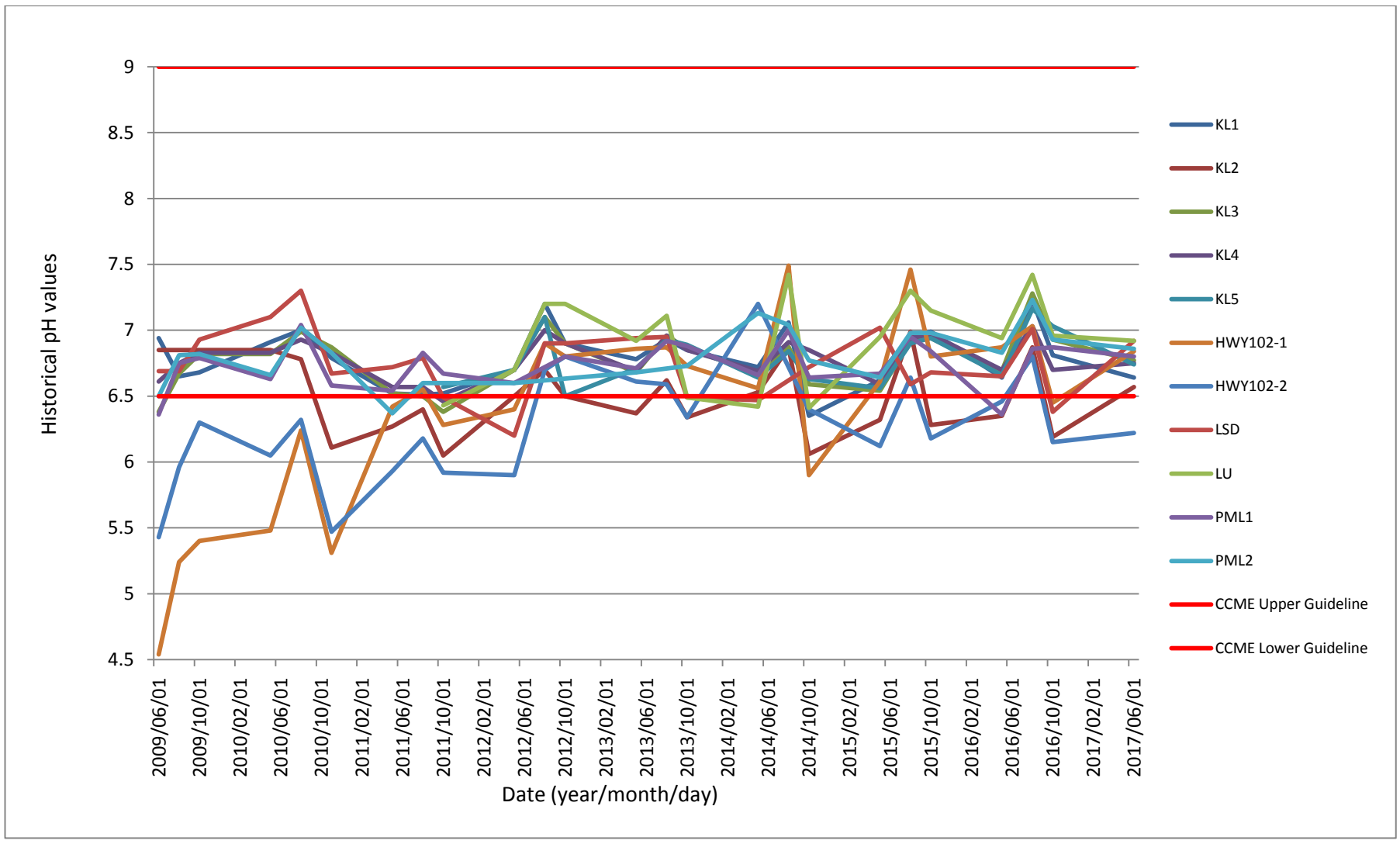


Figure 4 – Seasonal pH

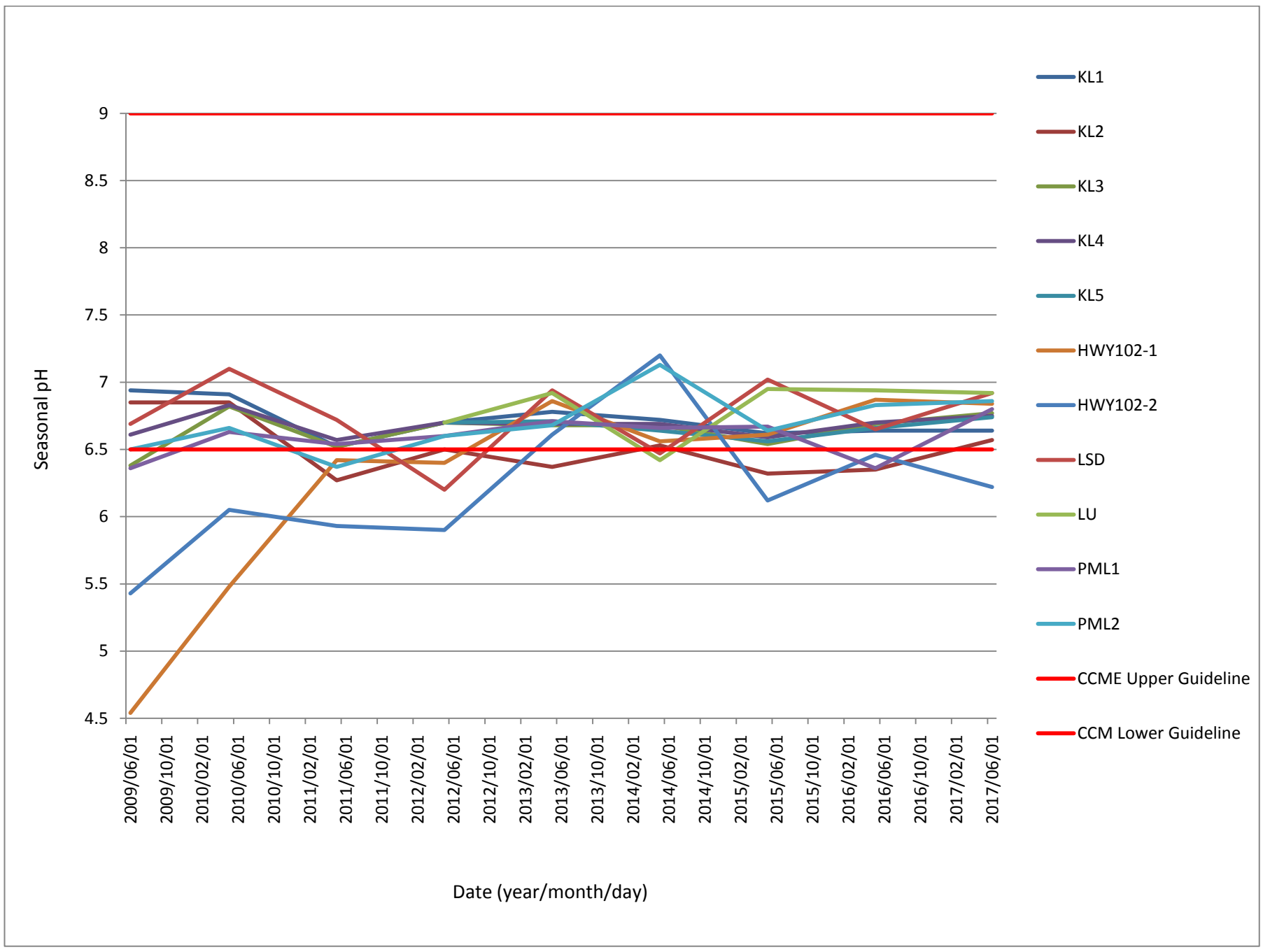


Figure 5 – Total suspended solids concentrations

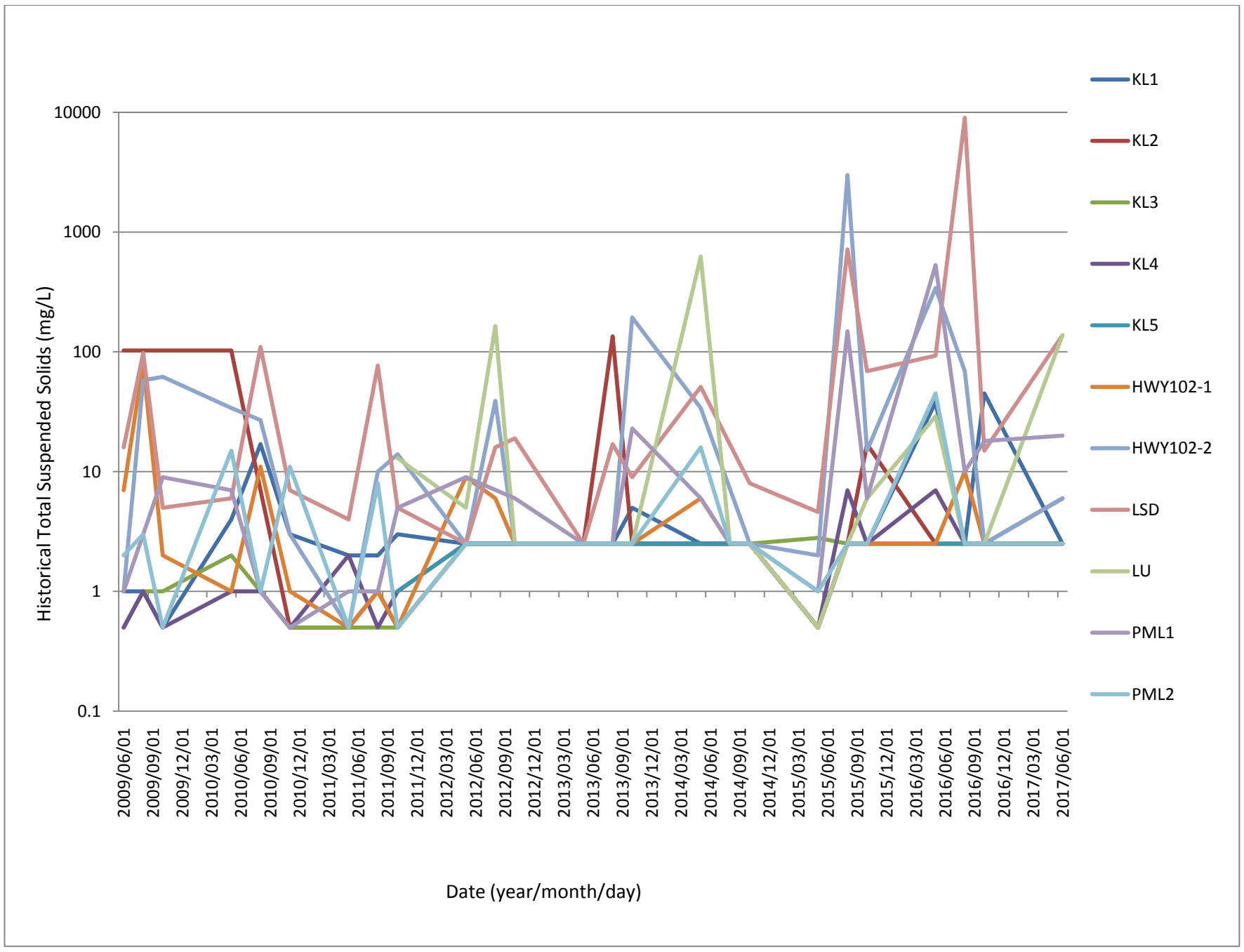


Figure 6 – Seasonal total suspended solids concentrations

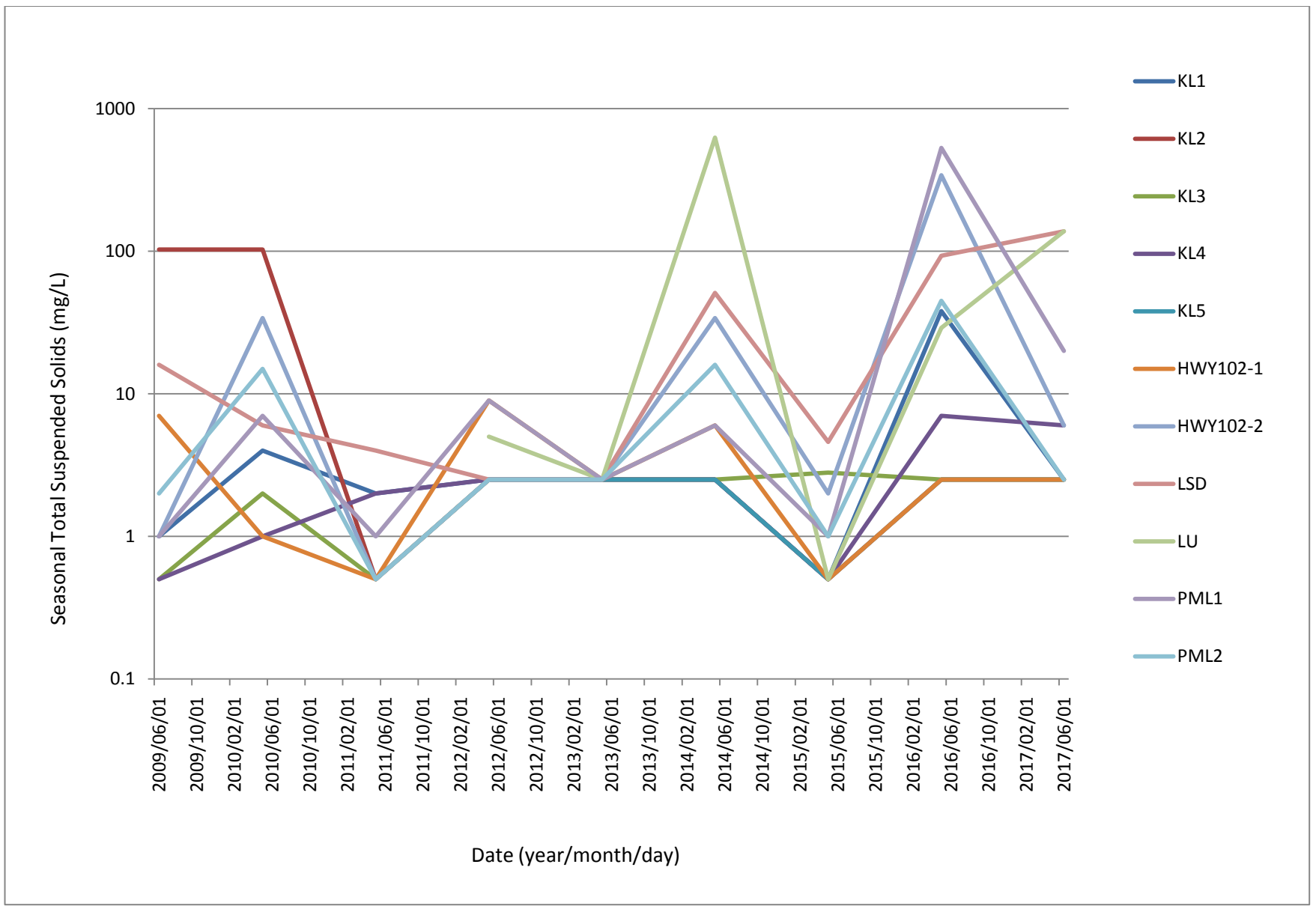


Figure 7 – Total phosphorus concentrations

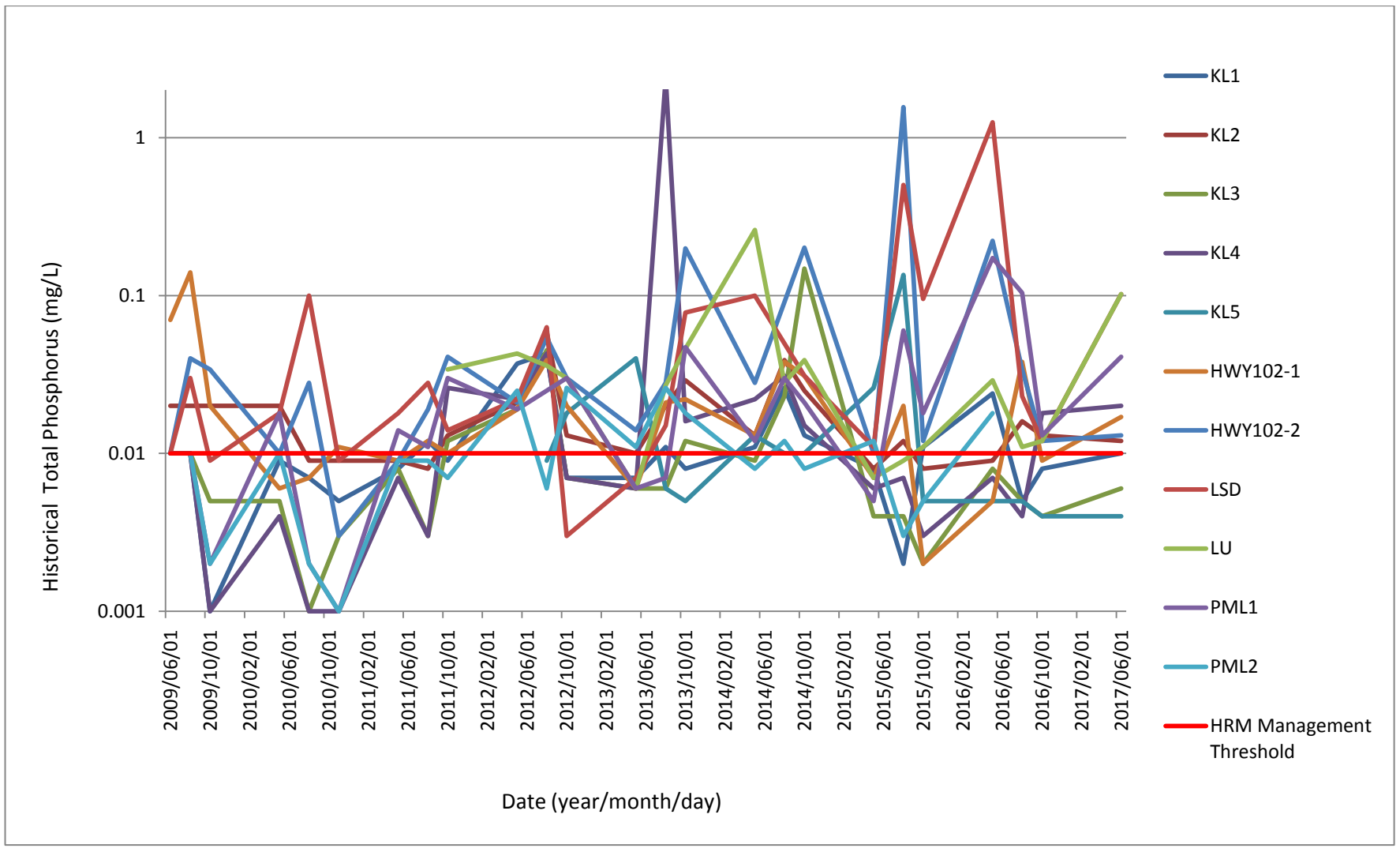


Figure 8 – Seasonal total phosphorus concentrations

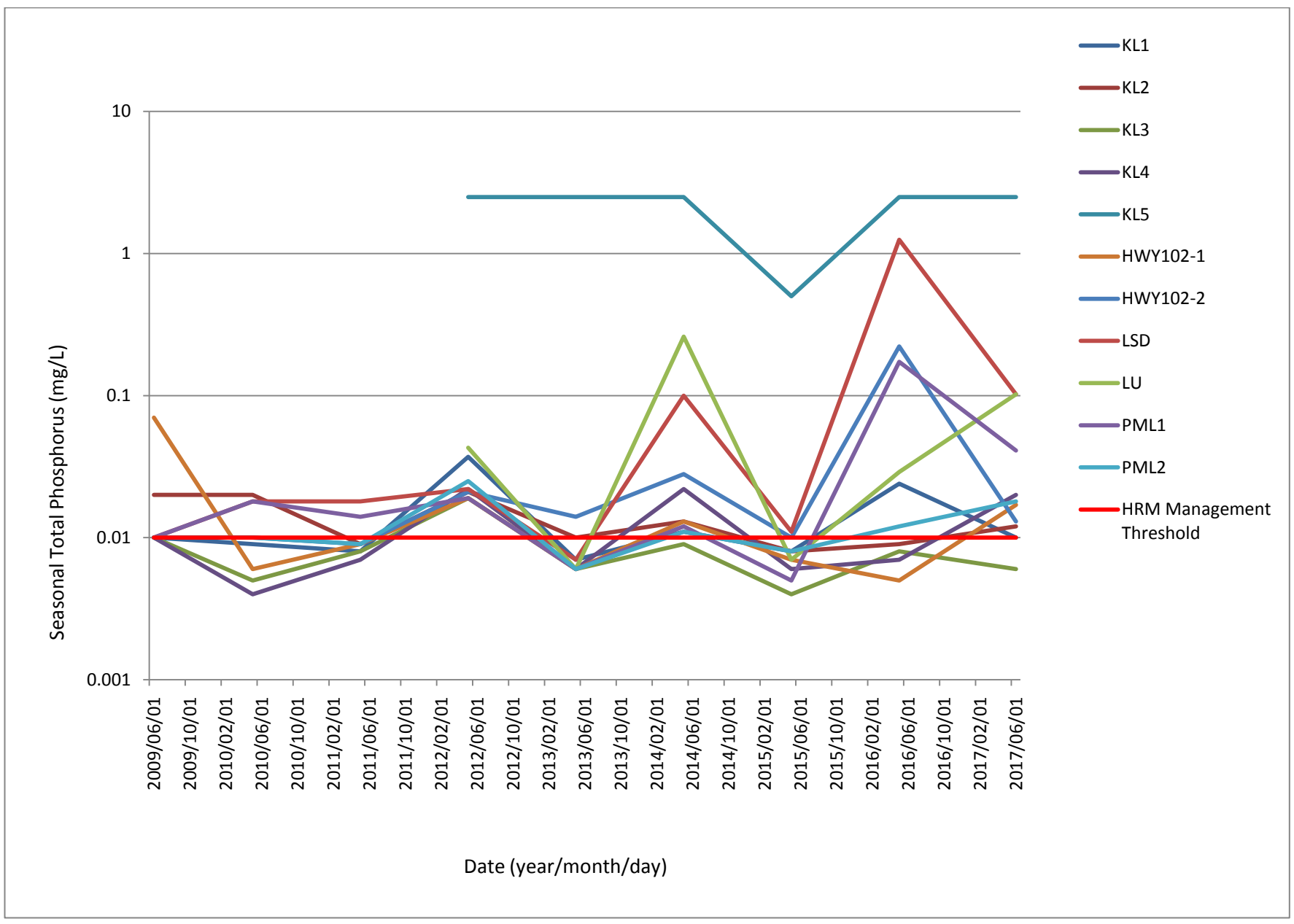


Figure 9 – Conductivity

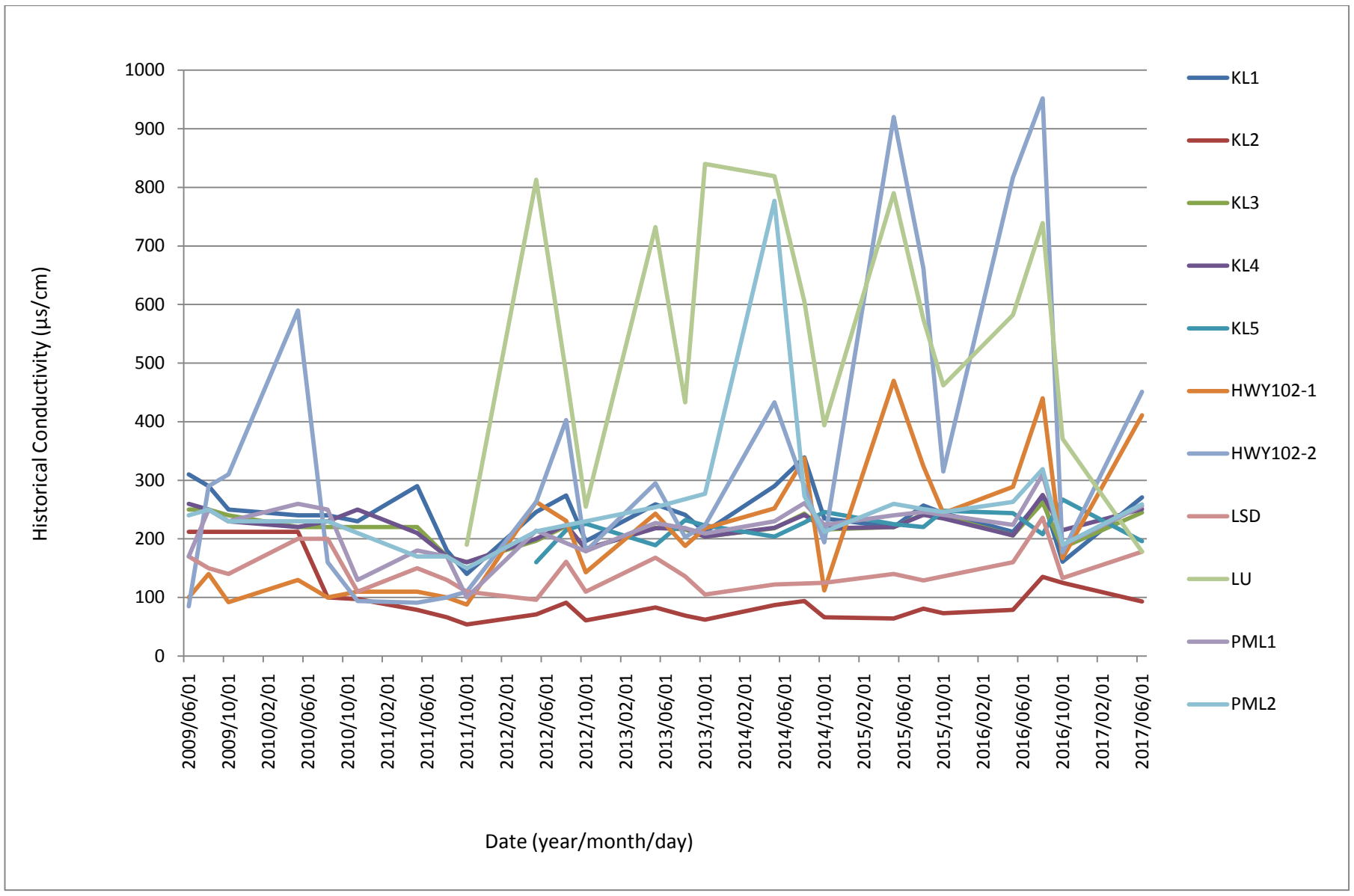


Figure 10 – Seasonal conductivity

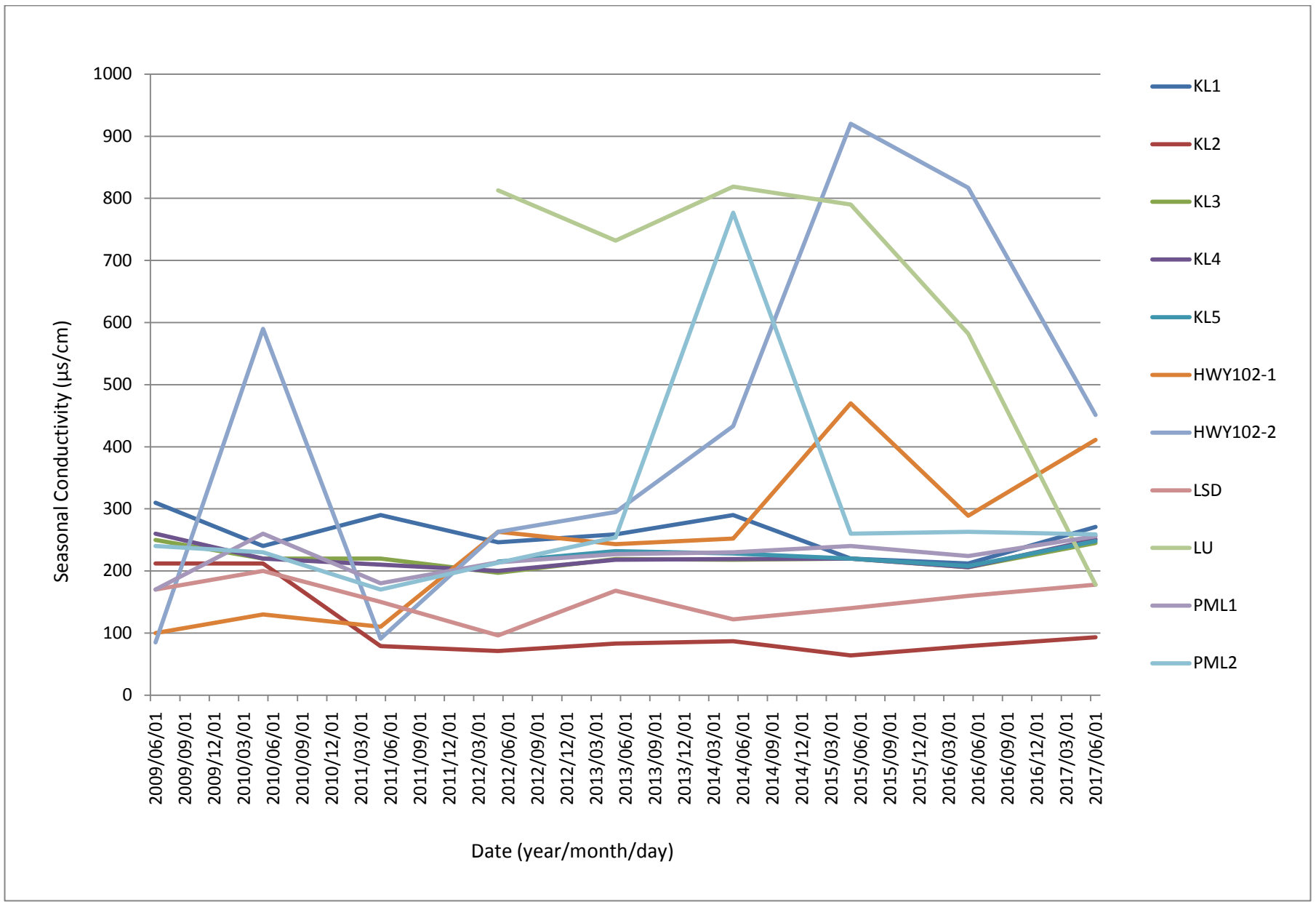


Figure 11 – Chlorophyll A concentrations

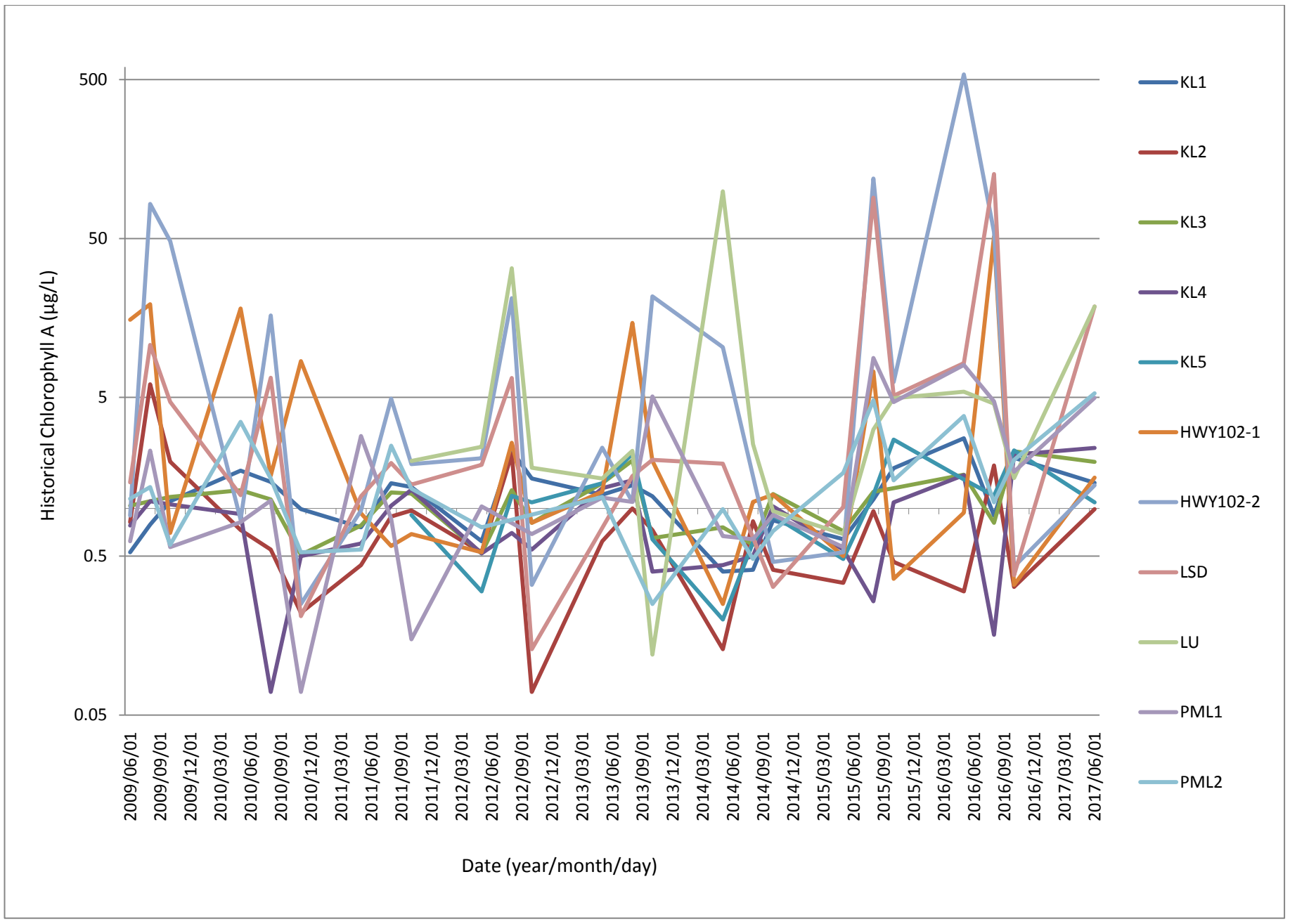
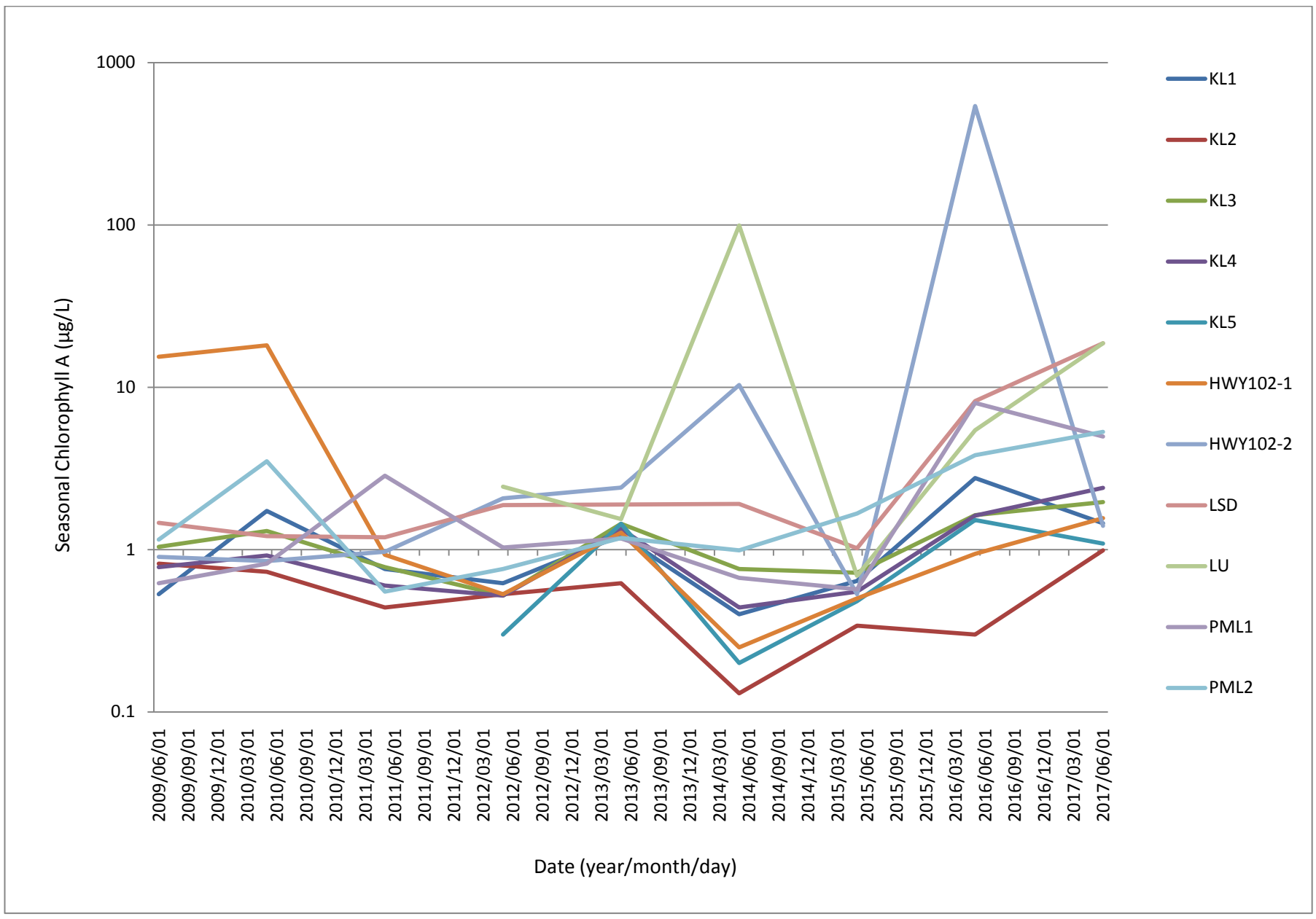
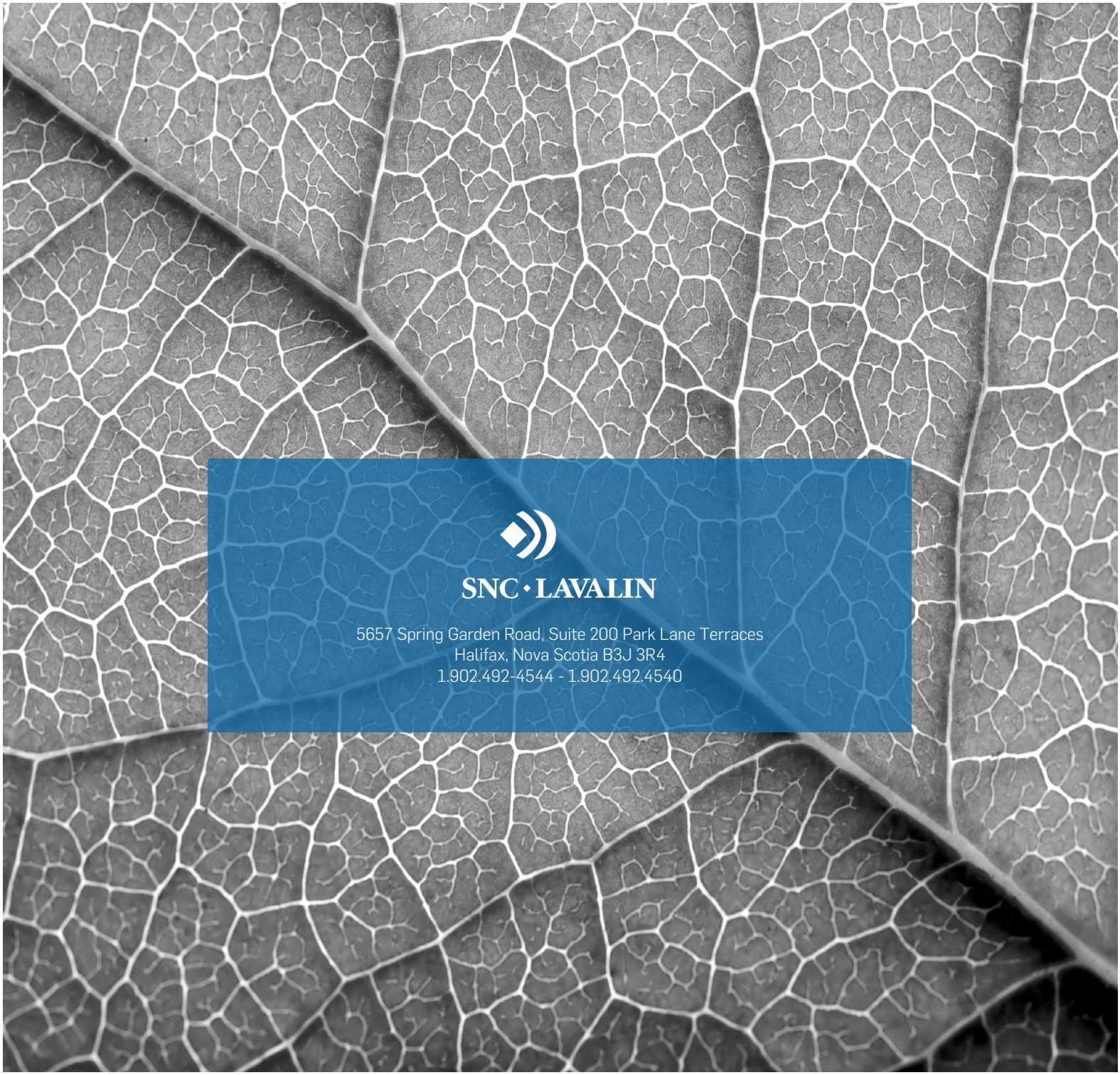


Figure 12 – Seasonal chlorophyll A concentrations





SNC·LAVALIN

5657 Spring Garden Road, Suite 200 Park Lane Terraces
Halifax, Nova Scotia B3J 3R4
1.902.492-4544 - 1.902.492.4540

Attachment B

SNC-Lavalin Inc.
Suite 200, Park Lane Terraces
5657 Spring Garden Road
Halifax, Nova Scotia, Canada, B3J 3R4
902.492.4544 902.492.4540

October 12, 2017

SENT VIA EMAIL: deacofc@halifax.ca

Halifax Regional Municipality
Halifax, Nova Scotia

Attention: **Mr. Cameron Deacoff**
Environmental Performance Officer
Planning and Development

Dear Mr. Deacoff:

RE: Final Report: Water Quality Monitoring Program, Summer 2017 Sampling Event Bedford West, Bedford, Nova Scotia

SNC-Lavalin Inc. (SLI) is pleased to submit one electronic copy of the final report presenting the results of the 2017 summer surface water quality sampling event for the Bedford West Water Quality Monitoring Program in Bedford, Nova Scotia. This report addresses the HRM comments received by SNCL on 2017/10/06.

If you have any questions or require clarification, please contact the undersigned.

Yours truly,

SNC♦LAVALIN INC.

Original Signed

Prepared by

Maria Gutierrez, *BSc., MSc (EnvMang)., OHS Cert.*
Natural Sciences Specialist
Infrastructure Engineering – Eastern Canada
(902) 492-4544 Ext. 308

Original Signed

Review by

Michael Smith, *AScT, B.Tech*
Project Manager / Environment Area Lead
Infrastructure Engineering – Eastern Canada
(709) 368-0118 Ext. 54957

631477-0001-T-4E-REP-000-0008_C02.docx

SNC·LAVALIN

Bedford West, Bedford, NS
Water Quality Monitoring Program

2017 Summer Sampling Event

Final Report

11 | 10 | 2017 Final Report

Water Quality Monitoring - Spring 2017

Rev. C02 > SLI ref. 631477-0001-T-4E-REP-000-0008

EXECUTIVE SUMMARY

On August 15, 2017 SNC-Lavalin Inc. (SNCL) completed the Bedford West summer 2017 water quality monitoring sampling event on behalf of Halifax Regional Municipality (HRM). The sampling program consisted of collecting surface water samples from eleven (11) water quality sampling stations. Field parameters were recorded and surface water samples were collected for laboratory analyses. The laboratory analysis included the following analysis: inorganics, calculated parameters, standard elements and microbiological.

The applicable water quality assessment standards 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); and
- 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 2017 summer water quality monitoring event, eight (8) stations reported concentrations that exceeded the Total Phosphorous management threshold criteria of 10 µg/L (0.01 mg/L) listed in the HRM RFP14-338.

- KL2 28 µg/L
- KL5 12 µg/L
- HWY 102-1 52 µg/L
- HWY 102-2 42 µg/L
- LSD 59 µg/L
- LU 27 µg/L
- PML-1 36 µg/L
- PML-2 13 µg/L

In addition, the following parameters exceeded the recommended CCME water quality criteria. Detailed information including the water quality sampling station ID(s) and the values/concentrations are outlined in the report:

- Dissolved Oxygen (in situ)
- Chloride
- Nitrite
- Metals (Aluminium, Cooper, Iron and Zinc)

E.coli exceeded the Heath Canada Guideline of 400 CFU /100 mL at one sampling station (LSD).

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1 INTRODUCTION AND BACKGROUND

SNC-Lavalin Inc. (SNCL) 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 in the Bedford West development area has been ongoing since 2009. SNCL was retained by HRM to complete water quality monitoring programs each spring, summer and fall for two years beginning in 2015. The results of the summer 2017 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 related to the development project in order to detect any impacts on and/or changes to water quality.

The summer 2017 sampling stations are summarized in Table 1 and shown in Figure 1.

Table 1: Bedford West Water Quality 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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N

HWY102-2

PML2

HWY102-1

PAPER MILL LAKE

PML1

KL4

LSD

KL3

KL2

LU

KEARNEY LAKE

KL5

KL1

Legend

- Water Quality Monitoring Test Locations/Sample Identification

0 200 400 800 1,200 1,600

Meters

SNC•LAVALIN

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Certified ISO 9001

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 summer 2017 water quality sampling event included the collection of Field Parameters (Group A) and surface water for laboratory analysis of:

- Inorganics (Group B);
- Calculated Parameters (Group C);
- Standard Elements/Metals (Group D); and
- Microbiological Analyses (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)	Standard Metals (D)	Microbiological (E)
· 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)	· Calcium · Copper · Iron · Magnesium · Manganese · Potassium · Sodium · Zinc	· Chlorophyll A · E. coli · Most Probable Number (MPN) or CFU per 100 mL

All surface water samples, associated field parameters and secchi depth measurements were collected on August 15, 2017.

Field measurements of pH, dissolved oxygen, specific conductivity, water temperature and air temperature were taken at each station using an YSI Professional Plus multi meter probe (serial number 12G102936). The instrument is calibrated annually by the manufacturer and a pre-calibration was

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conducted by the provider (Open Road Environmental on August 12, 2017) prior to conducting the water quality sampling event. See Appendix A, Instrument Calibration Report.

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.

Water samples and field parameter readings were collected where possible within a depth of 1.0 m below surface. Samples were collected from the shore at all sample locations. Surface water sampling followed SNCL's Standard Operating Procedures (SOP) for surface water sampling. A new pair of nitrile 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

- 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 environmental quality issues, which "triggers" the need for further investigation. According to the 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.
- The Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Aquatic Life – Freshwater (PAL-F) (Version 2015) were used for parameter such as Dissolved Oxygen, pH (in Situ and Laboratory analysis), Chloride, Nitrate, Nitrite, Nitrogen, as well as for total metals (i.e. Aluminum, Arsenic, Boron, Cadmium, Cooper, Iron, Lead, Molybdenum, Nickel, Selenium, Silver, Thallium, Uranium, and Zinc).
- For Total Suspended Solids (TSS), the CCME PAL-F at high flow conditions was applied. The TSS 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 concentrations are greater than 250 mg/L, the concentration should not increase more than 10% from background levels.
- The Health Canada guidelines for Canadian Recreational Water Quality (2012, Third Edition) were used for parameters such as Secchi Depth (i.e. the guidelines indicate that the clarity of the water should be sufficiently clear such that a Secchi disk is visible at a minimum depth of 1.2

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metres); pH (guideline of 5.0-9.0 pH); Turbidity (limit of 50 Nephelometric Turbidity Units); E. coli (400 MPN/100mL) and Fecal Coliform (400 MPN/mL).

- The 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) for Fresh Water were used for assessment of total metals (i.e. Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Uranium, Vanadium and Zinc).

4 FIELD OBSERVATIONS

The summer 2017 site conditions were recorded for all eleven (11) surface water quality monitoring 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**.

5 FIELD MEASUREMENTS

Field measurements were recorded on field data sheets, which are enclosed in **Appendix B** and include collection of parameters such as in Situ pH, Dissolved Oxygen, water temperature, conductivity and Secchi depth (where applicable).

