P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 2
North West Community Council
January 14, 2019

TO: Chair and Members of North West Community Council

Original Signed

SUBMITTED BY: _____

Kelly Denty, Planning & Development

Original Signed

_____

Jacques Dubé, Chief Administrative Officer

DATE: October 30, 2018

SUBJECT: **Bedford West Water Quality Status Update – Spring & Summer 2018**

INFORMATION REPORT

ORIGIN

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

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

LEGISLATIVE AUTHORITY

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

BACKGROUND

The Bedford West Secondary Planning Strategy, Policy BW-3, requires that a water quality monitoring program be undertaken for the Paper Mill Lake watershed to track the eutrophication process. 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.

The terms of the monitoring program are specified within Development Agreements that have been negotiated in consultation with the Bedford Watershed Advisory Board. 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 (TP) 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 the 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.

DISCUSSION

The purpose of this report is to share the results of the May and August 2018 monitoring events. TP concentrations exceeded the trigger value of 10 µg/L at ten stations in May and six stations in August. The report for spring of 2018 was received on June 21, 2018, and the report for summer 2018 was received on September 27, 2018. The primary delay in reporting the results was due to limited staff resource capacity and their need to attend to other high priority and time sensitive activities during the summer months including blue-green algae response and summer beach oversight.

As noted in the Background section of the report, the Bedford West Development agreement stipulates that results be reported within three months. This provision is based on the assumption that development activity bears some relation to the test results. Consultant research has since pointed out that changes in

water quality cannot be attributed to a single source, and further has recommended that individual developments should not be regulated based on trophic state indicators in a lake.[1]

A summary of TP results observed at all stations during these events is presented below in Table 2. It is important to note that these results only represent water quality at the time that the samples were collected.

Sample Station	May 2018 Concentration (µg/L)	May Exceedance	August 2018 Concentration (µg/L)	August Exceedance
KL1	12	Yes	7	No
KL2	14	Yes	15	Yes
KL3	10	No	10	No
KL4	24	Yes	4	No
KL5	31	Yes	5	No
HWY 102-1	22	Yes	14	Yes
HWY 102-2	34	Yes	25	Yes
LSD	52	Yes	305	Yes
LU	78	Yes	19	Yes
PML1	32	Yes	11	Yes
PML2	47	Yes	5	No

Table 2. Summary of TP results and exceedances May & August 2018.

The final annual monitoring event will be conducted in October, and results from that event will be reported to the North West Community Council in early 2019.

The final report of the Paper Mill Lake Watershed Assessment Study, completed in fall 2016, determined that, although stormwater runoff from residential developments were among the top three sources with significant effects on in-lake mean total phosphorus concentrations, no one source can be identified as the primary cause of recent TP increases." Lessons learned from the water quality monitoring requirements for Bedford West will be applied to future planning areas to more effectively assess potential impacts to water quality from development. Alternative approaches will be considered going forward, such as a focus on the implementation and enforcement of required best management practices.
The final report of the Paper Mill Lake Watershed Assessment Study, completed in fall 2016, determined that, although stormwater runoff from residential developments were among the top three sources with significant effects on in-lake mean total phosphorus concentrations, no one source can be identified as the primary cause of recent TP increases.

FINANCIAL IMPLICATIONS

There are no financial implications for this report.

COMMUNITY ENGAGEMENT

No community engagement was required for this report.

ATTACHMENTS

[1] Presentation by Rob Jamieson, Ph.D., P.Eng. entitled "Phosphorus Loading and Trophic State Assessment in the Paper Mill Lake Watershed", North West Community Council, November 15, 2016.

Attachment A. Bedford West Water Quality Report Spring 2018.
Attachment B. Bedford West Water Quality Report Summer 2018.

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: Peter Duncan, Manager, Infrastructure Planning, 902.489.4634

SNC·LAVALIN

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

June 21, 2018

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: Surface Water Quality Monitoring Program, 2018 Spring Sampling Event, Bedford West, Bedford, Nova Scotia**

SNC-Lavalin Inc. (SLI) is pleased to submit to Halifax Regional Municipality (HRM) one electronic copy of the final report presenting the results of the 2018 spring surface water quality sampling event for the Bedford West Water Quality Monitoring Program in Bedford, Nova Scotia.

This final report addressed the HRM's comments dated June 19, 2018. It should be noted that the final report (revision C01) replaces the draft report (revision B01).

If you have any questions, please contact the undersigned or in his absence, please contact Maria Gutierrez, MSc. at 902.492.4544 Ext 308

Yours truly,

SNC♦LAVALIN INC.

Original signed

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

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Building what matters

Surface Water Quality Monitoring Program, Bedford West.
Bedford West, Nova Scotia Canada

2018 Spring Report - Final

06/21/2018

Prepared for:

Halifax Regional MUnicipality

Attention: Cameron Deacoff, P. Eng.

Environmental Performance Officer

Halifax, NS

PH: (902) 490.1926

Prepared by:

SNC-Lavalin Inc.

5657 Spring Garden Road, Suite 200

Halifax, Nova Scotia, B3J 3R4

PH: (902) 492.4544

EXECUTIVE SUMMARY

On May 8, 2018 SNC-Lavalin Inc. (SNCL) completed the Bedford West water quality monitoring program (2018 spring event) on behalf of Halifax Regional Municipality (HRM). The sampling program consisted of collecting surface water samples from eleven (11) water quality 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 this water quality monitoring event, ten (10) monitoring 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. Exceedances were as follows:

- KL1: 12 µg/L
- KL2: 14 µg/L
- KL4: 24 µg/L
- KL5: 31 µg/L
- HWY-102-1: 22 µg/L
- HWY-102-2: 34 µg/L
- LSD: 52 µg/L
- LU: 78 µg/L
- PML-1: 32 µg/L
- PML-2: 47 µg/L

The following parameters exceeded the CCME and/or Heath Canada water quality guidelines:

- Dissolved Oxygen (In Situ): The CCME guideline of 5.5 - 9.5 mg/L was exceeded at five (5) monitoring stations as follows, KL-1 (11.1 mg/L), KL4 (11.0 mg/L), KL5 (10.4 mg/L), LU(11.3 mg/L) and PM-2 (9.9 mg/L);

- Nitrite: The CCME PAL-F guideline of 0.06 mg/L was exceeded at five (5) monitoring stations as follows, KL1 (0.10 mg/L), KL4 (0.10 ml/L), HWY-102-2 (0.17 mg/L), LU (0.14 mg/L) and PML-1 (0.11mg/L);

- Total Aluminum: All monitoring stations with exception of one station (HWY-102-1) exceeded the CCME PAL-F guideline of 100 µg/L. In addition, all eleven stations exceeded the NSE EQS guideline of 5 µg/L as follows KL1 (169 µg/L), KL2 (228 µg/L), KL3 (164 µg/L), KL4 (157 µg/L), KL5 (172 µg/L), HWY-102-2 (167 µg/L), HWY-102-1 (72 µg/L), LSD (142 µg/L), LU (231 µg/L), PML-1 (151 µg/L) and PML-2 (141 µg/L);
- Total Cadmium: One (1) monitoring station, LU (0.141 µg/L), exceeded the CCME guideline of 0.09 µg/L;
- Total Copper: One (1) monitoring station, LU (4 µg/L), exceeded the CCME guideline of 2 µg/L;
- Total Iron: Two (2) monitoring stations, HWY-102-2 (870 µg/L) and LU (494 µg/L), exceeded the CCME guideline of 300 µg/L;
- Total Lead: Six (6) monitoring stations, KL1 (1.3 µg/L), KL2 (1.2 µg/L), KL4 (1.4 µg/L), HWY102-2 (2.3 µg/L), LU (1.3 µg/L) and PML-1 (1.2 µg/L), exceeded the CCME guideline of 1 µg/L;
- Total Zinc: One (1) monitoring station, LU (41 µg/L), exceeded the CCME guideline of 30 µg/L.

In terms of microbiological analyses, E. Coli was not found in exceedance of the Heath Canada Guideline of 400 CFU/100 mL, at any of the sampling locations. There are not applicable Health Canada guidelines for Total Coliforms in recreation water; however, reported concentrations were above the laboratory RDL of 1 CFU/100mL at nine (9) of the stations as documented in the report.

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1. INTRODUCTION

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 since 2015. The results of the 2018 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 Bedford West development in order to detect any impacts on and/or changes to water quality.

The 2018 spring sampling stations are summarized in Table 1 and shown in Drawing 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

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

SNC•LAVALIN Inc.
Halifax, Nova Scotia, Canada
Telephone: (902) 492-4544
Fax: (902) 492-4540
Member of the SNC•LAVALIN Group

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 2018 spring 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)	Inorganics (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 May 8, 2018.

Field measurements of pH, dissolved oxygen, specific conductivity and water temperature were taken at each station using an YSI Professional Plus multi meter probe with a serial number 17J101123. The instrument is calibrated annually by the manufacturer and a pre-calibration was conducted on May 7, 2018 by the provider (Open Road Environmental Limited) 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 (See Appendix B, Field Reports). Each sample station was photographed during the sample event (See Appendix C, Site Photographs).

Water samples and field parameter readings were collected within a depth of ≤1.0 m below surface. All surface water samples were collected from the shore. 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. APPLICABLE GUIDELINES

For this water quality monitoring program, the Federal and provincial water quality guidelines being used for the assessment of surface water quality results are as follows, the Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Aquatic Life – Freshwater (PAL-F) (Version 2015), the Health Canada (HC) guidelines for Canadian Recreational Water Quality (2012, Third Edition), and 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. These guidelines were used to determine whether a tested parameter was in exceedance. Exceedances may be an indication of water quality impairment or conditions that will eventually lead to impairment. A detail description of the guidelines is presented below:

CCME Guidelines

- The CCME PAL-F guidelines were used for parameters such as dissolved oxygen, pH (In Situ and analytical), Chloride, Nitrate, Nitrite, Nitrogen, as well as for total metals such as Aluminum, Arsenic, Boron, Cadmium, Cooper, Iron, Lead, Molybdenum, Nickel, Selenium, Silver, Thallium, Uranium, and Zinc.
- There is not a CCME recommend value for Total Suspended Solids (TSS), however the following CCME narrative for TSS at high flow was applied “maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is ≥ 250 mg/L”.
- According to CCME, 10 µg/L of total phosphorous is the threshold between oligotrophic and mesotrophic classifications. In the Canadian framework, 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 may trigger the need for further investigation. HRM defined for this monitoring program a Total Phosphorous management threshold value of 10 µg/L or 0.01 mg/L.

HC Guidelines

- The HC guidelines for Canadian Recreational Water Quality was used for parameters such as secchi depth (i.e. visibility at a minimum depth of 1.2 metres), pH guideline of 5.0-9, turbidity (limit of 50 Nephelometric Turbidity Units), and E. coli (i.e. ≤400 E.Coli/100mL).

NSE Guidelines

- The NSE EQS were used for assessment of total metals such as 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 2018 spring 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 parameters such as In Situ pH, dissolved oxygen, water temperature, conductivity and secchi depth (where applicable) were recorded on field data sheets. Collected data is enclosed in Appendix B.

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

In 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

Dissolved oxygen concentrations were outside of the CCME PAL-F recommended range of 5.5-9.5 mg/L at five (5) monitoring stations as follows:

- KL1: 11.1 mg/L
- KL4: 11.0 mg/L
- KL5: 10.4 mg/L
- LU: 11.3 mg/L
- PM-2: 9.9 mg/L

6. ANALYTICAL RESULTS

Analytical results of the 2018 spring monitoring event and applicable/reference guidelines are tabulated in Table D1 enclosed in Appendix D. In addition, historical water quality results since 2009 are summarized in Table D2 enclosed in Appendix D.

Laboratory certificates of analysis for the 2018 spring event are located in Appendix E.

6.1 Total Phosphorous

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

- KL1: 12 µg/L
- KL2: 14 µg/L
- KL4: 24 µg/L
- KL5: 31 µg/L
- HWY-102-1: 22 µg/L
- HWY-102-2: 34 µg/L
- LSD: 52 µg/L
- LU: 78 µg/L
- PML-1: 32 µg/L
- PML-2: 47 µg/L

6.2 General Chemistry

For all inorganic parameters tested, only nitrite exceeded the applicable CCME PAL-F recommended value of 0.06 mg/L at five (5) sampling stations as follows:

- KL1: 0.10 mg/L
- KL4: 0.10 ml/L
- HWY-102-2: 0.17 mg/L
- LU: 0.14 mg/L
- PML-1: 0.11mg/L

6.3 Metals

For the standard/additional metals analyzed, the following metal concentrations reported exceedances above the applicable guidelines:

Aluminum: All of the monitoring stations with exception of HWY-102-1 exceeded the CCME PAL-F guideline of 100 µg/L. In addition, all eleven (11) stations exceeded the NSE EQS aluminum guideline of 5 µg/L. Exceedances were reported as follows:

- KL1: 169 µg/L
- KL2: 228 µg/L
- KL3: 164 µg/L
- KL4 : 157 µg/L
- KL5: 172 µg/L
- HWY-102-1: 72 µg/L
- HWY-102-2: 167 µg/L
- LSD: 142 µg/L
- LU: 231 µg/L
- PML-1: 151 µg/L
- PML-2: 141 µg/L

Cadmium: Station LU (0.14 µg/L) was the only station that exceeded the CCME-PAL-F recommended limit of 0.09 µg/L for cadmium.

Copper: Station LU (4 mg/L) was the only station that exceeded the CCME-PAL-F recommended limit of 2 µg/L (based on a hardness < 82 mg/L) for copper. The NSE EQS guideline is also 2 µg/L.

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

- HWY102-2: 870 µg/L
- LU: 494 µg/L

Lead: Six (6) stations exceeded the CCME-PAL-F recommended limit of 1 µg/L. The NSE EQS guideline is also 1 µg/L. Exceedance was reported as follows:

- KL1: 1.3 µg/L
- KL2: 1.2 µg/L

- KL4: 1.4 µg/L
- HWY102-2: 2.3 µg/L
- LU: 1.3 µg/L
- PML-1: 1.2 µg/L

Zinc: Station LU (41 µg/L) was the only station that exceeded the CCME-PAL-F and NSE EQS recommended limit of 30µg/L.

6.4 Microbiological

Eleven (11) E.coli samples were collected during the spring 2018 sampling event. There were no exceedances of the Heath Canada (HC) E.coli Guideline of ≤ 400 CFU/100 mL.

HC does not have a guideline for Total Coliform in regards to recreational water quality. The lab analysis identifies Total Coliform at a RDL of 1 CFU/100mL. In spring 2018, Total Coliforms concentrations were reported above the lab RDL at nine (9) stations as follows:

- KL1: 14 CFU/100 mL
- KL2: 10 CFU/100 mL
- KL4: 4 CFU/100 mL
- KL5: 58 CFU/100 mL
- HWY-102-1: 105 CFU/100 mL
- HWY-102-2: 6 CFU/100 mL
- LSD: 46 CFU/100 mL
- LU: 210 CFU/100 mL
- PML-1: 9 CFU/100 mL

7. STATISTICAL PRESENTATION

Table 3 in this section of the report provides seasonal statistics for the below six (6) key water quality parameters selected by HRM. Statistics are completed for all eleven (11) water quality sampling stations including water quality data from 2009 to May 2018:

- 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.

TABLE 3: Statistical Presentation of Key Water Quality Parameters - Spring 2018

KL-1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.01	0.01	0.04	0.01	0.01
Chloride (mg/L)	1	53.00	53.00	81.00	66.00	51.00
Lab pH	N/A	6.71	6.52	6.94	6.71	6.77
Total Suspended Solids (mg/L)	5	2.50	0.50	38.00	2.50	2.67
Conductivity (uS/cm)	1	243.00	212.00	310.00	252.50	213.00
Chlorophyll-A acidification method (µg/L)	0.05	1.91	0.40	2.76	0.99	1.33

KL-2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.01	0.01	0.02	0.01	0.01
Chloride (mg/L)	1	12.00	12.00	48.00	19.00	23.40
Lab pH	N/A	6.46	6.27	6.85	6.48	6.51
Total Suspended Solids (mg/L)	5	2.50	0.50	103.00	2.50	22.20
Conductivity (uS/cm)	1	68.00	64.00	212.00	81.00	104.80
Chlorophyll-A acidification method (µg/L)	0.05	0.51	0.13	0.99	0.52	0.54

KL-3	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.01	0.00	0.02	0.01	0.01
Chloride (mg/L)	1	54.00	50.00	66.00	55.50	57.00
Lab pH	N/A	6.72	6.38	6.82	6.69	6.65
Total Suspended Solids (mg/L)	5	2.50	0.50	2.80	2.50	2.08
Conductivity (uS/cm)	1	244.00	197.00	250.00	220.00	223.90
Chlorophyll-A acidification method (µg/L)	0.05	1.16	0.52	1.96	1.10	1.13

KL-4	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.02	0.00	0.02	0.01	0.01
Chloride (mg/L)	1	52.00	51.00	67.00	56.00	58.00
Lab pH	N/A	6.74	6.57	6.83	6.69	6.68
Total Suspended Solids (mg/L)	5	2.50	0.50	7.00	2.50	2.72
Conductivity (uS/cm)	1	243.00	200.00	260.00	219.00	222.67
Chlorophyll-A acidification method (µg/L)	0.05	1.06	0.44	2.40	0.78	1.02

KL-5	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.03	0.00	0.03	0.01	0.01
Chloride (mg/L)	1	56.00	54.00	65.00	58.00	58.29
Lab pH	N/A	6.70	6.56	6.74	6.70	6.67
Total Suspended Solids (mg/L)	5	2.50	0.50	2.50	2.50	2.21
Conductivity (uS/cm)	1	247.00	208.00	248.00	228.00	228.29
Chlorophyll-A acidification method (µg/L)	0.05	6.25	0.20	6.25	1.09	1.61

Note: The number of decimal places presented for each listed parameter is based on the Laboratory RDL.

HWY 102-1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.02	0.01	0.07	0.01	0.02
Chloride (mg/L)	1	51.00	24.00	130.00	55.50	60.90
Lab pH	N/A	7.02	4.54	7.02	6.59	6.36
Total Suspended Solids (mg/L)	5	2.50	0.50	9.00	2.50	3.40
Conductivity (uS/cm)	1	298.00	100.00	470.00	257.50	256.60
Chlorophyll-A acidification method (µg/L)	0.05	1.57	0.25	18.12	1.11	4.11

HWY 102-2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.03	0.01	0.22	0.01	0.04
Chloride (mg/L)	1	79.00	21.00	260.00	96.00	117.00
Lab pH	N/A	6.79	5.43	7.20	6.17	6.27
Total Suspended Solids (mg/L)	5	12.00	0.50	342.00	4.25	43.65
Conductivity (uS/cm)	1	422.00	85.00	920.00	427.50	436.70
Chlorophyll-A acidification method (µg/L)	0.05	2.56	0.53	539.78	1.74	56.18

LSD	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.05	0.01	0.01	0.02	0.16
Chloride (mg/L)	1	23.00	22.00	22.00	38.50	35.50
Lab pH	N/A	6.91	6.20	6.20	6.82	6.76
Total Suspended Solids (mg/L)	5	2.50	2.50	2.50	5.30	32.01
Conductivity (uS/cm)	1	122.00	96.00	96.00	155.00	150.60
Chlorophyll-A acidification method (µg/L)	0.05	0.93	0.03	0.03	1.34	3.65

LU	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.08	0.01	0.26	0.03	0.06
Chloride (mg/L)	1	96.00	96.00	247.00	210.00	194.86
Lab pH	N/A	7.01	6.42	7.26	6.94	6.89
Total Suspended Solids (mg/L)	5	52.00	0.50	626.00	22.00	105.29
Conductivity (uS/cm)	1	518.00	518.00	849.00	790.00	729.00
Chlorophyll-A acidification method (µg/L)	0.05	78.76	0.69	99.13	5.43	30.55

PML1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.03	0.01	0.17	0.02	0.03
Chloride (mg/L)	1	57.00	39.00	67.00	58.00	57.20
Lab pH	N/A	6.84	6.36	6.84	6.65	6.62
Total Suspended Solids (mg/L)	5	2.50	0.50	531.00	4.25	58.05
Conductivity (uS/cm)	1	242.00	170.00	260.00	228.50	224.30
Chlorophyll-A acidification method (µg/L)	0.05	1.93	0.57	8.00	1.10	2.26

PML2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.05	0.01	0.05	0.01	0.02
Chloride (mg/L)	1	46.00	44.00	245.00	63.00	78.10
Lab pH	N/A	6.81	6.37	7.13	6.67	6.71
Total Suspended Solids (mg/L)	5	2.50	0.50	45.00	2.50	8.95
Conductivity (uS/cm)	1	249.00	170.00	777.00	251.50	291.50
Chlorophyll-A acidification method (µg/L)	0.05	1.37	0.55	5.31	1.28	2.03

Note: The number of decimal places presented for each listed parameter is based on the Laboratory RDL.

8. GRAPHS

Appendix F presents seasonal and annual graphs that illustrate concentrations of the below six (6) key water quality parameters selected by HRM. Graphs were completed for all eleven (11) water quality monitoring stations including water quality data collected from 2009 to May 2018:

- 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.

9. CONCLUSIONS

The 2018 spring water quality monitoring event included the 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.

Total Phosphorous

The following station meets the HRM management threshold criteria of 10 µg/L.

- KL3: 10 µg/L

The following ten (10) stations reported total phosphorous concentrations that exceeded the HRM management threshold criteria of 10 µg/L:

- KL1: 12 µg/L
- KL2: 14 µg/L
- KL4: 24 µg/L
- KL5: 31 µg/L
- HWY-102-1: 22 µg/L
- HWY-102-2: 34 µg/L
- LSD: 52 µg/L
- LU: 78 µg/L
- PML-1: 32 µg/L
- PML-2: 47 µg/L

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.

In Situ pH values were within the CCME-PAL-F recommended range of 6.5 - 9.0 pH and the Health Canada Guideline for Recreational Water Quality of 5.0 - 9.0 pH at all eleven stations.

In situ dissolved oxygen concentrations were outside of the CCME PAL-F recommended range of 5.5-9.5 mg/L at five stations: KL1, KL4, KL5, LU, and PM-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 (CCME-PAL-F, edition 2015) and/or the Nova Scotia Environment (NSE) Environmental Quality Standards (EQS) for Surface Water, EQS for Contaminated Sites (NSE 2014):

- Nitrite exceeded the applicable CCME PAL-F recommended value of 0.06 mg/L at five (5) sampling stations as follows: KL1, KL4, HWY-102-2, LU, and PML-1.
- Aluminum: All of the sampling stations with exception of HWY-102-1 exceeded the CCME PAL-F guideline of 100 µg/L. All eleven (11) stations (KL1, KL2, KL3, KL4, KL5, HWY-102-1, HWY-102-2, LSD, LU, PML-1, and PML-2) exceeded the NSE EQS guideline of 5 µg/L.
- Cadmium: One (1) station (LU) exceeded the CCME-PAL-F recommended limit of 0.09 µg/L.
- Copper: One (1) station (LU) exceeded the CCME-PAL-F and NSE EQS guideline of 2 µg/L
- Iron: Two (2) stations (HWY-102-2 and LU) exceeded the CCME-PAL-F and NSE EQS guideline of 300 µg/L
- Lead: Six (6) stations (KL1, KL2, KL4, HWY-102-2, LU, and PML-1) exceeded the CCME-PAL-F and NSE EQS guideline of 1 µg/L
- Zinc: One (1) station (LU) exceeded the CCME-PAL-F recommended limit of 30 µg/L.

Microbiological

The Heath Canada E.coli guideline of ≤ 400 CFU/100 mL was not in exceedance at any of the stations for the 2018 spring event.

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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".

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Canadian Council of Ministers of the Environment guidelines for the Protection of Aquatic Life – Freshwater.

http://st-ts.ccme.ca/en/index.html

Environment Canada, 2005, The Inspector's field sampling manual. Second Edition

http://publications.gc.ca/collections/Collection-R/En40-498-2005-1E.pdf

Health Canada guidelines for Canadian Recreational Water Quality, 2012, Third Edition.

https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-recreational-water-quality-third-edition.html

Nova Scotia Environment, Notification of Contamination Protocol, Table 3 Tier 1 EQS for Surface Water, Revision July 2013

https://novascotia.ca/nse/contaminatedsites/protocols.asp

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 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.

This report was prepared by Maria Gutierrez, BSc. MEM and Cally Baxter BSc., EPt. Please contact me at 709-3680118 Ext 54957 if you have any questions.

Respectfully submitted,

SNC Lavalin Inc.

Michael Smith
Area Lead, Environmental Engineering
Infrastructure Engineering Eastern Canada
SNC-Lavalin Inc.

Appendix A

Instrument Calibration Report

Open Road Environmental Limited

YSI Professional Plus

Serial Number 17J101123 (Quattro)

Calibration Certificate

3 Point Calibration pH (4.00, 7.00,10.00)	*Calibartion solution*	*Specific Conductivity 1413 uS/cm*	*DO 100% @20 Deg.C*
pH 4.00 pass 163.5mV	*Lot#A6239 Exp. Aug-20*	*pass*	*pass*
pH 7.00 pass 13.5	*Lot#A6250 Exp. Aug-18*	*pass*	
pH 10.00 pass -150.2mV	*Lot#165882 Exp. Sept-18*	*pass*	

May 7, 2018

Original signed

Ghislain Pitre, CET

Appendix B

Field Reports

FIELD REPORT – Spring 2018

Project	Surface 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
GPS Coordinates		20T 0445718E, 4948496N (UTM, NAD83)	
SNC Field Personnel		Ryan Flinn / Maria Gutierrez	

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	9°
Cloud Cover	none
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	9:15 am
pH	7.85
Dissolved Oxygen (mg/L)	11.13
Secchi Depth (meters)	2.1 (visible to bottom)
Water Temperature (degrees Celsius)	12.20
Conductivity (µs/cm)	203.1

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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
GPS Coordinates	20T 0443942E, 4949803N (UTM, NAD83)		
SNC Field Personnel	Ryan Flinn / Maria Gutierrez		

Site Conditions

Weather:	Sunny
Air Temperature (degrees Celsius)	15°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	11:00 am
pH	6.21
Dissolved Oxygen (mg/L)	9.41
Secchi Depth (meters)	N/A
Water Temperature (degrees Celsius)	11.7
Conductivity (µs/cm)	57.4

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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
GPS Coordinates	20T 0444390E, 4950406N (UTM, NAD83)		
SNC Field Personnel	Ryan Flinn / Maria Gutierrez		

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	14°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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 downhill 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)	May 8, 208
Time (hh:mm)	10:30 am
pH	6.66
Dissolved Oxygen (mg/L)	7.33
Secchi Depth (m)	N/A
Water Temperature (degrees Celsius)	12.1
Conductivity (µs/cm)	190.3

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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
GPS Coordinates	20T 0444463E, 4950571N (UTM, NAD83)		
SNC Field Personnel	Ryan Flinn / Maria Gutierrez		

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	14°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	10:45 am
pH	7.01
Dissolved Oxygen (mg/L)	11.01
Secchi Depth (m)	N/A
Water Temperature (degrees Celsius)	12.7
Conductivity (µs/cm)	202.9

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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
GPS Coordinates	20T 4949142E, 445280N (UTM, NAD83)		
SNC Field Personnel	Ryan Flinn / Maria Gutierrez		

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	11°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	9:30 am
pH	6.74
Dissolved Oxygen (mg/L)	10.42
Secchi Depth (meters)	3.1
Water Temperature (degrees Celsius)	12.70
Conductivity (µs/cm)	196.40

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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
GPS Coordinates	20T 0444708E, 4951644N (UTM, NAD83)		
SNC Field Personnel	Ryan Flinn / Maria Gutierrez		

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	15°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	12:30 pm
pH	6.13
Dissolved Oxygen (mg/L)	7.09
Secchi Depth (m)	N/A
Water Temperature (degrees Celsius)	14.4
Conductivity (µs/cm)	332.2

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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	
GPS Coordinates	20T 0444829E, 4951778N (UTM, NAD83)	
SNC Field Personnel	Ryan Flinn / Maria Gutierrez	

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	20°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	12:30
pH	6.13
Dissolved Oxygen (mg/L)	8.75
Secchi Depth (m)	N/A
Water Temperature (degrees Celsius)	14.9
Conductivity (µs/cm)	355.6

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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	
GPS Coordinates	20T 0442583E, 4950431N (UTM, NAD83)	
SNC Field Personnel	Ryan Flinn / Maria Gutierrez	

Site Conditions

Weather:	Sunny
Air Temperature (degrees Celsius)	14°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	11:30 am
pH	5.82
Dissolved Oxygen (mg/L)	9.08
Secchi Depth (m)	N/A
Water Temperature (degrees Celsius)	14.4
Conductivity (µs/cm)	75

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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	
GPS Coordinates	20T 0444954E, 4949891N (UTM, NAD83)	
SNC Field Personnel	Ryan Flinn / Maria Gutierrez	

Site Conditions

Weather:	Sunny
Air Temperature (degrees Celsius)	14°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	10:00 am
pH	6.73
Dissolved Oxygen (mg/L)	11.34
Secchi Depth (m)	N/A
Water Temperature (degrees Celsius)	14.3
Conductivity (µs/cm)	434.6

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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	
GPS Coordinates	20T 0445129E, 4951154N (UTM, NAD83)	
SNC Field Personnel	Ryan Flinn / Maria Gutierrez	

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	15°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	1:00 pm
pH	6.29
Dissolved Oxygen (mg/L)	9.44
Secchi Depth (meters)	4.1
Water Temperature (degrees Celsius)	14.4
Conductivity (µs/cm)	203.7

Additional Comments / Notes

FIELD REPORT – Spring 2018

Project	Surface 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	
GPS Coordinates	20T 0445363E, 4951740N (UTM, NAD83)	
SNC Field Personnel	Ryan Flinn / Maria Gutierrez	

Site Conditions

Weather	Sunny
Air Temperature (degrees Celsius)	15°
Cloud Cover	None
Wildlife Sightings	N/A
Site Accessibility	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)	May 8, 2018
Time (hh:mm)	1:30 pm
pH	6.33
Dissolved Oxygen (mg/L)	9.91
Secchi Depth (m)	2.9 (visible on bottom)
Water Temperature (degrees Celsius)	15.3
Conductivity (µs/cm)	214.4

Additional Comments / Notes

Appendix C

Site Photographs

Photo 1: KL1 Kearney Lake Sample Location

Photo 2: KL2 Kearney Lake Sample Location.

Photo 3: KL3 Kearney Lake Sample Location

Photo 4: KL4 Kearney Lake Sample Location

Photo 5: KL5 Kearney Lake Sample Location

Photo 6: HWY 102-1 Sample Location

Photo 7: HWY102-2 Sample Location

Photo 8: LSD Lake Shore Drive Sample Location

Photo 9: LU Larry Uteck Sample Location

Photo 10: PML-1 Paper Mill Lake Sample Location

Photo 11: PML-2 Paper Mill Lake Sample Location

Appendix D

Summary Table Results (Seasonal and Historical)

TABLE D1: 2018 Spring Results and Exceedances, Bedford West Water Quality Sampling Program

Tested Parameters		RDL	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2
Sampling Date						2018/05/08	2017/05/08	2018/05/08	2018/05/08	2018/05/08	2018/05/08	2018/05/08	2018/05/08	2018/05/08	2018/05/08	2018/05/08
Sampling Time						9:15 AM	11:00 AM	10:30	10:45 AM	9:30	12:40	12:30	11:30	10:00	13:00	13:30
Field Data (in Situ)																
Secchi Depth	Meters	--	--	minimum of 1.2	--	2.1	2.1	N/A	N/A	3.1	N/A	N/A	N/A	N/A	4.1	2.9
Water Temp	Celsius	--	--	--	--	12.2	11.7	12.1	12.7	12.7	14.4	14.9	14.4	14.3	14.4	15.3
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5	**11.1**	9.4	7.3	**11.0**	**10.4**	7.1	8.8	9.1	**11.3**	9.4	**9.9**
pH	pH	--	--	5.0-9.0	6.5 - 9.0	7.9	6.2	6.7	7.0	6.74	6.1	6.1	5.8	6.7	6.3	6.3
Specific Conductance (µs/cm)	uS/cm	--	--	--	--	203.1	57.4	190.3	202.9	196.4	232.2	355.6	75.0	434.6	203.7	214.4
Inorganic Parameters																
Alkalinity	mg/L	5	--	--	--	<5	<5	<5	<5	<5	13	9	9	11	<5	5
Chloride	mg/L	1	--	--	120	53	12	54	52	56	51	79	23	96	57	46
True Color	TCU	5	--	--	--	42	82	63	35	34	27	25	36	28	28	31
Nitrate + Nitrite as N	mg/L	0.05	--	--	--	0.26	0.07	0.17	0.27	0.17	0.37	0.33	0.32	1.01	0.51	0.17
Nitrate as N	mg/L	0.05	--	--	13	0.16	0.07	0.17	0.17	0.17	0.37	0.16	0.32	0.87	0.40	0.17
Nitrite as N	mg/L	0.05	--	--	0.06	**0.10**	<0.05	<0.05	**0.10**	<0.05	<0.05	**0.17**	<0.05	**0.14**	**0.11**	<0.05
Ammonia as N	mg/L	0.03	--	--	18	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--	<0.4	<0.4	<0.4	<0.4	<0.4	1.1	1.4	<0.4	1.1	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--	5.1	9.0	5.1	5.1	4.9	5.0	5.6	5.8	9.3	4.9	4.9
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		--	--	5.0-9.0	6.5 - 9.0	6.71	6.46	6.72	6.74	6.70	7.02	6.79	6.91	7.01	6.84	6.81
Calcium	mg/L	0.1	--	--	--	5.8	2.3	6.0	5.9	5.9	12.5	11.5	4.4	12.7	6.3	6.7
Magnesium	mg/L	0.1	--	--	--	1.0	0.7	1.0	1.0	1.0	1.8	1.4	1.1	1.6	1.1	1.1
Total Phosphorus	mg/L	0.002	--	--	0.01	**0.012**	**0.014**	0.010	**0.024**	**0.031**	**0.022**	**0.034**	**0.052**	**0.078**	**0.032**	**0.047**
Potassium	mg/L	0.1	--	--	--	0.7	0.5	0.7	0.7	0.7	1.6	1.3	0.9	2.2	0.9	0.9
Sodium	mg/L	0.1	--	--	--	36.4	9.2	35.9	35.6	37.2	41.2	59.4	16.5	73.0	35.5	37.5
Reactive Silica as SiO2	mg/L	0.5	--	--	--	2.6	2.3	2.6	2.6	2.4	2.5	1.6	2.4	3.5	2.7	2.5
Total Suspended Solids	mg/L	5	--	--	25**	<5	<5	<5	<5	<5	<5	12	<5	52	<5	<5
Sulphate	mg/L	2	--	--	--	8	3	8	8	8	12	9	5	19	9	7
Turbidity	NTU	0.1	--	50	--	1.3	0.9	1.0	1.2	1.4	1.7	7.0	2.0	21.4	0.7	1.4
Conductivity	umho/cm	1	--	--	--	243	68	244	243	247	298	422	122	518	242	249
Calculated Parameters																
Anion Sum	me/L		--	--	--	1.68	0.41	1.70	1.65	1.76	1.97	2.62	0.96	3.40	1.83	1.56
Bicarb. Alkalinity (as CaCO3)	mg/L	5	--	--	--	<5	<5	<5	<5	<5	13	9	9	11	<5	5
Calculated TDS	mg/L	1	--	--	--	106	28	107	105	110	130	170	58	216	112	103
Carb. Alkalinity (as CaCO3)	mg/L	10	--	--	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cation sum	me/L	--	--	--	--	2.00	0.62	1.98	1.96	2.04	2.62	3.36	1.08	4.04	1.99	2.10
Hardness	mg/L	--	--	--	--	18.6	8.6	19.1	18.9	18.9	38.6	34.5	15.5	38.3	20.3	21.3
% Difference/ Ion Balance (NS)	%	--	--	--	--	8.6	20.8	7.6	8.6	7.3	14.0	12.4	6.0	8.7	4.2	14.9
Langelier Index (@20C)	NA	--	--	--	--	-3.42	-4.02	-3.39	-3.38	-3.42	-2.37	-2.81	-3.06	-2.47	-3.26	-3.25
Langelier Index (@ 4C)	NA	--	--	--	--	-3.74	-4.34	-3.71	-3.70	-3.74	-2.69	-3.13	-3.38	-2.79	-3.58	-3.57
Saturation pH (@ 20C)	NA	--	--	--	--	10.1	10.5	10.1	10.1	10.1	9.39	9.60	9.97	9.48	10.1	10.1
Saturation pH (@ 4C)	NA	--	--	--	--	10.4	10.8	10.4	10.4	10.4	9.71	9.92	10.3	9.80	10.4	10.4
Metals (ICP-MS)																
Total Aluminum	ug/L	5	5	--	100 ug/L (pH ≥6.5)	**169**	**228**	**164**	**157**	**172**	72	**167**	**142**	**231**	**151**	**141**
Total Antimony	ug/L	2	20	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Arsenic	ug/L	2	5.0	--	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Barium	ug/L	5	1000	--	--	12	7	14	15	13	68	96	8	110	19	21
Total Beryllium	ug/L	2	5.3	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Bismuth	ug/L	2	--	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron	ug/L	5	1200	--	1500	5	7	5	6	5	11	7	10	9	6	6
Total Cadmium	ug/L	0.017	0.01	--	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	**0.14**	<0.09	<0.09
Total Chromium	ug/L	1	---	--	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Cobalt	ug/L	1	10	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Copper	ug/L	1	2	--	2 ug/L (hardness < 82 mg/L)	<1	<1	<1	<1	<1	1	2	<1	**4**	<1	<1
Total Iron	ug/L	50	300	--	300	96	148	81	83	80	85	**870**	239	**494**	93	104
Total Lead	ug/L	0.5	1	--	1 ug/L (base on hardness)	**1.3**	**1.2**	0.7	**1.4**	0.9	0.8	**2.3**	0.7	**1.3**	**1.2**	<0.5
Total Manganese	ug/L	2	820	--	--	28	17	21	19	24	9	55	55	91	21	20
Total Molybdenum	ug/L	2	73	--	73	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L	2	25	--	25 ug/L (base on hardness)	<2	<2	<2	<2	<2	6	<2	<2	<2	2	<2
Total Selenium	ug/L	1	1.0	--	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Silver	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	<0.1	<0.1
Total Strontium	ug/L	5	21000	--	--	26	10	27	27	28	54	53	17	56	27	29
Total Thallium	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	<0.1	<0.1
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	4	3	6	<2	<2
Total Uranium	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
Total Vanadium	ug/L	2	6	--	--	<2	<2	<2	<2	<2	<2	<2	<2	2	<2	<2
Total Zinc	ug/L	5	30	--	30	8	<5	6	7	8	6	12	<5	**41**	6	5
Microbiological Parameters																
Total Coliforms	CFU/100 mL	1	--	--	--	14	10	<1	4	58	105	6	46	210	9	1
E. Coli	CFU/100 mL	1	--	400	--	5	4	<1	2	8	<1	1	23	<1	1	<1
Chlorophyll A - Acidification Method	ug/L	0.05	--	--	--	1.91	0.51	1.16	1.06	6.25	1.57	2.56	0.93	78.76	1.93	1.37
Chlorophyll A - Welschmeyer Method	ug/L	0.05	--	--	--	3.09	0.91	1.8	1.71	3.35	2.62	4.28	1.6	131.56	0.98	2.22

RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / no parameter tested.
Nova Scotia Environmental Quality Standards
Health Canada Guidelines for Canadian
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 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 PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

Bold and Black Shaded Concentration exceeds CCME FWAL applicable guideline.

Underlined and Black Shaded Concentration exceeds NSE EQS Contaminated Sites Regulations and/or Health Canada Guideline for Recreational Water Quality (Reference Guidelines)

TABLE D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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)	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	2017/10/18	2018/05/08
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	9:30 AM	9:35 AM	9:15 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	2.4	5.4	N/A	2.5	2.0	2.9	2.4	2.7	2.5	NCC	N/A	2.2	1.8	2.1	2.5	2.1	2.2	2.2	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	14.1	26.1	9.4	12.8	22.2	11.9	16.6	23.2	14.1	12.2
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.8	8.2	7.0	9.1	7.9	10.5	10.7	8.2	9.2	9.0	7.9	8.7	9.8	8.6	8.3	15.3	7.2	8.1	9.6	8.1	7.4	14.0	10.3	12.1	8.3	7.9	8.2	11.1
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.2	6.8	6.7	7.2	7.3	6.6	6.6	6.2	6.0	8.7	6.9	6.3	6.3	8.2	6.4	6.7	7.5	6.4	8.3	7.0	7.0	8.3	4.6	6.2	7.5	7.0	7.8	7.9
Specific Conductance	uS/cm	--	--	--	--		263.0	299.0	261.0	248.0	242.0	218.7	288.0	178.6	146.3	277.0	279.0	198.1	243.0	216.5	217.9	547.0	341.0	223.0	0.2	298.3	238.5	239.0	298.0	212.4	240.0	292.0	312.0	203.1
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	6	7	5	8	6	<5	8	10	<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	73	60	53
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	12	42
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.18	0.09	0.12	0.21	0.16	0.23	0.20	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	0.10	0.26
Nitrate (N)	mg/L	0.05	--	--	13		0.18	--	--	0.21	0.16	--	0.20	--	--	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	0.10	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	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.07	<0.05	0.12	0.21	<0.05	0.10
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	0.04	<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	0.2	4.5	0.4	0.7	<0.4	0.6	<0.4	<0.4	<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	4.8	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	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.9	6.7	6.7	6.9	7.0	6.8	6.5	6.5	6.5	6.7	7.2	6.9	6.8	6.9	6.9	6.7	7.1	6.4	6.6	7.0	7.0	6.6	7.2	6.8	6.6	7.1	7.0	6.71
Total Calcium (Ca)	mg/L	0.1	--	--	--		9.2	8.5	7.2	7.7	8.7	8.3	7.7	4.8	5.3	6.8	8.4	6.3	7.5	6.6	6.5	8.1	11.0	6.0	6,400.0	7.9	6.1	6.8	8.0	6.3	8.6	7.1	8.3	5.8
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.5	1.4	1.2	1.4	1.4	1.3	1.3	0.9	1.1	1.1	1.5	1.5	1.1	1.2	1.2	1.6	1.6	0.9	920.0	1.3	0.9	1.1	1.1	1.2	1.3	1.2	1.3	1.0
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.020	<0.020	<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	0.013	0.008	0.002	0.011	0.024	0.005	0.008	0.010	0.010	0.005	0.012
Total Potassium (K)	mg/L	0.1	--	--	--		1.1	0.9	1.3	0.9	0.9	0.9	0.8	0.8	0.9	0.7	0.9	0.9	0.8	0.7	1.1	0.9	1.6	0.7	680.0	0.9	0.7	0.7	0.9	0.8	1.0	0.9	1.2	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		51.0	46.0	37.0	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	33.0	43.3	39.8	35.5	32.2	31.0	44.9	50.3	35.7	36.4
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	1.8	2.6
Total Suspended Solids	mg/L	5	--	--	25		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	<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	9	10	8	10	10	10	11	9	10	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	0.8	1.0	1.3	0.6	1.0	1.0	1.0	0.9	2.4	0.8	1.3	1.6	3.3	0.5	2.9	0.7	1.9	0.8	1.9	1.1	10.6	0.9	2.6	1.4	1.1	0.8	1.3
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	249	243
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	2.11	1.68
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	<5	5	6	7	5	8	6	<5	8	10	<5
Calculated TDS	mg/L	1	--	--	--		166	151	131	123	125	118	143	92	77	139	137	98	124	104	103	172	165	99	120	130	119	113	115	99	139	148	123	106
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	<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	2.12	2.00
Hardness (CaCO3)	mg/L	N/A	--	--	--		29.00	27.00	23.00	25.00	27.00	26.00	24.00	16.00	18.00	21.50	27.20	21.90	23.30	21.40	21.20	26.80	34.10	18.70	20.00	25.10	18.90	21.50	24.50	20.70	26.80	22.70	26.10	18.6
Ion Balance (% Difference)	%	N/A	--	--	--		2.33	0.98	2.53	4.95	0.48	2.80	1.89	11.00	0.79	5.90	2.10	5.30	0.70	7.30	3.40	5.80	7.50	17.20	3.66	7.50	4.50	4.10	1.50	6.20	6.10	4.80	0.20	8.6
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	-2.68	-3.42
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	-3.10	-3.00	-3.74
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	10.00	10.10	9.87	9.23	9.42	10.10	9.83	9.92	9.96	10.10	9.79	10.00	9.97	9.85	9.68	10.1
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	10.20	10.40	10.30	10.40	10.20	9.55	9.74	10.40	10.10	10.20	10.30	10.40	10.10	10.30	10.30	10.20	10.00	10.4
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		230	--	--	289	48	--	338	--	--	321	43	168	191	120	56	229	42	155	100	--	88	206	--	--	158	41	46	169
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	--	<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	--	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	19	16	--	13	--	--	12	15	9	12	7	16	14	20	9	16	--	17	14	--	--	16	--	17	12
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	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	11	9	--	<50	--	--	<5	11	33	6	10	9	7	22	10	<50	--	<5	8	--	--	<5	--	26	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	--	<0.017	<0.09
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	--	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		1	--	--	1	<0.40	--	1	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	6	<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	1	<1
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	116	96
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	--	<0.5	1.3
Total Manganese (Mn)	µg/L	2	820	--	--		100	--	--	79	57	59	78	52	56	48	65	68	73	48	24	48	115	42	39	41	22	47	23	45	46	31	17	28
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	--	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		5	--	--	3	<2.0	--	3	--	--	<2	<2	2	2	<2	<2	3	<2	3	<2.0	--	<2	3	--	--	15	--	<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	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<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	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		46	--	--	39	38	--	36	--	--	32	41	32	37	33	30	40	45	26	29	--	19	30	--	--	38	--	40	26
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	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		11	--	--	6	<2.0	--	5	--	--	8	<2	3	4	2	<2	2	<2	5	2	--	<2	2	--	--	<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	<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	<2	<2	<2	<2	--	<2	<2	--	--	2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		27	--	--	14	8	11	12	13	10	5	<5	11	11	6	5	14	<5	9	13	8	<5	11	<5	19	58	<5	6	8
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		200	65	--	>250	63	>250	91	>250	--	2,420	>2420	1,120	1,200	866	488	525	1,550	>2420	---	980	122	866	548	>2420	299	488	154	14
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	3	5
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	2.30	1.54	1.22	1.40	1.19	0.40	0.41	0.84	0.64	1.14	1.79	2.76	0.90	2.08	1.45	1.75	1.10	1.91
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	2.30	2.16	1.40	1.40	1.19	1.32	0.36	0.80	0.62	1.11	0.95	3.48	1.15	2.19	2.55	1.87	1.18	3.09

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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)	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	2017/10/18	2018/05/08
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	11:15 AM	10:30 AM	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	1.3	2.1	1.8	1.9	2.0	1.5	1.2	2.1
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	13.1	24.7	8.1	10.7	20.3	10.2	15.7	21.2	10.6	11.7
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.2	8.5	5.7	6.3	4.7	9.6	9.7	7.1	8.4	6.5	5.8	7.6	9.4	6.4	7.4	14.9	7.0	7.7	8.4	7.3	7.1	7.9	4.2	9.7	9.7	6.6	6.2	9.4
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.3	6.4	6.2	6.6	7.0	6.3	6.8	5.9	5.6	7.7	6.4	6.3	5.8	7.5	5.6	6.6	7.2	5.8	6.4	5.9	6.4	7.6	6.0	5.5	6.7	6.0	6.3	6.2
Specific Conductance	uS/cm	--	--	--	--		46.0	106.0	89.2	198.5	104.0	75.1	79.7	66.7	54.3	58.0	96.6	61.1	77.9	65.3	64.5	188.0	266.0	63.0	0.1	107.9	73.6	82.0	117.0	103.7	78.0	114.0	109.0	57.4
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	9	<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	19	19	12
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	57	82
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	0.06	0.08	<0.05	<0.05	0.06	0.19	0.05	0.08	<0.05	0.07
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	0.06	0.08	<0.05	<0.05	<0.05	0.19	<0.05	0.08	<0.05	0.07
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	<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	0.04	0.04
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	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		4.3	4.3	4.3	4.3	6.6	9.7	6.5	10.0	12.0	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	8.5	9.0
Orthophosphate (as P)	mg/L	0.01	--	--	--		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<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		6.9	6.9	6.9	6.9	6.8	6.1	6.3	6.4	6.1	6.5	6.7	6.5	6.4	6.6	6.3	6.5	6.9	6.1	6.3	7.0	6.3	6.4	6.9	6.2	6.6	6.9	6.7	6.46
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.5	6.5	6.5	4.1	3.6	2.5	2.5	2.2	2.4	3.6	2.9	2.7	2.5	2.4	3.4	4.0	2.4	2,600.0	3.4	1.1	2.9	4.5	5.6	3.6	4.3	3.9	2.3
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.2	1.2	1.2	1.0	0.8	0.6	0.6	0.4	0.7	1.0	1.0	0.7	0.5	0.8	1.1	1.0	0.6	640.0	0.9	0.7	0.7	1.1	1.5	1.0	1.2	0.9	0.7
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.020	0.020	0.020	0.020	0.009	0.009	0.009	0.008	0.013	0.021	0.009	0.013	0.010	0.020	0.029	0.013	0.039	0.025	0.008	0.012	0.008	0.009	0.016	0.013	0.012	0.028	0.010	0.014
Total Potassium (K)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.1	0.6	0.8	0.5	0.5	0.7	0.5	0.7	0.8	0.5	0.5	0.7	0.7	0.9	0.7	540.0	0.7	0.6	0.9	0.8	1.1	0.8	0.8	0.7	0.5
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	13.0	9.2
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.2	2.2	2.2	2.2	4.2	4.7	2.7	4.3	4.0	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	4.6	2.3
Total Suspended Solids	mg/L	5	--	--	25		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	12	<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	3	<2	3	4	3	7	3	2	3	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	4.4	1.6	0.9
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	97	68
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	0.78	0.41
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	12	9	<5
Calculated TDS	mg/L	1	--	--	--		36	55	35	46	55	38	37	34	25	45	44	34	37	37	31	65	44	44	32	36	25	38	59	68	46	51	47	28
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	<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	0.90	0.62
Hardness (CaCO3)	mg/L	N/A	--	--	--		10.00	15.00	10.00	12.00	14.00	12.00	9.00	9.00	8.00	8.90	13.10	11.40	9.60	8.30	9.30	13.00	14.10	8.50	9.10	12.20	5.60	10.10	15.80	20.20	13.10	15.70	13.40	8.6
Ion Balance (% Difference)	%	N/A	--	--	--		18.30	9.39	19.60	1.99	5.56	20.30	12.40	1.85	27.30	17.60	19.70	15.10	0.30	12.90	11.00	7.10	19.10	25.70	8.57	20.50	7.50	14.90	4.50	5.30	11.00	12.30	7.50	20.8
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	-3.35	-4.02
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	-3.30	-3.67	-4.34
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	9.78	NC	10.00	9.83	NC	NC	10.10	NC	9.87	10.30	10.20	10.40	10.50	10.50	9.57	10.10	9.72	NC	10.20	10.80	10.40	9.91	10.00	10.30	9.85	10.00	10.5
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	10.00	NC	10.30	10.10	NC	NC	10.30	NC	10.20	10.60	10.50	10.70	10.80	10.80	9.89	10.40	10.00	NC	10.50	11.10	10.70	10.20	10.40	10.60	10.20	10.30	10.8
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	150	240	228
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	--	<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	--	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		9	--	--	12	14	--	10	--	--	9	11	10	8	<5	13	13	18	9	9	--	9	10	--	--	10	--	14	7
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	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	15	13	--	<50	--	--	6	14	22	6	11	9	11	12	12	<50	--	<5	9	--	--	<5	--	17	7
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	--	<0.017	<0.09
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	--	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	--	<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	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	1,000	290	168	759	572	148
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	1.0	<0.50	--	<0.50	--	--	<0.5	<0.5	1.1	<0.5	0.5	<0.5	5.8	<0.5	0.5	<0.5	--	0.6	<0.5	--	--	<0.5	--	<0.5	1.2
Total Manganese (Mn)	µg/L	2	820	--	--		26	--	--	43	83	35	12	68	23	17	90	114	24	67	53	33	146	25	47	120	57	21	109	39	39	96	64	17
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1	<1	--	<1	--	--	<1	<1	1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	0.4	<0.1	--	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		14	--	--	18	20	--	12	--	--	10	18	15	12	9	12	16	17	12	12	--	8	12	--	--	15	--	20	10
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	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	3	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		2	--	--	<2	<2	--	3	--	--	<2	2	3	4	<2	2	2	<2	3	3	--	<2	<2	--	--	<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	<0.1	--	<0.1	<0.1	--	--	<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	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	5	5	7	<5.0	<5.0	<5.0	<5	<5	7	<5	<5	<5	<5	<5	<5	<5.0	<5	<5	<5	<5	8	<5	8	6	<5
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		1,800	170	--	>250	11	>250	59	>250	--	>2420	1,986	>2420	>2420	>2420	>2420	525	>2420	>2420	---	>2420	>2420	>2420	>2420	>2420	>2420	>2420	659	10
E. coli	MPN/100mL	1	--	400	--		1,500	100	--	>250	6	6	2	>250	<100	3	7	3	12	6	2	<1	18	11	30	11	5	4	15	25	31	16	3	4
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	2.20	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	0.31	0.51
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	2.20	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	0.49	0.91

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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)	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	2017/10/18	2018/05/08
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	10:15	10:15	10:30
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	N/A
Water Temp	Celsius	--	--	--	--		14.0	21.6	17.3	14.7	23.1	9.9	10.3	21.1	15.5	9.0	24.5	15.6	11.7	21.5	13.6	11.0	22.7	12.8	14.7	25.0	8.4	12.1	21.7	12.5	16.1	22.5	13.8	12.1
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		**10.8**	8.0	8.0	9.3	7.8	**10.4**	**11.1**	8.4	**9.6**	8.9	8.2	7.7	**10.2**	9.2	8.9	5.9	7.9	8.1	8.0	**9.9**	8.7	9.3	7.7	**11.4**	9.0	7.4	8.2	7.3
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.3	6.7	7.0	7.3	7.3	6.8	6.8	7.0	6.3	7.7	6.9	6.5	5.9	7.3	6.5	6.6	7.4	6.7	6.8	6.9	7.2	7.4	6.8	**5.6**	7.0	7.0	7.0	6.7
Specific Conductance	uS/cm	--	--	--	--		95.0	282.0	246.0	220.0	228.0	199.4	220.0	175.0	161.3	204.0	225.0	177.2	207.3	194.4	210.6	405.0	252.0	208.0	0.2	245.1	236.6	213.0	264.0	227.8	204.0	248.0	248.0	190.3
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	9	<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	56	59	54
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	15	63
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	0.30	0.24	0.17
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	0.24	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**	<0.05	<0.05
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	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	0.2	1.2	0.9	<0.4	<0.4	0.4	<0.4	0.8	<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	5.0	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	4.1	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	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		**6.4**	6.7	6.8	6.8	7.0	6.9	6.5	6.5	**6.4**	6.7	7.1	6.9	6.7	7.0	6.9	6.7	6.9	6.6	6.5	6.9	6.9	6.7	7.3	6.9	6.8	7.1	6.9	6.72
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.7	7.1	6.8	6.8	8.0	8.3	7.1	4.7	5.6	5.7	6.9	6.0	7.0	5.3	6.8	6.4	7.9	6.8	6,600.0	7.8	5.2	6.2	8.3	7.3	6.9	7.2	8.1	6.0
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.2	1.1	1.2	1.3	1.3	1.2	0.8	1.0	1.0	1.2	1.3	1.0	0.9	1.3	1.4	1.2	1.0	940.0	1.2	0.9	1.0	1.3	1.3	1.0	1.1	1.2	1.0
Total Phosphorus	mg/L	0.002	--	--	--	0.010	**<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**	**0.148**	0.004	0.004	0.002	0.008	0.005	0.004	0.006	0.009	0.007	0.010
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.1	0.9	0.8	0.8	1.0	0.9	0.7	0.9	0.7	0.9	0.9	0.8	0.6	1.2	0.8	1.1	0.9	770.0	0.9	0.7	0.7	1.0	1.0	0.8	0.9	1.0	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		38.0	38.0	35.0	28.3	33.1	33.0	33.0	20.8	21.3	31.2	34.5	26.4	35.1	20.1	32.1	36.4	39.0	35.3	34.0	40.0	27.1	32.1	37.2	32.8	44.0	41.4	35.9	35.9
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	1.9	2.6
Total Suspended Solids	mg/L	5	--	--	25		<1	1	1	2	<2	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	3	<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	8	9	8	10	10	10	10	9	10	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	1.4	0.6	0.3	0.5	0.6	0.6	0.6	0.4	0.8	0.7	1.0	0.7	2.4	0.4	0.4	0.3	0.9	0.7	0.5	0.7	1.1	1.1	1.0	1.0	1.3	2.6	1.0
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	247	244
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	2.07	1.70
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	6	<5	9	8	<5	8	9	<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	122	122	107
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	<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	2.10	1.98
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.00	23.00	22.00	22.00	25.00	26.00	23.00	15.00	18.00	18.40	22.20	20.30	21.60	16.90	22.30	21.70	24.70	21.10	20.00	24.40	16.70	19.60	26.10	23.60	21.30	22.50	25.20	19.1
Ion Balance (% Difference)	%	N/A	--	--	--		0.24	0.23	2.21	5.85	1.03	2.86	0.52	12.50	1.49	6.80	2.10	1.60	8.60	5.50	8.30	1.50	17.90	12.80	0.53	9.00	9.80	2.60	4.80	4.90	8.60	7.90	0.80	7.6
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	-2.85	-3.39
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	-3.17	-3.71
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	10.00	10.20	9.91	9.61	9.99	9.98	NC	9.92	10.10	10.10	9.72	9.82	10.10	9.84	9.73	10.1
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	9.92	9.96	9.99	9.84	9.86	10.00	10.10	9.98	9.79	10.30	10.40	10.40	10.50	10.20	9.93	10.30	10.30	NC	10.20	10.40	10.40	10.00	10.10	10.40	10.20	10.10	10.4
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		**259**	**259**	--	**124**	54	--	**266**	--	--	**199**	54	**153**	**140**	65	100	**260**	52	**105**	**180**	--	90	**163**	--	--	**128**	**36**	43	**164**
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	--	<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	--	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		13	13	--	16	13	--	19	--	--	18	17	15	19	9	18	17	17	16	19	--	19	15	--	--	17	--	20	14
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	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		9	9	--	8	9	--	<50	--	--	5	9	17	7	7	10	8	10	12	<50	--	<5	8	--	--	7	--	12	5
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**	--	--	**0.020**	--	<0.017	<0.09
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	--	<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	--	<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	<1	2	<1	<1	<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	130	81
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	<0.5	--	0.6	<0.5	--	<0.5	--	--	<0.5	<0.5	0.7	<0.5	<0.5	0.9	3.6	<0.5	<0.5	<0.5	--	<0.5	<0.5	--	--	<0.5	--	<0.5	0.7
Total Manganese (Mn)	µg/L	2	820	--	--		53	53	--	37	67	32	42	33	33	25	47	46	37	20	92	41	45	27	36	48	24	31	41	20	30	35	54	21
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	--	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	<2	--	2	<2.0	--	2	--	--	<2	<2	<2	<2	<2	<2	2	<2	<2	<2.0	--	<2	2	--	--	<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	--	<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	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		12	12	--	34	36	--	33	--	--	25	33	29	33	18	32	31	32	29	29	--	21	28	--	--	33	--	41	27
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	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<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	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		2	2	--	<2.0	<2.0	--	5	--	--	<2	<2	<2	<2	<2	2	3	<2	2	3	--	<2	<2	--	--	<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	<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	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		<5	<5	--	10	7	6	9	7	9	<5	<5	8	10	5	7	10	<5	6	9	7	8	8	<5	<5	6	6	6	6
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		120	24	--	190	16	58	72	110	--	291	1,553	178	345	2,420	1,300	86	1,730	>2420	---	2,420	285	548	1,990	2,420	687	2,420	411	<1
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	46	<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	1.30	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	1.34	1.16
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	1.20	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	1.87	1.8

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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)	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	2017/10/18	2018/05/08
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	10:45 AM	10:05 AM	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	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	14.8	24.7	9.5	12.2	20.6	12.3	16.5	22.4	13.8	12.7
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.9	8.1	8.3	9.0	6.3	10.9	11.0	8.6	9.7	8.7	7.3	8.9	10.1	8.9	9.6	14.5	5.9	7.5	9.8	9.1	8.8	8.3	5.5	10.1	8.3	6.4	7.3	11.0
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		8.0	6.7	6.9	7.2	7.0	6.1	6.5	6.4	6.0	9.0	6.7	6.8	5.7	7.1	6.4	6.3	7.3	6.6	6.6	6.8	7.1	7.3	6.7	6.1	6.9	6.9	6.8	7.0
Specific Conductance	uS/cm	--	--	--	--		771.0	262.0	247.0	224.0	226.0	214.8	218.0	171.9	126.2	206.0	225.0	185.9	207.1	196.2	209.0	273.0	251.0	208.0	0.2	243.5	232.4	215.0	260.0	228.0	213.0	262.0	252.0	202.9
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	10	<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	62	59	52
Colour TCU	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	16	35
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	0.15	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	0.12	0.15	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	0.12	<0.05	<0.05	0.10
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	0.10	<0.03	0.04	0.06	<0.03	<0.03	<0.03	0.03	0.04	<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	0.2	0.4	1.0	<0.4	<0.4	0.4	<0.4	0.5	<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	6.0	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	4.0	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	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.6	6.8	6.8	6.8	6.9	6.8	6.6	6.6	6.5	6.7	7.0	6.9	6.7	7.0	6.9	6.7	6.9	6.9	6.6	6.9	7.0	6.7	7.0	6.9	6.8	7.0	7.0	6.74
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.8	7.7	7.0	6.8	8.0	8.5	6.8	4.9	5.2	5.7	6.8	5.8	6.8	5.1	6.8	6.4	7.9	6.8	6,500.0	7.9	3.7	6.5	7.1	7.3	7.7	7.5	8.6	5.9
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.3	1.2	1.2	1.2	1.3	1.2	0.9	1.0	1.0	1.2	1.2	1.0	0.8	1.2	1.3	1.2	1.0	920.0	1.3	1.0	1.0	1.1	1.3	1.2	1.1	1.3	1.0
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<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	2.390	0.016	0.022	0.031	0.015	0.006	0.007	0.003	0.007	0.004	0.007	0.020	0.008	0.006	0.024
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.0	1.0	0.8	0.9	1.0	0.8	0.7	1.1	0.7	1.0	0.9	0.8	0.6	1.2	0.8	1.1	0.9	760.0	0.9	0.7	0.7	0.9	1.0	0.8	0.9	1.1	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		39.0	41.0	37.0	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	34.0	40.0	28.2	32.4	41.4	31.1	37.6	41.4	38.9	35.6
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	1.7	2.1	2.6
Total Suspended Solids	mg/L	5	--	--	25		<1	1	<1	<2	<2	<1	2	<1	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	7	<5	7	<5	10	6	<5	<5	<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	8	9	8	10	10	10	10	9	10	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.5	1.0	0.3	0.3	0.2	0.8	0.7	0.7	0.4	0.7	0.4	0.8	0.7	2.6	2.1	1.1	0.6	0.8	0.6	0.7	1.2	1.2	1.5	1.6	1.3	0.9	1.6	1.2
Conductivity (uS/cm)	µS/cm	1	--	--	--		260	250	230	220	230	250	210	170	160	200	224	183	218	218	204	219	241	218	220	241	235	206	275	185	251	255	248	243
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	2.08	1.65
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	7	<5	9	8	<5	9	10	<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	128	126	105
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	<10	<10
Cation Sum	me/L	N/A	--	--	--		2.16	2.32	2.07	1.70	2.02	2.03	1.86	1.28	1.30	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	2.27	1.96
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.00	25.00	22.00	22.00	25.00	27.00	22.00	16.00	17.00	18.40	21.90	19.40	21.10	16.00	21.90	21.30	24.70	21.10	20.00	25.10	13.40	20.30	22.30	23.60	24.20	23.30	26.80	18.9
Ion Balance (% Difference)	%	N/A	--	--	--		1.59	2.20	0.48	5.82	2.02	4.64	0.53	11.70	2.26	6.60	0.80	2.80	4.50	3.20	9.20	9.50	15.80	4.20	0.79	10.70	10.10	3.40	5.50	3.00	3.20	4.10	4.30	8.6
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	-2.71	-3.38
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	-3.10	-3.03	-3.70
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	10.10	10.20	10.10	9.32	9.99	9.30	NC	9.92	10.20	10.10	9.79	9.82	10.00	9.77	9.66	10.1
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.10	9.89	9.92	10.00	9.82	9.83	10.00	10.00	10.00	9.81	10.20	10.40	10.40	10.50	10.40	9.64	10.30	9.62	NC	10.20	10.50	10.40	10.10	10.10	10.30	10.10	9.98	10.4
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		150	--	--	125	29	--	231	--	--	188	48	149	141	106	159	236	46	93	160	--	84	172	--	--	180	89	55	157
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	--	<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	--	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	17	18	--	18	--	--	18	17	16	18	10	19	17	19	16	20	--	17	16	--	--	20	--	20	15
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	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		6	--	--	9	9	--	<50	--	--	6	9	16	7	6	9	8	11	11	<50	--	<5	7	--	--	<5	--	11	6
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	--	<0.017	<0.09
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	--	<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	<0.4	--	<1	<1	--	--	<1	--	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	2	<2.0	2	<2.0	<2.0	<2	<2	4	9	<1	1	<1	<1	2	7	1	1	1	<1	4	<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	141	83
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	3.2	<0.5	--	<0.5	--	--	<0.5	<0.5	0.8	0.9	<0.5	<0.5	2.6	<0.5	<0.5	<0.5	--	<0.5	<0.5	--	--	<0.5	--	<0.5	1.4
Total Manganese (Mn)	µg/L	2	820	--	--		51	--	--	35	64	29	39	27	30	23	34	38	34	77	130	34	29	24	25	78	34	34	58	29	74	76	48	19
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	--	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		3	--	--	2	<2.0	--	<2.0	--	--	<2	<2	5	<2	<2	<2	<2	<2	<2	<2.0	--	<2	2	--	--	7	--	<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	--	3	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<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	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		34	--	--	33	37	--	33	--	--	25	32	28	32	17	31	31	31	29	30	--	20	28	--	--	33	--	40	27
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	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	5	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	4	--	--	<2	<2	<2	<2	<2	3	2	<2	<2	<2.0	--	<2	<2	--	--	<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	<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	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		14	--	--	10	7	7	11	7	7	<5	<5	68	21	<5	9	9	<5	<5	10	8	12	7	<5	<5	13	7	<5	7
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		28	58	--	100	16	75	83	95	--	345	>2420	921	548	>2420	770	308	1,550	>2420	---	>2420	281	488	1,730	>2420	792	>2420	>2420	4
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	3	2
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	0.70	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	2.40	0.33	0.35	1.06
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	0.70	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	0.43	1.71

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.