Field measurements are also presented in Appendix D - Summary Tables 1 and 1A.

Situ pH

All eleven (11) stations were within the CCME-PAL-F recommended range of 6.5 - 9.0 pH as well as the Health Canada Guideline for Recreational Water Quality of 5.0 - 9.0 pH.

Dissolved Oxygen

One (1) station exceeded the CCME PAL-F recommended range for dissolved oxygen of 5.5-9.5 mg/L. Dissolved oxygen concentration at station HWY-102-1 was recorded as 1.8 mg/L

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6 ANALYTICAL RESULTS

Analytical results of the 2017 summer water quality sampling event are summarized in **Table 1** enclosed in **Attachment C**. In addition, historical water quality results since 2009 are summarized in **Table 1A** enclosed in **Attachment C**.

Laboratory certificates of analysis for the 2017 summer event are enclosed in **Appendix E**.

6.1 Total Phosphorous

Eight (8) stations reported concentrations that exceeded the management threshold criteria of 10 µg/L (0.01 mg/L) listed in the HRM RFP #14-338. Reported concentrations were as follows:

- KL2 28 µg/L
- KL5 12 µg/L
- HWY 102-1 52 µg/L
- HWY 102-2 42 µg/L
- LSD 59 µg/L
- LU 27 µg/L
- PML-1 36 µg/L
- PML-2 13 µg/L

6.2 General Chemistry

Chloride: One (1) station exceeded the CCME PAL-F recommended value for Chloride of 120 mg/L. Chloride concentration at LU was reported as 154 mg/L.

Nitrite: Seven (7) stations exceeded the CCME PAL-F recommended value for Nitrite of 0.06 mg/L. Exceedances reported in mg/L were as follows:

KL1:	0.21
KL3:	0.13
KL5:	0.14
HWY102-1:	0.21
LSD:	0.09
LU:	0.36
PML-1:	0.15

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6.3 Metals

Aluminum: All eleven (11) stations exceeded the CCME PAL-F recommended value for aluminum of 5-00 µg/L and the NSE EQS guideline of 5 µg/L. Exceedances reported in µg/L were as follows:

KL1:	41	HWY102-2:	149
KL2:	150	LSD:	48
KL3:	36	LU:	978
KL4:	89	PML-1:	94
KL5:	45	PML-2:	40
HWY102-1:	450		

Cooper: Two (2) stations exceeded the CCME-PAL-F recommended limit of 2 µg/L. The NSE EQS guideline is also 2 µg/L. Copper exceedances reported in µg/L were as follows:

HWY102-1:	4
LU:	14

Iron: Seven (7) stations exceeded the CCME-PAL-F recommended limit of 300 µg/L. The NSE EQS guideline is also 300 µg/L. Exceedances reported in µg/L were as follows:

KL2:	759
HWY102-1:	3960
HWY102-2:	2560
LSD:	375
LU:	3540
PML-1:	359
PML-2:	203

Zinc: Two (2) stations exceeded the CCME-PAL-F recommended limit of 30 µg/L. The NSE EQS guideline is also 30 µg/L. Exceedances were reported as follows:

HWY102-1:	37
LU:	120

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6.4 Microbiological

Eleven (11) E.coli samples were collected during the 2017 summer sampling program. E.coli exceeded the Heath Canada Guideline of ≤ 400 E.Coli /100 mL at station LSD which reported 479 Most probable number (MPN) E.Coli /100 ml.

7 STATISTICAL PRESENTATION

Table 3 attached at the end of this section provides seasonal statistics for below six (6) key water quality parameters at the eleven (11) water quality sampling stations, representing water quality data from 2009 to August 2017:

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

It should be noted where analytical results were found to be less than the laboratory Reportable Detection Limit (<RDL), the statistics (minimum, maximum, media and average) were calculated as half the reportable detection limit (1/2 RDL value) as a conservative approach.

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TABLE 3: Statistical Presentation of Key Water Quality Parameters

KL-1	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.010	0.002	0.043	0.010	0.014
Chloride (mg/L)	1	73.00	45.00	76.00	62.00	64.00
Lab pH	N/A	7.07	6.51	7.23	7.00	6.96
Total Suspended Solids (mg/L)	5	2.50	1.00	17.00	2.50	3.89
Conductivity (uS/cm)	1	260.00	180.00	339.00	260.00	261.22
Chlorophyll-A acidification method (µg/L)	0.05	1.75	0.41	2.30	1.40	1.29

KL-2	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.028	0.008	0.059	0.020	0.023
Chloride (mg/L)	1	19.00	14.00	48.00	20.00	22.67
Lab pH	N/A	6.87	6.40	6.99	6.85	6.77
Total Suspended Solids (mg/L)	5	12.00	1.00	135.00	2.50	29.78
Conductivity (uS/cm)	1	110.00	66.00	212.00	94.00	106.44
Chlorophyll-A acidification method (µg/L)	0.05	1.47	0.55	6.05	1.00	1.76

KL-3	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.009	0.001	0.045	0.006	0.012
Chloride (mg/L)	1	56.00	40.00	63.00	56.00	52.44
Lab pH	N/A	7.13	6.50	7.28	6.96	6.94
Total Suspended Solids (mg/L)	5	2.50	0.50	2.50	2.50	1.94
Conductivity (uS/cm)	1	251.00	170.00	262.00	242.00	230.67
Chlorophyll-A acidification method (µg/L)	0.05	1.24	0.59	2.00	1.24	1.19

KL-4	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.008	0.002	2.390	0.008	0.278
Chloride (mg/L)	1	62.00	41.00	65.00	56.00	54.00
Lab pH	N/A	6.99	6.57	7.03	6.94	6.90
Total Suspended Solids (mg/L)	5	2.50	0.50	7.00	2.50	2.44
Conductivity (uS/cm)	1	255.00	170.00	275.00	241.00	233.78
Chlorophyll-A acidification method (µg/L)	0.05	0.33	0.07	1.50	0.50	0.63

KL-5	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.012	0.004	0.040	0.013	0.017
Chloride (mg/L)	1	58.00	44.00	58.00	56.50	53.33
Lab pH	N/A	7.09	6.84	7.16	7.01	7.00
Total Suspended Solids (mg/L)	5	2.50	2.50	2.50	2.50	2.50
Conductivity (uS/cm)	1	249.00	223.00	267.00	247.00	243.17
Chlorophyll-A acidification method (µg/L)	0.05	1.43	0.61	2.20	1.21	1.31

HWY 102-1	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.052	0.007	0.140	0.038	0.041
Chloride (mg/L)	1	49.00	19.00	87.00	48.00	46.78
Lab pH	N/A	6.91	5.24	7.49	6.90	6.74
Total Suspended Solids (mg/L)	5	11.00	1.00	80.00	6.00	14.06
Conductivity (uS/cm)	1	251.00	100.00	440.00	231.00	234.67
Chlorophyll-A acidification method (µg/L)	0.05	5.32	0.58	51.51	5.32	11.55

HWY 102-2	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.042	0.019	1.560	0.037	0.226
Chloride (mg/L)	1	107.00	21.00	226.00	94.50	101.75
Lab pH	N/A	6.73	5.96	6.80	6.62	6.49
Total Suspended Solids (mg/L)	5	7.00	2.50	3,000.00	33.00	401.56
Conductivity (uS/cm)	1	413.00	100.00	952.00	346.50	397.88
Chlorophyll-A acidification method (µg/L)	0.05	2.11	1.10	119.14	18.70	37.78

LSD	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.059	0.015	0.501	0.045	0.102
Chloride (mg/L)	1	38.00	27.00	45.00	33.50	35.13
Lab pH	N/A	7.08	6.59	7.30	6.93	6.91
Total Suspended Solids (mg/L)	5	41.00	16.00	9,020.00	87.50	1,262.25
Conductivity (uS/cm)	1	192.00	129.00	236.00	155.50	166.75
Chlorophyll-A acidification method (µg/L)	0.05	20.15	1.60	127.14	8.67	33.14

LU	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.027	0.009	0.036	0.027	0.023
Chloride (mg/L)	1	154.00	99.00	164.00	124.00	128.17
Lab pH	N/A	7.40	7.11	7.42	7.35	7.31
Total Suspended Solids (mg/L)	5	16.00	2.50	165.00	2.50	31.83
Conductivity (uS/cm)	1	673.00	433.00	739.00	590.00	584.50
Chlorophyll-A acidification method (µg/L)	0.05	21.03	2.30	32.52	3.86	11.02

PML1	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.036	0.002	0.104	0.021	0.033
Chloride (mg/L)	1	63.00	43.00	67.00	59.00	57.75
Lab pH	N/A	7.15	6.75	7.15	6.94	6.94
Total Suspended Solids (mg/L)	5	5.00	1.00	149.00	2.75	21.75
Conductivity (uS/cm)	1	277.00	170.00	310.00	250.00	247.75
Chlorophyll-A acidification method (µg/L)	0.05	4.40	0.64	8.84	1.72	3.00

PML2	RDL 2017/08/15	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.013	0.002	0.026	0.010	0.011
Chloride (mg/L)	1	72.00	43.00	72.00	59.00	58.86
Lab pH	N/A	7.23	6.60	7.23	7.02	6.99
Total Suspended Solids (mg/L)	5	14.00	1.00	14.00	2.50	4.79
Conductivity (uS/cm)	1	286.00	170.00	319.00	251.00	254.14
Chlorophyll-A acidification method (µg/L)	0.05	4.30	0.48	4.79	1.54	2.29

8 GRAPHS

Appendix F includes seasonal and yearly graphs that illustrate water quality data from 2009 to August 2017 of below key water quality parameters at each of the eleven (11) water quality monitoring stations:

- Dissolved chloride (mg/L),
- pH,
- Total phosphorus (mg/L),
- Total suspended solids (mg/L),
- Conductivity (µS/cm) and
- Chlorophyll A (µg/L)

The graphs allow for comparison between water quality sampling stations and identification of concentration increases (i.e. above applicable CCME guidelines). As many parameters show seasonal concentration fluctuations, the water quality data was also graphed showing only the concentrations for a given season (i.e. spring).

It should be noted that where results were found to be less than the laboratory Reportable Detection Limit (<RDL), they were graphed as half the reportable detection limit ($^1/_2$ RDL value) as a conservative approach.