**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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)	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	2017/10/18	2018/05/09
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	9:50	9:30
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	2.7	2.1	5.3	4.2	2.1	4.6	2.7	3.1
Water Temp	Celsius	--	--	--	--		14.7	10.5	26.1	16.6	13.3	22.7	14.7	13.7	22.9	12.8	14.1	25.4	9.4	12.2	22.2	12.7	16.8	21.0	14.6	12.7
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		9.4	7.9	7.9	8.2	9.7	8.9	8.6	15.8	7.6	7.9	8.3	8.8	7.6	10.5	8.4	9.9	8.7	7.1	7.2	10.42
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.5	7.8	6.7	6.7	6.2	8.6	6.5	6.8	7.9	6.6	7.8	6.8	7.1	5.8	5.1	5.7	7.0	6.8	7.1	6.74
Specific Conductance	uS/cm	--	--	--	--		111.9	230.0	229.0	189.0	219.5	202.1	212.9	472.0	251.0	211.0	0.2	249.8	240.8	209.0	267.0	243.2	219.0	246.0	257.0	196.4
INORGANICS																										
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5	6	7	<5	7	9	<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	58	60	56
Colour	TCU	5	--	--	--		35	43	10	27	10	22	18	14	11	22	35	8	19	27	13	17	18	14	14	34
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	0.09	0.17
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	0.09	0.17
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	<0.05	<0.05
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	0.04	<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	0.3	<0.4	1.8	0.5	<0.4	0.7	0.4	<0.4	<0.4	<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	4.7	4.8	3.9	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	<0.010	<0.01	<0.01	<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		6.6	6.7	7.1	6.5	6.7	6.9	6.9	6.6	6.8	6.6	6.6	6.9	6.9	6.7	7.2	7.0	6.7	7.1	6.9	6.70
Total Calcium (Ca)	mg/L	0.1	--	--	--		5.8	6.1	6.6	5.9	7.1	5.7	6.4	6.5	7.6	7.0	6,500.0	8.0	4.7	6.3	7.3	8.2	7.4	7.0	7.5	5.9
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.1	1.0	1.1	1.2	1.0	1.0	1.1	1.4	1.2	1.0	930.0	1.3	0.9	1.0	1.1	1.3	1.2	1.0	1.1	1.0
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.009	0.018	0.040	0.006	0.005	0.013	0.010	0.010	0.026	0.135	0.005	0.005	0.005	0.004	0.004	0.003	0.010	0.012	0.005	0.031
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	0.7	0.9	0.8	0.8	0.7	1.1	0.8	1.1	0.9	720.0	0.1	0.7	0.7	0.9	1.0	0.9	0.8	0.9	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		22.0	34.6	32.0	27.7	33.6	19.2	31.3	37.5	40.3	38.3	33.0	42.6	28.3	32.5	33.1	33.5	38.9	42.4	37.2	37.2
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	2.1	1.6	1.7	2.4
Total Suspended Solids	mg/L	5	--	--	25		1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	<5	<5	<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	8	10	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	0.7	1.0	1.0	0.7	1.3	1.2	0.9	0.9	0.9	1.4
Conductivity (uS/cm)	µS/cm	1	--	--	--		160	215	226	189	232	223	204	228	246	225	220	248	244	208	267	196	248	249	246	247
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	2.09	1.76
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5	6	7	<5	7	9	<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	122	123	110
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	<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	2.30	2.12	2.04
Hardness (CaCO3)	mg/L	N/A	--	--	--		19.00	19.30	21.00	19.70	21.80	18.40	20.50	22.00	23.90	21.60	20.00	25.30	15.40	19.80	22.80	25.80	23.40	21.60	23.30	18.9
Ion Balance (% Difference)	%	N/A	--	--	--		2.16	4.70	2.60	2.00	3.20	10.60	6.70	9.40	20.30	17.50	1.84	10.20	10.80	3.20	0.40	3.00	3.40	8.10	0.70	7.3
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	-2.84	-3.42
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	-3.16	-3.74
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.63	9.49	9.87	10.10	10.00	10.00	10.10	9.28	10.00	10.00	9.81	9.92	10.10	10.10	9.88	9.72	10.00	9.91	9.77	10.1
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.88	9.81	10.20	10.40	10.40	10.40	10.40	9.60	10.30	10.40	10.10	10.20	10.40	10.40	10.20	10.00	10.30	10.20	10.10	10.4
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	45	44	172
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	--	<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	--	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		--	18	16	15	19	9	16	16	17	17	17	---	19	14	--	--	17	--	17	13
Total Beryllium (Be)	µg/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		--	6	9	15	7	7	9	7	6	10	<50	---	<5	7	--	--	<5	--	10	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	--	--	0.025	--	<0.017	<0.09
Total Chromium (Cr)	µg/L	1	---	--	1		--	<1	<1	5	<1	<1	<1	6	<1	<1	<1.0	---	7	<1	--	--	2	--	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	---	<1	<1	--	--	<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	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	<50	106	80
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	--	<0.5	0.9
Total Manganese (Mn)	µg/L	2	820	--	--		36	30	14	37	35	13	12	40	18	25	34	24	35	23	15	17	24	11	13	24
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<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	--	<2	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	---	<1	<1	--	--	<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	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		--	27	31	29	31	18	31	31	30	30	29	---	23	28	--	--	32	--	38	28
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	<0.1	---	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	---	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		--	3	<2	<2	<2	<2	<2	<2	<2	2	2	---	<2	<2	--	--	<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	--	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	---	<2	<2	--	--	<2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		9	5	<5	64	11	7	5	10	<5	10	14	6	12	10	<5	<5	11	8	<5	8
MICROBIOLOGICAL																										
Total Coliform	MPN/100mL	1	--	--	--		--	461	613	93	461	308	461	42	629	>2470	---	356	163	179	517	2,420	260	577	>2420	58
E. coli	MPN/100mL	1	--	400	--		100	14	2	6	6	6	4	<1	1	17	<10	1	2	<1	23	44	<1	5	517	8
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.91	0.30	1.20	1.09	1.44	2.20	0.64	0.20	0.61	0.90	0.48	1.22	2.71	1.52	1.20	2.32	1.09	1.43	1.22	6.25
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.85	0.33	1.00	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	1.33	3.35

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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	2017/10/18	2018/05/08
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	15:00	11:40	12:40
FIELD DATA																																	
Secchi Depth	Meters	--	--	1.2	--		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	14.3	20.7	5.4	13.4	19.3	9.2	16.4	22.1	10.1	14.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		11.4	5.8	4.3	8.2	4.3	6.1	8.2	3.9	5.3	5.7	1.0	3.8	7.6	3.3	3.1	12.0	2.1	4.5	4.3	3.8	5.0	8.2	10.1	7.4	5.8	5.8	5.6	7.1
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		8.0	5.4	5.3	6.3	5.3	5.6	5.8	5.8	6.0	8.8	5.7	6.4	6.2	7.1	6.8	6.0	6.6	5.1	6.4	6.2	6.9	7.3	6.1	5.7	6.4	7.8	6.3	6.1
Specific Conductance	uS/cm	--	--	--	--		194.0	153.0	103.8	135.0	106.0	108.6	114.1	107.6	88.6	288.0	225.0	155.5	226.0	173.2	234.0	880.0	337.0	109.0	0.4	335.8	251.2	289.0	353.0	208.9	354.0	257.0	266.0	232.2
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	16	13
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	51	51
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	29	27
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.69	<0.05	1.20	0.69	0.25	1.20	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	0.58	0.37
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	0.50	0.58	0.37
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	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.29	<0.05	<0.05	<0.05	<0.05	0.05	0.10	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	0.10	0.07	<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	0.3	0.5	0.6	0.7	1.2	0.7	0.5	1.3	3.8	1.1
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	10.0	7.7	4.7	11.0	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	6.9	5.0
Orthophosphate (as P)	mg/L	0.01	--	--	--		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<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	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		4.5	5.2	5.4	5.5	6.2	5.3	6.4	6.6	6.3	6.4	6.9	6.8	6.9	6.9	6.7	6.6	7.5	5.9	6.6	7.5	6.8	6.9	7.0	6.5	6.8	6.9	6.9	7.02
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.7	1.8	1.6	4.9	3.3	5.1	4.9	5.2	5.6	12.5	11.7	7.5	11.1	10.5	13.9	7.2	23.3	2.2	18,000.0	18.0	12.4	12.9	25.8	9.9	20.9	10.3	14.6	12.5
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.3	0.5	0.5	1.1	0.8	1.1	0.9	0.9	1.2	1.7	2.0	1.4	1.4	1.5	2.3	1.6	3.2	0.6	2,400.0	2.7	2.3	1.7	2.7	1.7	3.0	1.7	2.2	1.8
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.070	0.140	0.020	0.006	0.007	0.011	0.009	0.012	0.010	0.019	0.039	0.020	0.006	0.021	0.022	0.013	0.038	0.031	0.007	0.020	0.002	0.005	0.038	0.009	0.017	0.052	0.008	0.022
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	1.2	0.7	1.1	1.6	1.3	1.1	1.5	1.9	1.6	2.5	1.5	1.3	1.7	2.4	1.2	2.5	0.7	2,000.0	2.1	1.5	1.4	1.9	1.7	2.0	2.1	2.0	1.6
Total Sodium (Na)	mg/L	0.1	--	--	--		15.0	25.0	13.0	15.9	14.5	14.6	14.8	10.2	8.3	36.3	27.7	14.6	30.8	15.0	20.5	39.1	38.7	18.6	64.0	37.7	28.8	45.4	43.8	24.8	64.1	29.7	29.6	41.2
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	5.6	2.5
Total Suspended Solids	mg/L	5	--	--	25*		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	<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	13	19	12
Turbidity (NTU)	NTU	0.1	--	50	--		14.0	35.0	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	0.6	0.9	0.8	1.0	4.1	1.0	1.3	7.7	1.1	1.7
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	258	298
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	2.20	1.97
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	21	16	13
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	127	131	130
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	<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	2.28	2.62
Hardness (CaCO3)	mg/L	N/A	--	--	--		6.00	6.00	6.00	17.00	12.00	17.00	16.00	17.00	19.00	38.20	37.50	24.50	33.50	32.40	44.20	24.60	71.40	8.00	55.00	56.10	40.40	39.20	75.50	31.70	64.50	32.70	45.50	38.6
Ion Balance (% Difference)	%	N/A	--	--	--		4.35	8.20	0.68	2.30	13.40	7.37	1.48	6.74	0.00	2.60	1.90	4.60	2.40	3.50	2.60	8.40	16.40	11.20	3.19	7.10	4.70	4.40	3.10	5.70	8.00	2.20	1.80	14.0
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	-2.33	-2.37
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	-2.65	-2.69
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	9.23	9.39
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	10.10	9.18	9.35	9.74	9.67	9.09	9.91	9.39	9.58	9.55	9.71
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	100	72
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	--	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		22	--	--	53	37	--	37	--	--	58	284	42	57	57	80	46	142	17	130	--	86	79	--	--	130	--	77	68
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		<5	--	--	11	11	--	<50	--	--	12	18	13	10	10	11	9	14	11	<50	--	<5	10	--	--	<5	--	24	11
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	<0.017	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	8	<1	<1	<1.0	--	<1	<1	--	--	1	--	1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	0	--	<0.40	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	3	<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	1	1
Total Iron (Fe)	µg/L	50	300	--	300		720	--	--	146	637	150	107	209	219	102	1,380	255	111	938	446	147	820	290	140	1,280	138	144	766	228	151	3,960	281	85
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		1.6	--	--	2.4	0.6	--	<0.5	--	--	<0.5	0.7	<0.5	<0.5	<0.5	0.6	2.6	<0.5	0.6	<0.5	--	<0.5	<0.5	--	--	<0.5	--	<0.5	0.8
Total Manganese (Mn)	µg/L	2	820	--	--		40	--	--	55	39	67	28	21	31	34	79	28	23	45	31	56	122	61	28	95	22	19	78	38	22	511	28	9
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	--	<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	--	<2	6
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		11	--	--	29	20	--	24	--	--	48	58	36	52	47	62	38	103	13	85	--	39	58	--	--	92	--	76	54
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	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		6	--	--	<2	<2	--	4	--	--	<2	3	<2	<2	<2	4	2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<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	<0.1	--	<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	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		21	--	--	16	7	7	<5.0	<5.0	7	<5	6	<5	<5	<5	10	10	<5	7	11	<5	<5	<5	<5	6	9	37	8	6
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		84	>250	--	>250	>250	180	120	180	--	687	>2420	>2420	1,550	>2420	1,553	120	>2420	>2420	---	>2420	659	>2420	>2420		914	>2420	>2420	105
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	3	<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	0.50	7.27	0.36	0.94	51.51	0.33	1.56	5.32	0.62	1.57
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	0.99	2.62

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2107/06/08	2017/08/15	2017/10/18	2018/05/09
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	10:07	11:00	12:58	14:30	12:50	12:45	10:40	11:45	15:25	12:25	12:30
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	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	13.4	20.4	10.2	13.0	22.4	15.2	14.9
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.0	5.9	4.8	4.9	2.5	3.0	6.9	7.0	5.1	3.7	13.1	3.3	6.3	1.6	4.2	10.5	9.3	4.2	6.1	5.3	6.8	7.1	6.8	5.7	1.8	11.3	8.8
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.6	5.7	5.4	6.3	5.9	5.6	6.2	5.9	5.3	7.3	6.4	6.7	6.0	6.9	5.4	5.4	5.9	6.5	6.0	6.0	5.9	6.2	5.4	6.0	7.6	8.3	6.1
Specific Conductance	uS/cm	--	--	--	--		37.0	457.0	162.1	415.0	167.0	101.2	92.2	123.1	96.0	225.0	226.0	159.1	288.0	188.5	204.4	204.4	174.0	0.4	699.0	197.6	968.0	838.0	219.2	400.0	414.0	338.0	355.6
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	8	5	<5	13	21	6	<5	22	11	9
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	92	79
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	22	25
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.10	<0.05	0.62	0.26	1.80	3.20	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	0.20	0.09	0.07	0.33
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	0.07	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	<0.05	<0.05	<0.010	<0.05	<0.05	0.21	0.23	<0.05	0.20	<0.05	<0.05	0.17
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	0.06	0.19	0.05	0.14	0.37	<0.03	<0.03	0.09	0.14	<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	0.3	62.6	2.0	24.3	2.1	0.6	<0.4	0.7	0.6	1.4
Total Organic Carbon	mg/L	0.5	--	--	--		8.5	13.0	13.0	7.2	14.0	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	5.9	5.6
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	<0.010	<0.01	<0.01	<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		5.4	6.0	6.3	6.1	6.3	5.5	5.9	6.2	5.9	5.9	6.7	6.8	6.6	6.6	6.3	7.2	6.4	6.1	6.6	6.2	6.5	6.8	6.2	6.2	6.7	6.5	6.79
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.6	4.0	4.8	7.4	3.8	4.0	3.1	2.2	3.8	7.0	8.4	5.6	7.6	8.5	8.2	14.1	9.5	20,000.0	33.3	9.8	23.9	23.8	8.6	13.3	14.7	14.7	11.5
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.4	0.7	0.9	1.0	0.6	1.0	0.7	0.7	1.4	1.2	1.4	1.2	1.2	1.3	2.2	3.1	1.8	2,500.0	32.7	2.2	3.2	2.5	1.7	2.5	1.9	2.1	1.4
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.02	0.040	0.034	0.010	0.028	0.003	0.009	0.019	0.041	0.021	0.054	0.030	0.014	0.028	0.199	0.028	0.201	0.010	1.560	0.012	0.222	0.034	0.012	0.013	0.042	0.011	0.034
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	0.8	1.1	1.0	1.0	1.4	0.8	1.3	1.9	1.2	1.7	1.6	1.3	1.5	2.5	2.9	1.7	1,900.0	12.5	1.1	4.0	2.1	1.4	1.1	1.6	1.6	1.3
Total Sodium (Na)	mg/L	0.1	--	--	--		15.0	51.0	55.0	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	150.0	124.0	36.8	149.0	124.0	26.4	68.8	66.0	55.2	59.4
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	6.4	1.6
Total Suspended Solids	mg/L	5	--	--	25*		<2	58	62	34	27	3	<1	10	14	<5	39	<5	<5	<5	194	34	<5	2	3,000	15	342	69	<5	6	7	8	12
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	9	9
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	2.0	1.5	3.3	144.0	1.1	1.1	1.2	1,490.0	9.9	131.0	54.2	1.1	2.4	9.9	12.5	7.0
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	366	422
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	3.01	2.62
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	8	5	<5	13	21	6	<5	22	11	9
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	187	170
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	<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	29.10	2.35	9.27	7.23	1.80	3.92	3.93	3.60	3.36
Hardness (CaCO3)	mg/L	N/A	--	--	--		6.00	13.00	16.00	23.00	12.00	14.00	11.00	8.00	15.00	22.40	26.70	18.90	23.90	26.60	29.50	48.00	31.10	59.00	218.00	33.50	72.90	69.70	28.50	43.50	44.50	45.40	34.5
Ion Balance (% Difference)	%	N/A	--	--	--		14.90	5.58	4.90	10.30	17.50	10.30	5.81	4.60	6.01	3.30	3.60	3.10	2.30	11.30	31.70	1.60	15.10	0.06	69.40	0.50	11.30	0.10	4.30	1.80	4.20	8.90	12.4
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	-2.90	-2.81
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	-3.90	-2.70	-3.22	-3.13
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	9.80	9.11	9.41	9.60
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	NC	10.10	10.00	10.30	NC	NC	10.50	NC	9.85	10.20	10.50	10.30	9.83	10.20	9.32	10.00	9.54	9.77	10.20	9.48	9.27	10.20	10.10	9.43	9.73	9.92
Metals (ICP-MS)																																
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		270	--	--	189	368	--	260	--	--	145	466	259	130	138	2,760	400	216	100	--	129	3,880	--	--	99	149	542	167
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	--	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	2	--	<1.0	--	--	<2	<2	<2	<2	<2	6	<2	<2	<1.0	--	<2	3	--	--	<2	--	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		20	--	--	53	28	--	27	--	--	49	74	33	44	43	213	381	63	140	--	147	762	--	--	151	--	122	96
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		<5	--	--	8	8	--	<50	--	--	10	17	15	9	10	13	11	12	<50	--	<5	9	--	--	<5	--	12	7
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	0.048	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	1	--	<1.0	--	--	<1	<1	<1	<1	1	9	2	<1	<1.0	--	<1	8	--	--	<1	--	2	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	1	--	<0.40	--	--	<1	1	1	<1	1	3	1	<1	2	--	3	4	--	--	<1	--	2	<1
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	2	<2.0	<2.0	<2.0	3	3	<2	3	3	<2	1	12	4	2	<2.0	404	2	13	<1	2	<1	1	3	2
Total Iron (Fe)	µg/L	50	300	--	300		880	--	--	1,380	3,850	303	229	897	1,110	214	5,210	1,550	383	1,720	28,400	1,660	485	960	217,000	714	21,300	7,380	375	369	2,650	4,760	870
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		1.9	--	--	1.6	2.7	--	0.6	--	--	<0.5	5.2	2.1	0.6	0.7	19.4	3.5	1.0	<0.50	--	0.6	39.7	--	--	<0.5	--	3.3	2.3
Total Manganese (Mn)	µg/L	2	820	--	--		110	--	--	387	135	53	41	106	176	78	219	207	83	173	327	212	93	470	2,800	303	586	359	71	125	160	215	55
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	--	<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	--	3	<2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		11	--	--	37	21	--	17	--	--	33	45	31	39	40	45	75	43	96	--	38	96	--	--	72	--	80	53
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	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		4	--	--	<2	6	--	5	--	--	<2	10	4	4	<2	60	9	6	<2	--	<2	41	--	--	<2	--	15	4
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<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	--	<0.1	0.2	--	--	<0.1	--	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	2	<2	<2	<2	11	<2	<2	<2.0	--	<2	18	--	--	2	--	3	<2
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	14	12	9	6	9	13	<5	7	12	12	<5	46	36	17	27	1,210	10	170	22	11	14	9	19	12
MICROBIOLOGICAL																																
Total Coliform	MPN/100mL	1	--	--	--		28	>250	--	>250	75	41	110	>250	--	1,553	>2420	>2420	2,420	1,990	>2420	687	>2420	---	>2420	328	>2420	>2420	>2420	>2420	>2420	>2420	6
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	41	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	1.90	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	1.40	2.11	28.94	2.56
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	37.67	4.28

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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																																
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	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15	2017/10/18	2018/05/09
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	13:30	09:50	16:02	13:40	15:00	12:10	12:25	10:20	11:55	11:05	11:30
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	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	10.5	12.5	24.3	5.8	13.2	24.0	9.4	15.6	23.0	9.7	14.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.8	5.7	5.5	8.6	5.4	8.5	9.4	7.9	8.2	4.1	2.7	7.6	8.8	7.3	7.6	14.8	7.2	6.3	7.3	7.2	8.2	1.9	8.7	11.4	7.0	5.3	9.1
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.9	6.7	6.3	6.4	6.6	6.2	7.1	6.9	6.6	8.2	7.2	6.9	5.2	7.3	6.2	7.0	6.3	6.9	6.3	6.5	6.6	6.2	6.3	6.8	6.6	5.9	5.8
Specific Conductance	uS/cm	--	--	--	--		723.0	210.0	167.7	217.8	203.2	110.3	145.9	126.4	111.9	62.0	177.5	116.7	123.6	132.5	147.8	180.0	111.0	0.1	155.3	132.3	162.0	254.0	162.2	150.0	188.0	92.0	75.0
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	20	9
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	36	23
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	21	36
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	0.22	0.32
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	0.22	0.32
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	<0.05	<0.05
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	0.04	<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	0.3	77.4	2.8	2.2	11.8	0.5	1.0	34.5	10.0	<0.4
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	6.9	5.8
Orthophosphate (as P)	mg/L	0.01	--	--	--		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<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		6.7	6.7	6.9	7.1	7.3	6.7	6.7	6.8	6.5	6.2	6.9	6.9	6.9	7.0	6.5	6.5	6.7	7.0	6.6	6.7	6.7	7.0	6.4	6.9	7.1	7.0	6.91
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.9	5.4	8.0	10.5	5.3	5.9	5.1	5.0	2.6	18.1	5.1	6.4	6.0	5.6	5.4	5.1	6,100.0	52.2	5.4	6.6	9.9	4.8	7.1	8.0	6.7	4.4
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.4	1.6	1.3	2.0	2.1	1.2	1.3	1.2	1.2	0.7	3.3	1.4	1.2	1.4	1.6	1.5	1.1	1,300.0	23.0	1.5	1.4	1.8	1.3	1.6	1.7	1.6	1.1
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.02	0.030	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	0.031	0.011	0.501	0.095	1.250	0.023	0.012	0.102	0.059	0.015	0.052
Total Potassium (K)	mg/L	0.1	--	--	--		1.2	1.1	1.3	1.2	1.2	1.0	1.1	1.0	1.2	0.6	1.9	1.3	1.2	1.1	1.4	1.1	1.1	1,100.0	9.7	1.0	1.2	1.3	1.1	1.3	1.4	1.2	0.9
Total Sodium (Na)	mg/L	0.1	--	--	--		24.0	21.0	18.0	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	19.0	24.4	13.4	25.1	23.4	19.7	25.2	26.0	23.0	16.5
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	4.0	2.4
Total Suspended Solids	mg/L	5	--	--	25*		16	98	5	6	110	7	4	77	5	<5	16	19	<5	17	9	51	8	5	719	69	93	9,020	15	138	41	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		6	4	5	7	3	4	6	4	4	5	5	5	6	7	5	5	4	5	<2	3	5	6	7	4	3	4	5
Turbidity (NTU)	NTU	0.1	--	50	--		0.6	12.0	2.5	12.0	6.2	1.0	0.6	2.5	1.7	6.7	283.0	2.1	1.1	31.6	82.6	6.6	1.4	1.2	4,430.0	5.4	65.3	206.0	7.9	53.8	21.3	15.1	2.0
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	171	122
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	1.51	0.96
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	20	9
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	87	58
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	<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	31.00	1.42	1.94	2.04	1.27	1.75	1.74	1.59	1.08
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.00	15.00	19.00	28.00	35.00	18.00	20.00	18.00	18.00	9.40	58.80	18.50	20.90	20.70	20.60	19.70	17.30	21.00	225.00	19.70	22.20	32.10	17.30	24.30	27.00	23.30	15.5
Ion Balance (% Difference)	%	N/A	--	--	--		0.97	9.39	0.83	3.15	4.58	3.96	1.77	5.56	2.04	20.70	63.00	6.10	1.00	5.20	25.00	3.40	11.80	2.40	94.20	17.50	15.20	5.30	3.80	6.10	1.40	2.30	6.0
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	-2.44	-3.06
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	-2.76	-3.38
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	9.45	9.97
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	10.10	9.63	10.20	9.77	9.41	10.20	10.00	9.57	10.30	9.97	9.59	9.77	10.3
Metals (ICP-MS)																																
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		99	--	--	349	189	--	217	--	--	490	19,200	186	131	93	3,420	487	141	120	--	1,960	2,150	--	--	731	48	401	142
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	--	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	8	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		14	--	--	15	19	--	14	--	--	11	86	12	12	7	24	15	11	12	--	27	34	--	--	32	--	11	8
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		13	--	--	41	22	--	<50	--	--	6	24	16	10	15	15	14	16	<50	--	<5	12	--	--	<5	--	20	10
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	<0.017	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	11	<1	<1	<1	2	<1	<1	<1.0	--	3	2	--	--	<1	--	1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	<0.40	1	--	<0.40	--	--	<1	34	<1	<1	<1	1	<1	<1	<0.40	--	4	4	--	--	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	22	2	<2	1	12	2	3	<2.0	183	6	3	<1	<1	<1	<1	1	<1
Total Iron (Fe)	µg/L	50	300	--	300		180	--	--	554	965	120	211	388	384	161	38,900	312	236	254	4,200	593	363	230	176,000	4,570	2,790	2,190	303	1,080	375	874	239
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		<0.5	--	--	3.0	0.5	--	<0.5	--	--	0.6	82.4	<0.5	<0.5	<0.5	5.2	0.5	<0.5	<0.5	--	5.9	4.3	--	--	0.6	--	0.7	0.7
Total Manganese (Mn)	µg/L	2	820	--	--		51	--	--	113	632	23	30	53	39	26	13,200	67	71	81	124	140	60	130	13,800	985	921	2,420	75	436	212	250	55
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	--	<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	--	<2	<2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	2	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		30	--	--	36	42	--	24	--	--	12	82	22	24	24	25	26	19	25	--	16	29	--	--	28	--	31	17
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.1	<0.1	--	<0.1	--	--	<0.1	0.2	<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 Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	7	4	--	5	--	--	3	405	4	<2	2	36	6	3	3	--	41	30	--	--	14	--	7	3
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<0.1	--	--	<0.1	<0.1	--	<0.1	--	--	<0.1	1.6	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	--	0.2	0.2	--	--	<0.1	--	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	30	<2	<2	<2	2	<2	<2	<2	--	6	4	--	--	<2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		7	--	--	7	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	7	<5
MICROBIOLOGICAL																																
Total Coliform	MPN/100mL	1	--	--	--		53	>250	--	>250	>250	280	85	>250	--	1,414	>2420	>2420	1,990	>2420	>2420	1,203	8	---	>2420	>2420	>2420	>2420	>2420	534	>2420	641	46
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	1	23
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	1.60	2.02	1.91	0.32	1.02	90.33	5.12	8.22	127.14	0.38	18.67	20.15	1.85	0.93
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	2.00	2.98	1.91	0.33	1.07	121.83	4.62	13.77	185.98	0.48	25.84	24.37	2.89	1.6

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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	2017/10/18	2018/05/08
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	10:15 AM	12:00	10:00
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	N/A	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	16.1	23.4	8.2	13.3	21.9	11.6	18.2	22.4	13.3	14.3
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		4.2	6.2	8.2	9.0	10.2	8.3	4.5	12.0	8.1	7.6	7.3	9.5	8.5	8.8	16.6	9.7	9.6	8.3	7.4	11.3
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.1	7.8	6.7	6.8	6.4	7.5	5.5	6.5	7.2	6.2	6.6	6.8	7.0	7.2	6.2	6.2	6.8	7.1	6.9	6.7
Specific Conductance	uS/cm	--	--	--	--		203.0	955.0	480.0	262.0	670.0	320.0	845.0	999.0	611.0	371.0	0.6	569.0	436.2	588.0	574.0	483.4	755.0	660.0	590.0	434.6
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	20	11
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	143	96
Colour	TCU	5	--	--	--		94	18	14	18	7	7	19	6	8	18	8	8	6	17	13	26	12	12	8	28
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	1.72	1.01
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	1.72	0.87
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	<0.05	0.14
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	0.04	<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	3.8	0.6	1.1
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	5.4	9.3
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	<0.010	<0.01	<0.01	<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		6.4	6.7	7.2	7.2	6.9	7.1	6.5	6.4	7.4	6.4	7.0	7.3	7.2	6.9	7.4	7.0	7.3	7.4	7.1	7.01
Total Calcium (Ca)	mg/L	0.1	--	--	--		7.6	30.7	22.1	14.5	22.0	17.6	21.8	23.9	27.6	12.6	27,000.0	20.3	15.9	20.6	17.2	17.9	25.7	23.8	22.8	12.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		2.3	4.2	3.6	2.2	2.8	2.7	4.0	4.2	3.8	2.2	3,800.0	3.4	1.9	2.9	3.4	2.6	3.8	3.0	2.5	1.6
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.034	0.043	0.036	0.030	0.006	0.027	0.046	0.260	0.028	0.039	0.007	0.009	0.011	0.029	0.011	0.012	0.024	0.027	0.008	0.078
Total Potassium (K)	mg/L	0.1	--	--	--		2.1	3.2	3.6	2.5	2.6	2.8	2.9	3.1	3.7	3.0	3,300.0	2.8	1.6	2.8	2.6	2.7	3.2	3.0	2.6	2.2
Total Sodium (Na)	mg/L	0.1	--	--	--		22.7	124.0	62.2	32.3	95.1	51.7	170.0	147.0	88.1	62.7	110.0	102.0	57.8	96.4	81.1	65.6	137.0	113.0	86.9	73.0
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	5.9	3.5
Total Suspended Solids	mg/L	5	--	--	25*		13	5	165	<5	<5	<5	<5	626	<5	<5	<1.0	<5	6	29	<5	<5	22	16	<5	52
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		21	26	25	23	26	29	33	29	20	27	27	31	30	28	23	41	32	18	33	19
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	3.0	21.4
Conductivity (uS/cm)	µS/cm	1	--	--	--		190	813	482	255	732	433	840	819	605	394	790	575	462	582	739	371	849	673	610	518
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	5.24	3.40
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	20	11
Calculated TDS	mg/L	1	--	--	--		109	426	246	144	347	229	496	477	262	187	400	305	216	321	310	242	463	341	311	216
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	<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	5.21	4.04
Hardness (CaCO3)	mg/L	N/A	--	--	--		29.00	94.00	70.00	45.30	66.50	55.10	70.90	77.00	84.60	40.50	84.00	64.70	47.50	63.40	56.90	55.40	79.80	71.80	67.20	38.3
Ion Balance (% Difference)	%	N/A	--	--	--		0.29	1.30	2.20	1.40	4.70	6.80	4.50	0.60	19.40	15.20	0.59	10.60	1.40	4.70	8.80	1.80	2.20	11.80	0.30	8.7
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	-1.85	-2.47
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	-2.17	-2.79
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	8.98	9.48
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	10.10	9.15	9.44	9.63	9.53	9.29	9.55	9.45	9.15	9.30	9.80
Metals (ICP-MS)																										
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		--	218	227	252	107	447	31	1,400	46	109	59	--	66	1,420	--	--	61	978	29	231
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		--	225	201	116	133	134	119	185	157	80	150	--	111	127	--	--	132	--	111	110
Total Beryllium (Be)	µg/L	2	5	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2	--	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		--	11	17	22	10	22	18	22	20	21	<50	--	9	14	--	--	<5	--	19	9
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		--	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	--	0.052	0.14
Total Chromium (Cr)	µg/L	1	1	--	1		--	<1	<1	<1	<1	1	<1	<1	<1	<1	<1.0	--	<1	3	--	--	<1	--	1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	2	--	--	<1	--	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		3	<2	3	16	2	6	2	2	<1	4	2	3	3	10	<1	3	<1	14	3	4
Total Iron (Fe)	µg/L	50	300	--	300		2,150	347	1,320	500	194	890	157	2,000	207	229	170	671	171	1,940	374	223	<50	3,540	289	494
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		--	0.8	0.7	1.0	<0.5	1.4	<0.5	1.8	<0.5	<0.5	<0.5	--	<0.5	3.4	--	--	<0.5	--	<0.5	1.3
Total Manganese (Mn)	µg/L	2	820	--	--		129	182	485	120	87	89	26	71	182	36	110	371	61	444	148	35	77	1,870	91	91
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<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	--	<2	<2
Total Selenium (Se)	µg/L	1	1	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		--	<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	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		--	112	94	60	93	90	96	116	111	54	120	--	43	89	--	--	104	--	111	56
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	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		--	4	3	7	3	11	2	22	<2	3	<2	--	<2	31	--	--	<2	--	<2	6
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		--	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	0.2	--	--	<0.1	--	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	4	--	--	3	--	<2	2
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	22	41
MICROBIOLOGICAL																										
Total Coliform	MPN/100mL	1	--	--	--		--	>2420	>2420	2,420	866	>2420	866	>2420	961	>2420	---	>2420	>2420	>2420	>2420	>2420	488	>2420	1,990	210
E. coli	MPN/100mL	1	--	400	--		<100	<1	2	19	3	86	<1	<1	7	1,730	<10	19	6	<1	40	50	6	51	4	<1
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	2.47	78.76
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	2.85	131.56

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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	2012/10/11	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	2017/10/18	2018/05/08
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	13:45	13:25	13:00
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	NCC	N/A	2.9	2.7	4.2	3.8	4.1	4.7	3.9	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	15.1	24.0	9.3	12.8	21.6	12.1	17.2	23.0	14.4	14.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.6	8.1	6.9	8.8	7.8	10.4	10.4	8.2	9.5	8.4	8.6	10.0	7.7	9.9	12.1	7.5	8.1	7.2	8.0	8.6	8.8	6.5	13.0	7.0	7.8	8.2	9.4
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.4	6.6	6.6	7.1	7.4	5.9	6.3	6.2	6.1	7.6	6.6	6.4	7.2	6.3	6.6	7.4	6.6	6.9	6.3	8.0	7.6	5.9	4.6	6.9	6.7	7.3	6.3
Specific Conductance	uS/cm	--	--	--	--		561.0	279.0	223.0	265.0	234.0	124.5	176.6	173.6	105.5	366.0	186.4	215.1	199.0	250.5	431.0	263.0	210.0	0.2	432.1	289.1	231.0	289.0	234.3	234.0	273.0	255.0	203.7
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	6	6	<5	8	7	<5	13	9	<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	63	59	57
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	24	28
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	0.20	0.51
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	0.20	0.40
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	<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	<0.03	0.05	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	0.4	--	0.4	0.8	0.4	0.4	<5	0.5	1.2	6.0	2.6	3.4	0.4	0.5	0.8	1.1	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	3.6	4.7	0.7	3.3	6.7	4.6	5.0	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	6.3	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	<0.010	<0.01	<0.01	<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		6.4	6.8	6.8	6.6	7.0	6.6	6.5	6.8	6.7	6.6	6.8	6.7	6.9	6.9	6.7	7.0	6.6	6.7	7.0	6.8	6.4	6.9	6.9	6.8	7.2	6.8	6.84
Total Calcium (Ca)	mg/L	0.1	--	--	--		4.5	6.9	6.4	8.4	9.0	5.9	6.0	5.0	4.6	6.0	6.0	6.8	6.6	6.9	6.9	9.1	7.0	6,900.0	7.8	4.8	7.9	10.5	7.6	8.0	8.2	9.5	6.3
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.6	1.1	1.0	1.3	1.2	0.8	1.0	0.9	0.8	1.0	1.1	1.0	0.9	1.5	1.3	1.4	1.0	970.0	1.4	0.9	1.5	1.8	1.3	1.3	1.2	1.5	1.1
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.02	<0.02	0.002	0.018	0.002	<0.002	0.014	0.011	0.030	0.019	0.030	0.006	0.007	0.047	0.012	0.030	0.021	0.005	0.060	0.018	0.173	0.104	0.013	0.041	0.036	0.099	0.032
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	0.9	0.9	1.2	1.1	1.3	1.2	0.8	1.4	0.8	1.0	0.8	1.0	1.5	0.9	1.3	0.9	800.0	1.0	0.6	1.0	1.3	1.1	1.0	1.1	1.3	0.9
Total Sodium (Na)	mg/L	0.1	--	--	--		25.0	38.0	34.0	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	35.0	38.6	25.6	37.6	35.1	32.1	40.9	45.3	36.0	35.5
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	1.8	2.7
Total Suspended Solids	mg/L	5	--	--	25*		<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	104	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		13	11	11	13	12	12	12	10	12	7	10	8	10	10	10	8	8	8	9	8	11	11	11	10	9	11	9
Turbidity (NTU)	NTU	0.1	--	50	--		0.4	0.5	0.6	8.2	0.9	0.5	0.6	1.0	1.2	0.7	1.0	0.7	1.1	19.2	1.4	0.9	1.5	0.5	3.8	24.2	199.0	112.0	2.6	3.3	3.2	31.3	0.7
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	248	242
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	2.09	1.83
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	6	6	<5	8	7	<5	13	9	<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	137	142	112
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	<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	3.15	1.99
Hardness (CaCO3)	mg/L	N/A	--	--	--		14.00	22.00	20.00	26.00	28.00	18.00	19.00	16.00	15.00	19.10	19.50	21.10	20.20	23.40	22.60	28.50	21.60	21.00	25.20	15.70	25.90	33.60	24.30	25.30	25.40	29.90	20.3
Ion Balance (% Difference)	%	N/A	--	--	--		3.78	1.63	2.58	5.17	4.02	4.80	1.25	7.22	1.60	5.50	9.00	5.50	7.00	19.80	9.20	17.00	9.20	3.18	15.20	1.20	30.00	18.60	3.80	5.80	6.10	20.30	4.2
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	-3.20	-2.42	-2.92	-3.26
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	-3.24	-3.58
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	10.10	9.99	9.91	9.27	9.79	9.90	9.80	9.93	10.10	10.00	9.68	9.86	10.00	9.57	9.67	10.1
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	10.40	10.30	10.20	9.59	10.10	10.20	10.10	10.20	10.50	10.30	10.00	10.20	10.30	9.89	9.99	10.4
Metals (ICP-MS)																																
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		260	--	--	665	46	--	233	--	--	177	306	141	103	3,920	305	129	142	140	--	2,320	7,690	--	--	250	94	4,190	151
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	--	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	2	<2	<2	<2	<1.0	--	<2	4	--	--	<2	--	3	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		23	--	--	35	24	--	27	--	--	22	19	20	12	40	23	23	18	21	--	34	60	--	--	22	--	58	19
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		8	--	--	11	9	--	<50	--	--	6	9	6	8	9	8	13	11	<50	--	<5	10	--	--	<5	--	12	6
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	0.179	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	3	<1	<1	<1	<1.0	--	2	6	--	--	<1	--	5	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	<0.4	--	<0.4	--	--	<1	2	<1	<1	9	<1	<1	<1	<0.40	--	3	6	--	--	<1	--	6	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	2	<2.0	<2.0	4	<2.0	2	<2	<2	<2	1	6	1	<1	2	<2.0	3	4	10	<1	<1	<1	<1	8	<1
Total Iron (Fe)	µg/L	50	300	--	300		140	--	--	837	89	161	141	315	528	137	742	130	205	5,300	239	296	182	93	4,460	6,020	13,600	8,250	171	206	359	12,600	93
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		<0.5	--	--	1.7	<0.5	--	<0.5	--	--	<0.5	0.9	<0.5	<0.5	13.5	0.9	<0.5	<0.5	<0.5	--	6.3	19.9	--	--	<0.5	--	9.1	1.2
Total Manganese (Mn)	µg/L	2	820	--	--		17	--	--	142	69	41	14	128	62	48	214	33	58	693	54	260	49	34	296	278	424	281	53	64	125	894	21
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	--	<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	--	6	2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	1	1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		18	--	--	36	37	--	25	--	--	26	30	31	25	34	35	37	30	32	--	22	40	--	--	34	--	47	27
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	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<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	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	8	<2.0	--	4	--	--	<2	4	<2	<2	65	4	<2	3	<2	--	25	106	--	--	2	--	75	<2
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<0.1	--	--	<0.1	<0.1	--	<0.1	--	--	0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	--	0.6	0.9	--	--	<0.1	--	0.6	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	10	<2	<2	<2	<2	--	7	16	--	--	<2	--	12	<2
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	10	5	6	6	6	5	<5	13	8	<5	62	<5	<5	6	11	13	12	34	20	<5	11	<5	29	6
MICROBIOLOGICAL																																
Total Coliform	MPN/100mL	1	--	--	--		200	73	--	>250	>250	>250	85	>250	--	411	2,420	866	1,730	1,011	613	2,420	>2420	---	>2420	>2420	>2420	>2420	1,410	>2420	665	>2420	166	9
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	<1	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	1.70	4.97	4.40	4.86	1.93
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	6.58	0.98

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 shac = Present Result - Parameter concentration exceeds CCME FWAL Guideline.
Underlined (blac = 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 D2: Historical Data - Bedford West Water Quality Sampling Program

Spring 2018	Units	RDL (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	2013/05/15	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	2017/10/18	2018/05/09
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	11:20	11:00	9:20	8:30	11:30	13:45	9:08	13:45	10:00	9:50	14:30	14:30	14:00	13:30
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	2.4	3.2	N/A	N/A	N/A	3.1	NCC	N/A	2.4	2.7	2.3	2.6	2.5	2.5	2.9	2.9
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	15.1	27.0	9.0	13.8	22.1	11.8	17.1	24.0	14.0	15.3
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.2	8.3	8.4	8.8	8.1	10.6	9.9	8.7	8.9	7.8	9.3	8.9	12.4	7.0	7.9	8.1	9.8	8.3	8.6	7.7	10.3	10.4	8.9	6.6	9.9
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.4	6.8	6.8	7.1	7.4	6.5	6.3	6.7	6.1	8.6	6.5	6.1	6.5	7.2	5.9	6.6	6.8	7.3	7.6	5.9	5.4	6.7	7.0	6.9	6.3
Specific Conductance	uS/cm	--	--	--	--		267.0	264.0	241.0	237.0	234.0	200.5	158.7	173.2	155.9	231.0	234.0	250.5	966.0	266.0	215.0	0.2	255.6	454.9	264.0	298.0	230.3	242.0	285.0	252.0	214.4
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	11	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	72	60	46
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	19	31
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	0.16	0.17
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	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	<0.010	0.15	<0.05	<0.05	0.11	<0.05	0.11	<0.05	<0.05	<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	<0.03	<0.03
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	--	1.7	<0.4	0.4	<5	0.2	1.2	3.0	0.6	<0.4	0.5	0.6	0.6	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		3.6	2.6	4.5	3.2	3.4	3.6	4.0	6.0	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	4.1	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	<0.010	<0.01	<0.01	<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		6.5	6.8	6.8	6.7	7.0	6.8	6.4	6.6	6.6	6.6	6.7	6.7	7.1	7.0	6.8	6.6	7.0	7.0	6.8	7.2	6.9	6.9	7.2	7.0	6.81
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.1	7.1	6.1	7.2	7.7	8.0	5.3	4.8	5.0	6.1	6.7	7.7	19.2	8.8	6.9	7,300.0	8.2	6.2	8.9	8.1	7.4	8.1	8.5	8.1	6.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.3	1.2	1.2	0.9	0.9	0.9	1.0	1.0	1.4	1.7	1.4	1.0	1,000.0	1.3	1.2	1.2	1.2	1.3	1.3	1.1	1.2	1.1
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<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	0.018	0.008	0.012	0.008	0.012	0.003	0.005	0.018	0.013	0.006	0.047
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.0	0.9	1.0	0.9	1.0	0.9	0.8	1.0	0.8	0.8	1.3	1.4	1.2	1.1	830.0	1.0	0.9	1.0	1.0	1.1	0.9	1.4	1.1	0.9
Total Sodium (Na)	mg/L	0.1	--	--	--		35.0	40.0	34.0	31.1	35.1	30.8	25.7	21.3	20.9	34.6	37.5	42.0	133.0	42.6	33.9	38.0	43.3	31.3	42.9	37.5	32.1	41.5	47.2	35.5	37.5
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.6	2.5	2.3	2.6	2.3	3.3	2.9	2.5	3.0	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	2.0	2.5
Total Suspended Solids	mg/L	5	--	--	25*		2	3	<1	15	<2	11	<1	8	<1	<5	<5	<5	16	<5	<5	1	<5	<5	45	<5	<5	<5	14	<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	8	11	7
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	1.0	3.3	2.6	0.7	1.0	0.9	1.9	1.3	9.4	1.1	1.4	1.9	1.9	1.8	1.4
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	255	249
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	2.15	1.56
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	11	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	146	124	103
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	<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	2.09	2.10
Hardness (CaCO3)	mg/L	N/A	--	--	--		20.00	22.00	20.00	23.00	24.00	25.00	17.00	15.00	16.00	19.30	20.80	25.00	54.90	27.70	21.30	23.00	25.80	20.40	27.20	25.20	23.80	25.60	25.80	25.20	21.3
Ion Balance (% Difference)	%	N/A	--	--	--		4.20	1.36	2.84	4.81	0.50	2.48	0.68	10.50	1.17	4.80	2.80	7.50	7.70	16.50	2.20	0.23	10.60	3.00	5.10	1.70	3.40	3.20	3.50	1.60	14.9
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	-2.66	-3.25
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	-2.98	-3.57
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	10.10	9.81	8.86	9.65	9.34	NC	9.98	9.95	9.81	9.69	9.82	9.99	9.60	9.65	10.1
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	10.40	10.10	9.18	9.97	9.66	NC	10.30	10.30	10.10	10.00	10.10	10.30	9.92	9.97	10.4
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		130	--	--	1,030	56	--	202	--	--	189	131	107	181	52	122	130	--	278	610	--	--	215	40	34	141
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	--	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		16	--	--	23	12	--	23	--	--	22	22	37	50	27	19	25	--	24	35	--	--	27	--	23	21
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		5	--	--	8	9	--	<50	--	--	6	6	9	7	13	11	<50	--	<5	8	--	--	<5	--	11	6
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	<0.017	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	<0.4	--	<0.4	--	--	<1	<1	2	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	3	<2	<2	<2	<2	<2	<2	<2	1,380	1	<1	2	<2.0	2	2	<1	<1	1	<1	<1	1	<1
Total Iron (Fe)	µg/L	50	300	--	300		100	--	--	1,090	151	76	143	699	181	178	181	1,760	264	316	134	170	334	368	647	174	123	<50	203	145	104
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		<0.5	--	--	2.4	<0.5	--	<0.5	--	--	<0.5	<0.5	49.7	0.7	<0.5	<0.5	<0.5	--	0.5	1.1	--	--	<0.5	--	<0.5	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		58	--	--	159	81	28	34	89	31	22	87	866	206	278	24	43	67	61	109	36	23	85	68	26	20
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	--	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		2	--	--	2	<2.0	--	<2.0	--	--	<2	<2	3	<2	<2	<2	<2.0	--	2	<2	--	--	4	--	<2	<2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		30	--	--	35	33	--	26	--	--	27	31	35	68	37	29	34	--	21	38	--	--	35	--	39	29
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	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	3	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	21	<2	--	4	--	--	<2	<2	2	3	<2	<2	2	--	4	7	--	--	<2	--	<2	<2
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<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	--	--	<0.1	--	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	18	<5.0	6	7	8	10	8	11	762	<5	<5	5	14	<5	8	7	<5	<5	8	9	5	5
MICROBIOLOGICAL																						1									
Total Coliform	MPN/100mL	1	--	--	--		49	40	--	>250	46	97	64	>250	--	261	1,410	411	291	517	>2420	---	>2420	1,120	687	>2420	>2420	1,990	>2420	1,730	1
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	5	<1
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	1.27	1.37
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	1.47	2.22

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
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 shad
Underlined (blac
Blue shaded

Appendix E

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: Mike Smith

PROJECT: 631477

AGAT WORK ORDER: 18X336746

MICROBIOLOGY ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

WATER ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

DATE REPORTED: May 17, 2018

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.

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Certificate of Analysis

AGAT WORK ORDER: 18X336746

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

Total Coliforms and E.coli Membrane Filtration

DATE RECEIVED: 2018-05-08 **DATE REPORTED: 2018-05-17**

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	PLM 1	PLM 2	LU
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08
Parameter	Unit	G / S	RDL	9228346	9228356	9228358	9228359	9228360	9228361	9228362	9228363
Total Coliforms (MF)	CFU/100 mL		1	14	10	<1	4	58	9	1	210
E. Coli (MF)	CFU/100 mL		1	5	4	<1	2	8	1	<1	<1

		SAMPLE DESCRIPTION:		LSD	HWY 102-1	HWY 102-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-05-08	2018-05-08	2018-05-08
Parameter	Unit	G / S	RDL	9228364	9228365	9228367
Total Coliforms (MF)	CFU/100 mL		1	46	105	6
E. Coli (MF)	CFU/100 mL		1	23	<1	1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Original signed

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18X336746

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2018-05-08

DATE REPORTED: 2018-05-17

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	PLM 1	PLM 2	LU
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08
Parameter	Unit	G / S	RDL	9228346	9228356	9228358	9228359	9228360	9228361	9228362	9228363
Alkalinity	mg/L		5	<5	<5	<5	<5	<5	<5	5	11
Chloride	mg/L		1	53	12	54	52	56	57	46	96
True Color	TCU		5	42	82	63	35	34	28	31	28
Nitrate + Nitrite as N	mg/L		0.05	0.26	0.07	0.17	0.27	0.17	0.51	0.17	1.01
Nitrate as N	mg/L		0.05	0.16	0.07	0.17	0.17	0.17	0.40	0.17	0.87
Nitrite as N	mg/L		0.05	0.10	<0.05	<0.05	0.10	<0.05	0.11	<0.05	0.14
Ammonia as N	mg/L		0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	5.1	9.0	5.1	5.1	4.9	4.9	4.9	9.3
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				6.71	6.46	6.72	6.74	6.70	6.84	6.81	7.01
Total Calcium	mg/L		0.1	5.8	2.3	6.0	5.9	5.9	6.3	6.7	12.7
Total Magnesium	mg/L		0.1	1.0	0.7	1.0	1.0	1.0	1.1	1.1	1.6
Total Phosphorus	mg/L		0.002	0.012	0.014	0.010	0.024	0.031	0.032	0.047	0.078
Total Potassium	mg/L		0.1	0.7	0.5	0.7	0.7	0.7	0.9	0.9	2.2
Total Sodium	mg/L		0.1	36.4	9.2	35.9	35.6	37.2	35.5	37.5	73.0
Reactive Silica as SiO2	mg/L		0.5	2.6	2.3	2.6	2.6	2.4	2.7	2.5	3.5
Total Suspended Solids	mg/L		5	<5	<5	<5	<5	<5	<5	<5	52
Sulphate	mg/L		2	8	3	8	8	8	9	7	19
Turbidity	NTU		0.1	1.3	0.9	1.0	1.2	1.4	0.7	1.4	21.4
Electrical Conductivity	umho/cm		1	243	68	244	243	247	242	249	518
Anion Sum	me/L			1.68	0.41	1.70	1.65	1.76	1.83	1.56	3.40
Bicarb. Alkalinity (as CaCO3)	mg/L		5	<5	<5	<5	<5	<5	<5	5	11
Calculated TDS	mg/L		1	106	28	107	105	110	112	103	216
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
Cation sum	me/L			2.00	0.62	1.98	1.96	2.04	1.99	2.10	4.04
Hardness	mg/L			18.6	8.6	19.1	18.9	18.9	20.3	21.3	38.3
% Difference/ Ion Balance (NS)	%			8.6	20.8	7.6	8.6	7.3	4.2	14.9	8.7
Langelier Index (@20C)	NA			-3.42	-4.02	-3.39	-3.38	-3.42	-3.26	-3.25	-2.47
Langelier Index (@ 4C)	NA			-3.74	-4.34	-3.71	-3.70	-3.74	-3.58	-3.57	-2.79
Saturation pH (@ 20C)	NA			10.1	10.5	10.1	10.1	10.1	10.1	10.1	9.48

Original signed

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18X336746

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2018-05-08

DATE REPORTED: 2018-05-17

SAMPLE DESCRIPTION:				KL1	KL2	KL3	KL4	KL5	PLM 1	PLM 2	LU
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08	2018-05-08
Parameter	Unit	G / S	RDL	9228346	9228356	9228358	9228359	9228360	9228361	9228362	9228363
Saturation pH (@ 4C)	NA			10.4	10.8	10.4	10.4	10.4	10.4	10.4	9.80
Total Aluminum	ug/L		5	169	228	164	157	172	151	141	231
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	12	7	14	15	13	19	21	110
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	7	5	6	5	6	6	9
Total Cadmium	ug/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	0.14
Total Chromium	ug/L		1	<1	<1	<1	<1	<1	<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	4
Total Iron	ug/L		50	96	148	81	83	80	93	104	494
Total Lead	ug/L		0.5	1.3	1.2	0.7	1.4	0.9	1.2	<0.5	1.3
Total Manganese	ug/L		2	28	17	21	19	24	21	20	91
Total Molybdenum	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L		2	<2	<2	<2	<2	<2	2	<2	<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	26	10	27	27	28	27	29	56
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	6
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	8	<5	6	7	8	6	5	41
Chlorophyll A - Acidification Method	ug/L		0.05	1.91	0.51	1.16	1.06	6.25	1.93	1.37	78.76
Chlorophyll A - Welschmeyer Method	ug/L		0.05	3.09	0.91	1.8	1.71	3.35	0.98	2.22	131.56
Total Kjeldahl Nitrogen as N	mg/L		0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1.1

Original signed

Certified By:

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

Certificate of Analysis

AGAT WORK ORDER: 18X336746

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2018-05-08

DATE REPORTED: 2018-05-17

Original signed

Certified By:

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11 Morris Drive, Unit 122
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CANADA B3B 1M2
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PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

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SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2018-05-08

DATE REPORTED: 2018-05-17

		SAMPLE DESCRIPTION:		LSD	HWY 102-1	HWY 102-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-05-08	2018-05-08	2018-05-08
Parameter	Unit	G / S	RDL	9228364	9228365	9228367
Alkalinity	mg/L		5	9	13	9
Chloride	mg/L		1	23	51	79
True Color	TCU		5	36	27	25
Nitrate + Nitrite as N	mg/L		0.05	0.32	0.37	0.33
Nitrate as N	mg/L		0.05	0.32	0.37	0.16
Nitrite as N	mg/L		0.05	<0.05	<0.05	0.17
Ammonia as N	mg/L		0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	5.8	5.0	5.6
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01
pH				6.91	7.02	6.79
Total Calcium	mg/L		0.1	4.4	12.5	11.5
Total Magnesium	mg/L		0.1	1.1	1.8	1.4
Total Phosphorus	mg/L		0.002	0.052	0.022	0.034
Total Potassium	mg/L		0.1	0.9	1.6	1.3
Total Sodium	mg/L		0.1	16.5	41.2	59.4
Reactive Silica as SiO2	mg/L		0.5	2.4	2.5	1.6
Total Suspended Solids	mg/L		5	<5	<5	12
Sulphate	mg/L		2	5	12	9
Turbidity	NTU		0.1	2.0	1.7	7.0
Electrical Conductivity	umho/cm		1	122	298	422
Anion Sum	me/L			0.96	1.97	2.62
Bicarb. Alkalinity (as CaCO3)	mg/L		5	9	13	9
Calculated TDS	mg/L		1	58	130	170
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10
Cation sum	me/L			1.08	2.62	3.36
Hardness	mg/L			15.5	38.6	34.5
% Difference/ Ion Balance (NS)	%			6.0	14.0	12.4
Langelier Index (@20C)	NA			-3.06	-2.37	-2.81
Langelier Index (@ 4C)	NA			-3.38	-2.69	-3.13
Saturation pH (@ 20C)	NA			9.97	9.39	9.60

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CANADA B3B 1M2
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AGAT WORK ORDER: 18X336746

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2018-05-08

DATE REPORTED: 2018-05-17

		SAMPLE DESCRIPTION:		LSD	HWY 102-1	HWY 102-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-05-08	2018-05-08	2018-05-08
Parameter	Unit	G / S	RDL	9228364	9228365	9228367
Saturation pH (@ 4C)	NA			10.3	9.71	9.92
Total Aluminum	ug/L		5	142	72	167
Total Antimony	ug/L		2	<2	<2	<2
Total Arsenic	ug/L		2	<2	<2	<2
Total Barium	ug/L		5	8	68	96
Total Beryllium	ug/L		2	<2	<2	<2
Total Bismuth	ug/L		2	<2	<2	<2
Total Boron	ug/L		5	10	11	7
Total Cadmium	ug/L		0.09	<0.09	<0.09	<0.09
Total Chromium	ug/L		1	<1	<1	<1
Total Cobalt	ug/L		1	<1	<1	<1
Total Copper	ug/L		1	<1	1	2
Total Iron	ug/L		50	239	85	870
Total Lead	ug/L		0.5	0.7	0.8	2.3
Total Manganese	ug/L		2	55	9	55
Total Molybdenum	ug/L		2	<2	<2	<2
Total Nickel	ug/L		2	<2	6	<2
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	17	54	53
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	3	<2	4
Total Uranium	ug/L		0.1	<0.1	<0.1	<0.1
Total Vanadium	ug/L		2	<2	<2	<2
Total Zinc	ug/L		5	<5	6	12
Chlorophyll A - Acidification Method	ug/L		0.05	0.93	1.57	2.56
Chlorophyll A - Welschmeyer Method	ug/L		0.05	1.6	2.62	4.28
Total Kjeldahl Nitrogen as N	mg/L		0.4	<0.4	1.1	1.4

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

Certificate of Analysis

AGAT WORK ORDER: 18X336746

PROJECT: 631477

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

SNC-Lavalin Bedford West Custom Inorganics Package

DATE RECEIVED: 2018-05-08

DATE REPORTED: 2018-05-17

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

9228346 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.

9228356 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.
When the cation and anion sums are below 1 me/L, the acceptable criteria is less than 0.3me/L.

9228358-9228361 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.

9228362 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.
Ion Balance is biased high, contributing parameters have been confirmed.

9228363-9228364 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.

9228365-9228367 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.
Ion Balance is biased high, contributing parameters have been confirmed.

Certified By: Original signed

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X336746

PROJECT: 631477

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: May 17, 2018			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	9228141		168	168	0.1%	< 5	92%	80%	120%	NA	80%	120%	NA	80%	120%
Chloride	9228140		(226)	91	84.7%	< 1	91%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	9228346	9228346	42	46	9.1%	< 5	110%	80%	120%	NA			NA		
Nitrate as N	9228140		0.84	0.18	128.3%	< 0.05	97%	80%	120%	NA	80%	120%	NA	80%	120%
Nitrite as N	9228140		0.38	0.19	67.1%	< 0.05	97%	80%	120%	NA	80%	120%	NA	80%	120%
Ammonia as N	1	9228626	<0.05	<0.05	NA	< 0.03	100%	80%	120%		80%	120%	93%	80%	120%
Total Organic Carbon	9228106		<0.5	<0.5	NA	< 0.5	103%	80%	120%	NA	80%	120%	85%	80%	120%
Ortho-Phosphate as P	1	9228622	<0.01	<0.01	NA	< 0.01	101%	80%	120%		80%	120%	106%	80%	120%
pH	9228141		7.63	7.67	0.5%	<	100%	80%	120%	NA	80%	120%	NA	80%	120%
Total Calcium	9228776		<0.1	<0.1	NA	< 0.1	100%	80%	120%	102%	80%	120%	98%	70%	130%
Total Magnesium	9228776		<0.1	<0.1	NA	< 0.1	107%	80%	120%	101%	80%	120%	101%	80%	120%
Total Phosphorus	9228346	9228346	0.012	0.010	14.2%	< 0.002	105%	90%	110%	105%	90%	110%	101%	80%	120%
Total Potassium	9228776		<0.1	<0.1	NA	< 0.1	104%	80%	120%	98%	80%	120%	99%	70%	130%
Total Sodium	9228776		1.3	1.3	0.2%	< 0.1	107%	80%	120%	101%	80%	120%	NA	70%	130%
Reactive Silica as SiO2	1	9228622	5.9	6.1	3.3%	< 0.5	101%	80%	120%		80%	120%	80%	80%	120%
Total Suspended Solids	9228346	9228346	<5	<5	NA	< 5	98%	80%	120%				92%	80%	120%
Sulphate	9228140		44	32	32.3%	< 2	110%	80%	120%	NA	80%	120%	NA	80%	120%
Turbidity	9228346	9228346	1.3	1.3	1.5%	< 0.1	99%	80%	120%	NA			NA		
Electrical Conductivity	9228141		1370	1370	0.2%	< 1	102%	80%	120%	NA	80%	120%	NA	80%	120%
Bicarb. Alkalinity (as CaCO3)	9228141		168	168	0.1%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	9228141		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	9228776		<5	<5	NA	< 5	113%	80%	120%	101%	80%	120%	105%	70%	130%
Total Antimony	9228776		<2	<2	NA	< 2	91%	80%	120%	98%	80%	120%	94%	70%	130%
Total Arsenic	9228776		<2	<2	NA	< 2	95%	80%	120%	92%	80%	120%	90%	70%	130%
Total Barium	9228776		<5	<5	NA	< 5	96%	80%	120%	93%	80%	120%	94%	70%	130%
Total Beryllium	9228776		<2	<2	NA	< 2	111%	80%	120%	106%	80%	120%	101%	70%	130%
Total Bismuth	9228776		<2	<2	NA	< 2	99%	80%	120%	99%	80%	120%	100%	70%	130%
Total Boron	9228776		7	8	NA	< 5	108%	80%	120%	99%	80%	120%	103%	70%	130%
Total Cadmium	9228776		<0.09	<0.09	NA	< 0.09	94%	80%	120%	92%	80%	120%	89%	70%	130%
Total Chromium	9228776		<1	<1	NA	< 1	90%	80%	120%	87%	80%	120%	95%	70%	130%
Total Cobalt	9228776		<1	<1	NA	< 1	89%	80%	120%	89%	80%	120%	95%	70%	130%
Total Copper	9228776		19	19	2.1%	< 1	97%	80%	120%	91%	80%	120%	NA	70%	130%
Total Iron	9228776		<50	<50	NA	< 50	88%	80%	120%	88%	80%	120%	93%	70%	130%
Total Lead	9228776		1.2	1.9	NA	< 0.5	100%	80%	120%	95%	80%	120%	100%	70%	130%
Total Manganese	9228776		<2	<2	NA	< 2	94%	80%	120%	92%	80%	120%	99%	70%	130%
Total Molybdenum	9228776		<2	<2	NA	< 2	88%	80%	120%	88%	80%	120%	92%	70%	130%
Total Nickel	9228776		3	<2	NA	< 2	95%	80%	120%	90%	80%	120%	96%	70%	130%
Total Selenium	9228776		<1	<1	NA	< 1	92%	80%	120%	95%	80%	120%	88%	70%	130%
Total Silver	9228776		<0.1	<0.1	NA	< 0.1	96%	80%	120%	96%	80%	120%	95%	70%	130%

AGAT Laboratories

11 Morris Drive, Unit 122
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CANADA B3B 1M2
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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X336746

PROJECT: 631477

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: May 17, 2018			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	9228776		<5	<5	NA	< 5	90%	80%	120%	86%	80%	120%	92%	70%	130%
Total Thallium	9228776		<0.1	<0.1	NA	< 0.1	100%	80%	120%	100%	80%	120%	103%	70%	130%
Total Tin	9228776		<2	<2	NA	< 2	95%	80%	120%	92%	80%	120%	90%	70%	130%
Total Titanium	9228776		<2	<2	NA	< 2	106%	80%	120%	102%	80%	120%	98%	70%	130%
Total Uranium	9228776		0.3	0.3	NA	< 0.1	96%	80%	120%	92%	80%	120%	101%	70%	130%
Total Vanadium	9228776		<2	<2	NA	< 2	86%	80%	120%	87%	80%	120%	92%	70%	130%
Total Zinc	9228776		32	32	2.5%	< 5	92%	80%	120%	92%	80%	120%	92%	70%	130%
Total Kjeldahl Nitrogen as N	1	9228631	<0.4	<0.4	NA	< 0.4	120%	80%	120%	NA	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.

Original signed

Certified By:

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X336746

PROJECT: 631477

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Total Coliforms (MF)	MIC-121-7002	Sm 9222 H	MF/INCUBATOR
E. Coli (MF)	MIC-121-7002	SM 9222 H	MF/INCUBATOR

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X336746

PROJECT: 631477

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SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Alkalinity	INOR-121-6001	SM 2320 B	
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
True Color	INOR-121-6014	SM 2120 C	NEPHELOMETER
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
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Total Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Phosphorus	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	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	ION CHROMATOGRAPH
Turbidity	INOR-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	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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

Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X336746

PROJECT: 631477

ATTENTION TO: Mike Smith

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
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

AGAT Laboratories

Unit 122 • 11 Morris Drive
Dartmouth, NS
B3B 1M2
webearth.agatlabs.com • www.agatlabs.com
P: 902.468.8718 • F: 902.468.8924

Chain of Custody Record

Laboratory Use Only
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: 7.6 8.4 10.6
Hold Time:
AGAT Job Number: 18x336746
Notes:

Report Information
Company: SNC-LAVALIN INC
Contact: Michael Smith / MARIA GUTIERREZ
Address: 5657 SPRING GARDEN ROAD
Phone: 902-4924544 Fax:
Client Project #: 631477
AGAT Quotation:
Please Note: If quotation number is not provided client will be billed full price for analysis.

Report Information (Please print):
1. Name: MARIA GUTIERREZ
Email: Maria.Gutierrez@snclavalin.com
2. Name:
Email:

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

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

Invoice To Same Yes ☐ / No ☐
Company:
Contact: Payables@SNCLavalin.com
Address:
Phone: Fax:
PO/Credit Card#:

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

Drinking Water Sample: ☐ Yes ☒ No **Salt Water Sample** ☐ Yes ☒ No
Reg. No.:

(8)

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments – Site/Sample Info. Sample Containment
KL1	MAY 8/18 9:15	WATER	7	SEE APPENDIX J FOR
KL2	" 11:00	"	"	SAMPLE PARAMETERS
KL3	" 10:30	"	"	
KL4	" 10:35	"	"	ONLY ANALYZE FOR
KL5	" 9:30	"	"	SPRING
PLM1	" 13:00	"	"	↓
PLM2	" 13:30	"	"	↓
LU	" 10:00	"	"	GROUPS B-F
~~LSD~~ LSD	" 11:30	"	"	
HWY102-1	" 12:30	"	"	
HWY102-2	" 12:45	"	"	

Field Filtered/Preserved | Standard Water Analysis | Metals: ☐ Total ☐ Diss ☐ Available | Mercury | ☐ BOD ☐ CBOD | pH | ☐ TSS ☐ TDS ☐ VSS | TKN | Total Phosphorus | Phenols | Tier 1: TPH/BTEX (PIRI) ☐ low level | Tier 2: TPH/BTEX Fractionation | CCME-CWS TPH/BTEX | VOC | THM | HAA | PAH | PCB | TC + EC ☐ P/A ☐ MPN ☐ MF | ☐ HPC ☐ Pseudomonas | Fecal Coliform ☐ MPN ☑ MF | Other: Dissolved Metals West | Other: | Hazardous (Y/N)

Custom Plan

Samples Relinquished By (Print Name):	Date/Time	Samples Receive	Date/Time
MARIA GUTIERREZ	MAY 8 2:20pm	Original signed	2:20pm
Samples Relinquished By (Sign):	Date/Time	Samples Receive	Date/Time
			May 8/18 14:30

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

Page 1 of 2
N°:

Document ID: DIV-133-I502.002 Date revised: May 19, 2016

Appendix F

Graphs (Seasonal and Historical)

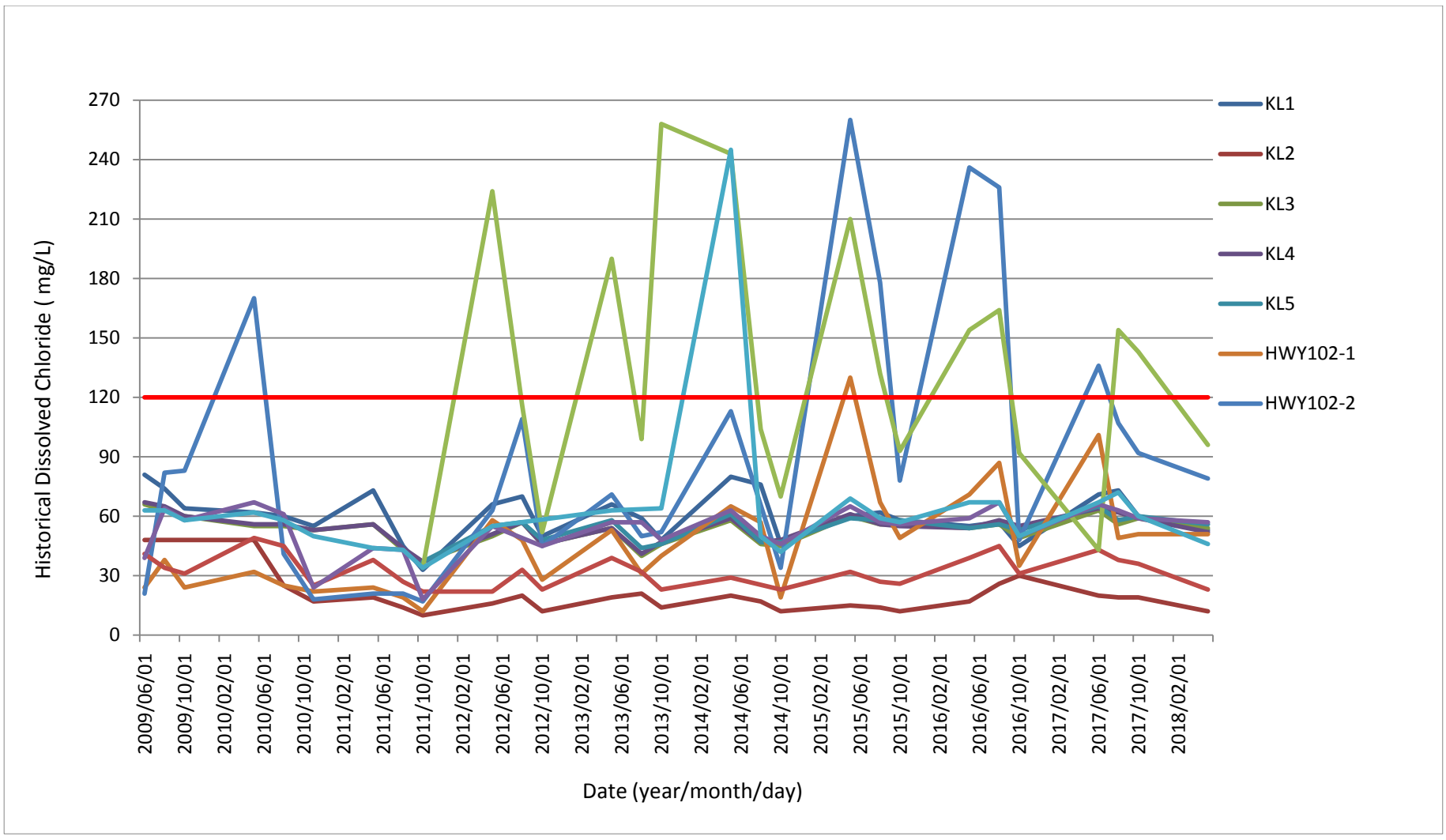

Figure 1 - Historical Dissolved Chloride Concentrations for Water Quality Monitoring Program.