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9 CONCLUSIONS

The 2017 summer water quality monitoring program included collection of surface water samples at eleven (11) water quality sampling 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 in Situ pH, water temperature, dissolved oxygen, conductivity, Secchi depth (where applicable), air temperature, cloud cover and wildlife sightings.

9.1 Total Phosphorous

Eight stations reported concentrations that exceeded the HRM management threshold criteria of 10 µg/L. Reported concentrations were as follows:

- KL2 28 µg/L
- KL5 12 µg/L
- HWY 102-1 52 µg/L
- HWY 102-2 42 µg/L
- LSD 59 µg/L
- LU 27 µg/L
- PML-1 36 µg/L
- PML-2 13 µg/L

9.2 Field Measurements

In Situ readings of parameters such as pH, Dissolved Oxygen, water temperature, conductivity and Secchi depth (where applicable) were recorded at all eleven stations.

- One (1) station (HWY-102-1) recorded 1.8 mg/L of dissolved oxygen, which exceeded the CCME PAL-F recommended range for dissolved oxygen of 5.5 - 9.5 mg/L.
- All eleven (11) stations were within the CCME-PAL-F recommended range of 6.5 - 9.0 pH, as well as the Health Canada Guideline for Recreational Water Quality of 5.0 - 9.0 pH.

9.3 General Chemistry and Metals

The following parameters exceeded the recommended Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (Edition 2015) and/or the Nova Scotia Environment (NSE) Environmental Quality Standards (EQS) for Surface Water, EQS for Contaminated Sites (NSE 2014):

- Chloride: One station (LU) exceeded the CCME PAL-F recommended value of 120 mg/L.
- Nitrite: Seven stations (KL1, KL3, KL4, KL5, HWY-102-1, LSD, LU, and PML-1) exceeded the CCME PAL-F recommended value of 0.06 mg/L.

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- Aluminum: All eleven stations exceeded the CCME PAL-F recommended value of 5-100 µg/L and the NSE EQS guideline of 5 µg/L.
- Copper: Two stations (HWY-102-1 and LU) exceeded the CCME-PAL-F and NSE EQS guideline of 2 µg/L
- Iron: Seven stations (KL2, HWY-102-1, HWY-102-2, LSD, LU, PML-1 and PML-2) exceeded the CCME-PAL-F and NSE EQS guideline of 300 µg/L
- Zinc: Two stations (HWY-102-1 and LU) exceeded the CCME-PAL-F and NSE EQS guideline of 30 µg/L

9.4 Microbiological

E.coli exceeded the Heath Canada Guideline of ≤ 400 E.Coli /100 mL at station LSD, which reported 479 Most Probable Number (MPN) of E.Coli /100 ml.

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10 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 (µg/L) – Fresh Water

11 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SNC-Lavalin Inc (SNCL) 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 SNCL 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 SNCL.

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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 SNCL and the Client. The findings, observations, reported data and conclusions expressed are limited by the Scope of Work. SNCL is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SNCL does not warranty the accuracy of information provided by third party sources.

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Appendix A

Instrument Calibration Report

Open Road Environmental Limited

YSI Professional Plus

Serial Number 12G102936 (Quattro)

Calibration Certificate

3 Point Calibration pH (4.00, 7.00,10.00)	*Calibration solution*	*Specific Conductivity 1413 uS/cm*	*DO 100% @20 Deg.C*
pH 4.00 141.2mV	*Lot#A6239 Exp. Aug-20*	*pass*	*pass*
pH 7.00 23mV	*Lot#A6250 Exp. Aug-18*	*pass*	
pH 10.00 - 160.3mV	*Lot#A6199 Exp. Jun-18*	*pass*	

August 12, 2017

Original Signed

Ghislain Pitre, CET

Appendix B

Field Reports

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sunny
Air Temperature:	20^{o}
Cloud Cover :	0%
Wildlife Sightings:	Fish, water bugs, birds
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):	**15.08.17**
Time (hh:mm):	9:30
Sample Depth (m):	1m
pH:	7.00
Dissolved Oxygen (mg/L):	7.91
Secchi Depth (m):	2.15 meters
Water Temperature (degrees Celsius):	23.20^{o}
Conductivity (µs/cm):	292

Additional Comments / Notes

- Clear water

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and Cloud
Air Temperature:	23 ^{o}
Cloud Cover:	25%
Wildlife Sightings:	Birds
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):	**15.08.17**
Time (hh:mm):	11:15
Sample Depth (m):	0.4m
pH:	6.00
Dissolved Oxygen (mg/L):	6.61
Secchi Depth (m):	1.52 meters
Water Temperature (degrees Celsius):	21.2 ^{o}
Conductivity (µs/cm):	114

Additional Comments / Notes

- Limited water flow
- Low water level

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	23 ^{o}
Cloud Cover:	25%
Wildlife Sightings:	Water bugs, fish, birds
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):	**15.08.17**
Time (hh:mm):	11:00
Sample Depth (m):	0.5m
pH:	7.04
Dissolved Oxygen (mg/L):	7.40
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	22.5 ^{o}
Conductivity (µs/cm):	248

Additional Comments / Notes

- Clear water

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	23 ^{o}
Cloud Cover:	20%
Wildlife Sightings:	Birds, fish
Site Accessibility: Yes, Accessible	Via the extended road at the end of Weybridge Ln.
Site Access Detail:	At 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):	**15.08.17**
Time (hh:mm):	10:45
Sample Depth (m):	0.5m
pH:	6.88
Dissolved Oxygen (mg/L):	6.41
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	22.4 ^{o}
Conductivity (µs/cm):	262

Additional Comments / Notes

- Clear water

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	23 ^{o}
Cloud Cover:	20%
Wildlife Sightings:	Birds
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 structures). 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):	**15.08.17**
Time (hh:mm):	9:45
Sample Depth (m):	1m
pH:	6.83
Dissolved Oxygen (mg/L):	7.07
Secchi Depth (m):	4.6 meters (visible on bottom)
Water Temperature (degrees Celsius):	21 ^{o}
Conductivity (µs/cm):	246

Additional Comments / Notes

- Clear water

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	25 ^{o}
Cloud Cover:	20%
Wildlife Sightings:	Birds, water bugs
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):	**15.08.17**
Time (hh:mm):	15:00
Sample Depth (m):	0.2m
pH:	7.76
Dissolved Oxygen (mg/L):	5.77
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	22.1^{o}
Conductivity (µs/cm):	257

Additional Comments / Notes

- Limited water flow and level

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	26 ^{o}
Cloud Cover:	20%
Wildlife Sightings:	Water bugs
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:	**15.08.17**
Time (hh:mm):	15:25
Sample Depth (m):	0.1m
pH:	7.56
Dissolved Oxygen (mg/L):	1.81
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	22.4 ^{o}
Conductivity (µs/cm):	414

Additional Comments / Notes

- Very murky water with high algae content
- Limited water flow and level

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	24 ^{o}
Cloud Cover:	20%
Wildlife Sightings:	Water bugs, frogs, birds
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) downhill 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):	**15.08.17**
Time (hh:mm):	11:55
Sample Depth (m):	0.1m
pH:	6.57
Dissolved Oxygen (mg/L):	6.95
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	23 ^{o}
Conductivity (µs/cm):	188

Additional Comments / Notes

- Muddy water (very limited water level and difficult to retrieve any water below 0.1m)
- Surficial due to in field limitations

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	23 ^{o}
Cloud Cover:	20%
Wildlife Sightings:	Birds, water bugs, fish
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):	**15.08.17**
Time (hh:mm):	10:15
Sample Depth (m):	0.5m
pH:	7.11
Dissolved Oxygen (mg/L):	8.34
Secchi Depth (m):	**N/A**
Water Temperature (degrees Celsius):	22.4 ^{o}
Conductivity (µs/cm):	660

Additional Comments / Notes

- Murky water near edge of pond (Small algae blooms visible)

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	26 ^{o}
Cloud Cover:	15%
Wildlife Sightings:	Birds, water bugs
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):	**15.08.17**
Time (hh:mm):	13:45
Sample Depth (m):	0.5m
pH:	6.74
Dissolved Oxygen (mg/L):	7.76
Secchi Depth (m):	4.7 meters
Water Temperature (degrees Celsius):	23 ^{o}
Conductivity (µs/cm):	273

Additional Comments / Notes

- Clear water

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FIELD REPORT –AUGUST 2017

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 / Maria Gutierrez	

Site Conditions

Weather:	Sun and cloud
Air Temperature:	25 ^{o}
Cloud Cover:	15%
Wildlife Sightings:	Birds, water bugs
Site Accessibility: Yes, Accessible	Via Lake Dr., off Hammonds Plains Rd.
Site Access Detail:	Follow pathway along lake bank to small clearing, use GPS to find exact sample location. Travel over small ridge to reach lake and sample at edge.

Field Parameter Data

	Remarks
Date (d.m.y):	**15.08.17**
Time (hh:mm):	14:30
Sample Depth (m):	1m
pH:	7.01
Dissolved Oxygen (mg/L):	8.89
Secchi Depth (m):	2.45 meters
Water Temperature (degrees Celsius):	24 ^{o}
Conductivity (µs/cm):	285

Additional Comments / Notes

- Clear water

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Appendix C

Site Photographs

Photo 1: KL1 Kearney Lake Sample Location

Photo 2: KL2 Kearney Lake Sample Location.

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Photo 3: KL3 Kearney Lake Sample Location

Photo 4: KL4 Kearney Lake Sample Location

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Photo 5: KL5 Kearney Lake Sample Location

Photo 6: HWY 102-1 Sample Location

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Photo 7: HWY102-2 Sample Location

Photo 8: LSD Lake Shore Drive Sample Location

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Photo 9: LU Larry Uteck Sample Location

Photo 10: PML-1 Paper Mill Lake Sample Location

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Photo 11: PML-2 Paper Mill Lake Sample Location

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Appendix D

Summary Table Results

TABLE 1: 2017 Summer Results and Exceedances, Bedford West Water Quality Sampling Program

Tested Parameters		RDL	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)
Sampling Date		2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15	2017/08/15			
Sampling Time			9:30 AM	11:15 AM	11:00 AM	10:45 AM	9:45 AM	15:00	15:25	11:55 AM	10:15 AM	13:45	14:30			
Field Data (in Situ)																
Secchi Depth	Meters	--	2.2	1.5	N/A	N/A	4.6	N/A	N/A	N/A	N/A	4.7	2.45	--	minimum of 1.2	--
Water Temp	Celsius	0.1	23.2	21.2	22.5	22.4	21.0	22.1	22.4	23	22.4	23.00	24.00	--	--	--
Dissolved Oxygen	mg/L	0.01	7.9	6.6	7.4	6.4	7.1	5.8	**1.8**	7.0	8.3	7.76	8.9	--	--	5.5 - 9.5
pH	pH	N/A	7.0	6.0	7.0	6.9	6.8	7.8	7.6	6.6	7.1	6.74	7.0	--	5.0-9.0	6.5 - 9.0
Specific Conductance (µs/cm)	uS/cm	1	292	114	248	262	246	257	414	188	660	273	285	--	--	--
Inorganic Parameters																
Alkalinity	mg/L	5	8	12	8	9	7	21	22	26	27	13	12	--	--	--
Chloride	mg/L	1	73	19	56	62	58	49	107	38	**154**	63	72	--	--	120
True Color	TCU	5	14	46	13	11	14	31	41	31	12	18	7	--	--	--
Nitrate + Nitrite as N	mg/L	0.05	0.29	0.08	0.3	0.12	0.21	0.71	0.09	0.48	0.87	0.28	0.07	--	--	--
Nitrate as N	mg/L	0.05	0.08	0.08	0.17	0.12	0.07	0.5	0.09	0.39	0.51	0.13	0.07	--	--	13
Nitrite as N	mg/L	0.05	**0.21**	<0.05	**0.13**	<0.05	**0.14**	**0.21**	<0.05	**0.09**	**0.36**	**0.15**	<0.05	--	--	0.06
Ammonia as N	mg/L	0.03	<0.03	0.03	0.03	0.03	<0.03	0.1	0.09	0.08	0.09	<0.03	<0.03	--	--	18
Total Kjeldahl Nitrogen as N	mg/L	0.4	<0.4	0.5	0.8	0.5	<0.4	1.3	0.7	34.5	3.8	0.8	0.6	--	--	--
Total Organic Carbon	mg/L	0.5	4.6	8.2	4.9	4.3	4.8	8.6	9.2	8.1	6.8	4.7	5.4	--	--	--
Ortho-Phosphate 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	--	--	--
pH		--	7.07	6.87	7.13	6.99	7.09	6.91	6.73	7.08	7.4	7.15	7.23	--	5.0-9.0	6.5 - 9.0
Calcium	mg/L	0.1	7.1	4.3	7.2	7.5	7	10.3	14.7	8	23.8	8.2	8.5	--	--	--
Magnesium	mg/L	0.1	1.2	1.2	1.1	1.1	1	1.7	1.9	1.7	3	1.2	1.1	--	--	--
Total Phosphorus	mg/L	0.002	0.01	**0.028**	0.009	0.008	**0.012**	**0.052**	**0.042**	**0.059**	**0.027**	**0.036**	**0.013**	--	--	0.01
Potassium	mg/L	0.1	0.9	0.8	0.9	0.9	0.8	2.1	1.6	1.4	3	1.1	1.4	--	--	--
Sodium	mg/L	0.1	50.3	15.4	41.4	41.4	42.4	29.7	66	26	113	45.3	47.2	--	--	--
Reactive Silica as SiO2	mg/L	0.5	1.6	2.2	1.6	1.7	1.6	3.8	5.7	2.7	3.6	1.3	0.8	--	--	--
Total Suspended Solids	mg/L	5	<5	12	<5	<5	<5	11	7	41	16	5	14	--	--	--
Sulphate	mg/L	2	9	2	9	9	8	13	7	3	18	9	8	--	--	--
Turbidity	NTU	0.1	1.1	4.4	1.3	0.9	0.9	7.7	9.9	21.3	6.6	3.2	1.9	--	50	--
Conductivity	umho/cm	1	260	110	251	255	249	251	413	192	673	277	286	--	--	--
Calculated Parameters																
Anion Sum	me/L		2.43	0.82	1.95	2.12	1.96	2.12	3.61	1.69	5.32	2.24	2.44	--	--	--
Bicarb. Alkalinity (as CaCO3)	mg/L	5	8	12	8	9	7	21	22	26	27	13	12	--	--	--
Calculated TDS	mg/L	1	148	51	122	128	122	127	215	97	341	137	146	--	--	--
Carb. Alkalinity (as CaCO3)	mg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	--	--	--
Cation sum	me/L	--	2.67	1.05	2.28	2.31	2.3	2.22	3.93	1.74	6.74	2.53	2.62	--	--	--
Hardness	mg/L	--	22.7	15.7	22.5	23.3	21.6	32.7	44.5	27	71.8	25.4	25.8	--	--	--
% Difference/ Ion Balance (NS)	%	--	4.8	12.3	7.9	4.1	8.1	2.2	4.2	1.4	11.8	6.1	3.5	--	--	--
Langelier Index (@20C)	NA	--	-2.78	-2.98	-2.71	-2.78	-2.82	-2.35	-2.38	-2.19	-1.43	-2.42	-2.37	--	--	--
Langelier Index (@ 4C)	NA	--	-3.1	-3.3	-3.03	-3.1	-3.14	-2.67	-2.7	-2.51	-1.75	-2.74	-2.69	--	--	--
Saturation pH (@ 20C)	NA	--	9.85	9.85	9.84	9.77	9.91	9.26	9.11	9.27	8.83	9.57	9.6	--	--	--
Saturation pH (@ 4C)	NA	--	10.2	10.2	10.2	10.1	10.2	9.58	9.43	9.59	9.15	9.89	9.92	--	--	--
Metals (ICP-MS)																
Total Aluminum	ug/L	5	**41**	**150**	**36**	**89**	**45**	**450**	**149**	**48**	**978**	**94**	**40**	5	--	5-100 ug/L (base on pH 6.5)
Total Antimony	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	20	--	--
Total Arsenic	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	5.0	--	5
Total Barium	ug/L	5	--	--	--	--	--	--	--	--	--	--	--	1000	--	--
Total Beryllium	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	5.3	--	--
Total Bismuth	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Boron	ug/L	5	--	--	--	--	--	--	--	--	--	--	--	1200	--	1500
Total Cadmium	ug/L	0.017	--	--	--	--	--	--	--	--	--	--	--	0.01	--	0.09
Total Chromium	ug/L	1	--	--	--	--	--	--	--	--	--	--	--	---	--	1
Total Cobalt	ug/L	1	--	--	--	--	--	--	--	--	--	--	--	10	--	--
Total Copper	ug/L	1	2	1	<1	<1	<1	**4**	1	<1	**14**	<1	<1	2	--	2 ug/L (based on hardness)
Total Iron	ug/L	50	70	**759**	83	131	<50	**3960**	**2650**	**375**	**3540**	**359**	**203**	300	--	300
Total Lead	ug/L	0.5	--	--	--	--	--	--	--	--	--	--	--	1	--	1 ug/L (base on hardness)
Total Manganese	ug/L	2	31	96	35	76	11	511	160	212	1870	125	68	820	--	--
Total Molybdenum	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	73	--	73
Total Nickel	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	25	--	25 ug/L (base on hardness)
Total Selenium	ug/L	1	--	--	--	--	--	--	--	--	--	--	--	1.0	--	1
Total Silver	ug/L	0.1	--	--	--	--	--	--	--	--	--	--	--	0.1	--	0.25
Total Strontium	ug/L	5	--	--	--	--	--	--	--	--	--	--	--	21000	--	--
Total Thallium	ug/L	0.1	--	--	--	--	--	--	--	--	--	--	--	0.8	--	0.8
Total Tin	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Titanium	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Uranium	ug/L	0.1	--	--	--	--	--	--	--	--	--	--	--	300	--	15
Total Vanadium	ug/L	2	--	--	--	--	--	--	--	--	--	--	--	6	--	--
Total Zinc	ug/L	5	<5	8	6	7	8	**37**	9	<5	**120**	<5	9	30	--	30
Microbiological Parameters																
Total Coliforms	MPN/100 mL	1	488	>2420	2420	>2420	577	>2420	>2420	>2420	>2420	>2420	>2420	--	--	--
E. Coli	MPN/100 mL	1	18	16	13	1	5	14	8	479	51	2	11	--	400	--
Chlorophyll A - Acidification Method	ug/L	0.05	1.75	1.47	1.24	0.33	1.43	5.32	2.11	20.15	21.03	4.40	4.30	--	--	--
Chlorophyll A - Welschmeyer Method	ug/L	0.05	1.87	1.81	1.32	0.39	1.40	5.48	3.20	24.37	24.37	4.96	4.23	--	--	--

RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / no parameter tested.
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
Health Canada Guidelines for Canadian Recreational Water Quality (Thrid Edition 2012)
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (Updated 2015)
CCME Phosphorus Trigger Range (Applied) of 0.01 mg/L
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The guideline value for each respective element was used.
CCME PAL-F Guideline for Ammonia-N vary base on water pH and Temperature. The value is converted to mg/L total ammonia-N by multiplying by 0.8224

Bold (black shaded)	Concentration exceeds CCME FWAL applicable guideline.
Underlined (black shaded)	Concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality (Reference Guidelines)

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM 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	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
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	9:30	7:50	13:20	8:30	9:30 AM
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	1.8	2.1	2.5	2.1	2.2
Water Temp	Celsius	--	--	--	--		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	12.8	22.2	11.9	16.6	23.2
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.72	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	14.02	10.33	12.06	8.3	7.9
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	8.29	4.6	6.23	7.5	7.0
Specific Conductance	uS/cm	--	--	--	--		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	239	298	212	240	292
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	5	8	6	<5	8
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	55	57	45	71	73
Colour	TCU	5	--	--	--		18	18	16	26	8	21	28	40	45	50	11	20	11	37	20	13	8	23	37	8	22	31	17	18	15	14
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	0.10	0.15	0.13	0.20	0.29
Nitrate (N)	mg/L	0.05	--	--	13		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	0.10	0.08	0.13	0.08	0.08
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.07	<0.05	0.12	0.21
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.05	0.09	<0.03	<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	0.7	<0.4	0.6	<0.4	<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	4.3	3.4	7.3	4.5	4.6
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	<0.01	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.64	7.23	6.81	6.64	7.07
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	6.8	8.0	6.3	8.6	7.1
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	1.1	1.1	1.2	1.3	1.2
Total Phosphorus	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	0.008	0.002	0.011	0.024	0.005	0.008	0.010	0.01
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	0.7	0.9	0.8	1.0	0.9
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	35.5	32.2	31.0	44.9	50.3
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	2.8	2.0	1.6	2.0	1.6
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	38	<5	<5	<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	10	10	10	11	9
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	0.8	1.0	1.3	0.6	1	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	10.6	0.9	2.6	1.4	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	212	270	161	271	260
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	1.87	1.99	1.61	2.25	2.43
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	5	8	6	<5	8
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	113	115	99	139.00	148
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	<10	<10	<10	<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	2.03	1.93	1.82	2.54	2.67
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	21.5	24.5	20.7	26.80	22.7
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	4.1	1.5	6.2	6.10	4.8
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	-3.42	-2.56	-3.20	-3.33	-2.78
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	-3.74	-2.88	-3.52	-3.65	-3.1
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	10.1	9.79	10.00	9.97	9.85
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	10.4	10.1	10.3	10.30	10.2
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		230	--	--	289	47.8	--	338	--	--	321	43	168	191	120	56	229	42	155	100	--	88	206	--	--	158	41
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	<2	--	--	<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	<2	--	--	<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	14	--	--	16	--
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	<2	--	<2	<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	<2	--	--	<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	8	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<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	0.029	--	--	0.058	--
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	<1	--	--	<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	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	5.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<1	1	1	<1	1	<2.0	<1	2	<1	<1	1	<1	2
Total Iron (Fe)	µg/L	50	300	--	300		130	--	--	313	62	125	177	162	384	229	137	195	207	132	92	147	124	168	110	157	81	149	62	269	78	70
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	<0.5	--	--	1.3	--
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	47	23	45	46	31
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	<2	--	--	<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	3	--	--	15	--
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	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	30	--	--	38	--
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	<0.1	--	--	<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	<2	--	--	<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	2	--	--	<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	0.1	--	--	<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	<2	--	--	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	11	<5	19	58	<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	866	548	>2420	299	488
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	4	33	99	29	18
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	2.76	0.9	2.08	1.45	1.75
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	3.48	1.15	2.19	2.55	1.87

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
* -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM 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	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
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	10:30	8:30	12:50	10:47	11:15 AM
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	2.1	1.83	1.85	1.95	1.5
Water Temp	Celsius	--	--	--	--		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	10.73	20.29	10.20	15.69	21.2
Dissolved Oxygen	mg/L	--	--	--	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	7.88	4.71	5.65	9.72	6.6
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	7.64	5.87	5.54	6.69	6.0
Specific Conductance	uS/cm	--	--	--	--		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	82	117	104	78	114
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	<5	10	6	5	12
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	17	26	30	20	19
Colour	TCU	5	--	--	--		20	20	20	20	63	95	80	110	120	52	60	94	37	90	71	25	44	168	50	63	61	47	48	93	46	46
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	<0.05	0.06	0.19	0.05	0.08
Nitrate (N)	mg/L	0.05	--	--	13		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	<0.05	<0.05	0.19	<0.05	0.08
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.06	<0.05	0.05	<0.05
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.05	0.06	<0.03	<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	0.4	0.9	0.5	<0.4	0.5
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	6.2	7.0	13.2	8.5	8.2
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	<0.01	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.35	6.87	6.19	6.57	6.87
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	2.9	4.5	5.6	3.6	4.3
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	0.7	1.1	1.5	1	1.2
Total Phosphorus	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	0.009	0.02	0.013	0.012	0.028
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	0.9	0.8	1.1	0.8	0.8
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	11.5	16.1	17.7	13.8	15.4
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	2.0	2.3	4.5	1.3	2.2
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	<5	<5	<5	<5	<5	12
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	4	3	7	3	2
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	0.7	2.0	1.9	0.8	4.4
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	79	135	125	93	110
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	0.56	1.00	1.13	0.73	0.82
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	<5	10	6	5.00	12
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	38	59	68	46.00	51
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	<10	<10	<10	<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	0.76	1.09	1.25	0.91	1.05
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	10.1	15.8	20.2	13.10	15.7
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	14.9	4.5	5.3	11.00	12.3
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	-4.04	-3.04	-3.85	-3.73	-2.98
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	-4.36	-3.36	-4.17	-4.05	-3.3
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	10.4	9.91	10.00	10.30	9.85
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	10.7	10.2	10.4	10.60	10.2
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	180	--	284	187	--	--	185	
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	<2	--	--	<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	<2	--	--	<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	10	--	--	10	--
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	<2	--	<2	<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	<2	--	--	<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	9	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<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	<0.017	--	--	0.041	--
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	1	--	--	<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	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<1	2	<1	<1	4	<2.0	<1	<1	<1	<1	2	<1	1
Total Iron (Fe)	µg/L	50	300	--	300		250	--	--	227	403	238	202	418	358	154	541	813	269	528	523	174	723	305	250	641	478	232	1000	290	168	
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	<0.5	--	--	<0.5	--
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	21	109	39	39	96
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	<2	--	--	<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	<2	--	--	<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	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	12	--	--	15	--
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	<0.1	--	--	<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	<2	--	--	<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	<2	--	--	<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	<0.1	--	--	<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	<2	--	--	<2	--
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	5.4	5.3	6.5	<5.0	<5.0	<5.0	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5	<5	<5	<5	8	<5	8
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		1800	170	--	>250	11	>250	59	>250	--	>2420	1986	>2420	>2420	>2420	>2420	525	>2420	>2420	---	>2420	>2420	>2420	>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	4	15	25	31	16
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	0.30	1.86	0.32	0.99	1.47
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	0.43	2.43	0.36	1.86	1.81

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected

RDL = Reported Detection Limit (represents most recent sampling event)

" -- " = no guideline available / Not Tested.

CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)

CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.

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 and black shaded = Present Result - Parameter concentration exceeds CCME FWAL Guideline.

Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM 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	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
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	11:00	11:30	11:00	9:36	11:00 AM
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	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		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	12.07	21.67	12.50	16.1	22.5
Dissolved Oxygen	mg/L	--	--	--	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	9.81	8.65	9.34	7.72	11.41	9.0	7.4
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	7.4	6.82	5.58	7.0	7.0
Specific Conductance	uS/cm	--	--	--	--		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	213	264	228	204.0	248
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	<5	9	8	<5	8
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	54	56	49	63	56
Colour	TCU	5	--	--	--		22	20	20	28	12	20	31	38	40	57	15	31	19	23	20	16	13	20	34	13	14	29	13	21	24	13
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	0.14	0.13	0.10	0.24	0.3
Nitrate (N)	mg/L	0.05	--	--	13		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	0.14	0.06	0.10	0.13	0.17
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.07	<0.05	0.11	0.13
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.06	<0.03	<0.03	<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	<0.4	<0.4	0.4	<0.4	0.8
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	4.3	2.7	8.0	5.3	4.9
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	<0.01	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.69	7.28	6.93	6.77	7.13
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	6.2	8.3	7.3	6.9	7.2
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	1.0	1.3	1.3	1	1.1
Total Phosphorus	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	0.15	0.004	0.004	0.002	0.008	0.005	0.004	0.006	0.009
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	0.7	1.0	1.0	0.8	0.9
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	32.1	37.2	32.8	44	41.4
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	2.6	1.8	2.5	2.2	1.6
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	<5	<5	<5	<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	10	10	10	10	9
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	1.1	1.1	1.0	1	1.3
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	206	262	185	245	251
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	1.74	1.98	1.76	2.00	1.95
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	<5	9	8	<5	8
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	105	120	107	127.00	122
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	<10	<10	<10	<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	1.55	1.83	2.18	1.94	2.38	2.28
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	19.6	26.1	23.6	21.30	22.5
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	2.6	4.8	4.9	8.60	7.9
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	-3.41	-2.44	-2.89	-3.29	-2.71
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	-3.73	-2.76	-3.21	-3.61	-3.03
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	10.1	9.72	9.82	10.10	9.84
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	10.4	10.0	10.1	10.40	10.2
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	180	--	90	163	--	--	128	85
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	<2	--	--	<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	<2	--	--	<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	15	--	--	17	--
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	<2	--	--	<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	<2	--	<2	<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	8	--	--	7	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		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	0.021	--	--	0.02	--
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	<1	--	--	<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	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		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	2	<1	<1	<1	<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	112	117	99	125	83
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	<0.5	--	--	<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	31	41	20	30	35
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	<2	--	--	<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	2	--	--	<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	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	28	--	--	33	--
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	<0.1	--	--	<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	<2	--	--	<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	<2	--	--	<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	<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	<2	--	--	<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	8	<5	<5	6	6
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	--		120	24	--	190	16	58	72	110	--	291	1553	178	345	2420	1300	86	1730	>2420	---	2420	285	548	1990	2420	687	2420
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	2	38	30	7	13
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	1.63	0.81	2.29	1.96	1.24
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	2.00	0.99	2.37	2.46	1.32

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM 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	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
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	11:30	12:00	11:11	9:25	10:45 AM
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	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		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	12.23	20.64	12.30	16.5	22.4
Dissolved Oxygen	mg/L	--	--	--	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	8.27	5.50	10.110	8.3	6.4
pH (In Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	7.32	6.72	6.140	6.9	6.9
Specific Conductance	uS/cm	--	--	--	--		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	215	260	228	213.0	262
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	<5	9	8	<5	9
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	54	58	49	64	62
Colour	TCU	5	--	--	--		22	18	20	27	11	20	32	38	43	48	11	20	17	21	20	13	11	28	33	10	12	25	12	22	19	11
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	0.15	0.21	0.10	0.27	0.12
Nitrate (N)	mg/L	0.05	--	--	13		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	0.15	0.14	0.10	0.15	0.12
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.070	<0.05	0.120	<0.05
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.06	<0.03	<0.03	<0.03	0.03
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	<0.4	<0.4	0.4	<0.4	0.5
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	4.3	3.3	8.1	5.1	4.3
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	<0.01	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.70	7.03	6.89	6.75	6.99
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	6.5	7.1	7.3	7.7	7.5
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	1.0	1.1	1.3	1.2	1.1
Total Phosphorus	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	0.007	0.004	0.007	0.020	0.008
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	0.7	0.9	1.0	0.8	0.9
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	32.4	41.4	31.1	37.6	41.4
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	2.6	2.0	2.4	2.3	1.7
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	7	<5	10	6	<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	10	10	10	10	9
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	1.2	1.5	1.6	1.3	0.9
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	206	275	185	251	255
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	1.74	2.04	1.76	2.03	2.12
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	<5	9	8	<5	9
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	106	125	105	123.00	128
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	<10	<10	<10	<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	1.86	2.28	1.87	2.17	2.31
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	20.3	22.3	23.6	24.20	23.3
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	3.4	5.5	3.0	3.20	4.1
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	-3.38	-2.76	-2.93	-3.26	-2.78
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	-3.70	-3.08	-3.25	-3.58	-3.1
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	10.1	9.79	9.82	10.00	9.77
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	10.4	10.1	10.1	10.30	10.1
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		150	--	--	125	29.2	--	231	--	--	188	48	149	141	106	159	236	46	93	160	--	84	172	--	--	180.000	89
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	<2	--	--	<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	<2	--	--	<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	16	--	--	20	--
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	<2	--	<2	<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	<2	--	--	<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	7	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<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	0.024	--	--	0.021	--
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	<1	--	--	<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	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	2.4	<2.0	2.3	<2.0	<2.0	<2	<2	4	9	<1	1	<1	<1	2	6.8	1	1	1	<1	<1	<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	122	61	114	136	131
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	<0.5	--	--	<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	34	58	29	74	76
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	<2	--	--	<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	2	--	--	7	--
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	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<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	28	--	--	33	--
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	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	5	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	4.2	--	--	<2	<2	<2	<2	<2	3	2	<2	<2	<2.0	--	<2	<2	--	--	<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	0.1	--	--	<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	<2	--	--	<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	7	<5	<5	13	7
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		28	58	--	100	16	75	83	95	--	345	>2420	921	548	>2420	770	308	1550	>2420	---	>2420	281	488	1730	>2420	792	>2420
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	2	35	29	15	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	1.62	0.16	2.18	2.4	0.33
Chlorophyll A - Welschmeyer 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	2.09	0.21	2.15	3.04	0.39

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM Phosphorus Trigger Range (Applied)	Kearney Lake															
Sample Sites							KLS															
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	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
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	10:00	8:00	13:05	9:00	9:45 AM
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	2.1	5.3	4.2	2.1	4.6
Water Temp	Celsius	--	--	--			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	12.22	22.2	12.7	16.8	21.0
Dissolved Oxygen	mg/L	--	--	--	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	10.47	8.39	9.92	8.7	7.1
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		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	5.75	5.11	5.72	7.0	6.8
Specific Conductance	uS/cm	--	--	--	--		112	230	229	189.0	219.5	202.1	212.9	472.0	251.0	211.0	0.184	249.8	240.8	209	267.0	243.2	219.0	246
INORGANICS																								
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5.4	6	7	<5	7	9	<5	7
Dissolved Chloride (Cl)	mg/L	1	--	--	120		37	55	57	48	58	44	46	61	47	47	59	58	58	54	56	53	65.00	58
Colour	TCU	5	--	--	--		35	43	10	27	10	22	18	14	11	22	35	8	19	27	13	17	18.00	14
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	0.14	0.19	0.15	0.25	0.21
Nitrate (N)	mg/L	0.05	--	--	13		--	0.19	0.15	0.83	0.21	0.21	0.20	0.16	0.10	0.16	0.16	0.12	0.19	0.14	0.09	0.15	0.13	0.07
Nitrite (N)	mg/L	0.05	--	--	0.06		--	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.10	<0.05	0.12	0.14
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		<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	0.06	<0.03	<0.03	<0.03	<0.03	<0.03
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	0.5	<0.4	0.7	0.40	<0.4
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	4.4	3.3	7.0	4.70	4.8
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		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	6.66	7.16	7.03	6.74	7.09
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	6.3	7.3	8.2	7.40	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	1.0	1.1	1.3	1.20	1
Total Phosphorus	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	0.004	0.004	0.003	0.010	0.012
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	0.7	0.9	1.0	0.90	0.8
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	32.5	33.1	33.5	38.90	42.4
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	2.7	2.0	2.3	2.10	1.6
Total Suspended Solids	mg/L	5	--	--	--		1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	<5	<5	<5	<5	<5	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		9	7	8	8	8	7	8	9	8	8	8	9	8	10	10	10	10.00	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	0.7	1.3	1.2	0.90	0.9
Conductivity (uS/cm)	µS/cm	1	--	--	--		160	215	226	189	232	223	204	228	246	225	220	248	244	208	267	196	248.00	249
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	1.74	1.94	1.89	2.06	1.96
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5.4	6	7	<5	7	9	<5	7
Calculated TDS	mg/L	1	--	--	--		84	118	111	96	110	82	98	136	106	103	120	124	106	105	114	113	125.00	122
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<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	1.86	1.93	2.01	2.20	2.3
Hardness (CaCO3)	mg/L	N/A	--	--	--		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	19.8	22.8	25.8	23.40	21.6
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	3.2	0.4	3.0	3.40	8.1
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	-3.43	-2.72	-2.69	-3.29	-2.82
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	-3.75	-3.04	-3.01	-3.61	-3.14
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	10.1	9.88	9.72	10.00	9.91
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	10.4	10.2	10.0	10.30	10.2
Metals (ICP-MS)																								
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		--	222	52	154	136	58	61	224	53	108	180	---	79	163	--	--	156.00	45
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	--	<2	--
Total Arsenic (As)	µg/L	2	5.0	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		--	18	16	15	19	9	16	16	17	17	17	---	19	14	--	--	17.00	--
Total Beryllium (Be)	µg/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	<2	<2	--
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		--	6	9	15	7	7	9	7	6	10	<50	---	<5	7	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		--	0.022	0.027	0.029	0.024	<0.017	0.034	0.036	<0.017	0.024	0.035	---	0.332	0.024	--	--	0.03	--
Total Chromium (Cr)	µg/L	1	---	--	1		--	<1	<1	5	<1	<1	<1	6	<1	<1	<1.0	---	7	<1	--	--	2.00	--
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	---	<1	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2.0	<2	<2	<2	<2	<1	1	<1	<1	5	<2.0	1	<1	<1	<1	<1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		175	160	78	120	111	70	79	111	<50	119	100	123	158	96	55	88	59.00	<50
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	<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	23	15	17	24.00	11
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		--	<2	<2	5	<2	<2	<2	2	<2	<2	<2.0	---	3	3	--	--	14.00	--
Total Selenium (Se)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	---	<1	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	---	<0.1	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		--	27	31	29	31	18	31	31	30	30	29	---	23	28	--	--	32.00	--
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	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		--	3	<2	<2	<2	<2	<2	<2	<2	2	2.3	---	<2	<2	--	--	<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	0.1	--	--	<0.1	--
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--
Total Zinc (Zn)	µg/L	5	30	--	30		9.3	5	<5	64	11	7	5	10	<5	10	14	6	12	10	<5	<5	11.00	8
MICROBIOLOGICAL																								
Total Coliform	MPN/100mL	1	--	--	--		--	461	613	93	461	308	461	42	629	>2470	---	356	163	179	517	2420	260.00	577
E. coli	MPN/100mL	1	--	400	--		100	14	2	6	6	6	4	<1	1	17	<10	1	2	<1	23	44	<1	5
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	1.52	1.2	2.32	1.09	1.43
Chlorophyll A - Welschmeyer 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	1.86	1.57	2.34	1.28	1.40

Notes:

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RDL = Reported Detection Limit (represents most recent sampling event)
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Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM Phosphorus Trigger Range (Applied)	Highway 102																								
Sample Sites							HWY102-1																								
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	2012/08/15	2012/10/11	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	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
Sampling Time	hh:mm	--					07:00	12:45	08:00	13:00	10:20	09:00	13:40	11:00	11:00	14:50	11:00	9:50	14:15	12:22	12:30	12:00	10:10	9:30	13:15	09:20	9:40	14:30	11:00	10:20	12:00	15:00
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	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
Water Temp	Celsius	--	--	--	--		11.8	18.8	15.7	14.9	19.6	7.4	11.4	17.8	14.6	10.7	21.8	13.6	11.7	19.5	8.9	12.1	19.6	10.2	14.29	20.70	5.40	13.42	19.28	9.20	16.40	22.1
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		**11.44**	5.80	**4.34**	8.18	**4.25**	6.05	8.15	**3.88**	**5.34**	5.65	**1.03**	**3.83**	7.55	**3.32**	**3.10**	**12.03**	**2.09**	**4.54**	**4.27**	**3.82**	**5.03**	8.18	**10.14**	7.35	5.77	5.8
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.98	5.35	5.25	6.31	5.26	5.62	5.75	5.77	5.99	8.76	5.73	6.38	6.19	7.10	6.79	6.02	6.63	5.12	6.35	6.24	6.92	7.34	**6.14**	**5.69**	**6.4**	7.8
Specific Conductance	uS/cm	--	--	--	--		194	153	104	135	106	109	114	108	89	288	225	155.5	226	173.2	234.0	880.0	337	109	0.393	335.8	251.2	289	353	208.9	354	257
INORGANICS																															
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		<5	<5	<5	<5	<5	<5	5	11	8	22	25	15	9	23	20	31	28	30	16	21	12	14	27	10	17	21
Dissolved Chloride (Cl)	mg/L	1	--	--	120		24	38	24	32	25	22	24	19	12	58	48	28	53	31	40	65	57	19	**130**	67	49	71	87	35	101	49
Colour	TCU	5	--	--	--		67	68	57	37	89	53	39	65	79	24	65	40	9	65	25	11	31	93	22	27	29	23	37	64	24	31
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.69	<0.05	1.2	0.69	0.25	1.2	2.61	0.06	0.43	0.51	<0.05	<0.05	<0.05	<0.05	0.53	<0.050	<0.05	0.17	0.05	0.13	0.53	0.35	0.71
Nitrate (N)	mg/L	0.05	--	--	13		<0.05	--	--	0.69	<0.05	--	0.69	--	--	2.61	0.06	0.43	0.51	<0.05	<0.05	<0.05	<0.05	0.53	<0.050	<0.05	0.17	0.05	<0.05	0.53	0.18	0.5
Nitrite (N)	mg/L	0.05	--	--	0.06		<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	<0.05	0.13	<0.05	**0.17**	**0.21**
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.29	<0.05	<0.05	<0.05	<0.05	0.05	0.1	0.07	0.31	0.19	0.04	<0.03	0.05	0.06	<0.03	0.04	0.03	<0.050	<0.03	0.04	0.06	0.06	<0.03	<0.03	0.1
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	1.1	1.3	0.6	--	0.6	0.6	0.7	0.6	<0.4	0.34	0.50	0.6	0.7	1.2	0.7	0.5	1.3
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	10	7.7	4.7	11	6.3	4.5	7.2	7.4	5.5	10.0	7.0	5.1	10.1	17.7	4.1	7.7	9.0	2.7	14.6	8.4	4.5	8.0	11.5	7.4	8.6
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	<0.01	<0.01	<0.01	<0.01	0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		**4.54**	**5.24**	**5.40**	**5.48**	**6.24**	**5.31**	**6.42**	6.55	**6.28**	**6.4**	6.9	6.8	6.86	6.87	6.73	6.56	7.49	**5.90**	6.61	7.46	6.80	6.87	7.03	**6.45**	6.8	6.91
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.7	1.8	1.6	4.93	3.34	5.09	4.9	5.21	5.55	12.5	11.7	7.5	11.1	10.5	13.9	7.2	23.3	2.2	18000	18.0	12.4	12.9	25.8	9.9	20.9	10.3
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.3	0.5	0.5	1.08	0.79	1.09	0.91	0.92	1.19	1.7	2.0	1.4	1.4	1.5	2.3	1.6	3.2	0.6	2400	2.7	2.3	1.7	2.7	1.7	3.0	1.7
Total Phosphorus	mg/L	0.002	--	--	--	0.01	**0.07**	**0.14**	**0.020**	0.006	0.007	**0.011**	0.009	**0.012**	**0.010**	**0.019**	**0.039**	**0.02**	0.006	**0.021**	**0.022**	**0.013**	**0.038**	**0.03**	0.007	**0.020**	0.002	0.005	**0.038**	0.009	**0.017**	**0.052**
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	1.2	0.7	1.140	1.630	1.310	1.100	1.500	1.880	1.6	2.5	1.5	1.3	1.7	2.4	1.2	2.5	0.7	2000	2.1	1.5	1.4	1.9	1.7	2.0	2.1
Total Sodium (Na)	mg/L	0.1	--	--	--		15	25	13	15.9	14.5	14.6	14.8	10.2	8.26	36.3	27.7	14.6	30.8	15.0	20.5	39.1	38.7	18.6	64	37.7	28.8	45.4	43.8	24.8	64.1	29.7
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.5	2.2	2.0	1.1	3.8	5.1	2.8	5.2	4.6	4.1	6.1	5.1	3.1	5.1	5.8	1.7	7.1	4.7	2.1	4.9	4.8	1.4	6.3	4.6	1.8	3.8
Total Suspended Solids	mg/L	5	--	--	--		7	80	2	<2	11	<2	<1	1	<1	9	6	<5	<5	<5	<5	6	<5	<5	<1.0	<5	<5	<5	10	<5	<5	11
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		5	3	3	8	<2	8	10	8	10	14	8	9	12	8	12	10	7	6	13	9	14	14	14	18	15.0	13
Turbidity (NTU)	NTU	0.1	--	50	--		14.0	35	0.9	1.4	1.2	0.6	0.4	0.6	1.1	0.9	1.9	0.9	0.5	1.6	0.5	0.7	1.6	0.9	0.59	0.9	0.8	1.0	4.1	1.0	1.3	7.7
Conductivity (uS/cm)	µS/cm	1	--	--	--		100	140	92	130	100	110	110	100	88	263	231	143	243	188	218	252	338	112	470	324	244	289	440	167	411	251
Calculated Parameters																															
Anion Sum	me/L	N/A	--	--	--		0.77	1.12	0.73	1.11	0.71	0.88	1.03	0.95	0.80	2.55	2.02	1.31	1.96	1.50	1.78	2.66	2.31	1.30	4.20	2.50	1.93	2.58	3.29	1.60	3.53	2.12
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		<1	<1	<1	<1	<1	<1	5	11	8	22	25	15	9	23	20	31	28	30	16	21	12	14	27	10	17.00	21
Calculated TDS	mg/L	1	--	--	--		50	73	45	67	50	63	65	58	54	150	117	73	117	83	104	143	150	68	240	151	116	155	193	100	218.00	127
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	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		0.84	1.32	0.74	1.06	0.93	1.02	1.00	0.83	0.80	2.43	6.04	1.19	2.06	1.40	1.87	2.25	3.22	1.04	3.94	2.88	2.11	2.81	3.51	1.79	4.14	2.22
Hardness (CaCO3)	mg/L	N/A	--	--	--		6	6	6	17	12	17	16	17	19	38.2	37.5	24.5	33.5	32.4	44.2	24.6	71.4	8.0	55.0	56.1	40.4	39.2	75.5	31.7	64.50	32.7
Ion Balance (% Difference)	%	N/A	--	--	--		4.35	8.20	0.68	2.30	13.40	7.37	1.48	6.74	0.00	2.6	1.9	4.6	2.4	3.5	2.6	8.4	16.4	11.2	3.19	7.1	4.7	4.4	3.1	5.7	8.00	2.2
Langelier Index (@ 20C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	-3.50	-2.99	-3.36	-2.77	-2.23	-2.72	-2.73	-2.33	-2.41	-2.69	-1.30	-3.85	-2.32	-1.57	-2.62	-2.48	-1.74	-3.14	-2.23	-2.35
Langelier Index (@ 4C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	-3.75	-3.25	-3.61	-3.09	-2.55	-3.04	-3.05	-2.65	-2.73	-3.01	-1.62	-4.17	-2.57	-1.89	-2.94	-2.80	-2.06	-3.46	-2.55	-2.67
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	9.92	9.54	9.64	9.17	9.13	9.52	9.59	9.20	9.14	9.25	8.79	9.75	8.93	9.03	9.42	9.35	8.77	9.59	9.07	9.26
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	NC	NC	NC	NC	NC	10.20	9.80	9.89	9.49	9.45	9.84	9.91	9.52	9.46	9.57	9.11	10.1	9.18	9.35	9.74	9.67	9.09	9.91	9.39	9.58
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		**510**	--	--	**169**	**192**	--	**205**	--	--	**134**	**183**	**146**	86	**145**	**150**	**187**	83	**310**	**51**	--	52	81	--	--	**69**	**450**
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	<2	--	--	<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	<2	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		22	--	--	52.9	36.9	--	37.3	--	--	58	284	42	57	57	80	46	142	17	130	--	86	79	--	--	130	--
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	<2	--	<2	<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	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		<5	--	--	11.4	10.9	--	<50	--	--	12	18	13	10	10	11	9	14	11	<50	--	<5	10	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	**0.043**	<0.017	--	**0.023**	--	--	**0.034**	**0.021**	<0.017	<0.017	<0.017	**0.040**	**0.022**	<0.017	**0.022**	**0.024**	--	<0.017	<0.017	--	--	**0.032**	--
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	**8**	<1	<1	<1.0	--	<1	<1	--	--	1	--
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.50	0.46	--	<0.40	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	3.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	3	<2	<1	2	<1	<1	2	<2.0	<1	1	<1	<1	2	<1	**4**
Total Iron (Fe)	µg/L	50	300	--	300		**720**	--	--	146	**637**	150	107	209	219	102	**1380**	255	111	**938**	**446**	147	**820**	290	140	**1280**	138	144	**766**	228	151	**3960**
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		1.6	--	--	2.37	0.56	--	<0.50	--	--	<0.5	0.7	<0.5	<0.5	<0.5	0.6	2.6	<0.5	0.6	<0.50	--	<0.5	<0.5	--	--	<0.5	--
Total Manganese (Mn)	µg/L	2	820	--	--		40	--	--	55.3	39.0	67.0	28.1	21.0	31.3	34	79	28	23	45	31	56	122	61	28	95	22	19	78	38	22	511
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	<2	--	--	<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	<2	--	--	12	--
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	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<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	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		11	--	--	29.1	19.7	--	24.3	--	--	48	58	36	52	47	62	38	103	13	85	--	39	58	--	--	92	--
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	<0.1	--	--	<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	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		6	--	--	<2.0	<2.0	--	3.5	--	--	<2	3	<2	<2	<2	4	2	<2	<2	<2.0	--	<2	<2	--	--	<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	<0.1	--	--	<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	<2	--	--	<2	--
Total Zinc (Zn)	µg/L	5	30	--	30		21	--	--	16.4	6.9	6.9	<5.0	<5.0	6.9	<5	6	<5	<5	<5	10	10	<5	7	11	<5	<5	<5	<5	6	9	**37**
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		84	>250	--	>250	>250	180	120	180	--	687	>2420	>2420	1550	>2420	1553	120	>2420	>2420	---	>2420	659	>2420	>2420		914	>2420
E. coli	MPN/100mL	1	--	400	--		54	**>250**	--	12	17	5	1	78	<100	3	68	145	4	9	5	3	179	3	20	25	2	<1	86		12	14
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		15.40	19.29	0.70	18.12	1.61	8.45	0.93	0.58	0.69	0.53	2.59	0.81	1.27	14.70	1.99	0.25	1.10	1.22	0.5	7.27	0.36	0.94	51.51	0.33	1.56	5.32
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		17.50	19.60	0.84	17.62	1.68	7.52	0.84	0.56	0.65	0.59	2.89	1.05	1.45	15.80	2.20	0.82	1.11	1.38	0.55	6.79	0.23	1.30	60.68	0.43	2.04	5.48

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL F (Applied)	HRM Phosphorus Trigger Range (Applied)	Highway 102																								
Sample Sites							HWY102-2																								
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	2012/08/15	2012/10/11	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	2016/05/16	2016/08/16	2016/10/25	2107/06/08	2017/08/15
Sampling Time	hh:mm	--					12:30	12:15	12:30	12:40	09:30	12:30	11:20	15:00	15:30	11:20	12:20	10:35	10:40	10:00	10:22	12:15	14:25	10:07	11:00	12:58	14:30	12:50	12:45	10:40	11:45	15:25
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	NCC	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		16.7	19.2	16.4	17.2	17.0	8.7	10.8	24.2	15.1	7.8	23.7	14.3	11.5	22.0	10.7	11.4	--	10.4	12.7	23.7	9.3	13.41	20.43	10.20	13.01	22.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.01	5.90	4.80	4.91	2.45	2.99	6.92	7.03	5.09	3.73	13.1	3.28	6.30	1.57	4.20	10.50	--	9.25	4.24	6.11	5.28	6.77	7.06	6.8	5.68	1.8
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.57	5.71	5.40	6.33	5.86	5.64	6.22	5.89	5.29	7.3	6.37	6.72	6.01	6.92	5.40	5.40	--	5.85	6.45	6.04	5.96	5.86	6.19	5.36	6.04	7.6
Specific Conductance	uS/cm	--	--	--	--		37	457	162	415	167	101.2	92.2	123.1	96	225	226	159.1	288	188.5	204.4	204.4	--	174	0.411	699	197.6	968	838	219.2	400	414
INORGANICS																															
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		<5	<5	7	6	5	<5	<5	5	<5	17	7	<5	6	14	7	30	--	8	7.5	5	<5	13	21	6	<5	22
Dissolved Chloride (Cl)	mg/L	1	--	--	120		21	82	83	170	41	18	21	21	17	63	109	45	71	50	52	113	--	34	260	178	78	236	226	48	136	107
Colour	TCU	5	--	--	--		120	190	91	96	160	68	65	98	77	32	100	70	11	61	36	13	--	85	17	9	8	14	39	86	20	41
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.10	<0.05	0.62	0.26	1.8	3.2	1.54	<0.05	0.14	0.17	<0.05	<0.05	<0.05	--	0.12	<0.050	<0.05	0.15	0.21	0.23	0.11	0.2	0.09
Nitrate (N)	mg/L	0.05	--	--	13		<0.05	--	--	0.10	<0.05	--	0.26	--	--	1.54	<0.05	0.14	0.17	<0.05	<0.05	<0.05	--	0.12	<0.050	<0.05	0.15	<0.05	<0.05	0.11	<0.05	0.09
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.010	<0.05	<0.05	0.21	0.23	<0.05	0.2	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.06	<0.05	<0.05	0.20	<0.05	<0.05	0.30	0.08	0.09	<0.03	<0.03	<0.03	0.17	0.09	<0.03	--	<0.03	0.056	0.19	0.05	0.14	0.37	<0.03	<0.03	0.09
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.6	1.1	0.5	--	0.7	2.0	15.3	--	<0.4	0.33	62.6	2.0	24.3	2.1	0.6	<0.4	0.7
Total Organic Carbon	mg/L	0.5	--	--	--		8.5	13	13	7.2	14	7.4	5.7	9.2	8.4	7.0	15.8	11.2	6.1	10.6	5.1	17.4	--	8.0	3.0	29.0	9.9	79.3	11.1	13.4	5.4	9.2
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		5.43	5.96	6.30	6.05	6.32	5.47	5.93	6.18	5.92	5.9	6.7	6.8	6.61	6.59	6.34	7.20	--	6.40	6.12	6.64	6.18	6.46	6.80	6.15	6.22	6.73
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.6	4.0	4.8	7.44	3.84	4.01	3.07	2.22	3.80	7.0	8.4	5.6	7.6	8.5	8.2	14.1	--	9.5	20000	33.3	9.8	23.9	23.8	8.6	13.3	14.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.4	0.7	0.9	0.96	0.59	1.00	0.68	0.68	1.38	1.2	1.4	1.2	1.2	1.3	2.2	3.1	--	1.8	2500	32.7	2.2	3.2	2.5	1.7	2.5	1.9
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	0.04	0.034	0.010	0.028	0.003	0.009	0.019	0.041	0.021	0.054	0.03	0.014	0.028	0.199	0.028	--	0.20	0.01	1.56	0.012	0.222	0.034	0.012	0.013	0.042
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	0.8	1.1	0.984	0.956	1.390	0.844	1.310	1.880	1.2	1.7	1.6	1.3	1.5	2.5	2.9	--	1.7	1900	12.5	1.1	4.0	2.1	1.4	1.1	1.6
Total Sodium (Na)	mg/L	0.1	--	--	--		15	51	55	83.7	32.0	12.1	13.3	13.1	13.3	41.5	63.6	20.4	39.0	19.1	34.5	69.6	--	24.0	150	124	36.8	149.0	124	26.4	68.8	66
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.2	4.4	4.0	3.0	6.4	5.4	2.5	6.5	6.7	4.1	6.9	5.8	1.6	6.2	6.6	1.6	--	5.9	2.3	7.2	5.6	2.8	9.0	4.5	3.1	5.7
Total Suspended Solids	mg/L	5	--	--	--		<2	58	62	34	27	3	<1	10	14	<5	39	<5	<5	<5	194	34	--	<5	2	3000	15	342	69	<5	6	7
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		<2	3	8	11	<2	7	5	5	8	12	6	10	10	9	10	12	--	8	15	7	8	22	21	8	10	7
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	3.8	4.2	2.6	3.1	0.5	0.4	1.2 (1)	3.9	0.6	10.8	2	1.5	3.3	144	1.1	--	1.1	1.2	1490	9.9	131	54	1.1	2.4	9.9
Conductivity (uS/cm)	µS/cm	1	--	--	--		85	290	310	590	160	94	91	100	110	263	403	179	295	203	223	433	--	194	920	662	315	817	952	177	451	413
Calculated Parameters																															
Anion Sum	me/L	N/A	--	--	--		0.60	2.37	2.62	5.13	1.27	0.70	0.73	0.91	0.86	2.48	3.34	1.49	2.34	1.88	1.81	4.04	--	1.29	7.88	5.27	2.38	7.39	7.25	1.65	4.06	3.61
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		<1	<1	7	6	5	<1	<1	5	<1	17	7	<5	6	14	7	30	--	8	7.5	5	<5	13	21	6	<5	22
Calculated TDS	mg/L	1	--	--	--		42	150	165	282	93	52	48	62	67	143	200	86	135	100	145	235	--	85	460	712	138	473	422	99	233	215
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	<1.0	<10	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		0.81	2.65	2.89	4.17	1.81	0.86	0.82	0.83	0.97	2.32	2.10	1.40	2.24	1.50	3.50	4.17	--	1.76	7.87	29.1	2.35	9.27	7.23	1.80	3.92	3.93
Hardness (CaCO3)	mg/L	N/A	--	--	--		6	13	16	23	12	14	11	8	15	22.4	26.7	18.9	23.9	26.6	29.5	48.0	--	31.1	59.0	218	33.5	72.9	69.7	28.5	43.5	44.5
Ion Balance (% Difference)	%	N/A	--	--	--		14.90	5.58	4.90	10.30	17.50	10.30	5.81	4.60	6.01	3.3	3.6	3.1	2.3	11.3	31.7	1.6	--	15.1	0.0600	69.4	0.5	11.3	0.1	4.3	1.8	4.2
Langelier Index (@ 20C)	N/A	N/A	--	--	--		NC	NC	-3.57	-3.72	-3.70	NC	NC	-4.07	NC	-3.63	-3.15	-3.34	-3.33	-2.92	-3.50	-1.80	--	-3.30	-3.18	-2.81	-3.73	-2.70	-2.15	-3.72	-3.58	-2.38
Langelier Index (@ 4C)	N/A	N/A	--	--	--		NC	NC	-3.82	-3.97	-3.95	NC	NC	-4.32	NC	-3.95	-3.47	-3.66	-3.65	-3.24	-3.82	-2.12	--	-3.62	-3.42	-3.13	-4.05	-3.02	-2.47	-4.04	-3.9	-2.7
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	NC	9.87	9.77	10.00	NC	NC	10.30	NC	9.53	9.85	10.10	9.94	9.51	9.84	9.00	--	9.70	9.29	9.45	9.91	9.16	8.95	9.87	9.8	9.11
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	NC	10.10	10.00	10.30	NC	NC	10.50	NC	9.85	10.2	10.5	10.3	9.83	10.2	9.32	--	10.0	9.54	9.77	10.2	9.5	9.27	10.20	10.1	9.43
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		270	--	--	189	368	--	260	--	--	145	466	259	130	138	2760	400	--	216	100	--	129	3880	--	--	99	148
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	--	<2	--
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	2.1	--	<1.0	--	--	<2	<2	<2	<2	<2	6	<2	--	<2	<1.0	--	<2	3	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		20	--	--	53.1	27.7	--	26.6	--	--	49	74	33	44	43	213	381	--	63	140	--	147	762	--	--	151	--
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	<2	<2	--
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		<5	--	--	7.9	7.8	--	<50	--	--	10	17	15	9	10	13	11	--	12	<50	--	<5	9	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.051	<0.017	--	<0.017	--	--	0.037	0.031	0.032	0.019	<0.017	0.096	0.051	--	0.019	0.100	--	<0.017	0.778	--	--	0.019	--
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	1.0	--	<1.0	--	--	<1	<1	<1	<1	1	9	2	--	<1	<1.0	--	<1	8	--	--	<1	--
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.66	0.77	--	<0.40	--	--	<1	1	1	<1	1	3	1	--	<1	1.8	--	3	4	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	2.0	<2.0	<2.0	<2.0	2.5	2.8	<2	3	3	<2	1	12	4	--	2	<2.0	404	2	13	<1	2	<1	1
Total Iron (Fe)	µg/L	50	300	--	300		880	--	--	1380	3850	303	229	897	1110	214	5210	1550	383	1720	28400	1660	--	485	960	217000	714	21300	7380	375	369	2650
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		1.9	--	--	1.61	2.70	--	0.59	--	--	<0.5	5.2	2.1	0.6	0.7	19.4	3.5	--	1.0	<0.50	--	0.6	39.7	--	--	<0.5	--
Total Manganese (Mn)	µg/L	2	820	--	--		110	--	--	387	135	52.9	40.5	106	176	78	219	207	83	173	327	212	--	93	470	2800	303	586	359	71	125	160
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2	--
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	4	2	--	<2	<2.0	--	<2	8	--	--	6	--
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	--	<1	<1.0	--	<1	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		11	--	--	37.4	21.1	--	16.9	--	--	33	45	31	39	40	45	75	--	43	96	--	38	96	--	--	72	--
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	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		4	--	--	<2.0	6.4	--	4.9	--	--	<2	10	4	4	<2	60	9	--	6	<2.0	--	<2	41	--	--	<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	<0.10	--	<0.1	0.2	--	--	<0.1	--
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	2	<2	<2	<2	11	<2	--	<2	<2.0	--	<2	18	--	--	2	--
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	13.6	12.3	9.3	5.5	9	12.5	<5	7	12	12	<5	46	36	--	17	27	1210	10	170	22	11	14	9
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		28	>250	--	>250	75	41	110	>250	--	1553	>2420	>2420	2420	1990	>2420	687	--	>2420	---	>2420	328	>2420	>2420	>2420	>2420	>2420
E. coli	MPN/100mL	1	--	400	--		4	230	--	9	5	<1	7	>250	<100	<1	16	50	111	9	4	<1	--	<1	<10	201	2	1	20	11	<1	8
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.90	82.63	48.17	0.85	16.36	0.25	0.97	4.91	1.9	2.07	21.03	0.33	2.41	1.10	21.62	10.34	--	0.46	0.53	119.14	6.24	539.78	54.98	0.43	1.4	2.11
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.91	81.20	52.50	0.85	17.35	0.23	0.87	4.49	2.15	2.27	17.26	0.50	3.02	1.30	27.02	11.09	--	0.55	0.58	129.77	2.23	793.90	73.67	0.56	1.74	3.20