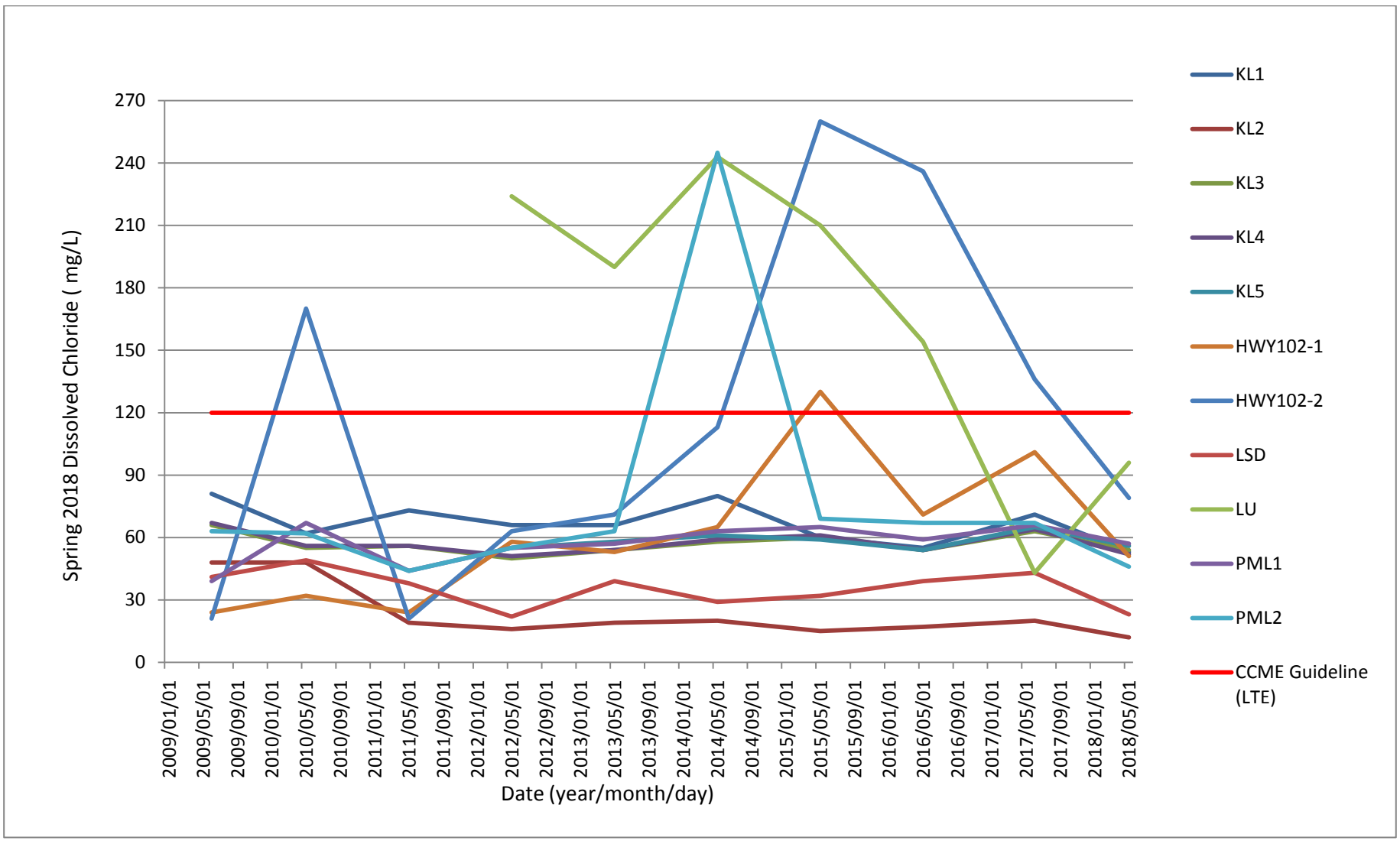

Figure 2 – Seasonal (Spring) Dissolved Chloride Concentrations for Water Quality Monitoring Program.

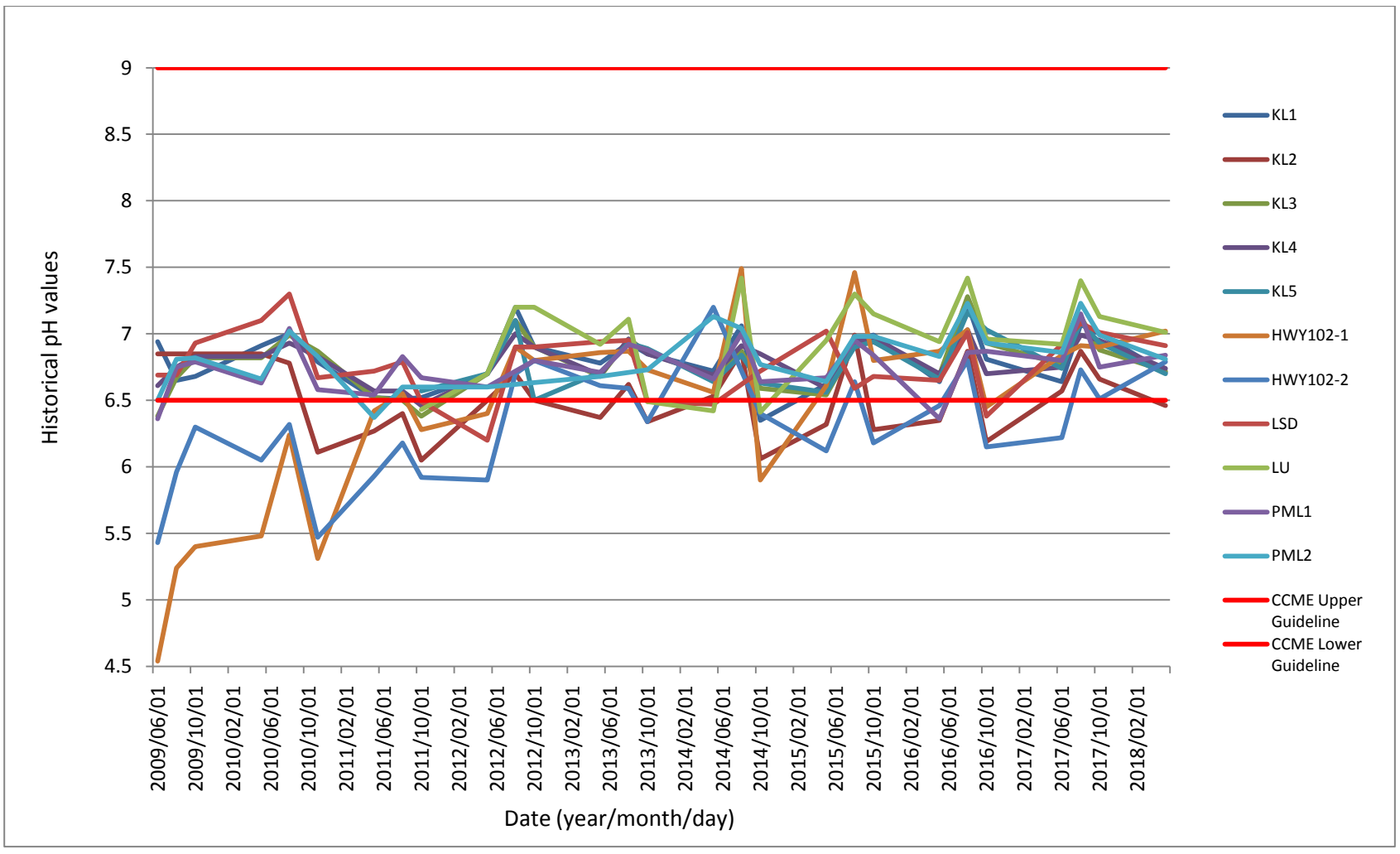

Figure 3 –Historical pH Measurements for Water Quality Monitoring Program

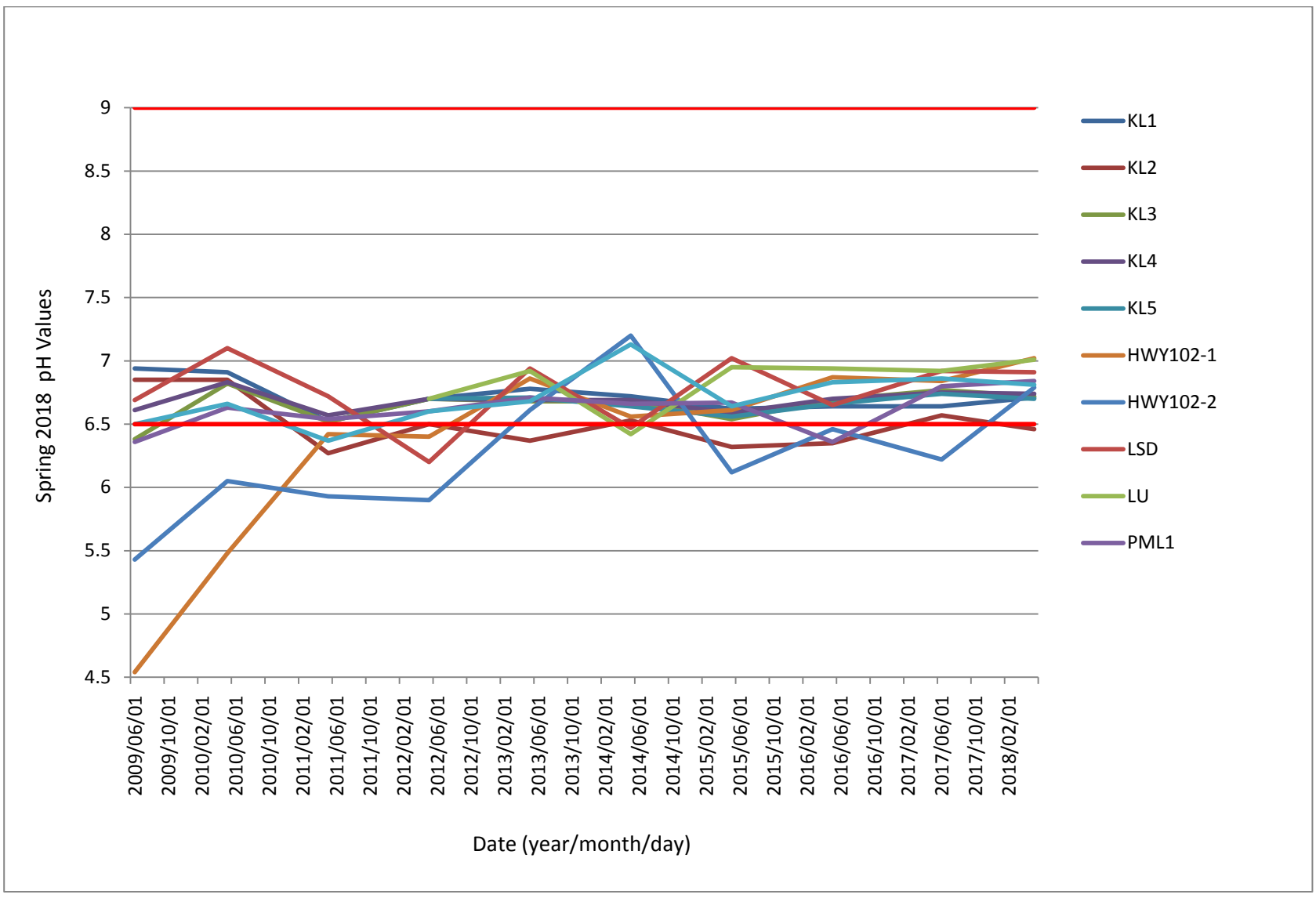

Figure 4 – Seasonal (Spring) pH Measurements for Water Quality Monitoring Program.

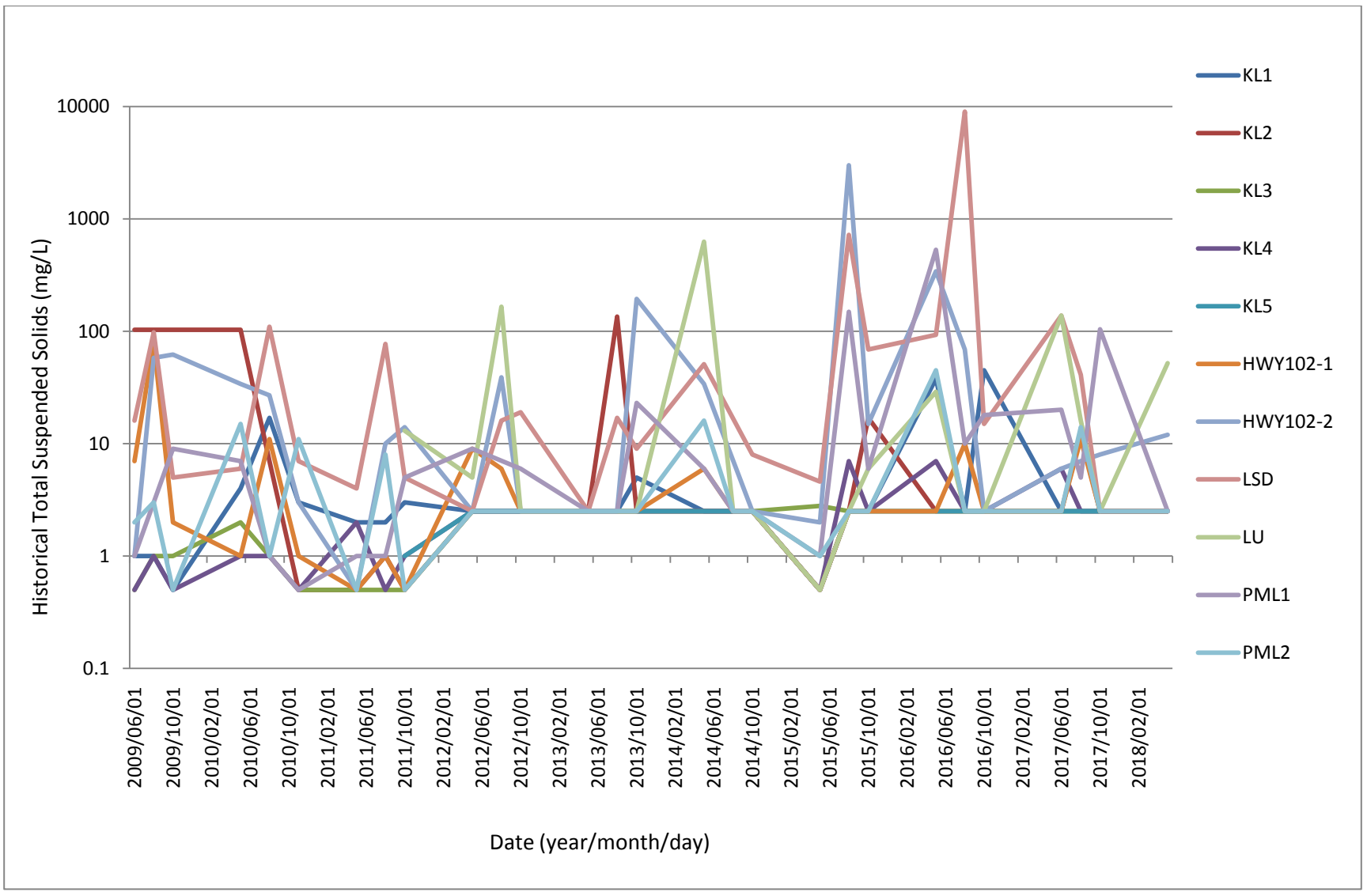

Figure 5 – Historical Total Suspended Solids Concentrations for Water Quality Monitoring Program.

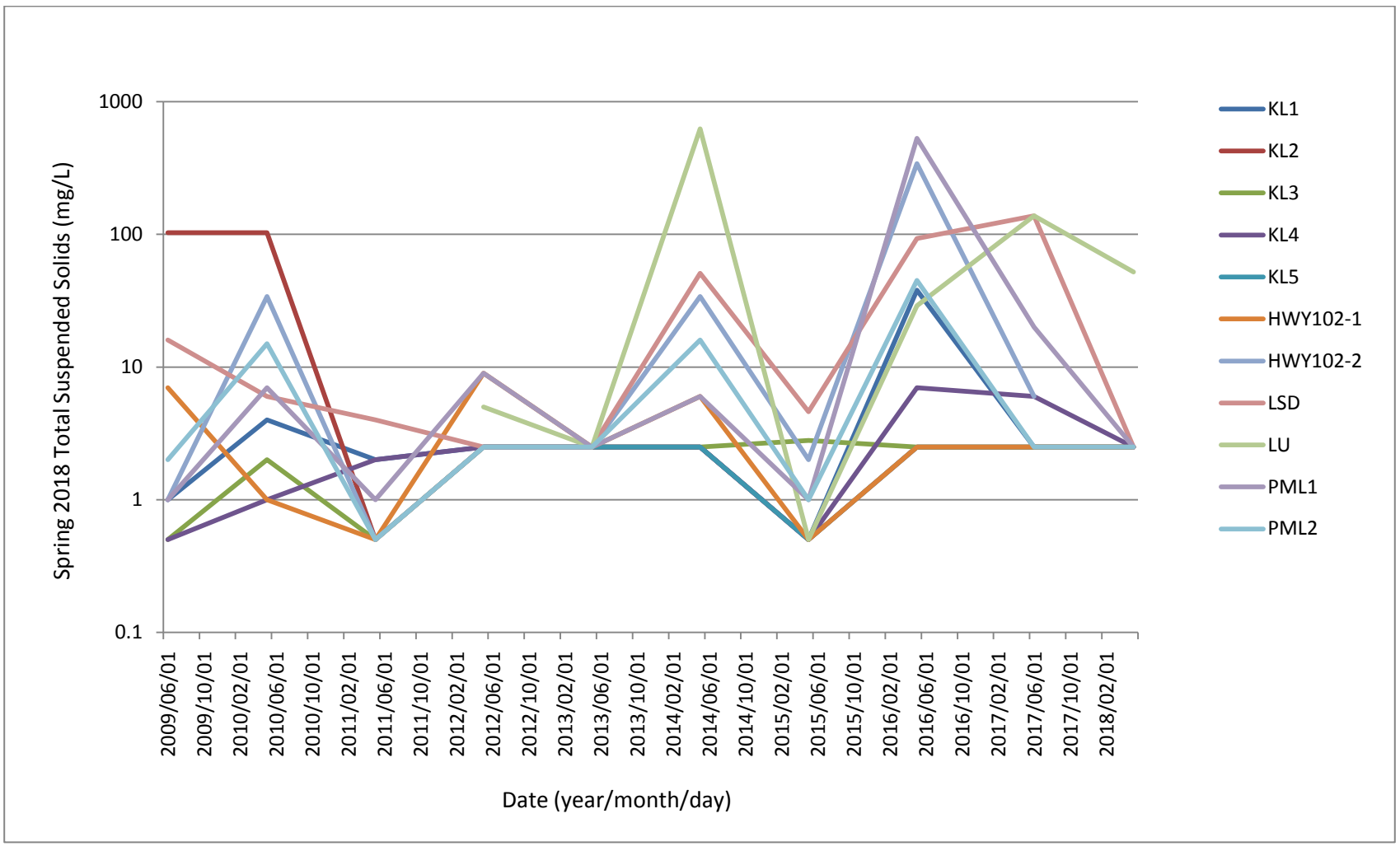

Figure 6 – Seasonal (Spring) Total Suspended Solids Concentrations for Water Quality Monitoring Program.

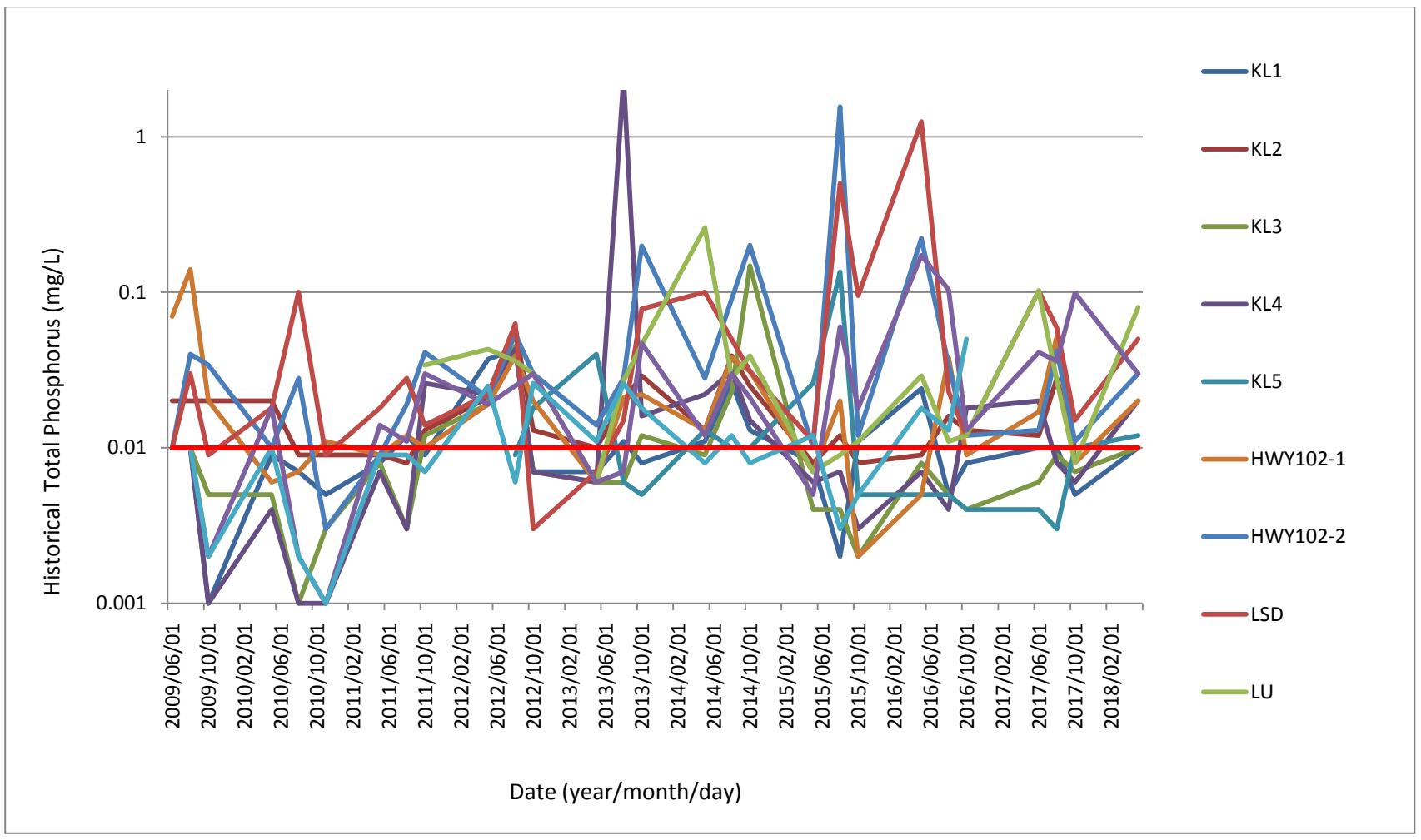

Figure 7 – Historical Total Phosphorus Concentrations for Water Quality Monitoring Program.

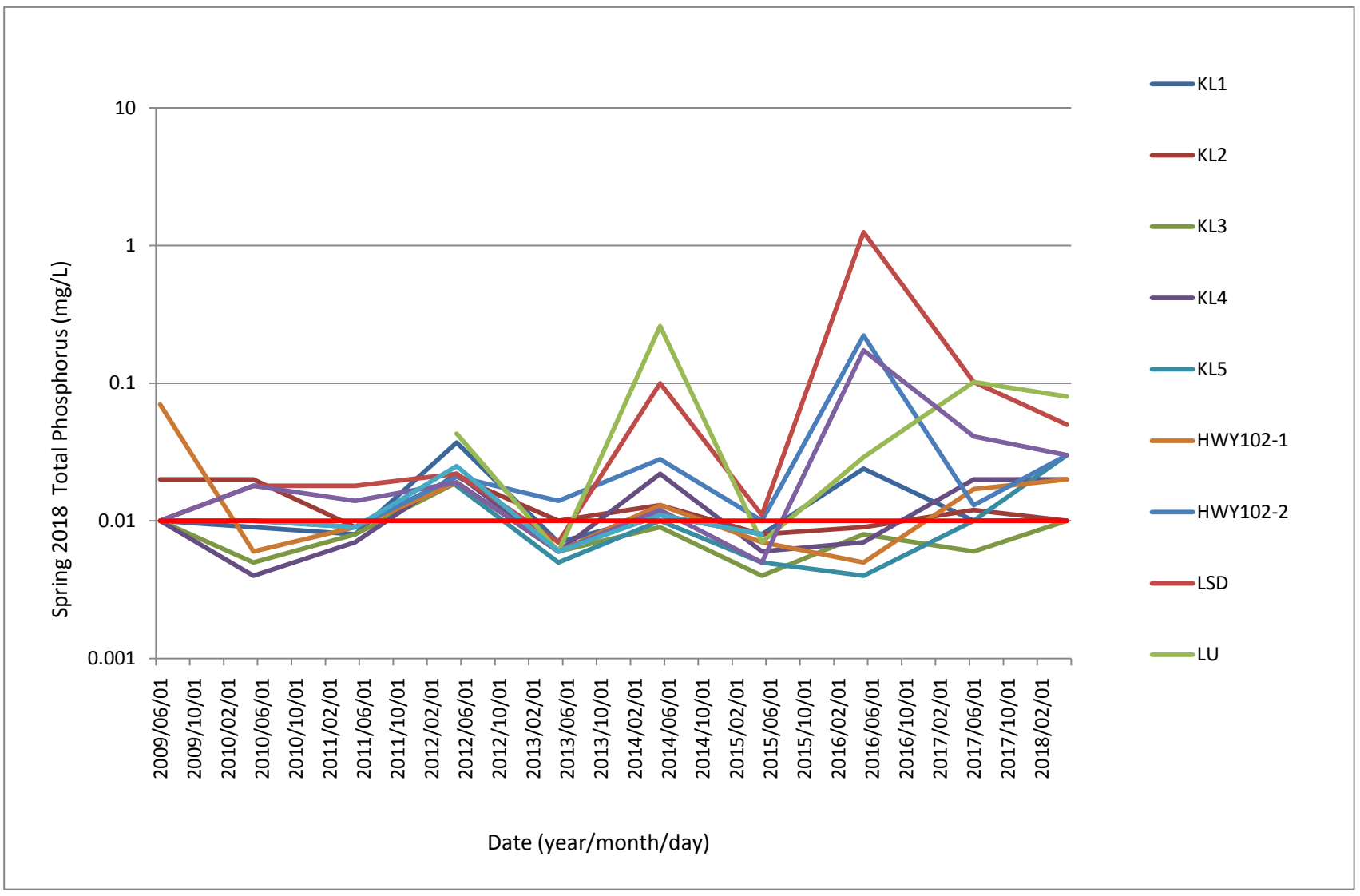

Figure 8 – Seasonal (Spring) Total Phosphorus Concentrations for Water Quality Monitoring Program.

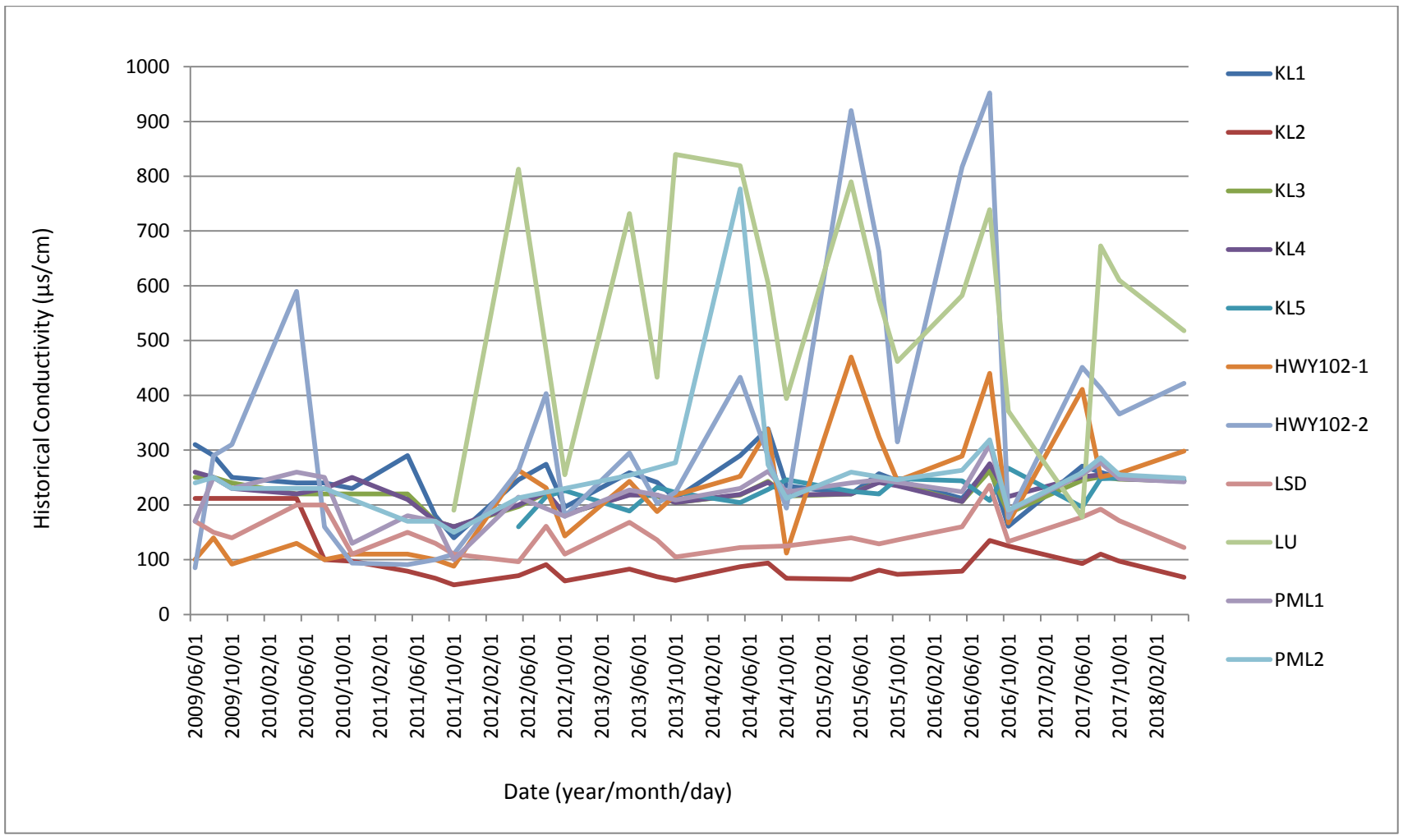

Figure 9 – Historical Measurement of Conductivity for Water Quality Monitoring Program.