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM Phosphorus Trigger Range (Applied)	Lake Shore Drive																								
Sample Sites																								LSD							
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	2011/10/17	2012/05/01	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
Sampling Time	hh:mm	--					12:00	09:30	11:45	09:00	11:28	10:00	08:45	13:20	9:00	9:15	13:00	9:10	08:40	15:30	11:55	9:30	12:45	13:30	09:50	16:02	13:40	15:00	12:10	12:25	10:20	11:55 AM
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	NCC	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		13.1	16.7	15.3	13.4	21.3	7.3	10.2	21.0	12.0	5.7	25.7	13.4	7.7	20.2	8.8	8.9	--	10.48	12.52	24.3	5.8	13.17	24.01	9.40	15.6	23
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.84	5.70	5.50	8.60	5.41	8.47	9.44	7.87	8.16	4.06	2.69	7.58	8.77	7.26	7.60	14.78	--	7.22	6.26	7.25	7.21	8.22	1.86	8.67	11.35	7.0
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.88	6.74	6.34	6.42	6.64	6.17	7.09	6.88	6.63	8.22	7.16	6.92	5.19	7.28	6.23	7.02	--	6.31	6.88	6.34	6.48	6.63	6.16	6.25	6.78	6.6
Specific Conductance	uS/cm	--	--	--	--		723	210	168	218	203	110	146	126	112	62	177.5	116.7	123.6	132.5	147.8	180.0	--	111	0.119	155.3	132.3	162	254	162.2	150	188
INORGANICS																															
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		13	16	12	13	21	9	9	15	12	21	14	11	8	20	11	35	--	10	11	7	9	11	22	8	12	26
Dissolved Chloride (Cl)	mg/L	1	--	--	120		41	34	31	49	45	25	38	27	22	22	33	23	39	32	23	29	--	23	32	27	26	39	45	31	43	38
Colour	TCU	5	--	--	--		32	27	37	20	26	33	32	41	49	13	20	40	10	21	25	9	--	31	20	11	26	25	26	24	25	31
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.14	0.14	0.06	0.23	0.10	0.12	0.25	0.17	0.09	0.13	0.80	<0.05	0.18	0.20	<0.05	0.09	--	0.11	0.15	0.25	0.30	0.08	0.08	<0.05	0.19	0.48
Nitrate (N)	mg/L	0.05	--	--	13		0.14	--	--	0.23	0.10	--	0.25	--	--	0.13	0.80	<0.05	0.18	0.20	<0.05	0.09	--	0.11	0.15	0.16	0.30	0.08	0.08	<0.05	0.10	0.39
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.010	0.09	<0.05	<0.05	<0.05	<0.05	0.09	0.09
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.06	0.03	<0.03	<0.03	<0.03	0.03	0.03	0.04	--	<0.03	<0.050	0.11	<0.03	0.06	0.10	<0.03	<0.03	0.08
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.5	3.5	0.5	--	0.7	3.0	1.0	--	<0.4	0.29	77.4	2.8	2.2	11.8	0.5	1	34.5
Total Organic Carbon	mg/L	0.5	--	--	--		5.0	3.8	6.8	3.7	6.0	5.3	4.7	7.1	7.5	3.1	8.0	7.7	4.7	6.3	6.9	5.2	--	8.1	3.2	14.1	9.9	5.5	14.0	8.9	7.7	8.1
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.69	6.69	6.93	7.10	7.30	6.67	6.72	6.79	6.49	6.2	6.9	6.9	6.94	6.95	6.49	6.47	--	6.72	7.02	6.59	6.68	6.65	7.01	6.38	6.92	7.08
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.9	5.4	7.99	10.5	5.29	5.9	5.14	5.04	2.6	18.1	5.1	6.4	6.0	5.6	5.4	--	5.1	6100	52.2	5.4	6.6	9.9	4.8	7.1	8
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.4	1.6	1.3	1.99	2.14	1.15	1.25	1.19	1.23	0.7	3.3	1.4	1.2	1.4	1.6	1.5	--	1.1	1300	23.0	1.5	1.4	1.8	1.3	1.6	1.7
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	0.03	0.009	0.018	0.100	0.009	0.018	0.028	0.014	0.022	0.063	0.003	0.007	0.015	0.078	0.100	--	0.03	0.011	0.501	0.095	1.25	0.02	0.012	0.10	0.059
Total Potassium (K)	mg/L	0.1	--	--	--		1.2	1.1	1.3	1.180	1.210	1.030	1.070	0.960	1.240	0.6	1.9	1.3	1.2	1.1	1.4	1.1	--	1.1	1100	9.7	1.0	1.2	1.3	1.1	1.3	1.4
Total Sodium (Na)	mg/L	0.1	--	--	--		24	21	18	24.8	26.9	15.2	23.2	14.3	13.8	11.3	18.6	15.2	21.9	26.6	14.6	23.4	--	18.1	19	24.4	13.4	25.1	23.4	19.7	25.2	26
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		3.1	4.2	4.0	3.2	3.4	4.3	2.6	3.9	3.8	3.1	2.9	4.9	2.6	3.9	5.0	2.9	--	4.2	2.4	4.2	4.4	1.6	3.3	3.5	1.1	2.7
Total Suspended Solids	mg/L	5	--	--	--		16	98	5	6	110	7	4	77	5	<5	16	19	<5	17	9	51	--	8	4.6	719	69	93	9020	15	138	41
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		6	4	5	7	3	4	6	4	4	5	5	5	6	7	5	5	--	4	4.8	<2	3	5	6	7	4	3
Turbidity (NTU)	NTU	0.1	--	50	--		0.6	12	2.5	12	6.2	1	0.6	2.5	1.7	6.7	283	2.1	1.1	31.6	82.6	6.6	--	1.4	1.2	4430	5.4	65	206	7.9	53.80	21.3
Conductivity (uS/cm)	µS/cm	1	--	--	--		170	150	140	200	200	110	150	130	110	96	161	110	168	136	105	122	--	125	140	129	136	160	236	133	178	192
Calculated Parameters																															
Anion Sum	me/L	N/A	--	--	--		1.56	0.82	1.22	1.80	1.77	0.97	1.39	1.14	0.96	1.15	1.37	0.97	1.40	1.46	0.97	1.63	--	0.94	1.22	0.92	1.00	1.43	1.84	1.18	1.55	1.69
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		13	8	12	13	21	9	9	15	12	21	14	11	8	20	11	35	--	10	11	7	9	11	22	8	12	26
Calculated TDS	mg/L	1	--	--	--		92	55	74	104	107	62	84	66	60	56	163	58	82	87	66	88	--	59	74	498	65	91	107	70	92	97
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	<1.0	<10	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.53	0.99	1.20	1.69	1.94	1.05	1.44	1.02	1.00	0.76	3.59	1.10	1.43	1.62	1.62	1.52	--	1.19	1.28	31.0	1.42	1.94	2.04	1.27	1.75	1.74
Hardness (CaCO3)	mg/L	N/A	--	--	--		22	15	19	28	35	18	20	18	18	9.4	58.8	18.5	20.9	20.7	20.6	19.7	--	17.3	21.0	225	19.7	22.2	32.1	17.3	24.3	27
Ion Balance (% Difference)	%	N/A	--	--	--		0.97	9.39	0.83	3.15	4.58	3.96	1.77	5.56	2.04	20.7	63.0	6.1	1.0	5.2	25.0	3.4	--	11.8	2.4	94.2	17.5	15.2	5.3	3.8	6.1	1.4
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-2.74	-3.20	-2.60	-2.22	-1.71	-2.99	-2.88	-2.64	-3.05	-3.62	-2.30	-2.91	-2.93	-2.55	-3.29	-2.84	--	-3.14	-2.50	-2.50	-3.20	-2.97	-2.24	-3.61	-2.73	-2.19
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-2.99	-3.45	-2.85	-2.47	-1.96	-3.24	-3.13	-2.89	-3.31	-3.94	-2.62	-3.23	-3.25	-2.87	-3.61	-3.16	--	-3.46	-2.75	-2.82	-3.52	-3.29	-2.56	-3.93	-3.05	-2.51
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.43	9.78	9.53	9.32	9.01	9.66	9.60	9.43	9.54	9.82	9.20	9.81	9.87	9.50	9.78	9.31	--	9.86	9.51	9.09	9.88	9.72	9.25	9.99	9.65	9.27
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.68	10.00	9.78	9.57	9.26	9.91	9.85	9.68	9.80	10.10	9.52	10.10	10.20	9.82	10.1	9.63	--	10.2	9.77	9.41	10.2	10.0	9.57	10.30	9.97	9.59
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		99	--	--	349	189	--	217	--	--	490	19200	186	131	93	3420	487	--	141	120	--	1960	2150	--	--	731.00	48
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	--	<2	--
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	8	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		14	--	--	15.3	19.2	--	13.9	--	--	11	86	12	12	7	24	15	--	11	12	--	27	34	--	--	32	--
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	2	<2	<2	<2	<2	<2	--	<2	<1.0	--	<2	<2	--	<2	<2	--
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		13	--	--	41.4	21.6	--	<50	--	--	6	24	16	10	15	15	14	--	16	<50	--	<5	12	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.018	<0.017	--	<0.017	--	--	0.029	1.050	0.023	<0.017	<0.017	0.073	0.032	--	<0.017	0.011	--	<0.017	0.120	--	--	0.03	--
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	11	<1	<1	<1	2	<1	--	<1	<1.0	--	3	2	--	--	<1	--
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	<0.40	0.88	--	<0.40	--	--	<1	34	<1	<1	<1	1	<1	--	<1	<0.40	--	4	4	--	--	1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	22	2	<2	1	12	2	<1	3	<2.0	183	6	3	<1	<1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		180	--	--	554	965	120	211	388	384	161	38900	312	236	254	4200	593	--	363	230	176000	4570	2790	2190	303	1080.00	375
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	3.02	0.54	--	<0.50	--	--	0.6	82.4	<0.5	<0.5	<0.5	5.2	0.5	--	<0.5	<0.50	--	5.9	4.3	--	--	0.6	--
Total Manganese (Mn)	µg/L	2	820	--	--		51	--	--	113	632	22.8	30.2	53.4	38.5	26	13200	67	71	81	124	140	--	60	130	13800	985	921	2420	75	436	212
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2	--
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	13	<2	<2	<2	2	<2	--	<2	<2.0	--	5	2	--	--	<2	--
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	2	<1	<1	<1	<1	<1	--	<1	<1.0	--	<1	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		30	--	--	36.3	42.1	--	24.4	--	--	12	82	22	24	24	25	26	--	19	25	--	16	29	--	--	28	--
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2.0	--	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	7.2	4.1	--	5.3	--	--	3	405	4	<2	2	36	6	--	3	3.3	--	41	30	--	--	14	--
Total Uranium (U)	µg/L	0.1	300	--	15		<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	1.6	<0.1	<0.1	<0.1	0.1	<0.1	--	<0.1	<0.10	--	0.2	0.2	--	--	<0.1	--
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	30	<2	<2	<2	2	<2	--	<2	<2.0	--	6	4	--	--	<2	--
Total Zinc (Zn)	µg/L	5	30	--	30		7	--	--	7.2	6.7	<5.0	<5.0	<5.0	5	<5	110	7	6	<5	15	<5	--	<5	<5.0	799	11	17	14	<5	8	<5
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		53	>250	--	>250	>250	280	85	>250	--	1414	>2420	>2420	1990	>2420	>2420	1203	--	8	---	>2420	>2420	>2420	>2420	>2420	534	>2420
E. coli	MPN/100mL	1	--	400	--		22	24	--	4	45	6	10	>250	<100	2	26	10	10	20	2	<1	--	>2420	<10	16	17	9	30	16	1	479
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.46	10.70	4.68	1.21	6.64	0.21	1.19	1.93	1.41	1.88	6.62	0.13	<0.50	1.6	2.02	1.91	--	0.32	1.02	90.33	5.12	8.22	127.14	0.38	18.67	20.15
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		1.85	11.10	5.62	1.32	7.71	0.19	1.07	1.73	1.18	2.28	7.58	0.22	<0.50	2	2.98	1.91	--	0.33	1.07	121.83	4.62	13.77	185.98	0.48	25.84	24.37

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F Guidelines for Aluminum, Lead, Copper and Nickel vary based on reported pH and water hardness (CCME PAL-F calculation equations). The largest guideline value for each respective element range was always used.
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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM Phosphorus Trigger Range (Applied)	Larry Uteck Blvd																
Sample Sites							LU																
Sampling Date	yyyy-mm-dd	--					2011/10/17	2012/05/01	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
Sampling Time	hh:mm	--					10:30	15:20	11:30	10:10	14:30	14:30	13:00	11:45	10:45	9:54	13:45	10:23	10:05	12:20	11:20	11:45	11:25	10:15 AM
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	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	--	--	--	--		11.3	12.8	27.3	14.6	13.9	18.3	10.9	15.0	22.8	10.2	16.06	23.40	8.20	13.32	21.91	11.60	18.22	22.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		4.24	6.17	8.2	9.04	10.15	8.29	4.50	11.96	8.08	7.55	7.28	9.49	8.50	8.75	16.62	9.68	9.56	8.3
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.07	7.82	6.65	6.78	6.39	7.49	5.45	6.50	7.23	6.17	6.57	6.80	6.99	7.17	6.24	6.23	6.8	7.1
Specific Conductance	uS/cm	--	--	--	--		203	955	480	262	670	320	845.0	999.0	611.0	371.0	0.646	569	436.2	588.0	574	483.4	755	660
INORGANICS																								
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		12	14	14	14	6	22	7	30	21	<5	13	16	13	13	27	14	13	27
Dissolved Chloride (Cl)	mg/L	1	--	--	120		34	224	116	52	190	99	258	243	104	70	210	132	93	154	164	92	247	154
Colour	TCU	5	--	--	--		94	18	14	18	7	7	19	6	8	18	8.4	8	6	17	13	26	12	12
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.61	1.00	0.64	1.89	1.11	2.57	0.34	1.22	0.47	1.97	0.53	0.59	1.63	1.01	0.47	2.61	1.35	0.87
Nitrate (N)	mg/L	0.05	--	--	13		--	1.00	0.64	1.89	1.11	2.57	0.34	1.22	0.47	1.97	0.53	0.59	1.63	1.01	0.41	2.61	1.01	0.51
Nitrite (N)	mg/L	0.05	--	--	0.06		--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.06	<0.05	0.34	0.36
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		0.06	0.04	0.16	<0.03	<0.03	0.04	0.04	0.05	<0.03	<0.03	<0.050	0.05	<0.03	0.05	0.05	<0.03	<0.03	0.09
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	0.4	4.2	0.7	--	0.5	<0.4	1.2	1.7	<0.4	0.3	8.0	0.7	1.2	1.1	0.6	0.7	3.8
Total Organic Carbon	mg/L	0.5	--	--	--		11.0	3.7	22.8	4.8	3.1	4.5	2.9	6.9	4.7	4.7	2.2	7.6	6.5	3.9	5.3	7.6	6.1	6.8
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.43	6.7	7.2	7.2	6.92	7.11	6.49	6.42	7.42	6.41	6.95	7.30	7.15	6.94	7.42	6.96	7.26	7.4
Total Calcium (Ca)	mg/L	0.1	--	--	--		7.63	30.7	22.1	14.5	22.0	17.6	21.8	23.9	27.6	12.6	27000	20.3	15.9	20.6	17.2	17.9	25.7	23.8
Total Magnesium (Mg)	mg/L	0.1	--	--	--		2.34	4.2	3.6	2.2	2.8	2.7	4.0	4.2	3.8	2.2	3800	3.4	1.9	2.9	3.4	2.6	3.8	3
Total Phosphorus	mg/L	0.002	--	--	--	0.01	0.034	0.043	0.036	0.030	0.006	0.027	0.046	0.260	0.028	0.04	0.007	0.009	0.011	0.029	0.011	0.012	0.024	0.027
Total Potassium (K)	mg/L	0.1	--	--	--		2.110	3.2	3.6	2.5	2.6	2.8	2.9	3.1	3.7	3.0	3300	2.8	1.6	2.8	2.6	2.7	3.2	3
Total Sodium (Na)	mg/L	0.1	--	--	--		22.7	124	62.2	32.3	95.1	51.7	170	147	88.1	62.7	110	102	57.8	96.4	81.1	65.6	137	113
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		6.9	4.9	0.7	6.3	5.1	8.6	7.0	2.1	2.5	6.9	3.6	4.9	6.9	4.2	1.3	6.7	4.6	3.6
Total Suspended Solids	mg/L	5	--	--	--		13	5	165	<5	<5	<5	<5	626	<5	<5	<1.0	<5	6	29	<5	<5	22	16
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		21	26	25	23	26	29	33	29	20	27	27	31	30	28	23	41	32	18
Turbidity (NTU)	NTU	0.1	--	50	--		3.3	4.1	23.0	2.3	1.8	1.6	0.7	42.7	10.1	1.6	0.3	2.8	2.4	15.8	3.0	3.3	7.3	6.6
Conductivity (uS/cm)	µS/cm	1	--	--	--		190	813	482	255	732	433	840	819	605	394	790	575	462	582	739	371	849	673
Calculated Parameters																								
Anion Sum	me/L	N/A	--	--	--		1.69	7.21	4.12	2.36	6.10	4.02	8.13	8.15	3.80	2.68	6.77	4.73	3.62	5.26	5.68	3.91	7.99	5.32
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		12	14	14	14	6	22	7	30	21	<5	13	16	13	13	27	14	13	27
Calculated TDS	mg/L	1	--	--	--		109	426	246	144	347	229	496	477	262	187	400	305	216	321	310	242	463	341
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.70	7.40	4.30	2.43	5.55	3.51	8.90	8.24	5.64	3.64	6.69	5.86	3.52	5.78	4.76	4.06	7.65	6.74
Hardness (CaCO3)	mg/L	N/A	--	--	--		29	94.0	70.0	45.3	66.5	55.1	70.9	77.0	84.6	40.5	84	64.7	47.5	63.4	56.9	55.4	79.8	71.8
Ion Balance (% Difference)	%	N/A	--	--	--		0.29	1.3	2.2	1.4	4.7	6.8	4.5	0.6	19.4	15.2	0.59	10.6	1.4	4.7	8.8	1.8	2.2	11.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-2.95	-2.32	-1.94	-2.10	-2.60	-1.93	-2.98	-2.38	-1.45	-3.41	-1.95	-1.82	-2.16	-2.27	-1.55	-2.27	-1.87	-1.43
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.20	-2.64	-2.26	-2.42	-2.92	-2.25	-3.30	-2.70	-1.77	-3.73	-2.20	-2.14	-2.48	-2.59	-1.87	-2.59	-2.19	-1.75
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.38	9.02	9.14	9.30	9.52	9.04	9.47	8.80	8.87	9.82	8.90	9.12	9.31	9.21	8.97	9.23	9.13	8.83
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.63	9.34	9.46	9.62	9.84	9.36	9.79	9.12	9.19	10.1	9.15	9.44	9.63	9.53	9.29	9.55	9.45	9.15
Metals (ICP-MS)																								
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		--	218	227	252	107	447	31	1400	46	109	59	--	66	1420	--	--	61	978
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--
Total Arsenic (As)	µg/L	2	5.0	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		--	225	201	116	133	134	119	185	157	80	150	--	111	127	--	--	132	--
Total Beryllium (Be)	µg/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2	--
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		--	11	17	22	10	22	18	22	20	21	<50	--	9	14	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		--	0.538	0.171	0.168	0.300	0.236	0.148	0.171	0.031	0.079	0.150	--	0.176	0.426	--	--	0.069	--
Total Chromium (Cr)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	1	<1	<1	<1	<1	<1.0	--	<1	3	--	--	<1	--
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	2	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		2.9	<2	3	16	2	6	2	2	<1	4	2.1	3	3	10	<1	3	<1	14
Total Iron (Fe)	µg/L	50	300	--	300		2150	347	1320	500	194	890	157	2000	207	229	170	671	171	1940	374	223	<50	3540
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		--	0.8	0.7	1.0	<0.5	1.4	<0.5	1.8	<0.5	<0.5	<0.50	--	<0.5	3.4	--	--	<0.5	--
Total Manganese (Mn)	µg/L	2	820	--	--		129	182	485	120	87	89	26	71	182	36	110	371	61	444	148	35	77	1870
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		--	<2	<2	<2	<2	<2	<2	3	<2	<2	<2.0	--	<2	3	--	--	<2	--
Total Selenium (Se)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		--	112	94	60	93	90	96	116	111	54	120	--	43	89	--	--	104	--
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	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		--	4	3	7	3	11	2	22	<2	3	<2.0	--	<2	31	--	--	<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	<0.10	--	<0.1	0.2	--	--	<0.1	--
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	4	--	--	3	--
Total Zinc (Zn)	µg/L	5	30	--	30		9	79	92	39	57	49	26	17	8	23	27	17	16	64	7	52	21	120
MICROBIOLOGICAL																								
Total Coliform	MPN/100mL	1	--	--	--		--	>2420	>2420	2420	866	>2420	866	>2420	961	>2420	---	>2420	>2420	>2420	>2420	>2420	488	>2420
E. coli	MPN/100mL	1	--	400	--		<100	<1	2	19	3	86	<1	<1	7	1730	<10	19	6	<1	40	50	6	51
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.99	2.44	32.52	1.80	1.54	2.30	0.12	99.13	2.54	0.96	0.69	3.14	4.94	5.43	4.57	1.55	25.83	21.03
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		2.08	2.71	31.31	2.15	1.77	2.50	0.11	98.00	2.51	0.96	0.68	3.10	2.71	6.73	5.23	1.61	31.14	24.37

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F 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 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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL F (Applied)	HRM Phosphorus Trigger Range (Applied)	Paper Mill Lake																							
Sample Sites							PML1																							
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	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
Sampling Time	hh:mm	--					13:45	13:00	13:00	13:35	15:15	13:00	13:00	16:50	17:00	12:50	--	10:55	10:51	11:35	10:45	10:30	14:45	12:35	12:45	08:45	8:20	13:15	9:30	9:15	13:40	13:45
FIELD DATA																															
Secchi Depth	Meters	--	--	1.2	--		3.2	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	NCC	N/A	2.91	2.65	4.15	3.79	4.1	4.7
Water Temp	Celsius	--	--	--	--		15.7	17.1	16.2	13.2	22.7	9.1	10.3	22.1	13.6	8.3	--	14.9	11.6	22.5	12.3	12.1	23.6	12.4	15.13	24.0	9.3	12.8	21.58	12.10	17.15	23.00
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.56	8.10	6.90	8.76	7.83	10.43	10.39	8.17	9.54	8.41	--	8.60	9.98	7.65	9.90	12.08	7.49	8.06	7.16	8.04	8.63	8.84	6.53	12.96	6.97	7.76
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.39	6.57	6.64	7.06	7.35	5.89	6.28	6.20	6.11	7.58	--	6.63	6.39	7.20	6.32	6.60	7.42	6.60	6.90	6.34	7.98	7.57	5.94	4.63	6.91	6.74
Specific Conductance	uS/cm	--	--	--	--		561	279	223	265	234	125	177	174	106	366	--	186.4	215.1	199.0	250.5	431.0	263.0	210.0	0.197	432.1	289.1	231.0	289	234.3	234	273
INORGANICS																															
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		6	7	7	7	9	5	6	7	7	20	--	<5	<5	6	7	31	7	7	5.2	6	6	<5	8	7	<5	13
Dissolved Chloride (Cl)	mg/L	1	--	--	120		39	64	58	67	61	24	44	43	18	55	--	45	57	57	48	63	50	46	65	57	56	59	67	50	66	63
Colour	TCU	5	--	--	--		54	15	21	19	12	57	32	38	65	38	--	29	8	15	11	17	10	30	31	7	15	18	16	20	20	18
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.49	0.10	0.17	0.42	0.27	0.66	0.55	0.15	0.62	0.22	--	0.14	0.21	0.18	0.18	0.22	0.24	0.18	0.18	0.14	0.24	0.19	0.09	0.16	0.28	0.28
Nitrate (N)	mg/L	0.05	--	--	13		0.49	--	--	0.42	0.27	--	0.55	--	--	0.22	--	0.14	0.21	0.18	0.18	0.22	0.24	0.18	0.18	0.14	0.24	0.19	<0.05	0.16	0.17	0.13
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.09	<0.05	0.11	0.15
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.06	--	<0.03	<0.03	0.04	<0.03	0.04	<0.03	<0.03	<0.050	<0.03	0.03	0.06	<0.03	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	--	0.4	--	0.4	0.8	0.4	0.4	<5	0.49	1.20	6.0	2.6	3.4	0.4	0.5	0.8
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	3.6	4.7	0.7	3.3	6.7	4.6	5	8.3	5.7	--	5.3	4.2	4.1	5.1	4.0	2.0	4.4	2.7	5.4	5.8	7.1	6.1	8.7	5.7	4.7
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.36	6.75	6.79	6.63	7.04	6.58	6.54	6.83	6.67	6.6	--	6.8	6.71	6.92	6.88	6.66	7.00	6.64	6.67	6.95	6.84	6.36	6.86	6.87	6.8	7.15
Total Calcium (Ca)	mg/L	0.1	--	--	--		4.5	6.9	6.4	8.37	9.02	5.90	6.02	4.99	4.64	6.0	--	6.0	6.8	6.6	6.9	6.9	9.1	7.0	6900	7.8	4.8	7.9	10.5	7.6	8	8.2
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.6	1.1	1.0	1.25	1.22	0.82	0.98	0.89	0.85	1.0	--	1.1	1.0	0.9	1.5	1.3	1.4	1.0	970	1.4	0.9	1.5	1.8	1.3	1.3	1.2
Total Phosphorus	mg/L	0.002	--	--	--	0.01	<0.02	<0.02	0.002	0.018	0.002	<0.002	0.014	0.011	0.030	0.019	--	0.03	0.006	0.007	0.047	0.012	0.030	0.02	0.005	0.060	0.018	0.173	0.104	0.013	0.04	0.036
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	0.9	0.9	1.160	1.060	1.340	1.230	0.771	1.430	0.8	--	1.0	0.8	1.0	1.5	0.9	1.3	0.9	800	1.0	0.6	1.0	1.3	1.1	1	1.1
Total Sodium (Na)	mg/L	0.1	--	--	--		25	38	34	35.2	40.2	18.4	26.8	22.8	13.7	33.6	--	29.8	35.3	28.5	32.2	38.1	41.6	33.7	35	38.6	25.6	37.6	35.1	32.1	40.9	45.3
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		4.5	2.6	2.8	3.8	3.4	5.9	3.7	2.6	5.4	2.9	--	3.2	2.8	2.6	2.6	2.5	2.3	2.7	2.4	2.4	2.5	2.5	0.8	2.7	1.9	1.3
Total Suspended Solids	mg/L	5	--	--	--		<2	3	9	7	<2	<1	1	<2	5	9	--	6	<5	<5	23	6	<5	<5	1	149	6	531	10	18	20	5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		13	11	11	13	12	12	12	10	12	7	--	10	8	10	10	10	8	8	7.8	9	8	11	11	11	10	9
Turbidity (NTU)	NTU	0.1	--	50	--		0.4	0.5	0.6	8.2	0.9	0.5	0.6	1	1.2	0.7	--	1	0.7	1.1	19.2	1.4	0.9	1.5	0.45	3.8	24.2	199.0	112.0	2.6	3.3	3.2
Conductivity (uS/cm)	µS/cm	1	--	--	--		170	250	230	260	250	130	180	170	100	214	--	179	227	218	209	230	261	224	240	246	241	224	310	189	256	277
Calculated Parameters																															
Anion Sum	me/L	N/A	--	--	--		1.51	2.18	1.99	2.34	2.15	1.09	1.62	1.56	0.92	2.11	--	1.49	1.79	1.95	1.71	2.62	1.73	1.62	2.11	1.93	1.88	1.91	2.29	1.79	2.09	2.24
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		6	7	7	7	9	5	6	7	7	20	--	<5	<5	6	7	31	7	7	5.2	6	6	<5	8	7	<5	13
Calculated TDS	mg/L	1	--	--	--		93	129	118	137	134	75	100	90	63	117	--	95	110	109	115	140	117	102	120	126	109	141	148	108	129	137
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	<1.0	<10	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.40	2.11	1.89	2.11	2.33	1.20	1.58	1.35	0.95	1.89	--	1.78	2.00	1.69	2.56	2.18	2.45	1.94	1.98	2.61	1.93	3.54	3.33	1.93	2.35	2.53
Hardness (CaCO3)	mg/L	N/A	--	--	--		14	22	20	26	28	18	19	16	15	19.1	--	19.5	21.1	20.2	23.4	22.6	28.5	21.6	21.0	25.2	15.7	25.9	33.6	24.3	25.3	25.4
Ion Balance (% Difference)	%	N/A	--	--	--		3.78	1.63	2.58	5.17	4.02	4.80	1.25	7.22	1.60	5.5	--	9.0	5.5	7.0	19.8	9.2	17.0	9.2	3.2	15.2	1.2	30.0	18.6	3.8	5.8	6.1
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-3.57	-2.90	-2.94	-2.96	-2.43	-3.25	-3.27	-2.94	-3.13	-2.91	--	-3.31	-3.35	-3.07	-3.03	-2.61	-2.79	-3.26	-3.13	-2.98	-3.29	-3.65	-2.82	-2.99	-3.2	-2.42
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.82	-3.15	-3.19	-3.21	-2.68	-3.50	-3.53	-3.19	-3.38	-3.23	--	-3.63	-3.67	-3.39	-3.35	-2.93	-3.11	-3.58	-3.38	-3.30	-3.61	-3.97	-3.14	-3.31	-3.52	-2.74
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.93	9.65	9.73	9.59	9.47	9.83	9.81	9.77	9.80	9.51	--	10.10	10.1	9.99	9.91	9.27	9.79	9.90	9.80	9.93	10.1	10.0	9.68	9.86	10	9.57
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.20	9.90	9.98	9.84	9.72	10.10	10.10	10.00	10.10	9.83	--	10.40	10.4	10.3	10.2	9.59	10.1	10.2	10.1	10.2	10.5	10.3	10.0	10.2	10.3	9.89
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		260	--	--	665	45.9	--	233	--	--	177	--	306	141	103	3920	305	129	142	140	--	2320	7690	--	--	250.00	94
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<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	<1.0	--	<2	4	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		23	--	--	35.3	24.4	--	26.6	--	--	22	--	19	20	12	40	23	23	18	21	--	34	60	--	--	22	--
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2	--
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	11.3	8.6	--	<50	--	--	6	--	9	6	8	9	8	13	11	<50	--	<5	10	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	0.032	<0.017	--	<0.017	--	--	<0.017	--	0.066	0.021	0.018	0.430	<0.017	0.020	<0.017	0.025	--	0.146	0.227	--	--	0.04	--
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	<1	<1	<1	3	<1	<1	<1	<1.0	--	2	6	--	--	<1	--
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.96	<0.40	--	<0.40	--	--	<1	--	2	<1	<1	9	<1	<1	<1	<0.40	--	3	6	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	2.0	<2.0	<2.0	4.0	<2.0	2.3	<2	--	<2	<2	1	6	1	<1	2	<2.0	3	4	10	<1	<1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		140	--	--	837	89	161	141	315	528	137	--	742	130	205	5300	239	296	182	93	4460	6020	13600	8250	171	206	359
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	1.73	<0.50	--	<0.50	--	--	<0.5	--	0.9	<0.5	<0.5	13.5	0.9	<0.5	<0.5	<0.50	--	6.3	13.9	--	--	<0.5	--
Total Manganese (Mn)	µg/L	2	820	--	--		17	--	--	142	68.9	41.3	14.4	128	62.4	48	--	214	33	58	693	54	260	49	34	296	278	424	281	53	64	125
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	2	<2	<2	9	<2	<2	<2	<2.0	--	5	7	--	--	22	--
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	<1	<1	<1	<1	<1	<1	<1	<1.0	--	1	1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		18	--	--	36.3	37.1	--	25	--	--	26	--	30	31	25	34	35	37	30	32	--	22	40	--	--	34	--
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	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	7.8	<2.0	--	3.9	--	--	<2	--	4	<2	<2	65	4	<2	3	<2.0	--	25	106	--	--	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	0.6	<0.1	<0.1	<0.1	<0.10	--	0.6	0.9	--	--	<0.1	--
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	10	<2	<2	<2	<2.0	--	7	16	--	--	<2	--
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	10.0	5.4	5.7	6.3	6.2	5.4	<5	--	13	8	<5	62	<5	<5	6	11	13	12	34	20	<5	11	<5
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		200	73	--	>250	>250	>250	85	>250	--	411	--	2420	866	1730	1011	613	2420	>2420	---	>2420	>2420	>2420	1410	>2420	665	>2420
E. coli	MPN/100mL	1	--	400	--		33	45	--	19	>250	2	2	34	<100	2	--	20	12	4	6	6	10	10	<10	3	6	>2420	34	10	6	2
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.62	2.31	0.57	0.82	1.12	0.07	2.85	0.86	0.15	1.03	--	0.69	1.17	1.10	5.07	0.67	0.64	0.91	0.57	8.84	4.67	8.00	4.71	1.7	4.97	4.40
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.64	2.21	0.64	0.74	1.04	0.06	2.75	0.76	0.15	1.10	--	0.91	1.37	1.10	6.39	0.65	0.65	0.87	0.54	9.54	3.69	12.31	10.82	1.76	6.45	4.96

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- '' = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F 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 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 (black shaded)	= Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded)	= Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded	= Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

TABLE 1A: Historical Data - Bedford West Water Quality Sampling Program

Summer 2017	Units	RDL (June 8-2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	HRM Phosphorus Trigger Range (Applied)	Paper Mill Lake																								
Sample Sites							PML2																								
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	2012/08/15	2012/10/11	2013/05/15	2013/08/15	2013/10/16	2014/05/15	2014/08/14	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15
Sampling Time	hh:mm	--					13:15	13:40	13:45	14:30	16:20	13:00	12:40	16:20	16:15	13:16	--	--	13:40	10:45	11:20	11:00	9:20	8:30	11:30	13:45	9:08	13:45	10:00	9:50	14:30	14:30
FIELD DATA																															
Secchi Depth	Meters	--	--	1.2	--		2.8	2.2	2.3	N/A	3.0	2.0	2.2	2.3	2.2	2.35	--	--	3.20	--	N/A	N/A	N/A	3.1	NCC	N/A	2.41	2.7	2.3	2.55	2.5	2.45
Water Temp	Celsius	--	--	--	--		14.8	24.2	19.7	17.8	25.3	10.1	10.9	23.1	15.2	11.6	--	--	14.8	--	12.6	14.4	21.1	12.1	15.09	27.0	9.0	13.8	22.09	11.80	17.10	24.00
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		**10.20**	8.30	8.40	8.78	8.09	**10.58**	**9.88**	8.7	8.94	7.75	--	--	9.26	--	8.90	**12.44**	6.95	7.92	8.06	**9.76**	8.28	8.55	7.69	**10.31**	**10.44**	8.9
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.36	6.82	6.84	7.09	7.39	6.53	6.31	6.67	6.13	8.61	--	--	6.49	--	6.13	6.50	7.22	5.92	6.56	6.76	7.25	7.57	**5.93**	**5.37**	6.73	7.0
Specific Conductance	uS/cm	--	--	--	--		267	264	241	237	234	201	159	173	156	231	--	--	234	--	250.5	966.0	266.0	215.0	0.214	255.6	454.9	264	298	230.3	242	285
INORGANICS																															
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		5	7	7	6	8	7	<5	8	7	21	--	--	<5	--	8	32	10	26	<5.0	5	7	7	10	8	5	12
Dissolved Chloride (Cl)	mg/L	1	--	--	120		63	63	58	62	58	50	44	43	34	55	--	--	63	--	64	**245**	50	42	69	59	57	67	67	50	67	72
Colour	TCU	5	--	--	--		22	17	19	20	13	23	35	38	48	39	--	--	18	--	8	6	7	31	26	10	9	22	13	22	18	7
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.14	0.07	0.09	0.19	0.11	0.23	0.33	0.14	0.22	0.24	--	--	0.22	--	<0.05	0.13	0.18	0.18	0.11	0.32	0.23	0.10	0.11	0.18	0.27	0.07
Nitrate (N)	mg/L	0.05	--	--	13		0.14	--	--	0.19	0.11	--	0.33	--	--	0.24	--	--	0.22	--	<0.05	0.13	0.18	0.18	0.11	0.17	0.23	0.10	<0.05	0.18	0.16	0.07
Nitrite (N)	mg/L	0.05	--	--	0.06		<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	--	--	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.010	0.15	<0.05	<0.05	**0.11**	<0.05	**0.11**	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	--	--	0.03	--	0.23	0.05	0.03	<0.03	<0.050	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	--	--	--	--	1.7	<0.4	0.4	<5	0.23	1.20	3.0	0.6	<0.4	0.5	0.6	0.6
Total Organic Carbon	mg/L	0.5	--	--	--		3.6	2.6	4.5	3.2	3.4	3.6	4	6	5.6	5.9	--	--	4.4	--	4.0	2.7	2.4	5.8	2.8	6.0	6.1	4.0	3.6	8.3	5.5	5.4
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.50	6.81	6.82	6.66	7.02	6.83	**6.37**	6.60	6.60	6.6	--	--	6.68	--	6.73	7.13	7.04	6.77	6.64	6.98	6.98	6.83	7.23	6.93	6.86	7.23
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.1	7.1	6.1	7.17	7.69	7.96	5.30	4.76	5.04	6.1	--	--	6.7	--	7.7	19.2	8.8	6.9	7300	8.2	6.2	8.9	8.1	7.4	8.1	8.5
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.25	1.17	1.20	0.93	0.86	0.90	1.0	--	--	1.0	--	1.4	1.7	1.4	1.0	1000	1.3	1.2	1.2	1.2	1.3	1.3	1.1
Total Phosphorus	mg/L	0.002	--	--	--	0.01	**<0.02**	**<0.02**	0.002	0.010	0.002	<0.002	0.009	0.009	0.007	**0.025**	--	--	0.006	--	**0.026**	**0.011**	**0.026**	**0.02**	0.008	**0.012**	0.008	**0.012**	0.003	0.005	**0.02**	**0.013**
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.0	0.9	0.984	0.900	1.020	0.861	0.801	0.968	0.8	--	--	0.8	--	1.3	1.4	1.2	1.1	830	1.0	0.9	1.0	1.0	1.1	0.9	1.4
Total Sodium (Na)	mg/L	0.1	--	--	--		35	40	34	31.1	35.1	30.8	25.7	21.3	20.9	34.6	--	--	37.5	--	42.0	133	42.6	33.9	38	43.3	31.3	42.9	37.5	32.1	41.5	47.2
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.6	2.5	2.3	2.6	2.3	3.3	2.9	2.5	3	2.8	--	--	2.7	--	4.2	2.4	2.3	2.9	1.9	1.8	2.8	2.3	0.6	2.6	1.7	0.8
Total Suspended Solids	mg/L	5	--	--	--		2	3	<1	15	<2	11	<1	8	<1	<5	--	--	<5	--	<5	16	<5	<5	1	<5	<5	45	<5	<5	<5	14
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		11	11	11	10	10	10	9	10	9	7	--	--	9	--	11	27	7	7	8	9	9	12	7	10	10	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.8	0.7	0.6	1.0	0.8	0.4	0.4	3.4	0.5	0.7	--	--	1	--	3.3	2.6	0.7	1	0.88	1.9	1.3	9.4	1.1	1.4	1.9	1.9
Conductivity (uS/cm)	µS/cm	1	--	--	--		240	250	230	230	230	210	170	170	150	213	--	--	254	--	277	777	273	212	260	251	246	263	319	190	259	286
Calculated Parameters																															
Anion Sum	me/L	N/A	--	--	--		2.11	2.17	1.99	2.07	2.01	1.77	1.46	1.58	1.30	2.13	--	--	1.98	--	2.19	8.12	1.77	1.86	2.13	1.97	1.95	2.29	2.24	1.79	2.22	2.44
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		5	7	7	6	8	7	<1	8	7	21	--	--	<5	--	8	32	10	26	<1.0	5	7	7	10	8	5	12
Calculated TDS	mg/L	1	--	--	--		123	131	117	120	120	110	91	89	79	119	--	--	119	--	137	448	118	109	130	127	112	139	129	108	133	146
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	--	--	<10	--	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	--		1.94	2.23	1.88	1.88	2.03	1.86	1.48	1.28	1.27	1.94	--	--	2.09	--	2.55	6.96	2.47	1.95	2.14	2.44	1.84	2.53	2.17	1.92	2.37	2.62
Hardness (CaCO3)	mg/L	N/A	--	--	--		20	22	20	23	24	25	17	15	16	19.3	--	--	20.8	--	25.0	54.9	27.7	21.3	23.0	25.8	20.4	27.2	25.2	23.8	25.6	25.8
Ion Balance (% Difference)	%	N/A	--	--	--		4.20	1.36	2.84	4.81	0.50	2.48	0.68	10.50	1.17	4.8	--	--	2.8	--	7.5	7.7	16.5	2.2	0.23	10.6	3.0	5.1	1.7	3.4	3.2	3.5
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-3.33	-2.83	-2.93	-3.06	-2.55	-2.80	NC	-3.18	-3.17	-2.89	--	--	-3.39	--	-3.08	-1.73	-2.61	-2.57	NC	-3.00	-2.97	-2.98	-2.46	-2.89	-3.13	-2.37
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-3.59	-3.08	-3.18	-3.31	-2.80	-3.05	NC	-3.43	-3.42	-3.21	--	--	-3.71	--	-3.40	-2.05	-2.93	-2.89	NC	-3.32	-3.29	-3.30	-2.78	-3.21	-3.45	-2.69
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.83	9.64	9.75	9.72	9.57	9.63	NC	9.78	9.77	9.49	--	--	10.1	--	9.81	8.86	9.65	9.34	NC	9.98	9.95	9.81	9.69	9.82	9.99	9.6
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.10	9.89	10.00	9.97	9.82	9.88	NC	10.00	10.00	9.81	--	--	10.4	--	10.1	9.18	9.97	9.66	NC	10.3	10.3	10.1	10.0	10.1	10.3	9.92
Metals (ICP-MS)																															
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		**130**	--	--	**1030**	55.8	--	**202**	--	--	**189**	--	--	**131**	--	**107**	**181**	52	**122**	**130**	--	**278**	**610**	--	--	**215.00**	**40**
Total Antimony (Sb)	µg/L	2	20	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--
Total Arsenic (As)	µg/L	2	5.0	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	23.0	12.2	--	23	--	--	22	--	--	22	--	37	50	27	19	25	--	24	35	--	--	27	--
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2	--
Total Bismuth (Bi)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Boron (B)	µg/L	5	1200	--	1500		5	--	--	8.2	8.8	--	<50	--	--	6	--	--	6	--	9	7	13	11	<50	--	<5	8	--	--	<5	--
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.3	--	--	**0.037**	<0.017	--	**0.028**	--	--	**0.023**	--	--	**0.039**	--	**0.060**	**0.062**	**0.019**	**0.018**	**0.023**	--	**0.145**	**0.042**	--	--	<0.017	--
Total Chromium (Cr)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	--	<1	--	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	0.65	<0.40	--	<0.40	--	--	<1	--	--	<1	--	2	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	3.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2	--	--	<2	--	**1380**	1	<1	2	<2.0	2	2	<1	1	<1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		100	--	--	**1090**	151	76	143	**699**	181	178	--	--	181	--	**1760**	264	**316**	134	170	**334**	**368**	**647**	174	123	<50	**203**
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	2.39	<0.50	--	<0.50	--	--	<0.5	--	--	<0.5	--	**49.7**	0.7	<0.5	<0.5	<0.50	--	0.5	**1.1**	--	--	<0.5	--
Total Manganese (Mn)	µg/L	2	820	--	--		58	--	--	159	81.0	28.0	33.8	88.6	30.6	22	--	--	87	--	866	206	278	24	43	67	61	109	36	23	85	68
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		2	--	--	2.2	<2.0	--	<2.0	--	--	<2	--	--	<2	--	3	<2	<2	<2	<2.0	--	2	<2	--	--	4	--
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	--	<1	--	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	--	<0.1	--	0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Strontium (Sr)	µg/L	5	21000	--	--		30	--	--	34.7	32.8	--	25.7	--	--	27	--	--	31	--	35	68	37	29	34	--	21	38	--	--	35	--
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	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	3	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	21.3	<2.0	--	3.6	--	--	<2	--	--	<2	--	2	3	<2	<2	2.1	--	4	7	--	--	<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	<0.10	--	<0.1	<0.1	--	--	<0.1	--
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2	--	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	18.3	<5.0	5.8	6.6	7.5	10	8	--	--	11	--	**762**	<5	<5	5	14	<5	8	7	<5	<5	8	9
MICROBIOLOGICAL																															
Total Coliform	MPN/100mL	1	--	--	--		49	40	--	>250	46	97	64	>250	--	261	--	--	1410	--	411	291	517	>2420	---	>2420	1120	687	>2420	>2420	1990	>2420
E. coli	MPN/100mL	1	--	400	--		10	31	--	69	<1	6	17	**>250**	<100	1	--	--	12	--	2	<1	3	16	<0.10	5	2	4	47	30	1	11
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.15	1.36	0.59	3.50	1.54	0.53	0.55	2.48	1.33	0.76	--	--	1.18	--	0.25	0.99	0.48	0.72	1.67	4.79	1.50	3.82	1.09	2.02	5.31	4.30
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		1.22	1.33	0.66	3.39	1.51	0.42	0.51	2.26	1.13	0.76	--	--	1.34	--	0.27	1.13	0.44	0.70	1.56	4.59	0.74	5.04	1.42	2.12	6.60	4.23

Notes:

N/A - Not Applicable; NC - Not Calculable; NCC Not Collected
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / Not Tested.
CCME PAL-F Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (updated 2011)
CCME PAL-F 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 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 (black shaded) = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (black shaded) = Present Result - Parameter concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality
Blue shaded = Past Result - Parameter concentration exceeds CCME FWAL Guideline and/or NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality

Appendix E

Laboratory Certificate of Analysis

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: Maria Gutierrez

PROJECT: 631477

AGAT WORK ORDER: 17X249061

MICROBIOLOGY ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

DATE REPORTED: Aug 24, 2017

PAGES (INCLUDING COVER): 14

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.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

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Dartmouth, Nova Scotia
CANADA B3B 1M2
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Certificate of Analysis

AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Total Coliforms and E.coli (MPN)

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15
Parameter	**Unit**	**G / S**	**RDL**	**8635996**	**8636019**	**8636036**	**8636043**	**8636050**	**8636058**	**8636065**	**8636086**
Total Coliforms (MPN)	MPN/100 mL		1	488	>2420	2420	>2420	577	>2420	>2420	>2420
E. Coli (MPN)	MPN/100 mL		1	18	16	13	1	5	14	8	479

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15
Parameter	**Unit**	**G / S**	**RDL**	**8636093**	**8636111**	**8636122**
Total Coliforms (MPN)	MPN/100 mL		1	>2420	>2420	>2420
E. Coli (MPN)	MPN/100 mL		1	51	2	11

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

Certified By: Original Signed

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Dartmouth, Nova Scotia
CANADA B3B 1M2
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Certificate of Analysis

AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis (Total)

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8635996	8636019	8636036	8636043	8636050	8636058	8636065	8636086
pH				7.07	6.87	7.13	6.99	7.09	6.91	6.73	7.08
Reactive Silica as SiO2	mg/L		0.5	1.6	2.2	1.6	1.7	1.6	3.8	5.7	2.7
Chloride	mg/L		1	73	19	56	62	58	49	107	38
Fluoride	mg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Sulphate	mg/L		2	9	2	9	9	8	13	7	3
Alkalinity	mg/L		5	8	12	8	9	7	21	22	26
True Color	TCU		5	14	46	13	11	14	31	41	31
Turbidity	NTU		0.1	1.1	4.4	1.3	0.9	0.9	7.7	9.9	21.3
Electrical Conductivity	umho/cm		1	260	110	251	255	249	251	413	192
Nitrate + Nitrite as N	mg/L		0.05	0.29	0.08	0.30	0.12	0.21	0.71	0.09	0.48
Nitrate as N	mg/L		0.05	0.08	0.08	0.17	0.12	0.07	0.50	0.09	0.39
Nitrite as N	mg/L		0.05	0.21	<0.05	0.13	<0.05	0.14	0.21	<0.05	0.09
Ammonia as N	mg/L		0.03	<0.03	0.03	0.03	0.03	<0.03	0.10	0.09	0.08
Total Organic Carbon	mg/L		0.5	4.6	8.2	4.9	4.3	4.8	8.6	9.2	8.1
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Total Sodium	mg/L		0.1	50.3	15.4	41.4	41.4	42.4	29.7	66.0	26.0
Total Potassium	mg/L		0.1	0.9	0.8	0.9	0.9	0.8	2.1	1.6	1.4
Total Calcium	mg/L		0.1	7.1	4.3	7.2	7.5	7.0	10.3	14.7	8.0
Total Magnesium	mg/L		0.1	1.2	1.2	1.1	1.1	1.0	1.7	1.9	1.7
Bicarb. Alkalinity (as CaCO3)	mg/L		5	8	12	8	9	7	21	22	26
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
Hydroxide	mg/L		5	<5	<5	<5	<5	<5	<5	<5	<5
Calculated TDS	mg/L		1	148	51	122	128	122	127	215	97
Hardness	mg/L			22.7	15.7	22.5	23.3	21.6	32.7	44.5	27.0
Langelier Index (@20C)	NA			-2.78	-2.98	-2.71	-2.78	-2.82	-2.35	-2.38	-2.19
Langelier Index (@ 4C)	NA			-3.10	-3.30	-3.03	-3.10	-3.14	-2.67	-2.70	-2.51
Saturation pH (@ 20C)	NA			9.85	9.85	9.84	9.77	9.91	9.26	9.11	9.27
Saturation pH (@ 4C)	NA			10.2	10.2	10.2	10.1	10.2	9.58	9.43	9.59
Anion Sum	me/L			2.43	0.82	1.95	2.12	1.96	2.12	3.61	1.69
Cation sum	me/L			2.67	1.05	2.28	2.31	2.30	2.22	3.93	1.74

Certified By: Original Signed

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AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis (Total)

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15
Parameter	**Unit**	**G / S**	**RDL**	**8635996**	**8636019**	**8636036**	**8636043**	**8636050**	**8636058**	**8636065**	**8636086**
% Difference/ Ion Balance (NS)	%			4.8	12.3	7.9	4.1	8.1	2.2	4.2	1.4
Total Aluminum	ug/L		5	41	150	36	89	45	450	149	48
Total Copper	ug/L		1	2	1	<1	<1	<1	4	1	<1
Total Iron	ug/L		50	70	759	83	131	<50	3960	2650	375
Total Manganese	ug/L		2	31	96	35	76	11	511	160	212
Total Phosphorous	mg/L		0.02	0.02	0.04	0.03	0.03	0.03	0.07	0.04	0.06
Total Zinc	ug/L		5	<5	8	6	7	8	37	9	<5

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AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis (Total)

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8636093	8636111	8636122
pH				7.40	7.15	7.23
Reactive Silica as SiO2	mg/L		0.5	3.6	1.3	0.8
Chloride	mg/L		1	154	63	72
Fluoride	mg/L		0.12	<0.12	<0.12	<0.12
Sulphate	mg/L		2	18	9	8
Alkalinity	mg/L		5	27	13	12
True Color	TCU		5	12	18	7
Turbidity	NTU		0.1	6.6	3.2	1.9
Electrical Conductivity	umho/cm		1	673	277	286
Nitrate + Nitrite as N	mg/L		0.05	0.87	0.28	0.07
Nitrate as N	mg/L		0.05	0.51	0.13	0.07
Nitrite as N	mg/L		0.05	0.36	0.15	<0.05
Ammonia as N	mg/L		0.03	0.09	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	6.8	4.7	5.4
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01
Total Sodium	mg/L		0.1	113	45.3	47.2
Total Potassium	mg/L		0.1	3.0	1.1	1.4
Total Calcium	mg/L		0.1	23.8	8.2	8.5
Total Magnesium	mg/L		0.1	3.0	1.2	1.1
Bicarb. Alkalinity (as CaCO3)	mg/L		5	27	13	12
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10
Hydroxide	mg/L		5	<5	<5	<5
Calculated TDS	mg/L		1	341	137	146
Hardness	mg/L			71.8	25.4	25.8
Langelier Index (@20C)	NA			-1.43	-2.42	-2.37
Langelier Index (@ 4C)	NA			-1.75	-2.74	-2.69
Saturation pH (@ 20C)	NA			8.83	9.57	9.60
Saturation pH (@ 4C)	NA			9.15	9.89	9.92
Anion Sum	me/L			5.32	2.24	2.44
Cation sum	me/L			6.74	2.53	2.62

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Certificate of Analysis

AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis (Total)

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8636093	8636111	8636122
% Difference/ Ion Balance (NS)	%			11.8	6.1	3.5
Total Aluminum	ug/L		5	978	94	40
Total Copper	ug/L		1	14	<1	<1
Total Iron	ug/L		50	3540	359	203
Total Manganese	ug/L		2	1870	125	68
Total Phosphorous	mg/L		0.02	0.09	0.03	0.03
Total Zinc	ug/L		5	120	<5	9

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

8636019 When the cation and anion sums are at, or below, 1 me/L, therefore the acceptable criteria is a difference of less than 0.3me/L.