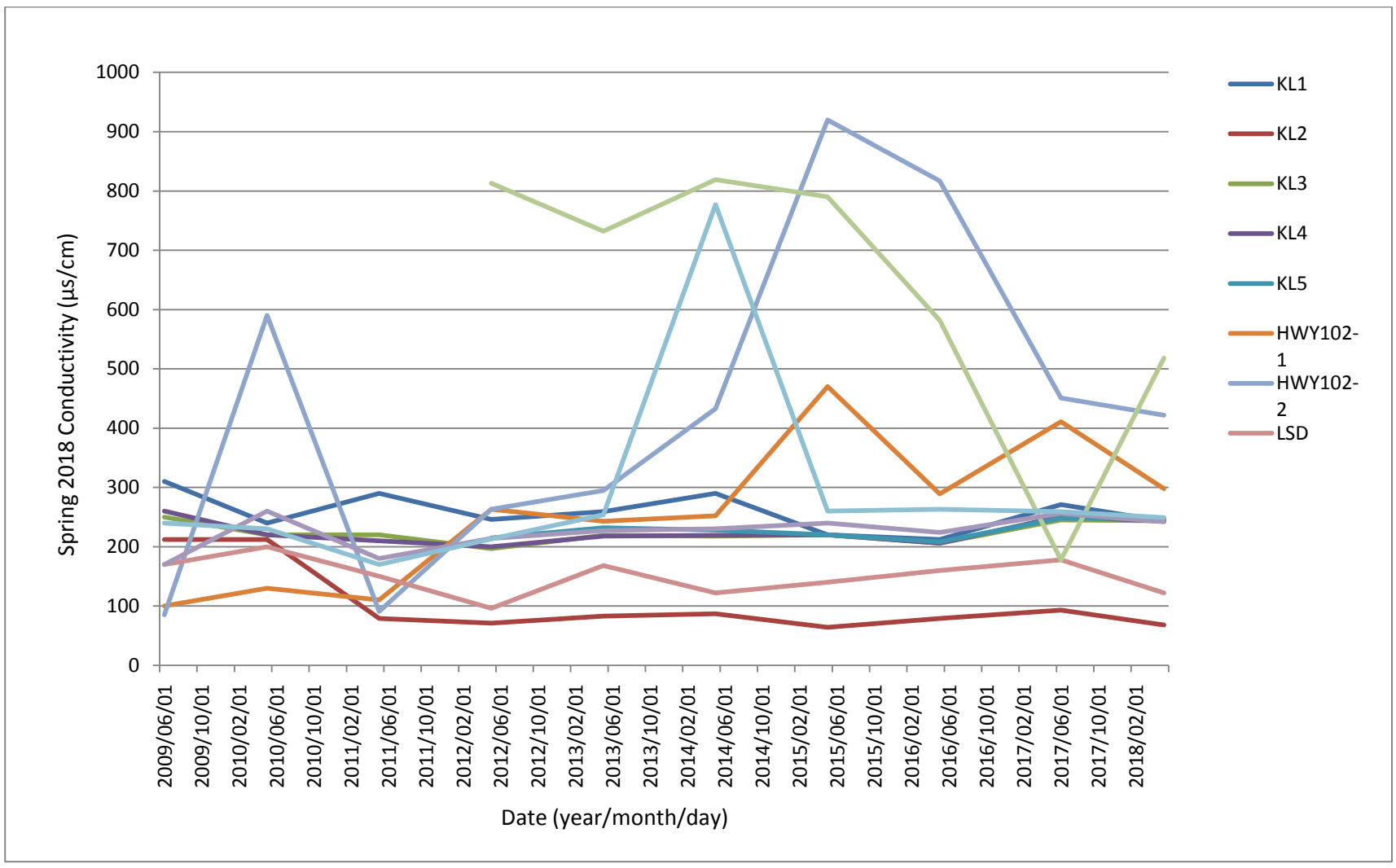

Figure 10 – Seasonal (Spring) Conductivity Measurements for Water Quality Monitoring Program.

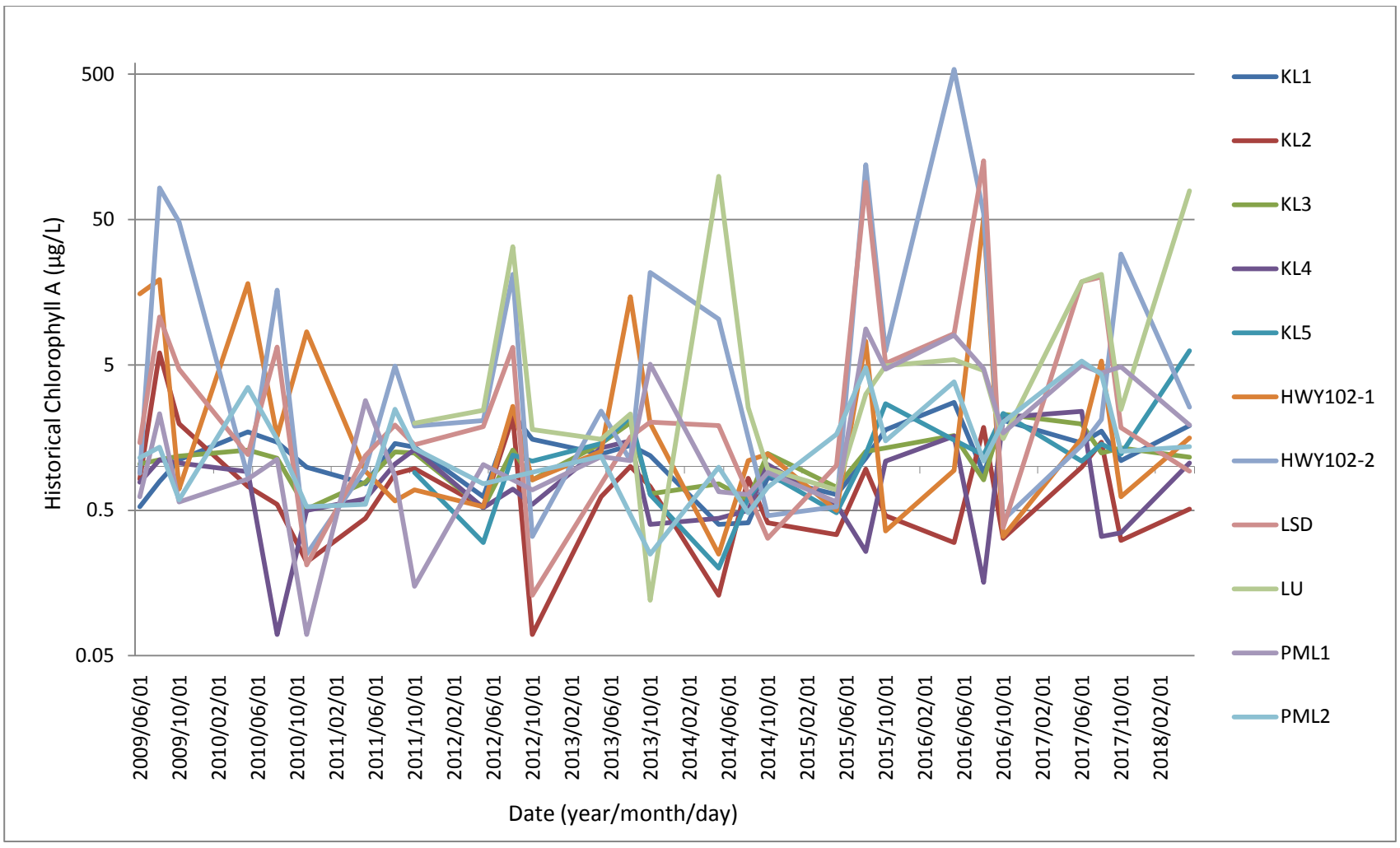

Figure 11 – Historical Chlorophyll A Concentrations for Water Quality Monitoring Program.

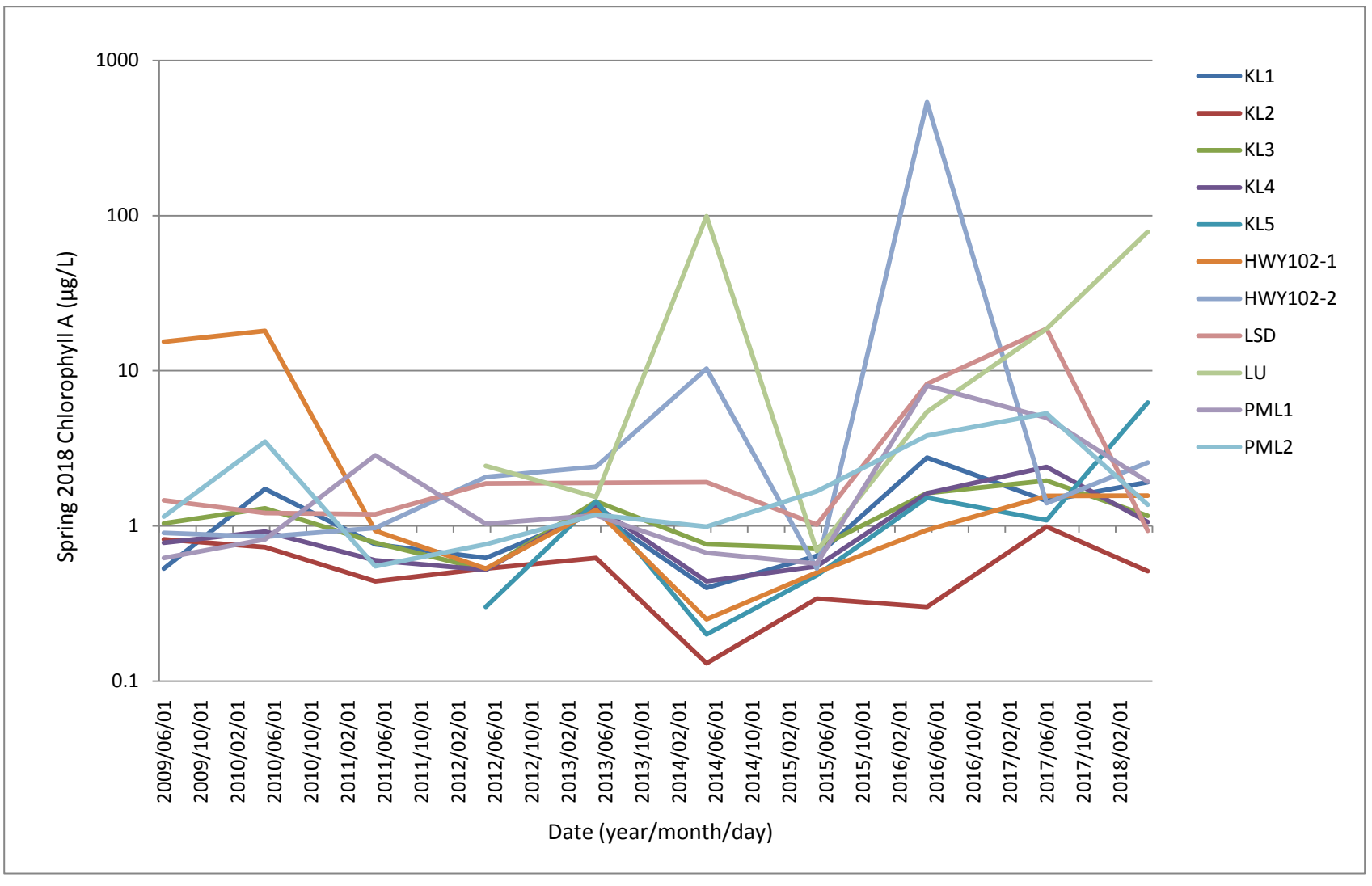

Figure 12 – Seasonal (Spring) Chlorophyll A Concentrations for Water Quality Monitoring Program.

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

September 27, 2018

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: Surface Water Quality Monitoring Program, 2018 Summer Sampling Event, Bedford West, Bedford, Nova Scotia**

SNC-Lavalin Inc. (SNCL) is pleased to submit one electronic copy of the Final Report presenting the results of the 2018 summer surface water quality sampling event for the Bedford West Water Quality Monitoring Program in Bedford, Nova Scotia.

It should be noted that this report addressed the comments received from Halifax Regional Municipality on September 18, 2018.

If you have any questions, please contact the undersigned or in his absence, please contact Maria Gutierrez, MSc. at Maria.Gutierrez@snclavalin.com or at (902) 292-4544 Ext 308

Yours truly,

SNC♦LAVALIN INC.

Original signed

Michael Smith, *AScT, B.Tech, EP*
Area Lead, Environmental Engineering
Infrastructure Engineering – Eastern Canada
(709) 368-0118 Ext. 54957

631477-0001-T-4E-REP-000-0012_C02

Surface Water Quality Monitoring Program, Bedford West

Bedford West, Nova Scotia, Canada

2018 Summer Final Report

09/27/2018

Prepared for:

Halifax Regional Municipality

Attention: Cameron Deacoff, MMM, PMP, CLP

Environmental Performance Officer

Halifax, NS

PH: (902) 490-1926

Prepared by:

SNC-Lavalin Inc.

5657 Spring Garden Road, Suite 200

Halifax, NS, B3J 3R4

PH: (902) 492-4544

EXECUTIVE SUMMARY

On August 17, 2018 SNC-Lavalin Inc. (SNCL) completed the Bedford West water quality monitoring program (2018 summer event) on behalf of Halifax Regional Municipality (HRM). The sampling program consisted of collecting surface water samples from eleven (11) water quality 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 this water quality monitoring event, six (6) monitoring stations reported concentrations that exceeded the Total Phosphorous management threshold criteria of 10 µg/L (equivalent to 0.01 mg/L) listed in the HRM RFP14-338. Based on the laboratory results reported in milligrams per litre (mg/L), the TP exceedances were as follows:

- KL2: 0.015 mg/L (equivalent 15 µg/L)
- HWY-102-1: 0.014 mg/L (equivalent 14 µg/L)
- HWY-102-2: 0.025 mg/L (equivalent 25 µg/L)
- LSD: 0.305 mg/L (equivalent 305 µg/L)
- LU: 0.019 mg/L (equivalent 19 µg/L)
- PML-1: 0.011 mg/L (equivalent 11 µg/L)

In-Situ readings of parameters such as pH, dissolved oxygen, water temperature and conductivity were recorded at all eleven (11) stations:

- In-Situ pH values were within the Health Canada Guideline for Recreational Water Quality of 5.0 - 9.0 pH for all eleven (11) of the stations. However, pH values outside of the CCME-PAL-F recommended range of 6.5 - 9.0, were found at two of the monitoring stations: KL2 (5.2 pH) and HWY-102-2 (5.9 pH).

- In-Situ dissolved oxygen concentrations were outside of the CCME PAL-F recommended range of 5.5-9.5 mg/L at four (4) stations: KL2 (4.2 mg/L), KL4 (4.7 mg/L), HWY-102-1 (2.8 mg/L) and HWY-102-2 (2.3 mg/L).
- In-Situ water temperature was recorded between 18.3°C and 24.7°C.
- In-Situ water conductivity was recorded between 109 µs/cm to 588 µs/cm.

Secchi depth readings were collected at six (6) stations. Recorded values meet the Health Canada reference guideline of minimum of 1.2 meters (m): KL1 (2.1 m); KL2 (1.4 m); KL5 (3.01 m); PML-1 (2.4); and PML-2 (3.0 m).

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

- Aluminum: All eleven (11) stations exceeded the NSE EQS guideline of 5 µg/L. In addition, three (3) stations exceeded the CCME PAL-F guideline of 100 µg/L as follows: KL2 (123 µg/L), HWY-102-2 (152 µg/L) and LSD (2590 µg/L).
- Copper: Only station LSD (4 µg/L) exceeded the CCME-PAL-F and NSE EQS guideline of 2 µg/L.
- Chloride: Exceeded the CCME PAL-F recommended value of 120 mg/L only at station LU with 124 mg/L.
- Iron: Five (5) stations exceeded the CCME-PAL-F and NSE EQS guideline of 300 µg/L: KL2 (783µg/L), HWY-102-1 (634 µg/L), HWY-102-2 (3600 µg/L), LSD (5460 µg/L) and LU (1090 µg/L).
- Lead: Only station LSD (4 µg/L) exceeded the CCME-PAL-F and NSE EQS guideline of 1 µg/L.
- Nitrite: Exceeded the applicable CCME PAL-F recommended value of 0.06 mg/L at eight (8) stations as follows: KL1 (0.09 mg/L), KL4 (0.12 mg/L), KL5 (0.11 mg/L), HWY-102-1 (0.11 mg/L), HWY-102-2 (0.21 mg/L), LU (0.25 mg/L), PML-1 (0.10 mg/L) and PML-2 (0.13 mg/L).
- Total suspended solids (TSS): There are two CCME PAL-F reference standards such as between 25-250 mg/L, and ≥ 250 mg/L. During the 2018 summer monitoring event, all sampling stations reported TSS concentrations of <5 mg/L, with the exception of station LU and LSD, which reported TSS concentrations of 11 mg/l and 444 mg/L respectively.

All eleven (11) stations reported laboratory pH concentrations well within Health Canada range of 5.0-9.0 for Recreational Water Quality, as well as within the CCME-PAL-F recommended range of 6.5-9.0

In terms of microbiological analyses, E. Coli was not found in exceedance of the Health Canada Guideline of 400 CFU/100 mL, at any of the eleven (11) sampling locations.

There are no applicable Health Canada guidelines for Total Coliforms (TC) in recreational water; however, reported concentrations were above the laboratory RDL of 1 CFU/100mL at nine (9) of the stations as documented in the report. In addition, two (2) stations (KL3 and KL4) were reported as "NDOGT- No Data Overgrown With Target", which means was reported by the laboratory that "there was too much growth to count individual colonies of TC". This would be the same as >2,420 for the most probably number (MPN) number.

TABLE OF CONTENTS

List of Tables

List of Drawing

Appendices

1. INTRODUCTION

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 since 2015. The results of the 2018 summer 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 Bedford West development in order to detect any impacts on and/or changes to water quality.

The 2018 summer sampling stations are summarized in Table 1 and shown in Drawing 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

N

HWY102-2

HWY102-1

PML2

PAPER MILL LAKE

PML1

KL4

KL3

LSD

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

SNC•LAVALIN Inc.
Halifax, Nova Scotia, Canada
Telephone: (902) 492-4544
Fax: (902) 492-4540
Member of the SNC•LAVALIN Group

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 2018 summer 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)	Inorganics (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 17, 2018.

Field measurements of pH, dissolved oxygen, specific conductivity and water temperature were taken at

each station using an YSI Professional Plus multi meter probe (serial number 18G102273). The instrument calibration report issued by the provider (Open Road Environmental Limited) is enclosed in Appendix A.

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 (See Appendix B, Field Reports). Each sample station was photographed during the sample event (See Appendix C, Site Photographs).

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. Water samples and field parameter readings were collected within a depth of ≤1.0 m below surface (if possible). Samples were collected from the shore at five (5) stations (KL3, KL4, HWY-102-1, HWY-102-2, LSD and LU) and wherever possible from a boat at six (6) stations (KL1, KL2, KL5, PML-1 and PML-2) which require secchi depth readings.

Surface water samples were collected and placed in clean laboratory-supplied bottles 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. APPLICABLE GUIDELINES

For this water quality monitoring program, the Federal and provincial water quality guidelines being used for the assessment of surface water quality results are as follows, the Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Aquatic Life – Freshwater (PAL-F) (Version 2015), the Health Canada (HC) guidelines for Canadian Recreational Water Quality (2012, Third Edition), and 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. These guidelines were used to determine whether a tested parameter was in exceedance. Exceedances may be an indication of water quality impairment or conditions that will eventually lead to impairment. A detail description of the guidelines is presented below:

CCME Guidelines

- The CCME PAL-F guidelines were used for parameters such as dissolved oxygen, pH (In-Situ and analytical), Chloride, Nitrate, Nitrite, Nitrogen, as well as for total metals such as Aluminum, Arsenic, Boron, Cadmium, Cooper, Iron, Lead, Molybdenum, Nickel, Selenium, Silver, Thallium, Uranium, and Zinc.
- There is no a CCME recommend value for Total Suspended Solids (TSS), however the following CCME narrative for TSS at high flow was applied “maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L should not increase more than 10% of background levels when background is ≥ 250 mg/L”.
- According to CCME, 10 µg/L of total phosphorous is the threshold between oligotrophic and mesotrophic classifications. In the Canadian framework, 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 may trigger the need for further investigation. HRM defined a Total Phosphorous management threshold value of 10 µg/L or 0.01 mg/L for this monitoring program.

HC Guidelines

- The HC guidelines for Canadian Recreational Water Quality was used for parameters such as secchi depth (i.e. visibility at a minimum depth of 1.2 metres), pH guideline of 5.0-9, turbidity (limit of 50 Nephelometric Turbidity Units), and E. coli (i.e. ≤400 E.Coli/100mL).

NSE Guidelines

- The NSE EQS were used for assessment of total metals such as 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 2018 summer 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 parameters such as In-Situ pH, dissolved oxygen, water temperature, conductivity and secchi depth (where applicable) were recorded on field data sheets. Collected data is enclosed in Appendix B.

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

In-Situ pH

All eleven (11) stations were within the 5.0 - 9.0 pH Health Canada range for Recreational Water Quality. However, pH values outside of the CCME-PAL-F recommended range of 6.5 - 9.0, were found at the following two (2) stations:

- KL2: pH 5.2
- HWY-102-2: pH 5.9

Dissolved Oxygen

Dissolved oxygen concentrations were outside of the CCME PAL-F recommended range of 5.5-9.5 mg/L at the following four (4) stations:

- KL2: 4.2 mg/L
- KL4: 4.7 mg/L
- HWY-102-1: 2.8 mg/L
- HWY-102-2: 2.3 mg/L

Water Temperature

There are no applicable Health Canada or NSE guidelines for recreation water temperature. Water temperature was recorded between 18.3°C and 24.7°C.

Conductivity

There are no applicable Health Canada or NSE guidelines for recreation water conductivity. However, specific water conductivity was recorded between 109 µs/cm to 588 µs/cm.

Secchi Disk Depth

As per scope of work secchi depths were collected at six (6) of the eleven (11) stations. Secchi depth readings met the Health Canada reference guideline of minimum of 1.2 meters (m). Recorded values were as follows:

- KL1: 2.1 m
- KL2: 1.4 m
- KL5: 3.01 m
- PML-1: 2.4
- PML-2: 3.0 m

6. ANALYTICAL RESULTS

Analytical results of the 2018 summer monitoring event and applicable/reference guidelines are tabulated in Table D1 and enclosed in Appendix D. In addition, historical water quality results since 2009 are summarized in Table D2 and enclosed in Appendix D.

Laboratory certificates of analysis for the 2018 summer event are located in Appendix E.

6.1 Total Phosphorous

Six (6) monitoring stations reported concentrations that exceeded the Total Phosphorous management threshold criteria of 10 µg/L (equivalent to 0.01 mg/L) listed in the HRM RFP14-338. Based on the laboratory results reported in milligrams per litre (mg/L), the TP exceedances were as follows:

- KL2: 0.015 mg/L (equivalent 15 µg/L)
- HWY-102-1: 0.014 mg/L (equivalent 14 µg/L)
- HWY-102-2: 0.025 mg/L (equivalent 25 µg/L)
- LSD: 0.305 mg/L (equivalent 305 µg/L)
- LU: 0.019 mg/L (equivalent 19 µg/L)
- PML-1: 0.011 mg/L (equivalent 11 µg/L)

6.2 General Chemistry

For all inorganic parameters tested, concentrations of Chloride, Nitrate and total suspended solids (TSS) were reported above the applicable CCME PAL-F guidelines. Detail information is outlined below.

Laboratory pH

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

Chloride

Concentrations exceeded the CCME PAL-F recommended value of 120 mg/L at station LU (124 mg/L).

Nitrate

Concentrations exceeded the CCME PAL-F recommended value of 0.06 mg/L at eight (8) stations:

- KL1: 0.09 mg/L
- KL4: 0.12 ml/L
- KL5: 0.11 mg/L
- HWY-102-1: 0.11 mg/L
- HWY-102-2: 0.21 mg/L
- LU: 0.25 mg/L
- PML-1: 0.10 mg/L
- PML-2: 0.13 mg/L

Total Suspended Solids

As identified within Section 3 (Applicable Guidelines), there are two applicable reference standards for Total Suspended Solids (TSS): between 25-250 mg/L, and ≥ 250 mg/L. During the 2018 summer monitoring event, all sampling stations reported TSS concentrations of <5 mg/L with the exception of station LU and LSD, which reported TSS concentrations of 11 mg/L and 444 mg/L respectively.

6.3 Metals

For the standard metals analyzed, concentrations of aluminum, copper, iron and lead were reported above the applicable CCME PAL-F guidelines. Detail information is outlined below.

Aluminum

Three (3) stations exceeded the CCME PAL-F aluminum guideline of 100 µg/L. In addition, all eleven (11) stations exceeded the NSE EQS aluminum guideline of 5 µg/L. Exceedances were as follows:

- KL1: 29 µg/L
- KL2: 123 µg/L
- KL3: 26 µg/L
- KL4 : 32 µg/L
- KL5: 30 µg/L
- HWY-102-1: 80 µg/L
- HWY-102-2: 152 µg/L
- LSD: 2590 µg/L
- LU: 94 µg/L
- PML-1: 26 µg/L
- PML-2: 75 µg/L

Copper

One (1) station exceeded the NSE EQS guideline and CCME-PAL-F limit of 2 µg/L (based on a hardness <82 mg/L): LSD (4 µg/L)

Lead

One (1) station exceeded the NSE EQS guideline and the CCME-PAL-F recommended limit of 1 µg/L: LSD (4.3 µg/L)

Iron

The following five (5) stations exceeded the NSE EQS guideline and CCME-PAL-F limit of 300 µg/L:

- KL2: 783 µg/L
- HWY102-1: 634 µg/L
- HWY102-2: 3600 µg/L
- LSD: 5460 µg/L
- LU: 1090 µg/L

6.4 Microbiological

There were no exceedances of the Heath Canada (HC) E.Coli Guideline of ≤ 400 CFU/100 mL.

HC does not have a guideline for Total Coliform (TC) in regards to recreational water quality. However, the following nine (9) stations reported TC concentrations above the laboratory RDL of 1 CFU/100mL.

- KL1: 611 CFU/100 mL
- KL2: 2,420 CFU/100 mL
- KL5: 601 CFU/100 mL
- HWY-102-1: 9,010 CFU/100 mL
- HWY-102-2: 410 CFU/100 mL
- LSD: 3,020 CFU/100 mL
- LU: 5,020 CFU/100 mL
- PML-1: 400 CFU/100 mL
- PML-2: 4,000 CFU/100 mL

In addition, TC concentrations at two (2) stations, KL3 and KL4 respectively, were reported as "NDOGT-No Data Overgrown with Target", which means that there was too much growth to count individual colonies. This would be the same as >2,420 for the most probably number (MPN) number.

7. STATISTICAL PRESENTATION

Statistics are completed for all eleven (11) water quality sampling stations including water quality data from 2009 to August 2018. Below Table 3 provides seasonal statistics for the following six (6) key water quality parameters selected by HRM:

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

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.

Table 3: Statistical Presentation of Key Water Quality Parameters

KL-1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.007	0.002	0.043	0.010	0.013
Chloride (mg/L)	1	54	45.0	76.0	61.0	63.0
Lab pH	N/A	7.31	6.51	7.31	7.03	6.99
Total Suspended Solids (mg/L)	5	<5	1.0	17.0	2.5	3.8
Conductivity (uS/cm)	1	261	180.0	339.0	260.5	261.2
Chlorophyll-A Acidification Method (µg/L)	0.05	1.26	0.41	2.30	1.33	1.29

KL-2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.015	0.008	0.059	0.018	0.023
Chloride (mg/L)	1	19	14.0	48.0	19.5	22.3
Lab pH	N/A	7.04	6.40	7.04	6.86	6.80
Total Suspended Solids (mg/L)	5	<5	1.0	135.0	2.5	27.1
Conductivity (uS/cm)	1	115	66.0	212.0	97.0	107.3
Chlorophyll-A Acidification Method (µg/L)	0.05	1.25	0.55	6.05	1.13	1.71

KL-3	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.010	0.045	0.045	0.008	0.012
Chloride (mg/L)	1	48	63.0	63.0	55.5	52.0
Lab pH	N/A	7.21	7.28	7.28	6.98	6.96
Total Suspended Solids (mg/L)	5	<5	2.5	2.5	2.5	2.0
Conductivity (uS/cm)	1	246	262.0	262.0	242.5	232.2
Chlorophyll-A Acidification Method (µg/L)	0.05	1.14	2.00	2.00	1.19	1.19

KL-4	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.004	0.002	2.390	0.008	0.250
Chloride (mg/L)	1	50	41.0	65.0	56.0	53.6
Lab pH	N/A	7.13	6.57	7.13	6.95	6.92
Total Suspended Solids (mg/L)	5	<5	0.5	7.0	2.5	2.5
Conductivity (uS/cm)	1	252	170.0	275.0	241.0	235.6
Chlorophyll-A Acidification Method (µg/L)	0.05	0.24	0.07	1.50	0.42	0.59

KL-5	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.005	0.004	0.040	0.012	0.015
Chloride (mg/L)	1	49	44.0	58.0	56.0	52.7
Lab pH	N/A	7.15	6.84	7.16	7.09	7.02
Total Suspended Solids (mg/L)	5	<5	2.5	2.5	2.5	2.5
Conductivity (uS/cm)	1	247	223.0	267.0	247.0	243.7
Chlorophyll-A Acidification Method (µg/L)	0.05	1.28	0.61	2.20	1.22	1.31

HWY 102-1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.014	0.007	0.140	0.030	0.038
Chloride (mg/L)	1	54	19.0	87.0	48.5	47.5
Lab pH	N/A	7.14	5.24	7.49	6.91	6.78
Total Suspended Solids (mg/L)	5	<5	1.0	80.0	4.3	12.9
Conductivity (uS/cm)	1	306	100.0	440.0	241.0	241.8
Chlorophyll-A Acidification Method (µg/L)	0.05	0.86	0.58	51.51	3.96	10.48

HWY 102-2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.025	0.019	1.560	0.034	0.203
Chloride (mg/L)	1	90	21.0	226.0	90.0	100.4
Lab pH	N/A	6.79	5.96	6.80	6.64	6.52
Total Suspended Solids (mg/L)	5	<5	2.5	3,000.0	27.0	357.2
Conductivity (uS/cm)	1	444	100.0	952.0	403.0	403.0
Chlorophyll-A Acidification Method (µg/L)	0.05	2.58	1.10	119.14	16.36	33.87

LSD	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.305	0.015	0.501	0.059	0.125
Chloride (mg/L)	1	32	27.0	45.0	33.0	34.8
Lab pH	N/A	7.20	6.59	7.30	6.95	6.95
Total Suspended Solids (mg/L)	5	444	16.0	9,020.0	98.0	1,171.3
Conductivity (uS/cm)	1	192	129.0	236.0	161.0	169.6
Chlorophyll-A Acidification Method (µg/L)	0.05	141.49	1.60	141.49	10.70	45.18

LU	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.019	0.009	0.036	0.027	0.022
Chloride (mg/L)	1	124	99.0	164.0	124.0	127.6
Lab pH	N/A	7.46	7.11	7.46	7.40	7.33
Total Suspended Solids (mg/L)	5	11	2.5	165.0	2.5	28.9
Conductivity (uS/cm)	1	620	433.0	739.0	605.0	589.6
Chlorophyll-A Acidification Method (µg/L)	0.05	5.50	2.30	32.52	4.57	10.23

PML-1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.011	0.002	0.104	0.030	0.030
Chloride (mg/L)	1	54	43.0	67.0	57.3	57.3
Lab pH	N/A	7.28	6.75	7.28	6.98	6.98
Total Suspended Solids (mg/L)	5	<5	1.0	149.0	19.6	19.6
Conductivity (uS/cm)	1	274	170.0	310.0	250.7	250.7
Chlorophyll-A Acidification Method (µg/L)	0.05	1.14	0.64	8.84	2.79	2.79

PML-2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.005	0.002	0.026	0.010	0.010
Chloride (mg/L)	1	55	43.0	72.0	58.5	58.4
Lab pH	N/A	7.29	6.600	7.290	7.030	7.025
Total Suspended Solids (mg/L)	5	<5	1.0	14.0	2.5	4.5
Conductivity (uS/cm)	1	289	170.0	319.0	262.0	258.5
Chlorophyll-A Acidification Method (µg/L)	0.05	1.28	0.48	4.79	1.45	2.17

Note: The number of decimal places presented for each listed parameter is based on the Laboratory RDL and Laboratory reported results.

8. GRAPHS

Graphs were completed for all eleven (11) water quality monitoring stations including water quality data collected from 2009 to August 2018. Appendix F presents seasonal and annual graphs that illustrate concentrations of the following six (6) key water quality parameters selected by HRM:

- Total phosphorus (mg/L),
- Dissolved chloride (mg/L),
- Laboratory measured pH
- 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.

9. CONCLUSIONS

The 2018 summer water quality monitoring event included the collection of surface water samples at eleven (11) water quality sampling stations for the analysis of general chemistry, 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.

Total Phosphorous

The following five (5) stations meet the HRM management threshold criteria of 10 µg/L (equivalent to 0.01 mg/L):

- KL1: 0.007 mg/L (equivalent to 7 µg/L)
- KL3: 0.010 mg/L (equivalent to 10 µg/L)
- KL4: 0.004 mg/L (equivalent to 4 µg/L)
- KL5: 0.005 mg/L (equivalent to 5 µg/L)
- PLM-2: 0.005 mg/L (equivalent to 5 µg/L)

The following six (6) monitoring stations reported total phosphorous concentrations above the HRM management threshold criteria of 10 µg/L (equivalent to 0.01 mg/L):

- KL2: 0.015 mg/L (equivalent to 15 µg/L)
- HWY-102-1: 0.014 mg/L (equivalent to 14 µg/L)
- HWY-102-2: 0.025 mg/L (equivalent to 25 µg/L)
- LSD: 0.305 mg/L (equivalent to 305 µg/L)
- LU: 0.019 mg/L (equivalent to 19 µg/L)
- PML-1: 0.011 mg/L (equivalent to 11 µg/L)

Field Measurements

- In-Situ pH values were well within the Health Canada Guideline for Recreational Water Quality of 5.0 - 9.0 pH for all eleven (11) of the stations.
- In-Situ pH values outside of the CCME-PAL-F recommended range of 6.5 - 9.0, were found at stations KL2 (5.2 pH) and HWY-102-2 (5.9 pH).
- In-Situ dissolved oxygen concentrations were outside of the CCME PAL-F range of 5.5 - 9.5 mg/L at stations KL2 (4.2 mg/L), KL4 (4.7 mg/L), HWY-102-1 (2.8 mg/L) and HWY-102-2 (2.3 mg/L).

- In-Situ water temperature was recorded between 18.3°C and 24.7°C.
- In-Situ water conductivity was recorded between 109 µs/cm to 588 µs/cm.
- Secchi depth readings were collected at six (6) stations. Recorded values meet the Health Canada reference guideline of minimum of 1.2 meters (m): KL1 (2.1 m); KL2 (1.4 m); KL5 (3.01 m); PML-1 (2.4); and PML-2 (3.0 m).

General Chemistry and Metals

Laboratory pH was reported at all eleven (11) stations well within Health Canada range of 5.0-9.0 for Recreational Water Quality, as well as within the CCME-PAL-F recommended range of 6.5-9.0

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

- Aluminum concentrations exceeded the NSE EQS guideline of 5 µg/L at all eleven (11) stations. In addition, concentrations were above the CCME PAL-F guideline of 100 µg/L at three (3) stations: KL2 (123 µg/L), HWY-102-2 (152 µg/L) and LSD (2590 µg/L).
- Copper concentrations exceeded the CCME-PAL-F and NSE EQS guideline of 2 µg/L at station LSD (4 µg/L).
- Chloride concentration exceeded the CCME PAL-F value of 120 mg/L at station LU (124 mg/L).
- Iron concentrations exceeded the CCME-PAL-F and NSE EQS guideline of 300 µg/L at five (5) stations as follows: KL2 (783µg/L), HWY-102-1 (634 µg/L), HWY-102-2 (3600 µg/L), LSD (5460 µg/L) and LU (1090 µg/L).
- Lead concentrations were above the CCME-PAL-F and NSE EQS guideline of 1 µg/L at station LSD (4 µg/L)
- Nitrite concentrations exceeded the applicable CCME PAL-F value of 0.06 mg/L at eight (8) stations as follows: KL1 (0.09 mg/L), KL4 (0.12 mg/L), KL5 (0.11 mg/L), HWY-102-1 (0.11 mg/L), HWY-102-2 (0.21 mg/L), LU (0.25 mg/L), PML-1 (0.10 mg/L) and PML-2 (0.13 mg/L).
- Total suspended solids (TSS) were reported as <5 mg/L in all sampling stations, with the exception of station LU (11 mg/L) and LSD (444 mg/L). The two CCME PAL-F reference standards for TSS are between 25-250 mg/L, and ≥ 250 mg/L.

Microbiological

The Heath Canada E.coli guideline of ≤ 400 CFU/100 mL was not in exceedance at any of the stations for the 2018 spring event.

10. LIMITATION

Related to the Chlorophyll A analyses, the Welschmeyer Method completed by Dalhousie is not presented in this report due to laboratory's instrument failure. The Chlorophyll A results presented in this report are based only on Acidification Technique, which is what the laboratory of Dalhousie University is reliant on reporting.

11. CLOSURE

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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This report was prepared by Maria Gutierrez, BSc. MEM and Cally Baxter BSc., EPt, and reviewed and approved by Michael Smith, AScT, B.Tech., EP.

12. 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 guidelines for the Protection of Aquatic Life Freshwater.

Health Canada guidelines for Canadian Recreational Water Quality, 2012, Third Edition.

Nova Scotia Environment, Notification of Contamination Protocol, Table 3 Tier 1 EQS for Surface Water, Revision July 2013

Appendix A

Instrument Calibration Report

Open Road Environmental Limited

YSI Professional Plus

Serial Number 18G102273 (Quattro)

Calibration Certificate

3 Point Calibration pH (4.00, 7.00, 10.00)	*Calibration solution*	*Specific Conductivity 12880 uS/cm*	*DO 100% @23.0 Deg.C*
pH 4.00 pass 161.3mV	*Lot#S180501018 Exp. May-20*	*pass*	*pass*
pH 7.00 pass 14.6mV	*Lot#S180315008 Exp. Mar-20*		
pH 10.00 pass -174.4mV	*Lot#S180104003 Exp. Jul-19*		

August 15, 2018

Original signed

Ghislain Pitre, CET

Appendix B

Field Reports

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	17^{o}
Cloud Cover :	20%
Wildlife Sightings:	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):	**17.08.18**
Time (hh:mm):	7:50
Sample Depth (m):	1M
pH:	7.51
Dissolved Oxygen (mg/L):	6.72
Secchi Depth (m):	2.1M Visible on bottom
Water Temperature (degrees Celsius):	24.2^{o}
Conductivity (µs/cm):	288.2

Additional Comments / Notes

- Clear water
- Sample taken from dock
- No wind

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	23^{o}
Cloud Cover:	50%
Wildlife Sightings:	Water bugs, 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):	**17.08.18**
Time (hh:mm):	10:10
Sample Depth (m):	0.3M
pH:	5.16
Dissolved Oxygen (mg/L):	4.17
Secchi Depth (m):	1.42M
Water Temperature (degrees Celsius):	21.6^{o}
Conductivity (µs/cm):	109.9

Additional Comments / Notes

- Secchi disk location had high turbidity / difficult to see disk
- Limited water flow at grab sample location

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	23^{o}
Cloud Cover:	40%
Wildlife Sightings:	Birds, Squirrels, Fish
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):	17.08.18
Time (hh:mm):	9:10
Sample Depth (m):	0.5M
pH:	6.94
Dissolved Oxygen (mg/L):	6.90
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	23.8^{o}
Conductivity (µs/cm):	242.7

Additional Comments / Notes

- Very low water level
- Visible rusty pole near historic sampling location (underwater)

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	22^{o}
Cloud Cover:	30%
Wildlife Sightings:	Water bugs, Birds
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):	17.08.18
Time (hh:mm):	9:00
Sample Depth (m):	0.5M
pH:	6.67
Dissolved Oxygen (mg/L):	4.71
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	23.1^{o}
Conductivity (µs/cm):	251

Additional Comments / Notes

- Limited water flow
- Low water levels

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 / Cally Baxter	

Site Conditions

Weather:	Sunny
Air Temperature:	19^{o}
Cloud Cover:	5%
Wildlife Sightings:	Birds, Water bugs
Site Accessibility: Yes, Accessible	Along Kearney Lake Road
Site Access Detail:	Easily accessible, sample location is directly off the Kearney Lake Road on a rocky outcrop supporting a power line pole (two pole structure). Slow truck down carefully, turn hazard lights on. Samples were taken on left front of outcrop facing lake.

Field Parameter Data

	Remarks
Date (d.m.y):	17.08.18
Time (hh:mm):	8:20
Sample Depth (m):	1M
pH:	7.14
Dissolved Oxygen (mg/L):	6.42
Secchi Depth (m):	3.01M Visible on bottom
Water Temperature (degrees Celsius):	24.5^{o}
Conductivity (µs/cm):	244.9

Additional Comments / Notes

- Notable clear water

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	23^{o}
Cloud Cover:	50%
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):	17.08.18
Time (hh:mm):	11:00
Sample Depth (m):	0.5M
pH:	6.13
Dissolved Oxygen (mg/L):	2.78
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	21.4^{o}
Conductivity (µs/cm):	280.5

Additional Comments / Notes

- Oily sheen visible on water surface, unsure of natural or unnatural source
- Limited water flow

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	23^{o}
Cloud Cover:	60%
Wildlife Sightings:	Water bugs, Birds, Frogs
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)	17.08.18
Time (hh:mm):	11:30
Sample Depth (m):	0.3M
pH:	5.88
Dissolved Oxygen (mg/L):	2.29
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	18.3^{o}
Conductivity (µs/cm):	394.7

Additional Comments / Notes

- Significant algae encountered at sample location
- Sheen visible on surface
- Limited water flow / level

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	23^{o}
Cloud Cover:	60%
Wildlife Sightings:	Frogs, Birds, Squirrels
Site Accessibility: Yes, Accessible	Via Lakeshore Drive in Kingswood Subdivision
Site Access Detail:	Take Kingswood Drive off Hammonds Plains Road. Travel down to Diana Drive on left go to end and take a left on Lakeshore drive. Travel approximately 1.0 km. There will be a clearing on left down to power lines. Drive truck (4X4) down until larger clearing is reached and park. Continue (walk) down hill to ATV pathway on left. Follow pathway for approximately 250m. Sample location is on right (river with a lot of vegetation throughout)

Field Parameter Data

	Remarks
Date (d.m.y):	17.08.18
Time (hh:mm):	10:30
Sample Depth (m):	0.2M
pH:	6.41
Dissolved Oxygen (mg/L):	6.85
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	22.4^{o}
Conductivity (µs/cm):	182.9

Additional Comments / Notes

- Very limited water level
- Stagnate water flow

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 / Cally Baxter	

Site Conditions

Weather:	Sunny
Air Temperature:	22^{O}
Cloud Cover:	0%
Wildlife Sightings:	Birds, Frogs, Water bugs, Minnows
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):	17.08.18
Time (hh:mm):	8:40
Sample Depth (m):	0.3M
pH:	6.85
Dissolved Oxygen (mg/L):	6.76
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	23.1^{o}
Conductivity (µs/cm):	588.0

Additional Comments / Notes

- Murky water
- Strong negative odor

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	23^{o}
Cloud Cover:	60%
Wildlife Sightings:	Birds
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):	17.08.18
Time (hh:mm):	11:40
Sample Depth (m):	1M
pH:	6.75
Dissolved Oxygen (mg/L):	5.57
Secchi Depth (m):	2.4M Visible on bottom
Water Temperature (degrees Celsius):	24.7^{o}
Conductivity (µs/cm):	203.8

Additional Comments / Notes

- N/A

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 / Cally Baxter	

Site Conditions

Weather:	Sun / Cloud
Air Temperature:	20^{o}
Cloud Cover:	60%
Wildlife Sightings:	Birds
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):	17.08.18
Time (hh:mm):	12:10
Sample Depth (m):	1M
pH:	6.97
Dissolved Oxygen (mg/L):	5.40
Secchi Depth (m):	2.95M Visible on bottom
Water Temperature (degrees Celsius):	24.7
Conductivity (µs/cm):	293.8

Additional Comments / Notes

Appendix C

Site Photographs

Photo 1: KL1 Kearney Lake Sample Location

Photo 2: KL2 Kearney Lake Sample Location.

Photo 3: KL3 Kearney Lake Sample Location

Photo 4: KL4 Kearney Lake Sample Location

Photo 5: KL5 Kearney Lake Sample Location

Photo 6: HWY 102-1 Sample Location

Photo 7: HWY102-2 Sample Location

Photo 8: LSD Lake Shore Drive Sample Location

Photo 9: LU Larry Uteck Sample Location

Photo 10: PML-1 Paper Mill Lake Sample Location

Photo 11: PML-2 Paper Mill Lake Sample Location

Appendix D

Summary Table Results (Seasonal and Historical)

TABLE D1: 2018 Summer Results and Exceedances, Bedford West Water Quality Sampling Program

Tested Parameters		RDL	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2
Sampling Date						2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17	2018/08/17
Sampling Time						7:50 AM	10:10 AM	9:10	9:00 AM	8:20	11:00	11:30	10:30	8:40	11:40	12:10
Field Data (in Situ)																
Secchi Depth	Meters	--	--	minimum of 1.2	--	2.1	1.4	N/A	N/A	3.01	N/A	N/A	N/A	N/A	2.4	3.0
Water Temp	Celsius	--	--	--	--	24.2	21.6	23.8	23.1	24.5	21.4	18.3	22.4	23.1	24.7	24.7
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5	6.7	**4.2**	6.9	**4.7**	6.4	**2.8**	**2.3**	6.9	6.8	5.6	7.0
pH	pH	--	--	5.0-9.0	6.5 - 9.0	7.5	**5.2**	6.9	6.7	7.14	6.1	**5.9**	6.4	6.9	6.8	24.7
Specific Conductance (µs/cm)	uS/cm	--	--	--	--	288.2	109.9	242.7	251.0	244.9	280.5	394.7	182.9	588.0	203.8	293.8
Inorganic Parameters																
Alkalinity	mg/L	5	--	--	--	9	11	8	9	7	26	21	27	23	10	11
Chloride	mg/L	1	--	--	120	54	19	48	50	49	54	90	32	**124**	54	55
True Color	TCU	5	--	--	--	16	59	26	10	14	56	85	40	21	7	21
Nitrate + Nitrite as N	mg/L	0.05	--	--	--	0.16	0.05	0.06	0.25	0.20	0.11	0.21	<0.05	0.41	0.15	0.13
Nitrate as N	mg/L	0.05	--	--	13	0.07	<0.05	0.06	0.13	0.09	<0.05	<0.05	<0.05	0.16	0.05	<0.05
Nitrite as N	mg/L	0.05	--	--	0.06	**0.09**	0.05	<0.05	**0.12**	**0.11**	**0.11**	**0.21**	<0.05	**0.25**	**0.10**	**0.13**
Ammonia as N	mg/L	0.03	--	--	18	0.08	0.06	0.04	0.04	0.04	0.07	0.24	0.06	0.17	0.04	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--	<0.4	<0.4	<0.4	<0.4	<0.4	0.70	0.90	1.70	0.60	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--	3.1	6.6	3.2	2.7	2.9	7.7	7.5	5.8	5.5	3.2	3.5
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			--	5.0-9.0	6.5 - 9.0	7.31	7.04	7.21	7.13	7.15	7.14	6.79	7.20	7.46	7.28	7.29
Calcium	mg/L	0.1	--	--	--	7.2	4.2	7.3	7.9	6.7	15.6	12.5	10.2	20.8	8.7	8.1
Magnesium	mg/L	0.1	--	--	--	1.2	1.1	1.2	1.2	1.1	2.2	1.7	2.3	2.7	1.4	1.2
Total Phosphorus	mg/L	0.002	--	--	0.01	0.007	**0.015**	0.010	0.004	0.005	**0.014**	**0.025**	**0.305**	**0.019**	**0.011**	0.005
Potassium	mg/L	0.1	--	--	--	1.0	0.8	1.0	1.0	0.9	2.0	1.6	1.6	2.9	1.2	1.1
Sodium	mg/L	0.1	--	--	--	34.7	13.9	36.6	39.2	38.5	35.5	81.6	21.7	94.7	37.5	37.7
Reactive Silica as SiO2	mg/L	0.5	--	--	--	1.7	2.8	1.7	1.8	1.7	5.3	8.8	2.4	5.4	1.2	1.0
Total Suspended Solids	mg/L	5	--	--	Comment 1	<5	<5	<5	<5	<5	<5	<5	**444**	11	<5	<5
Sulphate	mg/L	2	--	--	--	7.0	<2	7.0	7.0	7.0	7.0	4.0	<2	15.0	7.0	7.0
Turbidity	NTU	0.1	--	50	--	0.7	1.2	0.5	0.5	0.4	1.1	13.8	72.2	2.4	0.5	0.7
Conductivity	umho/cm	1	--	--	--	261	115	246	252	247	306	444	192	620	274	289
Calculated Parameters																
Anion Sum	me/L		--	--	--	1.86	0.76	1.66	1.75	1.68	2.2	3.06	1.44	4.3	1.88	1.93
Bicarb. Alkalinity (as CaCO3)	mg/L	5	--	--	--	9	11	8	9	7	26	21	27	23	10	11
Calculated TDS	mg/L	1	--	--	--	112	47	106	113	108	133	209	95	277	117	118
Carb. Alkalinity (as CaCO3)	mg/L	10	--	--	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cation sum	me/L	--	--	--	--	2.01	0.97	2.09	2.24	2.13	2.6	4.53	2.27	5.52	2.23	2.19
Hardness	mg/L	--	--	--	--	22.9	15	23.2	24.7	21.3	48	38.2	34.9	63.1	27.5	25.2
% Difference/ Ion Balance (NS)	%	--	--	--	--	3.8	12.4	11.4	12.1	11.8	8.3	19.4	22.2	12.5	8.4	6.4
Langelier Index (@20C)	NA	--	--	--	--	-2.47	-2.85	-2.61	-2.61	-2.77	-1.85	-2.41	-1.94	-1.49	-2.37	-2.35
Langelier Index (@ 4C)	NA	--	--	--	--	-2.79	-3.17	-2.93	-2.93	-3.09	-2.17	-2.73	-2.26	-1.81	-2.69	-2.67
Saturation pH (@ 20C)	NA	--	--	--	--	9.78	9.89	9.82	9.74	9.92	8.99	9.2	9.14	8.95	9.65	9.64
Saturation pH (@ 4C)	NA	--	--	--	--	10.1	10.2	10.1	10.1	10.2	9.31	9.52	9.46	9.27	9.97	9.96
Metals (ICP-MS)																
Total Aluminum	ug/L	5	5	--	100 ug/L (based on pH)	**29**	**123**	**26**	**32**	**30**	**80**	**152**	**2590**	**94**	**26**	**75**
Total Antimony	ug/L	2	20	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Arsenic	ug/L	2	5.0	--	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Barium	ug/L	5	1000	--	--	16	14	15	19	13	100	146	53	143	12	8
Total Beryllium	ug/L	2	5.3	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Bismuth	ug/L	2	--	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron	ug/L	5	1200	--	1500	10	13	10	10	9	14	11	20	16	11	10
Total Cadmium	ug/L	0.09	0.01	--	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	0.13	<0.09	<0.09	<0.09
Total Chromium	ug/L	1	---	--	1	<1	<1	<1	<1	<1	<1	2	2	<1	<1	<1
Total Cobalt	ug/L	1	10	--	--	<1	<1	<1	<1	<1	<1	2	6	<1	<1	<1
Total Copper	ug/L	1	2	--	2 ug/L (based on hardness)	<1	<1	<1	<1	<1	<1	1	**4**	2	<1	<1
Total Iron	ug/L	50	300	--	300	142	**783**	148	119	81	**634**	**3600**	**5460**	**1090**	184	163
Total Lead	ug/L	0.5	1	--	1 ug/L (base on hardness)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	**4.3**	<0.5	<0.5	<0.5
Total Manganese	ug/L	2	820	--	--	49	78	50	84	15	99	262	2630	240	64	42
Total Molybdenum	ug/L	2	73	--	73	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L	2	25	--	25 ug/L (base on hardness)	<2	<2	<2	<2	<2	<2	<2	4	2	<2	<2
Total Selenium	ug/L	1	1.0	--	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Silver	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	<0.1	<0.1
Total Strontium	ug/L	5	21000	--	--	38	24	38	39	35	88	81	54	115	42	38
Total Thallium	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	<0.1	<0.1
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	3	36	2	<2	<2
Total Uranium	ug/L	0.1	300	--	15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
Total Vanadium	ug/L	2	6	--	--	<2	<2	<2	<2	<2	<2	2	4	<2	<2	<2
Total Zinc	ug/L	5	30	--	30	<5	<5	<5	<5	<5	<5	6	23	13	6	<5

Tested Parameters		RDL	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2
Microbiological Parameters																
Total Coliforms	CFU/100 mL	1 to 10	--	--	--	611	2420	NDOGT	NDOGT	601	9010	410	3020	5020	400	4000
E. Coli	CFU/100 mL	1 to 10	--	400	--	11	20	51	19	1	10	26	20	20	10	1
Chlorophyll A - Acidification Method	ug/L	0.05	--	--	--	1.26	1.25	1.14	0.24	1.28	0.86	2.58	141.49	5.50	1.14	1.28
Chlorophyll A - Welschmeyer Method	ug/L	0.05	--	--	--	*	*	*	*	*	*	*	*	*	*	*

(*) Chlorophyll A - Welschmeyer Method not completed due to laboratory's instrument failure.
RDL = Reported Detection Limit (represents most recent sampling event)
" -- " = no guideline available / no parameter tested.
NDOGT- No Data Overgrown With Target
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
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 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
Comment 1: CCME PAL-F reference values between 25-250 mg/L, and >250 mg/L.

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

TABLE D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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)	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	2017/10/18	2018/05/08
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	9:30 AM	9:35 AM	9:15 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	2.4	5.4	N/A	2.5	2.0	2.9	2.4	2.7	2.5	NCC	N/A	2.2	1.8	2.1	2.5	2.1	2.2	2.2	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	14.1	26.1	9.4	12.8	22.2	11.9	16.6	23.2	14.1	12.2
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		**10.8**	8.2	7.0	9.1	7.9	**10.5**	**10.7**	8.2	9.2	9.0	7.9	8.7	**9.8**	8.6	8.3	**15.3**	7.2	8.1	**9.6**	8.1	7.4	**14.0**	**10.3**	**12.1**	8.3	7.9	8.2	**11.1**
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.2	6.8	6.7	7.2	7.3	6.6	6.6	6.2	6.0	8.7	6.9	6.3	6.3	8.2	6.4	6.7	7.5	6.4	8.3	7.0	7.0	8.3	**4.6**	**6.2**	7.5	7.0	7.8	7.9
Specific Conductance	uS/cm	--	--	--	--		263.0	299.0	261.0	248.0	242.0	218.7	288.0	178.6	146.3	277.0	279.0	198.1	243.0	216.5	217.9	547.0	341.0	223.0	0.2	298.3	238.5	239.0	298.0	212.4	240.0	292.0	312.0	203.1
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	6	7	5	8	6	<5	8	10	<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	73	60	53
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	12	42
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.18	0.09	0.12	0.21	0.16	0.23	0.20	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	0.10	0.26
Nitrate (N)	mg/L	0.05	--	--	13		0.18	--	--	0.21	0.16	--	0.20	--	--	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	0.10	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	<0.05	<0.05	<0.05	<0.010	<0.05	<0.05	<0.05	**0.07**	<0.05	**0.12**	**0.21**	<0.05	**0.10**
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	0.04	<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	0.2	4.5	0.4	0.7	<0.4	0.6	<0.4	<0.4	<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	4.8	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	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.9	6.7	6.7	6.9	7.0	6.8	6.5	6.5	6.5	6.7	7.2	6.9	6.8	6.9	6.9	6.7	7.1	**6.4**	6.6	7.0	7.0	6.6	7.2	6.8	6.6	7.1	7.0	6.71
Total Calcium (Ca)	mg/L	0.1	--	--	--		9.2	8.5	7.2	7.7	8.7	8.3	7.7	4.8	5.3	6.8	8.4	6.3	7.5	6.6	6.5	8.1	11.0	6.0	6,400.0	7.9	6.1	6.8	8.0	6.3	8.6	7.1	8.3	5.8
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.5	1.4	1.2	1.4	1.4	1.3	1.3	0.9	1.1	1.1	1.5	1.5	1.1	1.2	1.2	1.6	1.6	0.9	920.0	1.3	0.9	1.1	1.1	1.2	1.3	1.2	1.3	1.0
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.020	<0.020	<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**	0.013	0.008	0.002	**0.011**	**0.024**	0.005	0.008	0.010	0.010	0.005	**0.012**
Total Potassium (K)	mg/L	0.1	--	--	--		1.1	0.9	1.3	0.9	0.9	0.9	0.8	0.8	0.9	0.7	0.9	0.9	0.8	0.7	1.1	0.9	1.6	0.7	680.0	0.9	0.7	0.7	0.9	0.8	1.0	0.9	1.2	0.7
Total Sodium (Na)	mg/L	0.1	--	--	--		51.0	46.0	37.0	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	33.0	43.3	39.8	35.5	32.2	31.0	44.9	50.3	35.7	36.4
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	1.8	2.6
Total Suspended Solids	mg/L	5	--	--	Comment 1		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	<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	9	10	8	10	10	10	11	9	10	8
Turbidity (NTU)	NTU	0.1	--	50	--		0.7	0.8	1.0	1.3	0.6	1.0	1.0	1.0	0.9	2.4	0.8	1.3	1.6	3.3	0.5	2.9	0.7	1.9	0.8	1.9	1.1	10.6	0.9	2.6	1.4	1.1	0.8	1.3
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	249	243
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	2.11	1.68
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	<5	5	6	7	5	8	6	<5	8	10	<5
Calculated TDS	mg/L	1	--	--	--		166	151	131	123	125	118	143	92	77	139	137	98	124	104	103	172	165	99	120	130	119	113	115	99	139	148	123	106
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	<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	2.12	2.00
Hardness (CaCO3)	mg/L	N/A	--	--	--		29.00	27.00	23.00	25.00	27.00	26.00	24.00	16.00	18.00	21.50	27.20	21.90	23.30	21.40	21.20	26.80	34.10	18.70	20.00	25.10	18.90	21.50	24.50	20.70	26.80	22.70	26.10	18.6
Ion Balance (% Difference)	%	N/A	--	--	--		2.33	0.98	2.53	4.95	0.48	2.80	1.89	11.00	0.79	5.90	2.10	5.30	0.70	7.30	3.40	5.80	7.50	17.20	3.66	7.50	4.50	4.10	1.50	6.20	6.10	4.80	0.20	8.6
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	-2.68	-3.42
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	-3.10	-3.00	-3.74
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	10.00	10.10	9.87	9.23	9.42	10.10	9.83	9.92	9.96	10.10	9.79	10.00	9.97	9.85	9.68	10.1
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	10.20	10.40	10.30	10.40	10.20	9.55	9.74	10.40	10.10	10.20	10.30	10.40	10.10	10.30	10.30	10.20	10.00	10.4
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		**230**	--	--	**289**	48	--	**338**	--	--	**321**	43	**168**	**191**	**120**	56	**229**	42	**155**	**100**	--	88	**206**	--	--	**158**	**41**	**46**	**169**
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	--	<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	--	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	19	16	--	13	--	--	12	15	9	12	7	16	14	20	9	16	--	17	14	--	--	16	--	17	12
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	--	<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	--	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	11	9	--	<50	--	--	<5	11	33	6	10	9	7	22	10	<50	--	<5	8	--	--	<5	--	26	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**	--	<0.017	<0.09
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	--	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		1	--	--	1	<0.40	--	1	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	**6**	<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	1	<1
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	116	96
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**	--	<0.5	**1.3**
Total Manganese (Mn)	µg/L	2	820	--	--		100	--	--	79	57	59	78	52	56	48	65	68	73	48	24	48	115	42	39	41	22	47	23	45	46	31	17	28
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	--	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		5	--	--	3	<2.0	--	3	--	--	<2	<2	2	2	<2	<2	3	<2	3	<2.0	--	<2	3	--	--	15	--	<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	--	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<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	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		46	--	--	39	38	--	36	--	--	32	41	32	37	33	30	40	45	26	29	--	19	30	--	--	38	--	40	26
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	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		11	--	--	6	<2.0	--	5	--	--	8	<2	3	4	2	<2	2	<2	5	2	--	<2	2	--	--	<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	<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	<2	<2	<2	<2	--	<2	<2	--	--	2	--	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		27	--	--	14	8	11	12	13	10	5	<5	11	11	6	5	14	<5	9	13	8	<5	11	<5	19	**58**	<5	6	8
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		200	65	--	>250	63	>250	91	>250	--	2,420	>2420	1,120	1,200	866	488	525	1,550	>2420	---	980	122	866	548	>2420	299	488	154	14
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	3	5
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	2.30	1.54	1.22	1.40	1.19	0.40	0.41	0.84	0.64	1.14	1.79	2.76	0.90	2.08	1.45	1.75	1.10	1.91
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	2.30	2.16	1.40	1.40	1.19	1.32	0.36	0.80	0.62	1.11	0.95	3.48	1.15	2.19	2.55	1.87	1.18	3.09

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.
Comment 1: CCME PAL-F reference values between 25-250 mg/L, and >250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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)	
Sample Sites							
Sampling Date	yyyy-mm-dd	--					2018/08/17
Sampling Time	hh:mm	--					7:50 AM
FIELD DATA							
Secchi Depth	Meters	--	--	1.2	--		2.1
Water Temp	Celsius	--	--	--	--		24.2
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		6.7
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.5
Specific Conductance	uS/cm	--	--	--	--		288.2
INORGANICS							
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		9
Dissolved Chloride (Cl)	mg/L	1	--	--	120		54
Colour	TCU	5	--	--	--		16
Nitrite + Nitrate	mg/L	0.05	--	--	--		0.16
Nitrate (N)	mg/L	0.05	--	--	13		0.07
Nitrite (N)	mg/L	0.05	--	--	0.06		0.09
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	--	--	18		0.08
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		3.1
Orthophosphate (as P)	mg/L	0.01	--	--	--		<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		7.31
Total Calcium (Ca)	mg/L	0.1	--	--	--		7.2
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.007
Total Potassium (K)	mg/L	0.1	--	--	--		1.0
Total Sodium (Na)	mg/L	0.1	--	--	--		34.7
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		1.7
Total Suspended Solids	mg/L	5	--	--	Comment 1		<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		7.0
Turbidity (NTU)	NTU	0.1	--	50	--		0.7
Conductivity (uS/cm)	µS/cm	1	--	--	--		261
Calculated Parameters							
Anion Sum	me/L	N/A	--	--	--		1.86
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		9
Calculated TDS	mg/L	1	--	--	--		112
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	--		<10
Cation Sum	me/L	N/A	--	--	--		2.01
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.9
Ion Balance (% Difference)	%	N/A	--	--	--		3.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-2.47
Langelier Index (@ 4C)	N/A	N/A	--	--	--		-2.79
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.78
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.1
Metals (ICP-MS)							
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		29
Total Antimony (Sb)	µg/L	2	20	--	--		<2
Total Arsenic (As)	µg/L	2	5.0	--	5		<2
Total Barium (Ba)	µg/L	5	1000	--	--		16
Total Beryllium (Be)	µg/L	2	5.3	--	--		<2
Total Bismuth (Bi)	µg/L	2	--	--	--		<2
Total Boron (B)	µg/L	5	1200	--	1500		10
Total Cadmium (Cd)	µg/L	0.017	0.01	--	0.09		<0.09
Total Chromium (Cr)	µg/L	1	--	--	1		<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1
Total Copper (Cu)	µg/L	1	2	--	2		<1
Total Iron (Fe)	µg/L	50	300	--	300		142
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		49
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		38
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2
Total Uranium (U)	µg/L	0.1	300	--	15		<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2
Total Zinc (Zn)	µg/L	5	30	--	30		<5
MICROBIOLOGICAL							
Total Coliform	MPN/100mL	1	--	--	--		611
E. coli	MPN/100mL	1	--	400	--		11
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		1.26
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		--

TABLE D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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)	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	2017/10/18	2018/05/08	2018/08/17
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	10:30 AM	11:00 AM	10:10 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	1.8	1.9	2.0	1.5	1.2	2.1	1.4
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	13.1	24.7	8.1	10.7	20.3	10.2	15.7	21.2	10.6	11.7	21.6
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		**10.2**	8.5	5.7	6.3	**4.7**	**9.6**	**9.7**	7.1	8.4	6.5	5.8	7.6	9.4	6.4	7.4	**14.9**	7.0	7.7	8.4	7.3	7.1	7.9	**4.2**	**9.7**	**9.7**	6.6	6.2	9.4	4.2
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.3	6.4	6.2	6.6	7.0	6.3	6.8	5.9	5.6	7.7	6.4	6.3	5.8	7.5	5.6	6.6	7.2	5.8	6.4	5.9	6.4	7.6	6.0	5.5	6.7	6.0	6.3	6.2	5.2
Specific Conductance	uS/cm	--	--	--	--		46.0	106.0	89.2	198.5	104.0	75.1	79.7	66.7	54.3	58.0	96.6	61.1	77.9	65.3	64.5	188.0	266.0	63.0	0.1	107.9	73.6	82.0	117.0	103.7	78.0	114.0	109.0	57.4	109.9
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	9	<5	11
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	19	12	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	57	82	59
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	0.06	0.08	<0.05	<0.05	0.06	0.19	0.05	0.08	<0.05	0.07	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	0.06	0.08	<0.05	<0.05	0.06	0.08	<0.05	<0.05	<0.05	0.19	<0.05	0.08	<0.05	0.07	<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	<0.05	<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	0.04	0.04	0.06
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	<0.4	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		4.3	4.3	4.3	4.3	6.6	9.7	6.5	10.0	12.0	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	8.5	9.0	6.6
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	0.09	<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	<0.01	<0.01	<0.01
pH (Lab)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.9	6.9	6.9	6.9	6.8	**6.1**	**6.3**	**6.4**	**6.1**	6.5	6.7	6.5	**6.4**	6.6	**6.3**	6.5	6.9	**6.1**	**6.3**	7.0	**6.3**	**6.4**	6.9	**6.2**	6.6	6.9	6.7	6.46	7.04
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.5	6.5	6.5	4.1	3.6	2.5	2.5	2.2	2.4	3.6	2.9	2.7	2.5	2.4	3.4	4.0	2.4	2,600.0	3.4	1.1	2.9	4.5	5.6	3.6	4.3	3.9	2.3	4.2
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.2	1.2	1.2	1.0	0.8	0.6	0.6	0.4	0.7	1.0	1.0	0.7	0.5	0.8	1.1	1.0	0.6	640.0	0.9	0.7	0.7	1.1	1.5	1.0	1.2	0.9	0.7	1.1
Total Phosphorus	mg/L	0.002	--	--	--	0.010	**0.020**	**0.020**	**0.020**	**0.020**	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**	**0.025**	0.008	**0.012**	0.008	0.009	**0.016**	**0.013**	**0.012**	**0.028**	**0.010**	**0.014**	**0.015**
Total Potassium (K)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.1	0.6	0.8	0.5	0.5	0.7	0.5	0.7	0.8	0.5	0.5	0.7	0.7	0.9	0.7	540.0	0.7	0.6	0.9	0.8	1.1	0.8	0.8	0.7	0.5	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	13.0	9.2	13.9
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.2	2.2	2.2	2.2	4.2	4.7	2.7	4.3	4.0	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	4.6	2.3	2.8
Total Suspended Solids	mg/L	5	--	--	Comment 1		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	12	<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	3	<2	3	4	3	7	3	2	3	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	1.6	0.9	1.2
Conductivity (uS/cm)	µS/cm	1	--	--	--		212	212	212	212	100	97	79	66	54	71	91	61	83	69	62	87	94	66	64	81	73	79	135	125	93	110	97	68	115
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	0.78	0.41	0.76
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	12	9	<5	11
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	51	47	28	47
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	<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	0.90	0.62	0.97
Hardness (CaCO3)	mg/L	N/A	--	--	--		10.00	15.00	10.00	12.00	14.00	12.00	9.00	9.00	8.00	8.90	13.10	11.40	9.60	8.30	9.30	13.00	14.10	8.50	9.10	12.20	5.60	10.10	15.80	20.20	13.10	15.70	13.40	8.6	15
Ion Balance (% Difference)	%	N/A	--	--	--		18.30	9.39	19.60	1.99	5.56	20.30	12.40	1.85	27.30	17.60	19.70	15.10	0.30	12.90	11.00	7.10	19.10	25.70	8.57	20.50	7.50	14.90	4.50	5.30	11.00	12.30	7.50	20.8	12.4
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	-3.35	-4.02	-2.85
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	-3.30	-3.67	-4.34	-3.17
Saturation pH (@ 20C)	N/A	N/A	--	--	--		NC	9.78	NC	10.00	9.83	NC	NC	10.10	NC	9.87	10.30	10.20	10.40	10.50	10.50	9.57	10.10	9.72	NC	10.20	10.80	10.40	9.91	10.00	10.30	9.85	10.00	10.5	9.89
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	10.00	NC	10.30	10.10	NC	NC	10.30	NC	10.20	10.60	10.50	10.70	10.80	10.80	9.89	10.40	10.00	NC	10.50	11.10	10.70	10.20	10.40	10.60	10.20	10.30	10.8	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**	**150**	**240**	**228**	**123**
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	--	<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	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		9	--	--	12	14	--	10	--	--	9	11	10	8	<5	13	13	18	9	9	--	9	10	--	--	10	--	14	7	14
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	--	<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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		8	--	--	15	13	--	<50	--	--	6	14	22	6	11	9	11	12	12	<50	--	<5	9	--	--	<5	--	17	7	13
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**	--	<0.017	<0.09	<0.09
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	--	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	--	<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	1	<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	**1,000**	290	168	**759**	**572**	148	**783**
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	1.0	<0.50	--	<0.50	--	--	<0.5	<0.5	1.1	<0.5	0.5	<0.5	5.8	<0.5	0.5	<0.5	--	0.6	<0.5	--	--	<0.5	--	<0.5	**1.2**	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		26	--	--	43	83	35	12	68	23	17	90	114	24	67	53	33	146	25	47	120	57	21	109	39	39	96	64	17	78
Total Molybdenum (Mo)	µg/L	2	73	--	73		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		<2	--	--	<1	<1	--	<1	--	--	<1	<1	1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	**0.4**	<0.1	--	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		14	--	--	18	20	--	12	--	--	10	18	15	12	9	12	16	17	12	12	--	8	12	--	--	15	--	20	10	24
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	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	3	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		2	--	--	<2	<2	--	3	--	--	<2	2	3	4	<2	2	2	<2	3	3	--	<2	<2	--	--	<2	--	<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	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<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	--	<2	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	5	5	7	<5.0	<5.0	<5.0	<5	<5	<5	7	<5	<5	<5	<5	<5	<5.0	<5	<5	<5	<5	8	<5	8	6	<5	<5
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		1,800	170	--	>250	11	>250	59	>250	--	>2420	1,986	>2420	>2420	>2420	>2420	525	>2420	>2420	---	>2420	>2420	>2420	>2420	>2420	>2420	>2420	659	10	2420
E. coli	MPN/100mL	1	--	400	--		**1,500**	100	--	**>250**	6	6	2	**>250**	<100	3	7	3	12	6	2	<1	18	11	30	11	5	4	15	25	31	16	3	4	20
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	2.20	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	0.31	0.51	1.25
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	2.20	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	0.49	0.91	--