8636093 Ion Balance is biased high, contributing parameters have been confirmed.

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AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Subcontracted Data Received

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8635996	8636019	8636036	8636043	8636050	8636058	8636065	8636086
Subcontracted Data				Y	Y	Y	Y	Y	Y	Y	Y

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8636093	8636111	8636122
Subcontracted Data				Y	Y	Y

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

Certified By: Original Signed

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Certificate of Analysis

AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

TP (Water)

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8635996	8636019	8636036	8636043	8636050	8636058	8636065	8636086
Total Phosphorus	mg/L		0.002	0.010	0.028	0.009	0.008	0.012	0.052	0.042	0.059

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8636093	8636111	8636122
Total Phosphorus	mg/L		0.002	0.027	0.036	0.013

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

Certified By: Original Signed

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Certificate of Analysis

AGAT WORK ORDER: 17X249061

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

TSS, TKN

DATE RECEIVED: 2017-08-15

DATE REPORTED: 2017-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8635996	8636019	8636036	8636043	8636050	8636058	8636065	8636086
Total Suspended Solids	mg/L		5	<5	12	<5	<5	<5	11	7	41
Total Kjeldahl Nitrogen as N	mg/L		0.4	<0.4	0.5	0.8	0.5	<0.4	1.3	0.7	34.5

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2017-08-15	2017-08-15	2017-08-15
Parameter	Unit	G / S	RDL	8636093	8636111	8636122
Total Suspended Solids	mg/L		5	16	5	14
Total Kjeldahl Nitrogen as N	mg/L		0.4	3.8	0.8	0.6

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

Original Signed

Certified By:

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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.
AGAT WORK ORDER: 17X249061
PROJECT: 631477
ATTENTION TO: Maria Gutierrez
SAMPLING SITE:
SAMPLED BY:

Water Analysis

RPT Date: Aug 24, 2017			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
TSS, TKN															
Total Kjeldahl Nitrogen as N	1	8634826	0.2	0.2	NA	< 0.4	105%	80%	120%		80%	120%	101%	80%	120%
Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
TSS, TKN															
Total Suspended Solids	1	8640657	5	6	NA	< 5	98%	80%	120%				NA	80%	120%
Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
Standard Water Analysis (Total)															
pH	8635996	8635996	7.07	7.07	0.0%	<	106%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	1	8634735	8.8	8.7	1.1%	< 0.5	105%	80%	120%		80%	120%	83%	80%	120%
Chloride	8634872		3	3	NA	< 1	103%	80%	120%	NA	80%	120%	80%	80%	120%
Fluoride	8634872		0.25	0.27	NA	< 0.12	109%	80%	120%	NA	80%	120%	88%	80%	120%
Sulphate	8634872		37	38	1.1%	< 2	97%	80%	120%	NA	80%	120%	NA	80%	120%
Alkalinity	8635996	8635996	8	9	NA	< 5	96%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1	8640887	<5	<5	NA	< 5	110%	80%	120%						
Turbidity	1	8640887	1	1.1	9.5%	< 0.1	103%	80%	120%						
Electrical Conductivity	8635996	8635996	260	262	0.8%	< 1	102%	80%	120%	NA	80%	120%	NA	80%	120%
Nitrate as N	8634872		<0.05	<0.05	NA	< 0.05	100%	80%	120%	NA	80%	120%	88%	80%	120%
Nitrite as N	8634872		<0.05	<0.05	NA	< 0.05	106%	80%	120%	NA	80%	120%	89%	80%	120%
Ammonia as N	1	8636636	<0.03	<0.03	NA	< 0.03	98%	80%	120%		80%	120%	97%	80%	120%
Total Organic Carbon	1	8632886	2.6	2.7	3.8%	< 0.5	101%	80%	120%		80%	120%	92%	80%	120%
Ortho-Phosphate as P	1	8634735	<0.01	<0.01	NA	< 0.01	100%	80%	120%		80%	120%	100%	80%	120%
Total Sodium	8636529		45.2	45.9	1.6%	< 0.1	110%	80%	120%	106%	80%	120%	NA	70%	130%
Total Potassium	8636529		1.7	1.7	1.2%	< 0.1	110%	80%	120%	102%	80%	120%	NA	70%	130%
Total Calcium	8636529		598	582	2.7%	< 0.1	109%	80%	120%	101%	80%	120%	NA	70%	130%
Total Magnesium	8636529		40.8	42.1	3.2%	< 0.1	114%	80%	120%	106%	80%	120%	NA	80%	120%
Bicarb. Alkalinity (as CaCO3)	8635996	8635996	8	9	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	8635996	8635996	<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	8635996	8635996	<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	8636529		<5	<5	NA	< 5	119%	80%	120%	113%	80%	120%	99%	70%	130%
Total Copper	8636529		3	2	NA	< 1	113%	80%	120%	104%	80%	120%	71%	70%	130%
Total Iron	8636529		56	58	NA	< 50	108%	80%	120%	101%	80%	120%	99%	70%	130%
Total Manganese	8636529		<2	<2	NA	< 2	104%	80%	120%	98%	80%	120%	91%	70%	130%
Total Phosphorous	8636529		0.04	0.04	NA	< 0.02	104%	80%	120%	96%	80%	120%	108%	70%	130%
Total Zinc	8636529		8	7	NA	< 5	115%	80%	120%	107%	80%	120%	79%	70%	130%
Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
Standard Water Analysis (Total)															
Chloride	8636122	8636122	72	74	3.2%	< 1	89%	80%	120%	NA	80%	120%	NA	80%	120%

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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X249061

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Aug 24, 2017			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
Fluoride	8636122	8636122	<0.12	<0.12	NA	< 0.12	81%	80%	120%	NA	80%	120%	99%	80%	120%
Sulphate	8636122	8636122	8	9	NA	< 2	98%	80%	120%	NA	80%	120%	101%	80%	120%
Nitrate as N	8636122	8636122	0.07	0.07	NA	< 0.05	99%	80%	120%	NA	80%	120%	86%	80%	120%
Nitrite as N	8636122	8636122	<0.05	<0.05	NA	< 0.05	104%	80%	120%	NA	80%	120%	98%	80%	120%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

TP (Water)

Total Phosphorus	8635996	8635996	0.01	0.012	11.7%	< 0.006	97%	90%	110%	98%	90%	110%	97%	80%	120%

Certified By: Original Signed

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X249061

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Total Coliforms (MPN)	MIC-121-7000	Based on SM 9223B	INCUBATOR
E. Coli (MPN)	MIC-121-7000	Based on SM 9223B	INCUBATOR

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X249061

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Reactive Silica as SiO2	INORG-121-6028	SM 4110 B	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Alkalinity	INORG-121-6001	SM 2320 B	
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
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
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	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
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	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 Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Phosphorous	MET-121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Subcontracted Data			
Total Phosphorus	INOR-93-6022	SM 4500-P B & E	SPECTROPHOTOMETER
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC
Total Kjeldahl Nitrogen as N	INOR-121-6020	SM 4500 NORG D	COLORIMETER

Results relate only to the items tested and to all the items tested

AGAT Laboratories

Unit 122 - 11 Morris Dr.
Dartmouth, Nova Scotia
B3B 1M2
http://webearth.agatlabs.com

Phone: 902-468-8718
Fax: 902-468-8924
www.agatlabs.com

Laboratory use Only
Arrival Condition: ☐ Good ☐ Poor (complete 'notes')
Arrival Temperature: 20° AGAT Job Number: 17x249061
Notes:

Drinking Water Sample (y/n): _____ Reg. No. _____
Waterworks Number: _____

Report To:
Company: SNC Lavalin
Contact: Maria Gutierrez
Address: 5657 Spring Garden Road
Halifax, NS B3J 3R4
Phone: 902-492-4544 FAX:
PO#:
AGAT Quotation: 15-1718
Client Project #: 631477

Invoice to: Same (Y/N) - Circle
Company: SNC Lavalin
Contact: payables@snclavalin.com
Address:
Phone: Fax:
PO#/Credit Card #:

Report Information
1. Name: Maria Gutierrez
Email:
2. Name: Ryan Flinn
Email:

Regulatory Requirements (Check):
☐ List Guidelines on Report ☐ Do Not List Guidelines on Report
☐ PIRI
Site Info (check all that apply):
☐ Teir 1 ☐ Res. ☐ Pot. ☐ Coarse
☐ Teir 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☑ CCME ☐ CDWQ
☐ Ind ☐ NSDFOSP
☐ Com ☐ HRM 101
☐ Res/P Storm Water
☐ Ag ☐ HRM 101
☐ FWAL Waste Water
☐ Sediment
☐ Other: WATER

Report Format
☐ Single PDF sample per page
☐ Multiple PDF samples per page
☐ Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT:
■ 5 - 7 days
Rush TAT:
☐ 1 day ☐ 2 days
☐ 3 - 4 days
Date Required:
Time Required:

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/ Preserved	Standard Water Analysis	Metals (Spring Quarterly Only)	(circle-Total, Diss or Available)	Mercury	TKN	pH	TSS	TP- Low Level 0.002mg/L- Mississauga	Anions	Total Phosphorus	Phenols	TPH/BTEX (PIRI) Tier 1	TPH/BTEX-Fractionation Tier 2	VOC	THM	PAH	Chlorophyll A (Sub to DAL)	E coli by MPN	Hazardous (Y/N)	Lab Sample #
KL1	15.08.17/9:30	water	7			X		T		X		X	X									X	X		
KL2	11:15	water	7			X		T		X		X	X									X	X		
KL3	11:50	water	7			X		T		X		X	X									X	X		
KL4	10:45	water	7			X		T		X		X	X									X	X		
KL5	9:45	water	7			X		T		X		X	X									X	X		
HWY-102-1	15:10	water	7			X		T		X		X	X									X	X		
HWY-102-2	15:25	water	7			X		T		X		X	X									X	X		
LSD	11:55	water	7			X		T		X		X	X									X	X		
LU	10:15	water	7			X		T		X		X	X									X	X		
PML-1	15:45	water	7			X		T		X		X	X									X	X		
PML-2	14:30	water	7			X		T		X		X	X									X	X		

Sample Relinquished By (print name & sign) [redacted] Date/Time 15.08.17 Samples Received By (print name and sign) [redacted] Date/Time 15-Aug-17 Special Instructions

Sample Relinquished By (print name & sign) [redacted] Date/Time 15:45 Samples Received By (print name and sign) Date/Time 15:30 SNC Bedford West Package

Page of

Dalhousie University
Department of Oceanography
Halifax, N.S.
B3H 4R2

18-Aug-17 AGAT Laboratories, 11 Morris Dr. Unit 122, Dartmouth, NS, B3B 1M2

Attention: Janetta Fraser
Re: Determination of chlorophyll a in algae by fluorescence

AGAT Job#: 17X249061
PO#: 107799

Acidification Technique:

Sample ID	Chl a (µg/L)
KL1	1.75
KL2	1.47
KL3	1.24
KL4	0.33
KL5	1.43
HWY-102-1	5.32
HWY-102-2	2.11
LSD	20.15
LU	21.03
PML-1	4.40
PML-2	4.30

Welschmeyer Technique:

Sample ID	Chl a (µg/L)
KL1	1.87
KL2	1.81
KL3	1.32
KL4	0.39
KL5	1.40
HWY-102-1	5.48
HWY-102-2	3.20
LSD	24.37
LU	24.37
PML-1	4.96
PML-2	4.23

phone: (902)494-6663 **fax: (902)494-2039**

- **CHl a = chlorophyll a**
- **An underestimation of chl a occurs by the fluorescence acidification technique in the presence of Chl b. Since chl b containing chlorophytes are often present in freshwater ecosystems another technique (welschmeyer) was also employed.**
- **Reference for Welschmeyer technique Limnol. Oceanogr., 39(8) 1994, 1985-1992**

Received: 16-Aug-17
Completed: 17-Aug-17

Original Signed

Shannah Rastin

phone: (902)494-6663 **fax: (902)494-2039**

Appendix F

Graphs

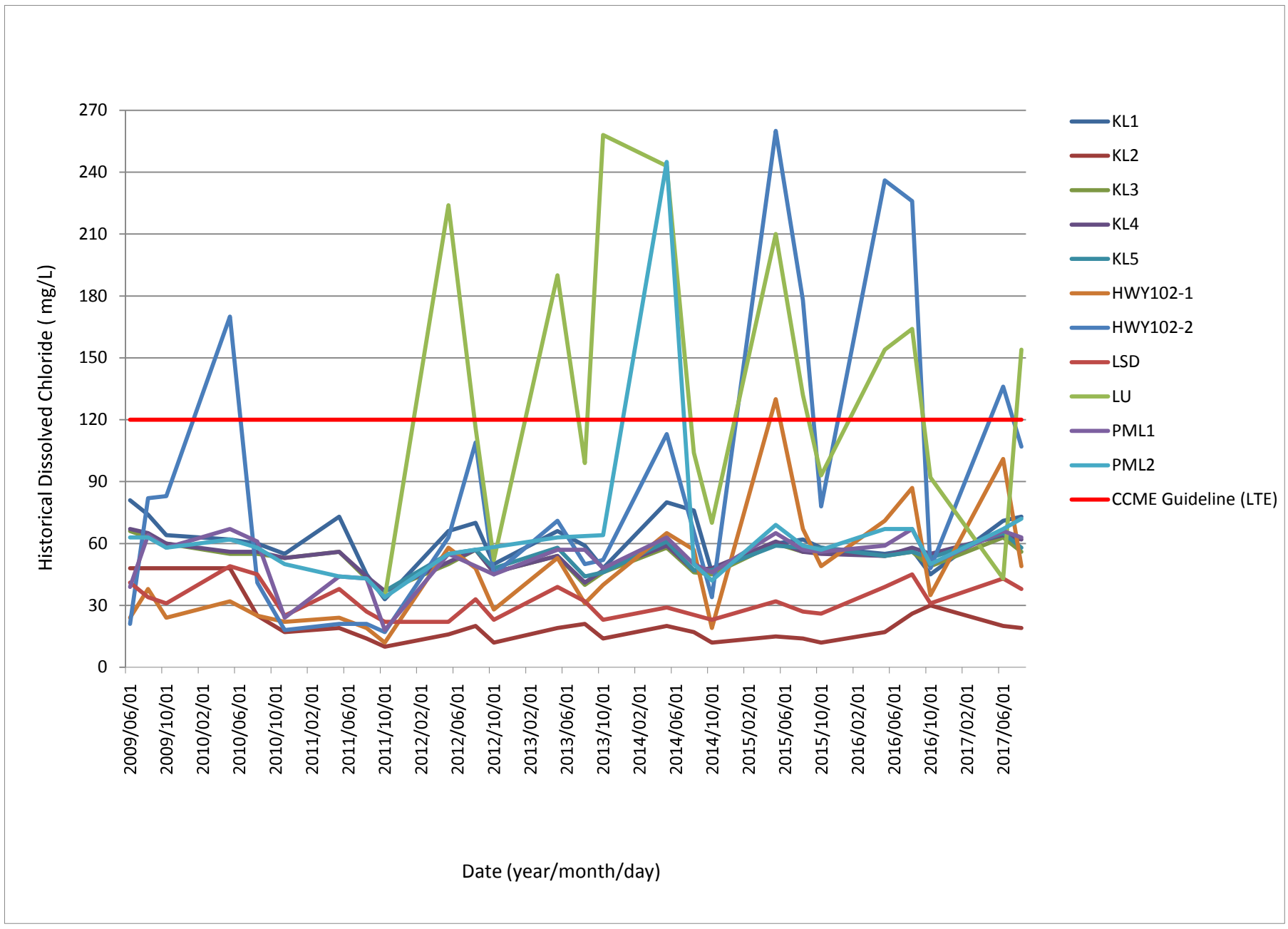


Figure 1 - Dissolved Chloride Concentrations

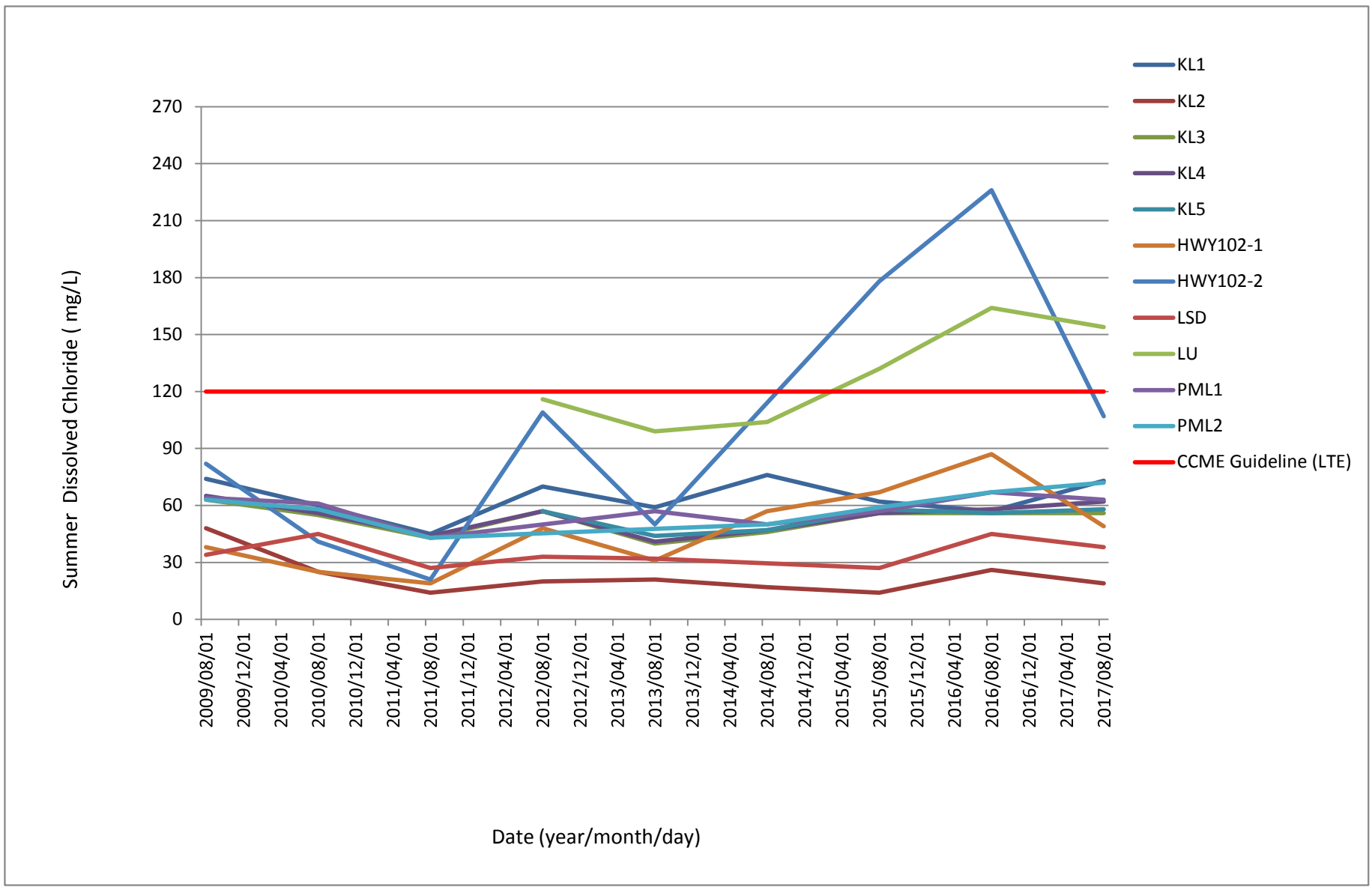


Figure 2 – Summer Dissolved Chloride Concentrations

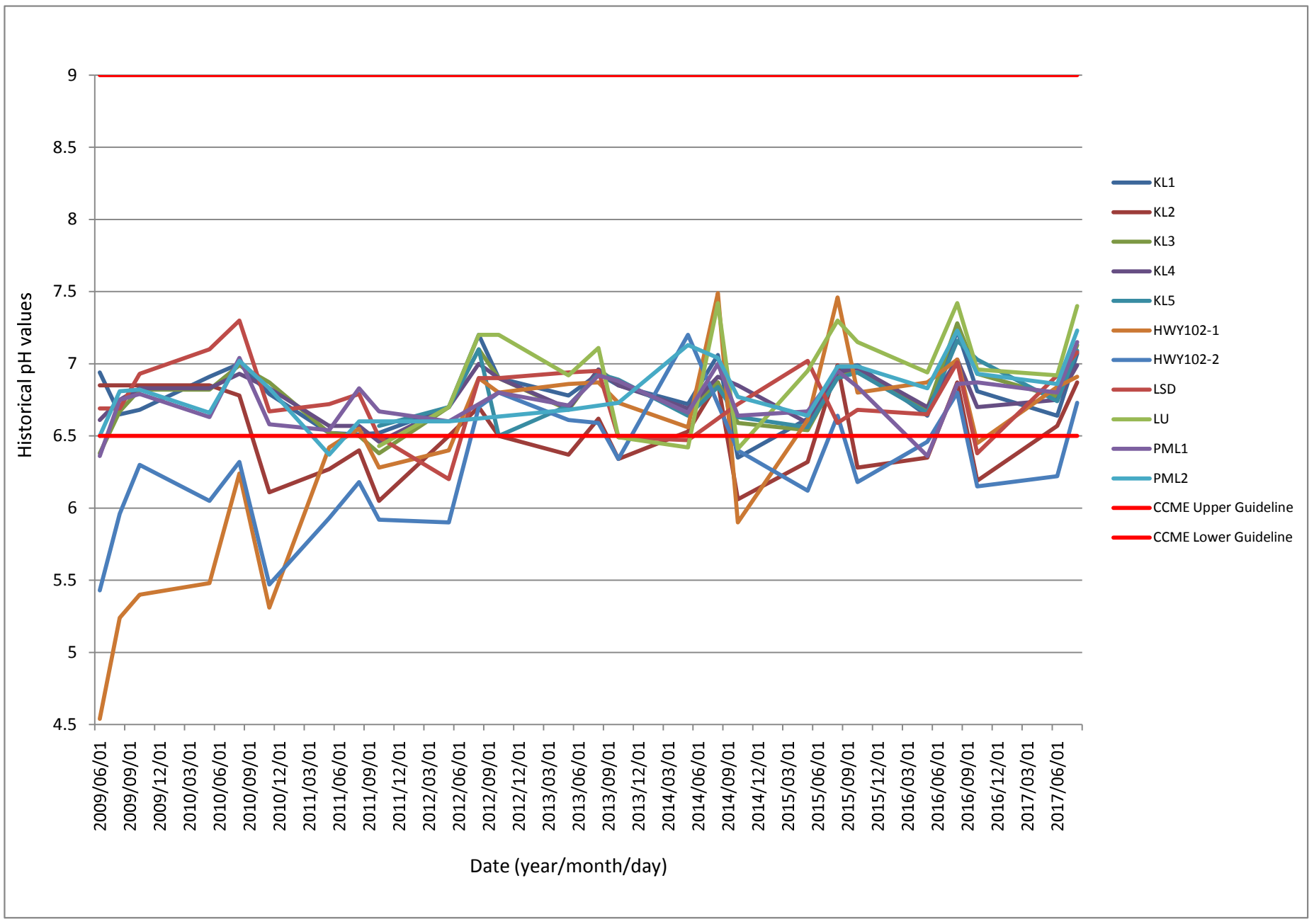


Figure 3 – pH

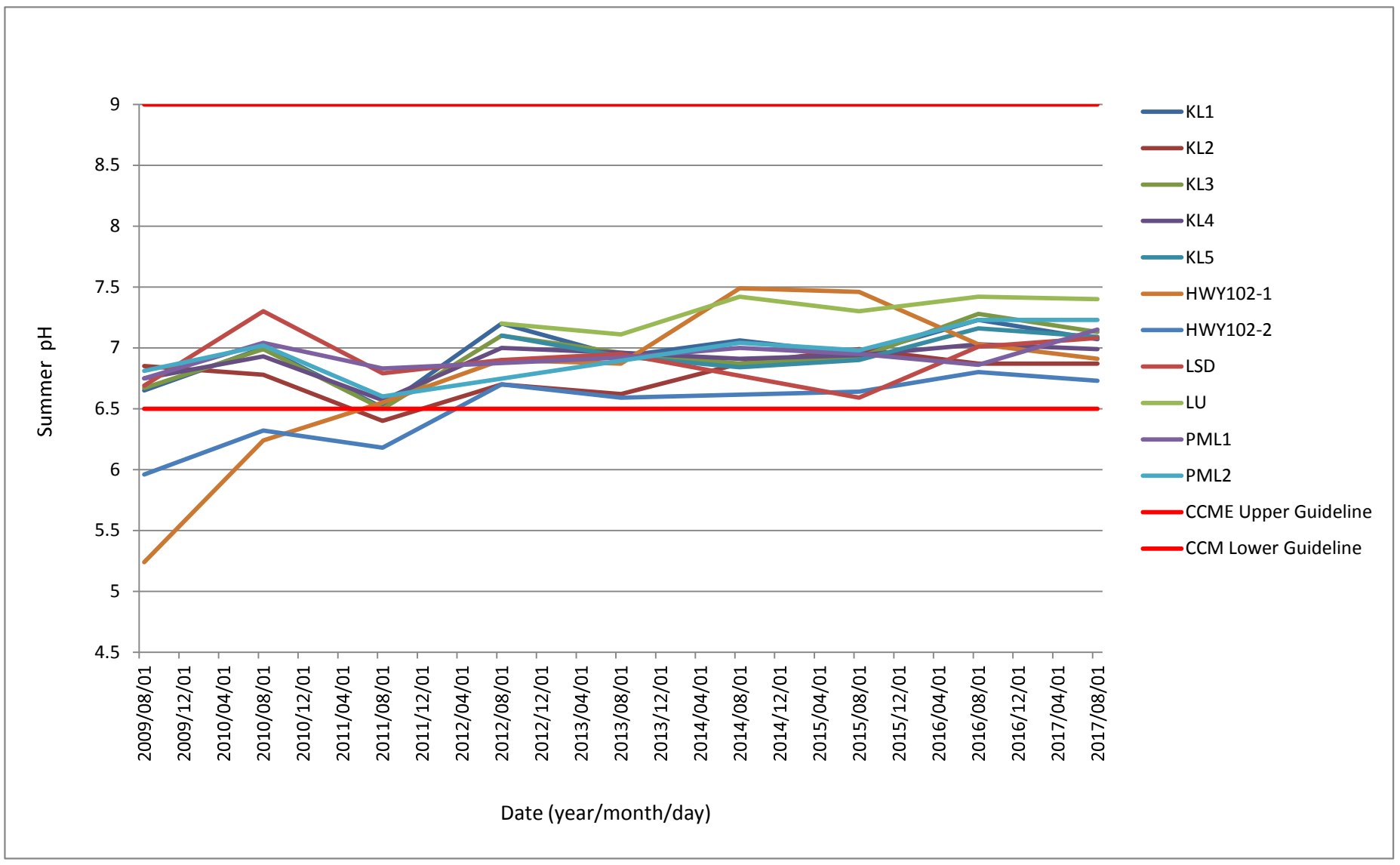


Figure 4 – Summer pH

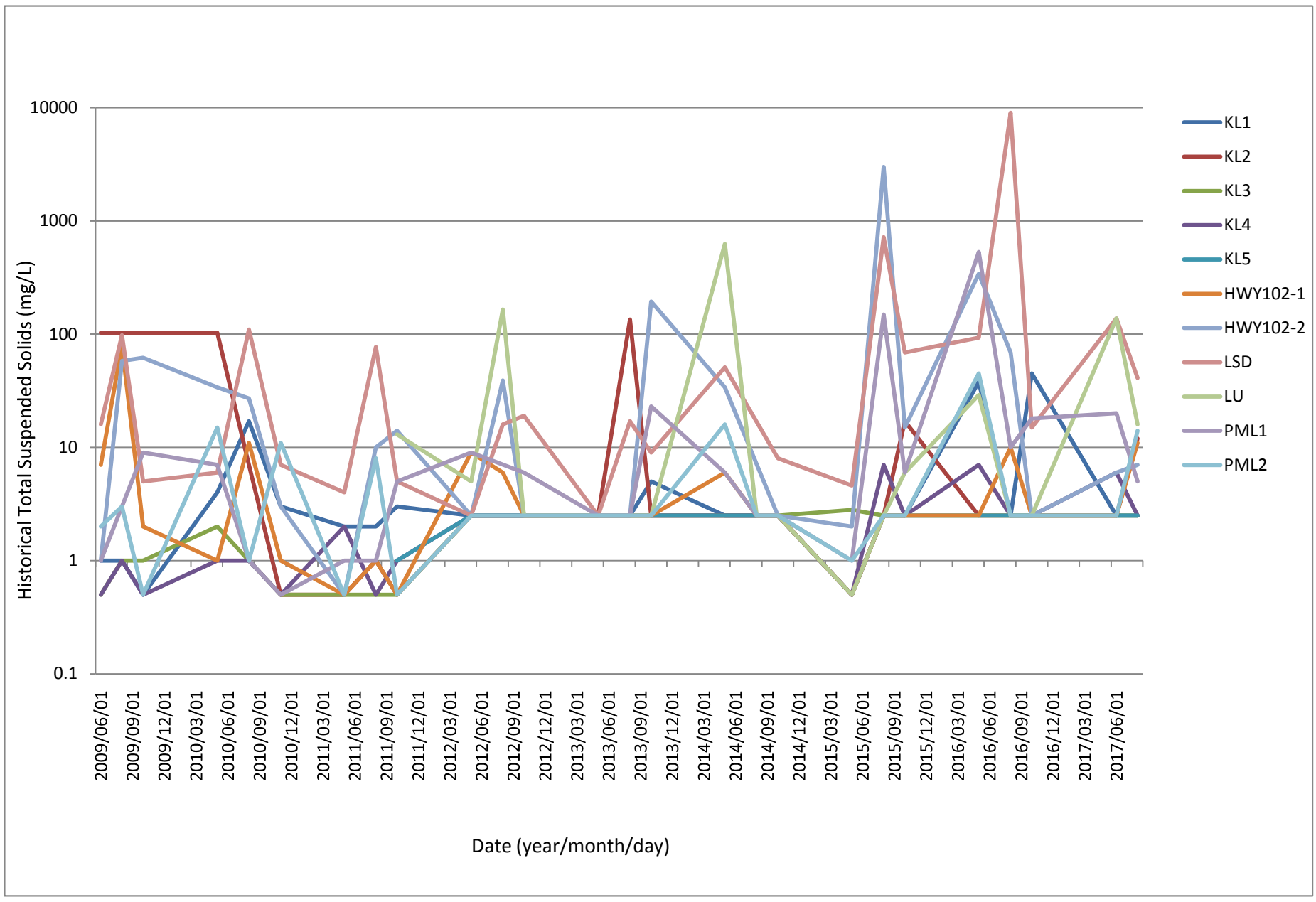


Figure 5 – Total Suspended Solids Concentrations

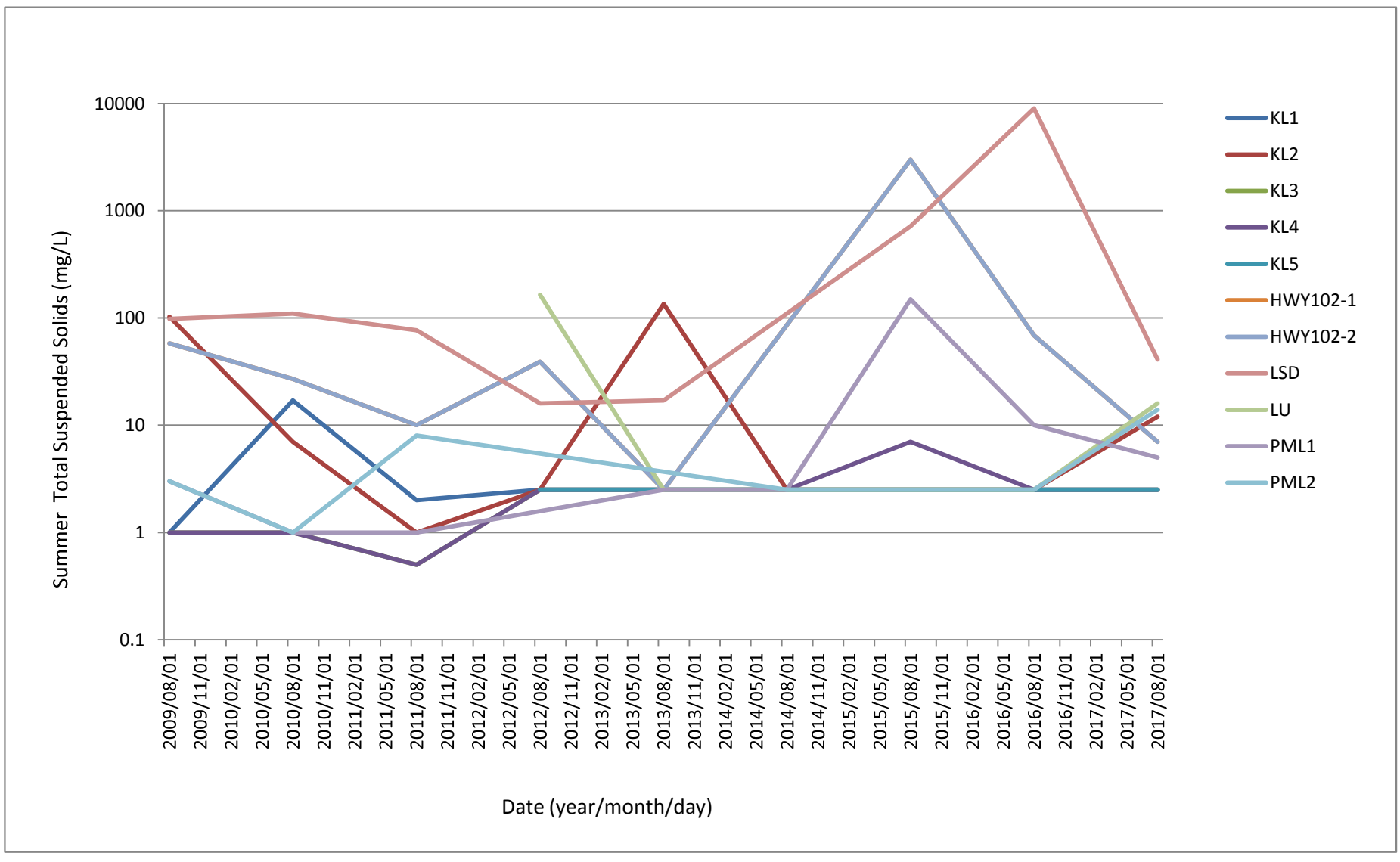


Figure 6 – Summer Total Suspended Solids Concentrations

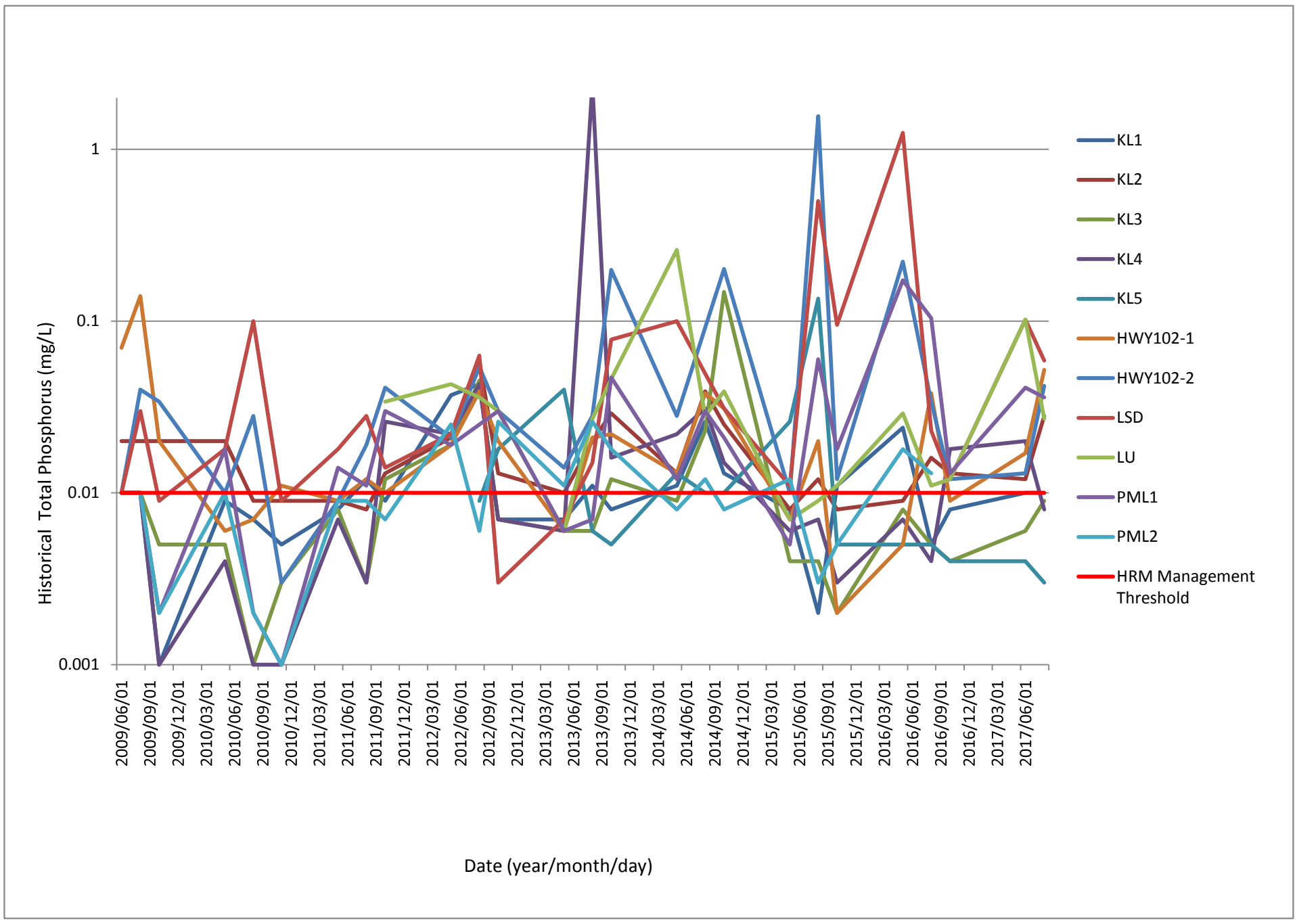


Figure 7 – Total Phosphorus Concentrations

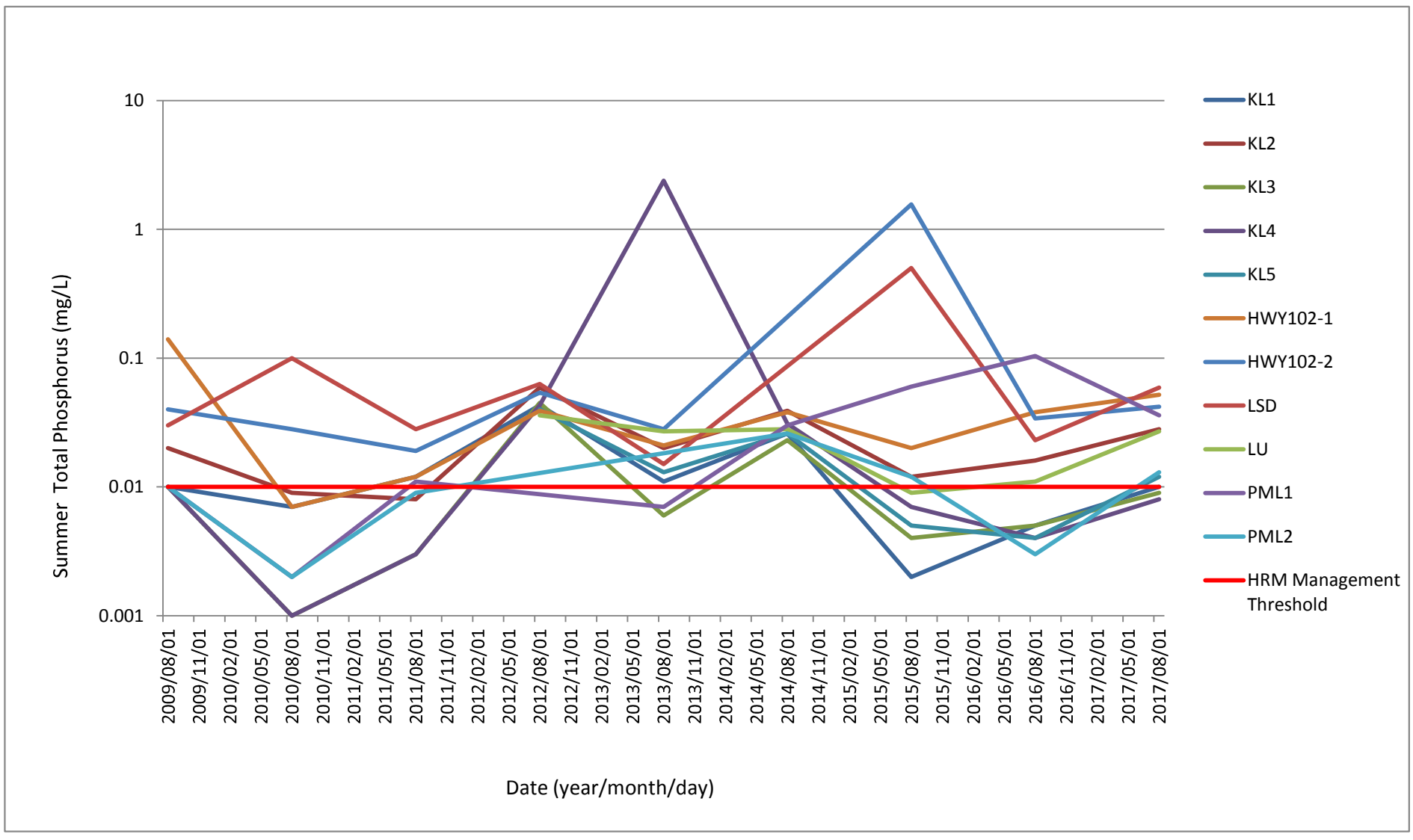


Figure 8 – Summer Total Phosphorus Concentrations

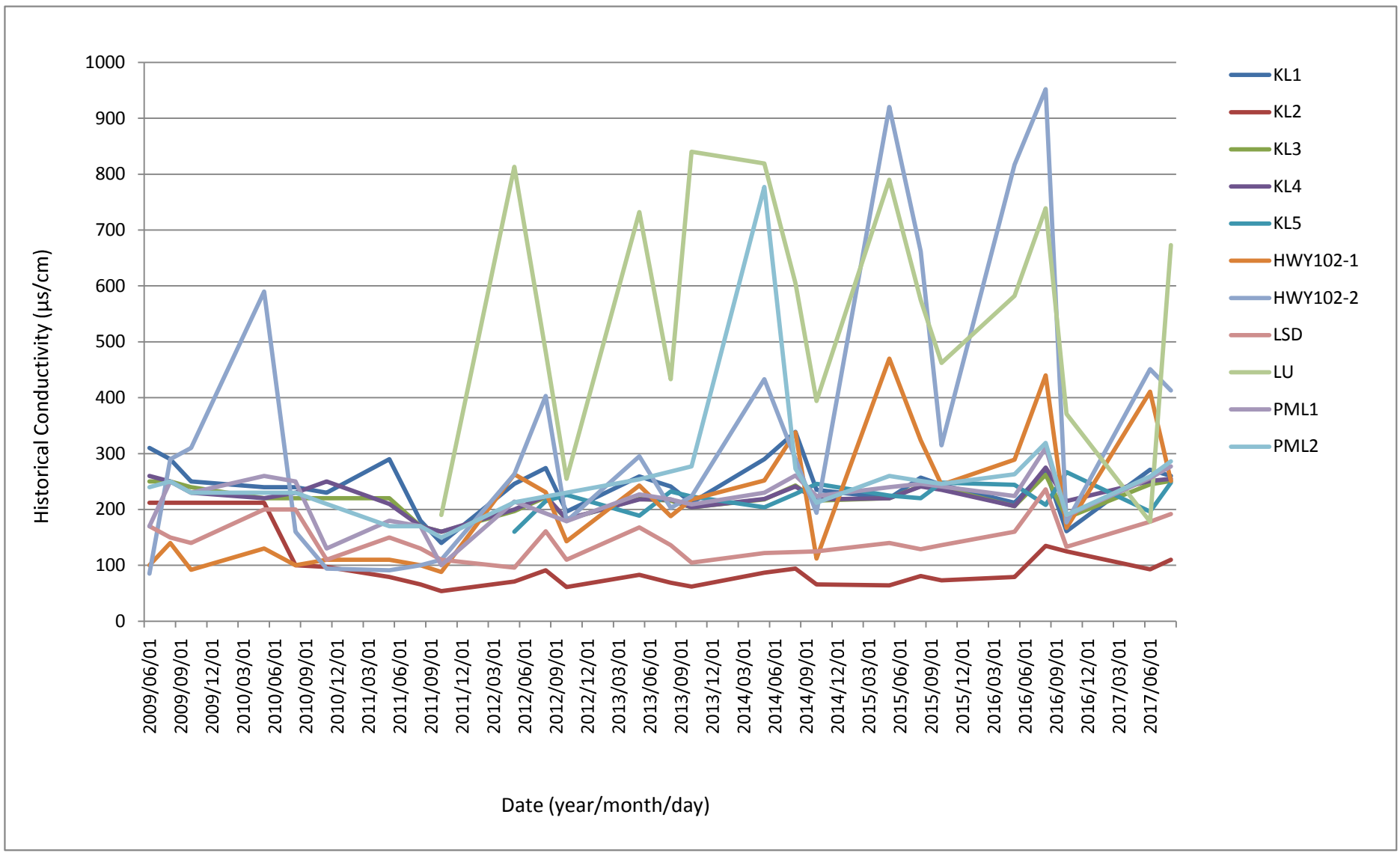


Figure 9 – Conductivity

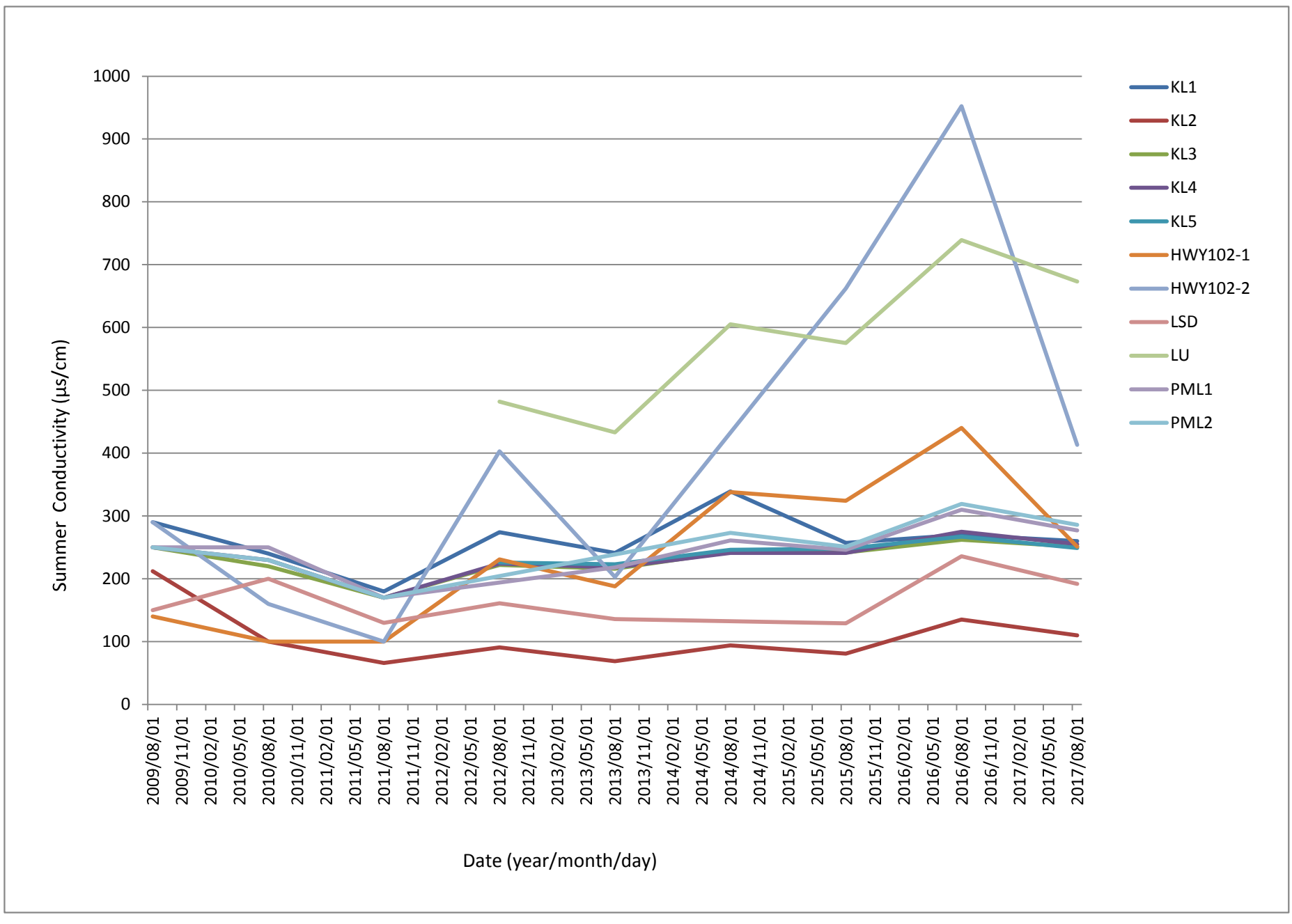


Figure 10 – Summer Conductivity

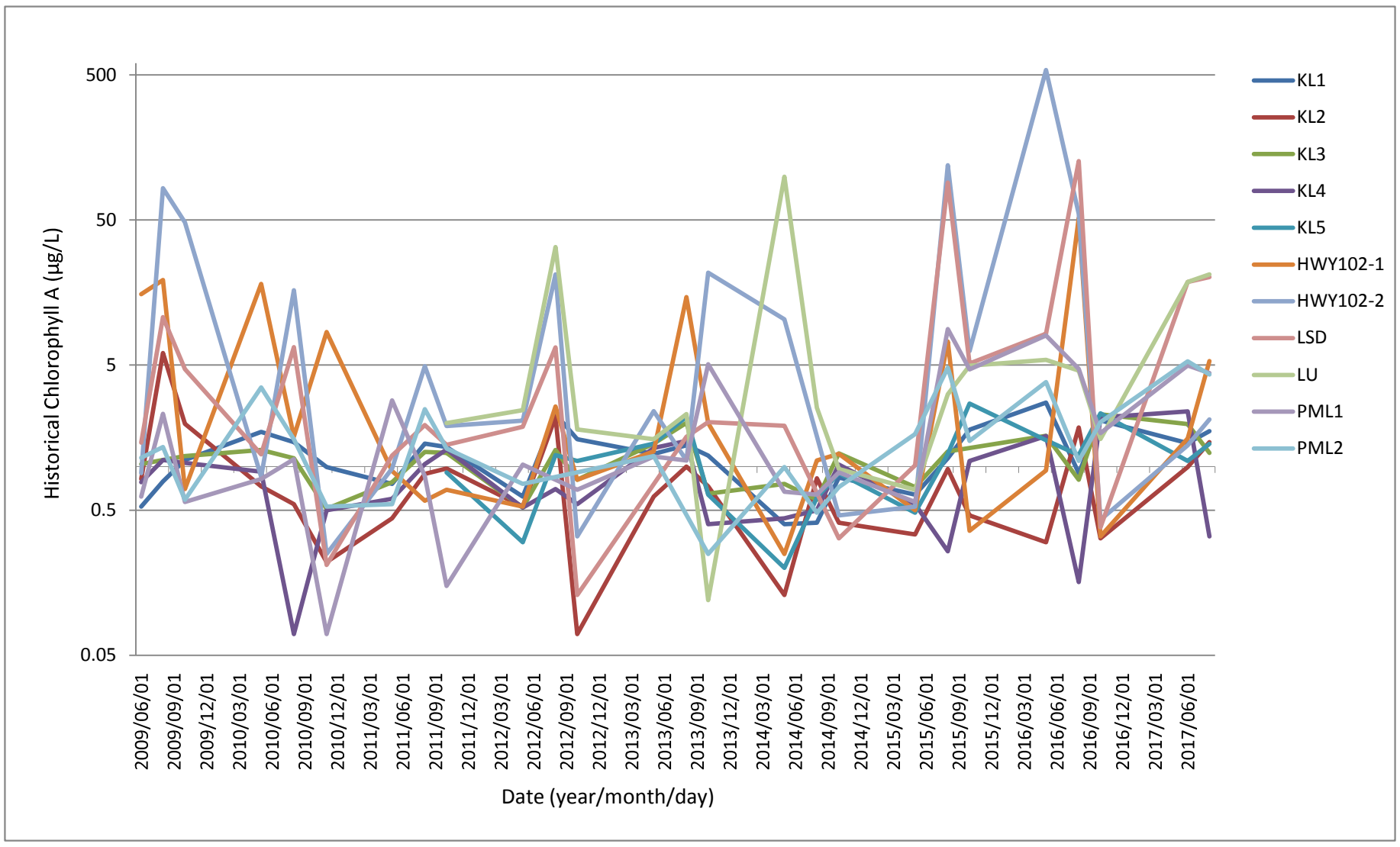


Figure 11 – Chlorophyll A concentrations

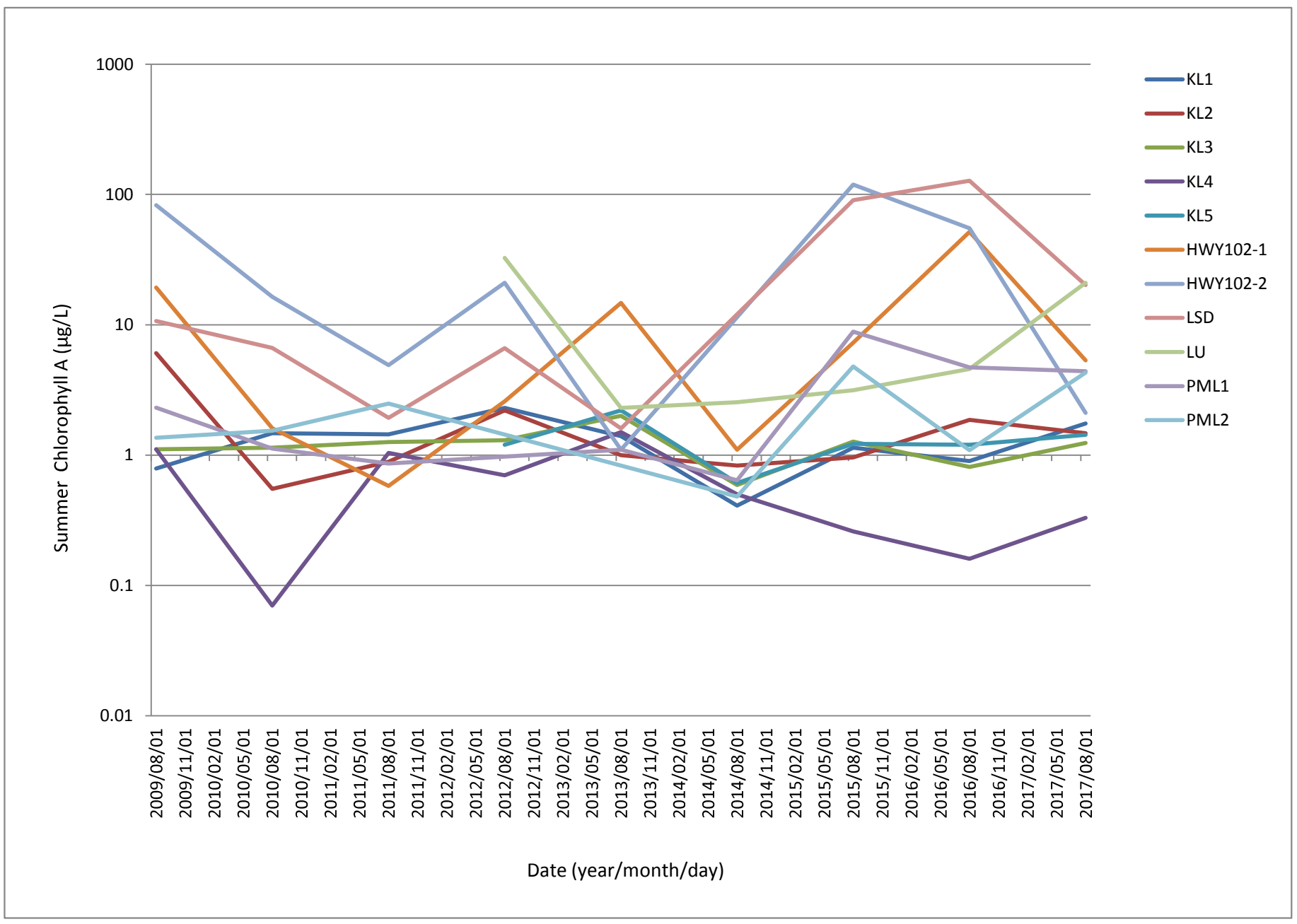
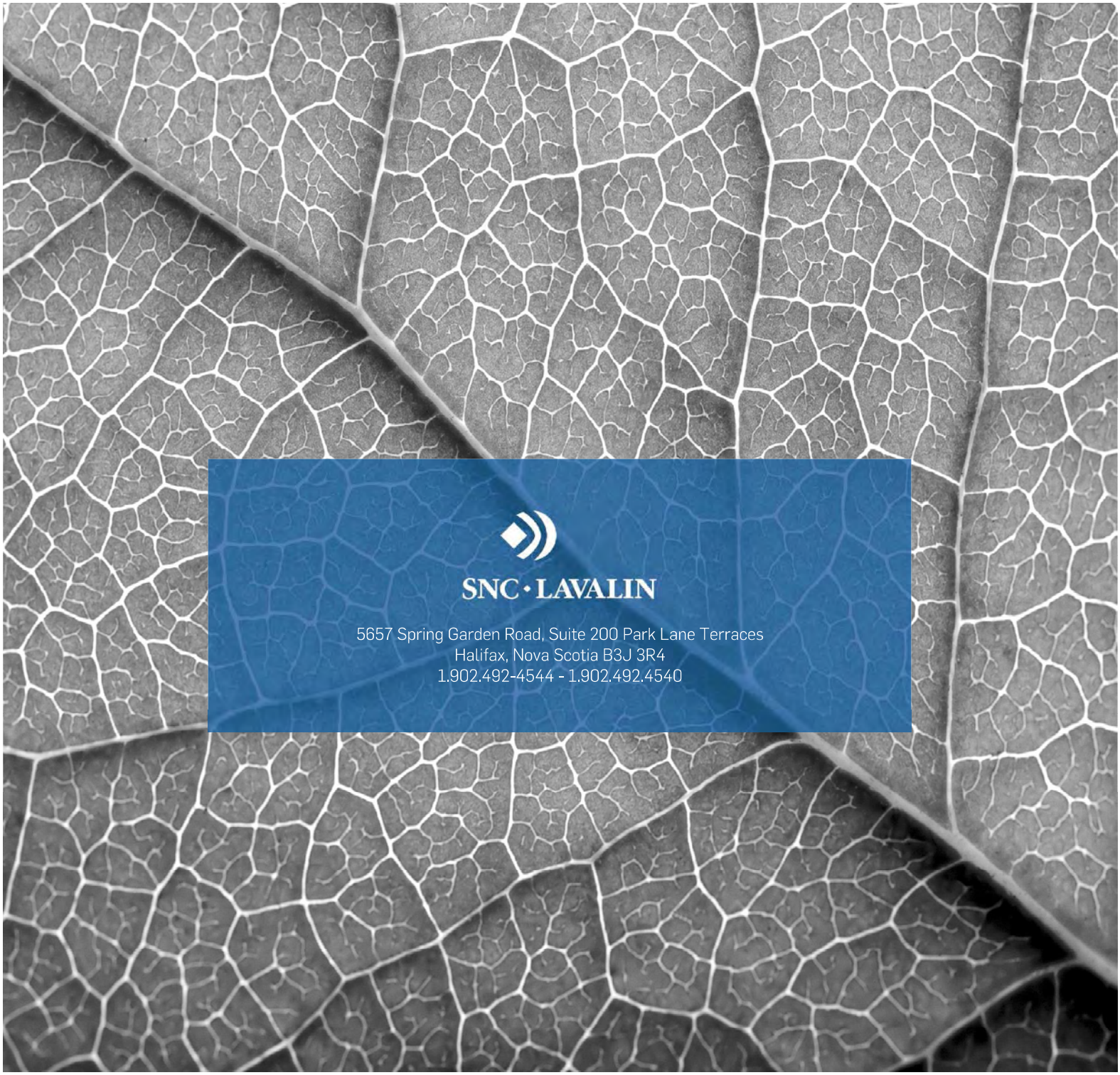


Figure 12 – Summer Chlorophyll A concentrations



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