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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)	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	2017/10/18	2018/05/08	2018/08/17
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	10:15	10:15	10:30	9:10
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	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	9.0	24.5	15.6	11.7	21.5	13.6	11.0	22.7	12.8	14.7	25.0	8.4	12.1	21.7	12.5	16.1	22.5	13.8	12.1	23.8
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		**10.8**	8.0	8.0	9.3	7.8	**10.4**	**11.1**	8.4	**9.6**	8.9	8.2	7.7	**10.2**	9.2	8.9	5.9	7.9	8.1	8.0	**9.9**	8.7	9.3	7.7	**11.4**	9.0	7.4	8.2	7.3	6.9
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.3	6.7	7.0	7.3	7.3	6.8	6.8	7.0	6.3	7.7	6.9	6.5	5.9	7.3	6.5	6.6	7.4	6.7	6.8	6.9	7.2	7.4	6.8	**5.6**	7.0	7.0	7.0	6.7	6.9
Specific Conductance	uS/cm	--	--	--	--		95.0	282.0	246.0	220.0	228.0	199.4	220.0	175.0	161.3	204.0	225.0	177.2	207.3	194.4	210.6	405.0	252.0	208.0	0.2	245.1	236.6	213.0	264.0	227.8	204.0	248.0	248.0	190.3	242.7
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	9	<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	59	54	48
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	15	63	26
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	0.30	0.24	0.17	0.06
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	0.24	0.17	0.06
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**	<0.05	<0.05	<0.05
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	0.03	<0.03	0.04
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	0.2	1.2	0.9	<0.4	<0.4	0.4	<0.4	0.8	<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	5.0	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	4.1	5.1	3.2
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	<0.01	<0.010	<0.01	<0.01	<0.01	<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		**6.4**	6.7	6.8	6.8	7.0	6.9	6.5	6.5	**6.4**	6.7	7.1	6.9	6.7	7.0	6.9	6.7	6.9	6.6	6.5	6.9	6.9	6.7	7.3	6.9	6.8	7.1	6.9	6.72	7.21
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.7	7.1	6.8	6.8	8.0	8.3	7.1	4.7	5.6	5.7	6.9	6.0	7.0	5.3	6.8	6.4	7.9	6.8	6,600.0	7.8	5.2	6.2	8.3	7.3	6.9	7.2	8.1	6.0	7.3
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.2	1.1	1.2	1.3	1.3	1.2	0.8	1.0	1.0	1.2	1.3	1.0	0.9	1.3	1.4	1.2	1.0	940.0	1.2	0.9	1.0	1.3	1.3	1.0	1.1	1.2	1.0	1.2
Total Phosphorus	mg/L	0.002	--	--	--	0.010	**<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**	**0.148**	0.004	0.004	0.002	0.008	0.005	0.004	0.006	0.009	0.007	0.010	0.010
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.1	0.9	0.8	0.8	1.0	0.9	0.7	0.9	0.7	0.9	0.9	0.8	0.6	1.2	0.8	1.1	0.9	770.0	0.9	0.7	0.7	1.0	1.0	0.8	0.9	1.0	0.7	1.0
Total Sodium (Na)	mg/L	0.1	--	--	--		38.0	38.0	35.0	28.3	33.1	33.0	33.0	20.8	21.3	31.2	34.5	26.4	35.1	20.1	32.1	36.4	39.0	35.3	34.0	40.0	27.1	32.1	37.2	32.8	44.0	41.4	35.9	35.9	36.6
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	1.9	2.6	1.7
Total Suspended Solids	mg/L	5	--	--	Comment 1		<1	1	1	2	<2	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	3	<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	8	9	8	10	10	10	10	9	10	8	7.0
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	0.7	2.4	0.4	0.4	0.3	0.9	0.7	0.5	0.7	1.1	1.1	1.0	1.0	1.3	2.6	1.0	0.5
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	247	244	246
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	2.07	1.70	1.66
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	6	<5	9	8	<5	8	9	<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	122	122	107	106
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	<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	2.10	1.98	2.09
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.00	23.00	22.00	22.00	25.00	26.00	23.00	15.00	18.00	18.40	22.20	20.30	21.60	16.90	22.30	21.70	24.70	21.10	20.00	24.40	16.70	19.60	26.10	23.60	21.30	22.50	25.20	19.1	23.2
Ion Balance (% Difference)	%	N/A	--	--	--		0.24	0.23	2.21	5.85	1.03	2.86	0.52	12.50	1.49	6.80	2.10	1.60	8.60	5.50	8.30	1.50	17.90	12.80	0.53	9.00	9.80	2.60	4.80	4.90	8.60	7.90	0.80	7.6	11.4
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	-2.85	-3.39	-2.61
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	-3.17	-3.71	-2.93
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	10.00	10.20	9.91	9.61	9.99	9.98	NC	9.92	10.10	10.10	9.72	9.82	10.10	9.84	9.73	10.1	9.82
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	10.30	10.40	10.40	10.50	10.20	9.93	10.30	10.30	NC	10.20	10.40	10.40	10.00	10.10	10.40	10.20	10.10	10.4	10.1
Metals (ICP-MS)																																		
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		**259**	**259**	--	**124**	54	--	**266**	--	--	**199**	54	**153**	**140**	65	100	**260**	52	**105**	**180**	--	90	**163**	--	--	**128**	**36**	**43**	**164**	26
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	--	<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	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		13	13	--	16	13	--	19	--	--	18	17	15	19	9	18	17	17	16	19	--	19	15	--	--	17	--	20	14	15
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	--	<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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		9	9	--	8	9	--	<50	--	--	5	9	17	7	7	10	8	10	12	<50	--	<5	8	--	--	7	--	12	5	10
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**	--	--	**0.020**	--	<0.017	<0.09	<0.09
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	--	<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	--	<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	<1	2	<1	<1	<1	<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	130	81	148
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	<0.5	--	0.6	<0.5	--	<0.5	--	--	<0.5	<0.5	0.7	<0.5	<0.5	0.9	3.6	<0.5	<0.5	<0.5	--	<0.5	<0.5	--	--	<0.5	--	<0.5	0.7	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		53	53	--	37	67	32	42	33	33	25	47	46	37	20	92	41	45	27	36	48	24	31	41	20	30	35	54	21	50
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	--	<2	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		<2	<2	--	2	<2.0	--	2	--	--	<2	<2	<2	<2	<2	<2	2	<2	<2	<2.0	--	<2	2	--	--	<2	--	<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	--	<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	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		12	12	--	34	36	--	33	--	--	25	33	29	33	18	32	31	32	29	29	--	21	28	--	--	33	--	41	27	38
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	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<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	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		2	2	--	<2.0	<2.0	--	5	--	--	<2	<2	<2	<2	<2	2	3	<2	2	3	--	<2	<2	--	--	<2	--	<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	<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	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		<5	<5	--	10	7	6	9	7	9	<5	<5	8	10	5	7	10	<5	6	9	7	8	8	<5	<5	6	6	6	6	<5
MICROBIOLOGICAL																																		
Total Coliform	MPN/100mL	1	--	--	--		120	24	--	190	16	58	72	110	--	291	1,553	178	345	2,420	1,300	86	1,730	>2420	---	2,420	285	548	1,990	2,420	687	2,420	411	<1	NDOGT
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	46	<1	51
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	1.30	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	1.34	1.16	1.14
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	1.20	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	1.87	1.8	--

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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)	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	2017/10/18	2018/05/08	2018/08/17
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	10:05 AM	10:45 AM	9:00 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	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	14.8	24.7	9.5	12.2	20.6	12.3	16.5	22.4	13.8	12.7	23.1
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.9	8.1	8.3	9.0	6.3	10.9	11.0	8.6	9.7	8.7	7.3	8.9	10.1	8.9	9.6	14.5	5.9	7.5	9.8	9.1	8.8	8.3	5.5	10.1	8.3	6.4	7.3	11.0	4.7
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		8.0	6.7	6.9	7.2	7.0	6.1	6.5	6.4	6.0	9.0	6.7	6.8	5.7	7.1	6.4	6.3	7.3	6.6	6.6	6.8	7.1	7.3	6.7	6.1	6.9	6.9	6.8	7.0	6.7
Specific Conductance	uS/cm	--	--	--	--		771.0	262.0	247.0	224.0	226.0	214.8	218.0	171.9	126.2	206.0	225.0	185.9	207.1	196.2	209.0	273.0	251.0	208.0	0.2	243.5	232.4	215.0	260.0	228.0	213.0	262.0	252.0	202.9	251.0
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	9	10	<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	59	52	50
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	16	35	10
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	0.15	0.27	0.25
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	0.15	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	<0.05	<0.010	<0.05	<0.05	<0.05	0.07	<0.05	0.12	<0.05	<0.05	0.10	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	0.10	<0.03	0.04	0.06	<0.03	<0.03	<0.03	0.03	0.04	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.5	<0.4	0.7	--	1.8	1.1	<0.4	<0.4	<0.4	0.2	0.4	1.0	<0.4	<0.4	0.4	<0.4	0.5	<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	6.0	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	4.0	5.1	2.7
Orthophosphate (as P)	mg/L	0.01	--	--	--		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<0.01	<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		6.6	6.8	6.8	6.8	6.9	6.8	6.6	6.6	6.5	6.7	7.0	6.9	6.7	7.0	6.9	6.7	6.9	6.9	6.6	6.9	7.0	6.7	7.0	6.9	6.8	7.0	7.0	6.74	7.13
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.8	7.7	7.0	6.8	8.0	8.5	6.8	4.9	5.2	5.7	6.8	5.8	6.8	5.1	6.8	6.4	7.9	6.8	6,500.0	7.9	3.7	6.5	7.1	7.3	7.7	7.5	8.6	5.9	7.9
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.2	1.3	1.2	1.2	1.2	1.3	1.2	0.9	1.0	1.0	1.2	1.2	1.0	0.8	1.2	1.3	1.2	1.0	920.0	1.3	1.0	1.0	1.1	1.3	1.2	1.1	1.3	1.0	1.2
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<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	2.350	0.016	0.022	0.031	0.015	0.006	0.007	0.003	0.007	0.004	0.007	0.020	0.008	0.006	0.024	0.004
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.0	1.0	0.8	0.9	1.0	0.8	0.7	1.1	0.7	1.0	0.9	0.8	0.6	1.2	0.8	1.1	0.9	760.0	0.9	0.7	0.7	0.9	1.0	0.8	0.9	1.1	0.7	1.0
Total Sodium (Na)	mg/L	0.1	--	--	--		39.0	41.0	37.0	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	34.0	40.0	28.2	32.4	41.4	31.1	37.6	41.4	38.9	35.6	39.2
Reactive Silica (SIO2)	mg/L	0.5	--	--	--		2.7	2.6	2.6	3.1	2.9	3.1	2.9	2.5	2.7	2.7	2.2	2.6	3.0	2.6	2.5	2.6	2.1	2.5	2.5	2.6	3.0	2.6	2.0	2.4	2.3	1.7	2.1	2.6	1.8
Total Suspended Solids	mg/L	5	--	--	Comment 1		<1	1	<1	<2	<2	<1	2	<1	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	7	<5	7	<5	10	6	<5	<5	<5	<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	8	9	8	10	10	10	10	9	10	8	7.0
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	0.6	0.7	1.2	1.2	1.5	1.6	1.3	0.9	1.6	1.2	0.5
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	248	243	252
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	2.08	1.65	1.75
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	7	<5	9	8	<5	9	10	<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	128	126	105	113
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	<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	1.30	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	2.27	1.96	2.24
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.00	25.00	22.00	22.00	25.00	27.00	22.00	16.00	17.00	18.40	21.90	19.40	21.10	16.00	21.90	21.30	24.70	21.10	20.00	25.10	13.40	20.30	22.30	23.60	24.20	23.30	26.80	18.9	24.7
Ion Balance (% Difference)	%	N/A	--	--	--		1.59	2.20	0.48	5.82	2.02	4.64	0.53	11.70	2.26	6.60	0.80	2.80	4.50	3.20	9.20	9.50	15.80	4.20	0.79	10.70	10.10	3.40	5.50	3.00	3.20	4.10	4.30	8.6	12.1
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	-2.71	-3.38	-2.61
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	-3.10	-3.03	-3.70	-2.93
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	10.10	10.20	10.10	9.32	9.99	9.30	NC	9.92	10.20	10.10	9.79	9.82	10.00	9.77	9.66	10.1	9.74
Saturation pH (@ 4C)	N/A	N/A	--	--	--		10.10	9.89	9.92	10.00	9.82	9.83	10.00	10.00	10.00	9.81	10.20	10.40	10.40	10.50	10.40	9.64	10.30	9.62	NC	10.20	10.50	10.40	10.10	10.10	10.30	10.10	9.98	10.4	10.1
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		150	--	--	125	29	--	231	--	--	188	48	149	141	106	159	236	46	93	160	--	84	172	--	--	180	89	55	157	32
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	--	<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	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		16	--	--	17	18	--	18	--	--	18	17	16	18	10	19	17	19	16	20	--	17	16	--	--	20	--	20	15	19
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	--	<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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		6	--	--	9	9	--	<50	--	--	6	9	16	7	6	9	8	11	11	<50	--	<5	7	--	--	<5	--	11	6	10
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	--	<0.017	<0.09	<0.09
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	--	<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	<0.4	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	<2.0	2	<2.0	2	<2.0	<2.0	<2	<2	4	9	<1	1	<1	<1	2	7	1	1	1	<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	141	83	119
Total Lead (Pb)	µg/L	0.5	1	--	1.0 - 7.0		<0.5	--	--	3.2	<0.5	--	<0.5	--	--	<0.5	<0.5	0.8	0.9	<0.5	<0.5	2.6	<0.5	<0.5	<0.5	--	<0.5	<0.5	--	--	<0.5	--	<0.5	1.4	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		51	--	--	35	64	29	39	27	30	23	34	38	34	77	130	34	29	24	25	78	34	34	58	29	74	76	48	19	84
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	--	<2	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		3	--	--	2	<2.0	--	<2.0	--	--	<2	<2	5	<2	<2	<2	<2	<2	<2	<2.0	--	<2	2	--	--	7	--	<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	--	3	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.25		<0.5	--	--	<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	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21000	--	--		34	--	--	33	37	--	33	--	--	25	32	28	32	17	31	31	31	29	30	--	20	28	--	--	33	--	40	27	39
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	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	5	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	4	--	--	<2	<2	<2	<2	<2	3	2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<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	<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	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		14	--	--	10	7	7	11	7	7	<5	<5	68	21	<5	9	9	<5	<5	10	8	12	7	<5	<5	13	7	<5	7	<5
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		28	58	--	100	16	75	83	95	--	345	>2420	921	548	>2420	770	308	1,550	>2420	---	>2420	281	488	1,730	>2420	792	>2420	>2420	4	NDOGT
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	3	2	19
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	0.70	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	2.40	0.33	0.35	1.06	0.24
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	0.70	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	0.43	1.71	--

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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)	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	2017/10/18	2018/05/09	2018/08/17
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	9:50	9:30	8:20
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	NCC	N/A	2.7	2.1	5.3	4.2	2.1	4.6	2.7	3.1	3.01
Water Temp	Celsius	--	--	--	--		14.7	10.5	26.1	16.6	13.3	22.7	14.7	13.7	22.9	12.8	14.1	25.4	9.4	12.2	22.2	12.7	16.8	21.0	14.6	12.7	24.5
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		9.4	7.9	7.9	8.2	**9.7**	8.9	8.6	**15.8**	7.6	7.9	8.3	8.8	7.6	**10.5**	8.4	**9.9**	8.7	7.1	7.2	**10.42**	6.42
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.5	7.8	6.7	6.7	6.2	8.6	6.5	6.8	7.9	6.6	7.8	6.8	7.1	**5.8**	**5.1**	**5.7**	7.0	6.8	7.1	6.74	7.14
Specific Conductance	uS/cm	--	--	--	--		111.9	230.0	229.0	189.0	219.5	202.1	212.9	472.0	251.0	211.0	0.2	249.8	240.8	209.0	267.0	243.2	219.0	246.0	257.0	196.4	244.9
INORGANICS																											
Total Alkalinity (as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5	6	7	<5	7	9	<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	58	60	56	49
Colour	TCU	5	--	--	--		35	43	10	27	10	22	18	14	11	22	35	8	19	27	13	17	18	14	14	34	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	0.09	0.17	0.20
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	0.09	0.17	0.09
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**	<0.05	<0.05	**0.11**
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	0.04	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	<0.4	2.3	1.0	--	0.6	1.1	<0.4	0.5	1.1	0.3	<0.4	1.8	0.5	<0.4	0.7	0.4	<0.4	<0.4	<0.4	<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	4.7	4.8	3.9	4.9	2.9
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	<0.010	<0.01	<0.01	<0.01	<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		6.6	6.7	7.1	6.5	6.7	6.9	6.9	6.6	6.8	6.6	6.6	6.9	6.9	6.7	7.2	7.0	6.7	7.1	6.9	6.70	7.15
Total Calcium (Ca)	mg/L	0.1	--	--	--		5.8	6.1	6.6	5.9	7.1	5.7	6.4	6.5	7.6	7.0	6,500.0	8.0	4.7	6.3	7.3	8.2	7.4	7.0	7.5	5.9	6.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.1	1.0	1.1	1.2	1.0	1.0	1.1	1.4	1.2	1.0	930.0	1.3	0.9	1.0	1.1	1.3	1.2	1.0	1.1	1.0	1.1
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.009	**0.018**	**0.040**	0.006	0.005	**0.013**	**0.010**	**0.010**	**0.026**	**0.135**	0.005	0.005	0.005	0.004	0.004	0.003	0.010	**0.012**	0.005	**0.031**	0.005
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	0.7	0.9	0.8	0.8	0.7	1.1	0.8	1.1	0.9	720.0	0.1	0.7	0.7	0.9	1.0	0.9	0.8	0.9	0.7	0.9
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	33.0	42.6	28.3	32.5	33.1	33.5	38.9	42.4	37.2	37.2	38.5
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	2.1	1.6	1.7	2.4	1.7
Total Suspended Solids	mg/L	5	--	--	Comment 1		1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	<5	<5	<5	<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	8	10	8	7.0
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	0.7	1.0	1.0	0.7	1.3	1.2	0.9	0.9	0.9	1.4	0.4
Conductivity (uS/cm)	µS/cm	1	--	--	--		160	215	226	189	232	223	204	228	246	225	220	248	244	208	267	196	248	249	246	247	247
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	2.09	1.76	1.68
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	--		9	21	8	<5	<5	6	5	32	<5	<5	5	6	7	<5	7	9	<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	122	123	110	108
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	<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	2.30	2.12	2.04	2.13
Hardness (CaCO3)	mg/L	N/A	--	--	--		19.00	19.30	21.00	19.70	21.80	18.40	20.50	22.00	23.90	21.60	20.00	25.30	15.40	19.80	22.80	25.80	23.40	21.60	23.30	18.9	21.3
Ion Balance (% Difference)	%	N/A	--	--	--		2.16	4.70	2.60	2.00	3.20	10.60	6.70	9.40	20.30	17.50	1.84	10.20	10.80	3.20	0.40	3.00	3.40	8.10	0.70	7.3	11.8
Langelier Index (@ 20C)	N/A	N/A	--	--	--		-3.06	-2.79	-2.77	-3.62	-3.33	-3.11	-3.19	-2.64	-3.17	-3.42	-3.24	-3.20	-3.13	-3.43	-2.72	-2.69	-3.29	-2.82	-2.84	-3.42	-2.77
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	-3.16	-3.74	-3.09
Saturation pH (@ 20C)	N/A	N/A	--	--	--		9.63	9.49	9.87	10.10	10.00	10.00	10.10	9.28	10.00	10.00	9.81	9.92	10.10	10.10	9.88	9.72	10.00	9.91	9.77	10.1	9.92
Saturation pH (@ 4C)	N/A	N/A	--	--	--		9.88	9.81	10.20	10.40	10.40	10.40	10.40	9.60	10.30	10.40	10.10	10.20	10.40	10.40	10.20	10.00	10.30	10.20	10.10	10.4	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**	**45**	**44**	**172**	30
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	--	<2	--	<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	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1000	--	--		--	18	16	15	19	9	16	16	17	17	17	---	19	14	--	--	17	--	17	13	13
Total Beryllium (Be)	µg/L	2	5.3	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	---	<2	<2	--	<2	<2	--	<2	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--	<2	<2	<2
Total Boron (B)	µg/L	5	1200	--	1500		--	6	9	15	7	7	9	7	6	10	<50	---	<5	7	--	--	<5	--	10	5	9
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**	--	--	**0.025**	--	<0.017	<0.09	<0.09
Total Chromium (Cr)	µg/L	1	---	--	1		--	<1	<1	5	<1	<1	<1	**6**	<1	<1	<1.0	---	**7**	<1	--	--	2	--	<1	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	---	<1	<1	--	--	<1	--	<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	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	<50	106	80	81
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	--	<0.5	0.9	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		36	30	14	37	35	13	12	40	18	25	34	24	35	23	15	17	24	11	13	24	15
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	---	<2	<2	--	--	<2	--	<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	--	<2	<2	<2
Total Selenium (Se)	µg/L	1	1.0	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	---	<1	<1	--	--	<1	--	<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	--	<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	--	38	28	35
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	<0.1	---	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	---	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		--	3	<2	<2	<2	<2	<2	<2	<2	2	2	---	<2	<2	--	--	<2	--	<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	--	<0.1	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	---	<2	<2	--	--	<2	--	<2	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		9	5	<5	**64**	11	7	5	10	<5	10	14	6	12	10	<5	<5	11	8	<5	8	<5
MICROBIOLOGICAL																											
Total Coliform	MPN/100mL	1	--	--	--		--	461	613	93	461	308	461	42	629	>2470	---	356	163	179	517	2,420	260	577	>2420	58	601
E. coli	MPN/100mL	1	--	400	--		100	14	2	6	6	6	4	<1	1	17	<10	1	2	<1	23	44	<1	5	**517**	8	1
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.91	0.30	1.20	1.09	1.44	2.20	0.64	0.20	0.61	0.90	0.48	1.22	2.71	1.52	1.20	2.32	1.09	1.43	1.22	6.25	1.28
Chlorophyll A - Welschmeyer method	µg/L	0.05	--	--	--		0.85	0.33	1.00	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	1.33	3.35	--

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.
**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
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

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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	2017/10/18	2018/05/08	2018/08/17
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	11:40	12:40	11:00
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	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	14.3	20.7	5.4	13.4	19.3	9.2	16.4	22.1	10.1	14.4	21.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		11.4	5.8	4.3	8.2	4.3	6.1	8.2	3.9	5.3	5.7	1.0	3.8	7.6	3.3	3.1	12.0	2.1	4.5	4.3	3.8	5.0	8.2	10.1	7.4	5.8	5.8	5.6	7.1	2.8
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		8.0	5.4	5.3	6.3	5.3	5.6	5.8	5.8	6.0	8.8	5.7	6.4	6.2	7.1	6.8	6.0	6.6	5.1	6.4	6.2	6.9	7.3	6.3	5.7	6.4	7.8	6.3	6.1	6.1
Specific Conductance	uS/cm	--	--	--	--		194.0	153.0	103.8	135.0	106.0	108.6	114.1	107.6	88.6	288.0	225.0	155.5	226.0	173.2	234.0	880.0	337.0	109.0	0.4	335.8	251.2	289.0	353.0	208.9	354.0	257.0	266.0	232.2	280.5
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	16	13	26
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	51	51	54
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	29	27	56
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.69	<0.05	1.20	0.69	0.25	1.20	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	0.58	0.37	0.11
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	0.50	0.58	0.37	<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	<0.05	<0.010	<0.05	<0.05	<0.05	0.13	<0.05	0.17	0.21	<0.05	<0.05	0.11
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	--	18		<0.05	0.29	<0.05	<0.05	<0.05	<0.05	0.05	0.10	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	0.10	0.07	<0.03	0.07
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	0.3	0.5	0.6	0.7	1.2	0.7	0.5	1.3	3.8	1.1	0.70
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	10.0	7.7	4.7	11.0	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	6.9	5.0	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	<0.01	<0.010	<0.01	<0.01	<0.01	<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		4.5	5.2	5.4	5.5	6.2	5.3	6.4	6.6	6.3	6.4	6.9	6.8	6.9	6.9	6.7	6.6	7.5	5.9	6.6	7.5	6.8	6.9	7.0	6.5	6.8	6.9	6.9	7.02	7.14
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.7	1.8	1.6	4.9	3.3	5.1	4.9	5.2	5.6	12.5	11.7	7.5	11.1	10.5	13.9	7.2	23.3	2.2	18,000.0	18.0	12.4	12.9	25.8	9.9	20.9	10.3	14.6	12.5	15.6
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.3	0.5	0.5	1.1	0.8	1.1	0.9	0.9	1.2	1.7	2.0	1.4	1.4	1.5	2.3	1.6	3.2	0.6	2,400.0	2.7	2.3	1.7	2.7	1.7	3.0	1.7	2.2	1.8	2.2
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.070	0.140	0.020	0.006	0.007	0.011	0.009	0.012	0.010	0.019	0.039	0.008	0.006	0.021	0.022	0.013	0.038	0.011	0.007	0.020	0.002	0.005	0.008	0.009	0.017	0.052	0.008	0.022	0.014
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	1.2	0.7	1.1	1.6	1.3	1.1	1.5	1.9	1.6	2.5	1.5	1.3	1.7	2.4	1.2	2.5	0.7	2,000.0	2.1	1.5	1.4	1.9	1.7	2.0	2.1	2.0	1.6	2.0
Total Sodium (Na)	mg/L	0.1	--	--	--		15.0	25.0	13.0	15.9	14.5	14.6	14.8	10.2	8.3	36.3	27.7	14.6	30.8	15.0	20.5	39.1	38.7	18.6	64.0	37.7	28.8	45.4	43.8	24.8	64.1	29.7	29.6	41.2	35.5
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	5.6	2.5	5.3
Total Suspended Solids	mg/L	5	--	--	Comment 1		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	<5	<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	13	19	12	7.0
Turbidity (NTU)	NTU	0.1	--	50	--		14.0	35.0	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	0.6	0.9	0.8	1.0	4.1	1.0	1.3	7.7	1.1	1.7	1.1
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	258	298	306
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	2.20	1.97	2.2
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	21	16	13	26
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	127	131	130	133
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	<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	2.28	2.62	2.6
Hardness (CaCO3)	mg/L	N/A	--	--	--		6.00	6.00	6.00	17.00	12.00	17.00	16.00	17.00	19.00	38.20	37.50	24.50	33.50	32.40	44.20	24.60	71.40	8.00	55.00	56.10	40.40	39.20	75.50	31.70	64.50	32.70	45.50	38.6	48
Ion Balance (% Difference)	%	N/A	--	--	--		4.35	8.20	0.68	2.30	13.40	7.37	1.48	6.74	0.00	2.60	1.90	4.60	2.40	3.50	2.60	8.40	16.40	11.20	3.19	7.10	4.70	4.40	3.10	5.70	8.00	2.20	1.80	14.0	8.3
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	-2.33	-2.37	-1.85
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	-2.65	-2.69	-2.17
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	9.23	9.39	8.99
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	10.10	9.18	9.35	9.74	9.67	9.09	9.91	9.39	9.58	9.55	9.71	9.31
Metals (ICP-MS)																																	
Total Aluminum (Al)	ug/L	5	5	--	5 - 100		510	--	--	169	192	--	205	--	--	134	183	146	86	145	150	187	83	310	51	--	52	81	--	--	69	450	100	72	80
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	--	<2	<2	<2
Total Arsenic (As)	ug/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Barium (Ba)	ug/L	5	1,000	--	--		22	--	--	53	37	--	37	--	--	58	284	42	57	57	80	46	142	17	130	--	86	79	--	--	130	--	77	68	100
Total Beryllium (Be)	ug/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<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	--	<2	<2	<2
Total Boron (B)	ug/L	5	1,200	--	1,500		<5	--	--	11	11	--	<50	--	--	12	18	13	10	10	11	9	14	11	<50	--	<5	10	--	--	<5	--	24	11	14
Total Cadmium (Cd)	ug/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	<0.017	<0.09	<0.09
Total Chromium (Cr)	ug/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	8	<1	<1	<1.0	--	<1	<1	--	--	1	--	1	<1	<1
Total Cobalt (Co)	ug/L	1	10	--	--		<1	--	--	1	0	--	<0.40	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Copper (Cu)	ug/L	1	2	--	2		2	--	--	3	<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	1	1	<1
Total Iron (Fe)	ug/L	50	300	--	300		720	--	--	146	637	150	107	209	219	102	1,380	255	111	518	445	147	820	290	140	1,280	138	144	766	228	151	3,960	281	85	634
Total Lead (Pb)	ug/L	0.5	1.0	--	1.0 - 7.0		1.6	--	--	2.4	0.6	--	<0.5	--	--	<0.5	0.7	<0.5	<0.5	<0.5	0.6	2.6	<0.5	0.6	<0.5	--	<0.5	<0.5	--	--	<0.5	--	<0.5	0.8	<0.5
Total Manganese (Mn)	ug/L	2	820	--	--		40	--	--	55	39	67	28	21	31	34	79	28	23	45	31	56	122	61	28	95	22	19	78	38	22	511	28	9	99
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	--	<2	<2	<2
Total Nickel (Ni)	ug/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	--	<2	6	<2
Total Selenium (Se)	ug/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	ug/L	0.1	0.1	--	0.3		<0.5	--	--	<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	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	ug/L	5	21,000	--	--		11	--	--	29	20	--	24	--	--	48	58	36	52	47	62	38	103	13	85	--	39	58	--	--	92	--	76	54	88
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	<0.1	<0.1	<0.1	<0.1	<0.10	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	ug/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	ug/L	2	--	--	--		6	--	--	<2	<2	--	4	--	--	<2	3	<2	<2	<2	4	2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Uranium (U)	ug/L	0.1	300.0	--	15.0		<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	<0.1	--	<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	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Zinc (Zn)	ug/L	5	30	--	30		21	--	--	16	7	7	<5.0	<5.0	7	<5	6	<5	<5	<5	10	10	<5	7	11	<5	<5	<5	<5	6	9	37	8	6	<5
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		84	>250	--	>250	>250	180	120	180	--	687	>2420	>2420	1,550	>2420	1,553	120	>2420	>2420	---	>2420	659	>2420	>2420		914	>2420	>2420	105	9010
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	3	<1	10
Chlorophyll A - Acidification method	ug/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	0.50	7.27	0.36	0.94	51.51	0.33	1.56	5.32	0.62	1.57	0.86
Chlorophyll A - Welschmeyer method	ug/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	0.99	2.62	--

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.

Comment 1: CCME PAL-F reference values between 25-250 mg/L, and >250 mg/L.

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2107/06/08	2017/08/15	2017/10/18	2018/05/09	2018/08/17
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	10:07	11:00	12:58	14:30	12:50	12:45	10:40	11:45	15:25	12:25	12:30	11:30
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	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	13.4	20.4	10.2	13.0	22.4	15.2	14.9	18.3
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.0	5.9	4.8	4.9	2.5	3.0	6.9	7.0	5.1	3.7	13.1	3.3	6.3	1.6	4.2	10.5	9.3	4.2	6.1	5.3	6.8	7.1	6.8	5.7	1.8	11.3	8.8	2.3
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.6	5.7	5.4	6.3	5.9	5.6	6.2	5.9	5.3	7.3	6.4	6.7	6.0	6.9	5.4	5.4	5.9	6.5	6.0	6.0	5.9	6.2	5.4	6.0	7.6	8.3	6.1	5.9
Specific Conductance	uS/cm	--	--	--	--		37.0	457.0	162.1	415.0	167.0	101.2	92.2	123.1	96.0	225.0	226.0	159.1	288.0	188.5	204.4	204.4	174.0	0.4	699.0	197.6	968.0	838.0	219.2	400.0	414.0	338.0	355.6	394.7
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	8	5	<5	13	21	6	<5	22	11	9	21
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	92	79	90
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	22	25	85
Nitrite + Nitrate	mg/L	0.05	--	--	--		<0.05	<0.05	<0.05	0.10	<0.05	0.62	0.26	1.80	3.20	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	0.20	0.09	0.07	0.33	0.21
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	0.07	0.16	<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	<0.05	<0.05	0.17	0.21
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	0.06	0.19	0.05	0.14	0.37	<0.03	<0.03	0.09	0.14	<0.03	0.24
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.6	1.1	0.5	--	0.7	2.0	15.3	<0.4	0.3	62.6	2.0	24.3	2.1	0.6	<0.4	0.7	0.6	1.4	0.90
Total Organic Carbon	mg/L	0.5	--	--	--		8.5	13.0	13.0	7.2	14.0	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	5.9	5.6	7.5
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	<0.010	<0.01	<0.01	<0.01	<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		5.4	6.0	6.3	6.1	6.3	5.5	5.9	6.2	5.9	5.9	6.7	6.8	6.6	6.6	6.3	7.2	6.4	6.1	6.6	6.2	6.5	6.8	6.2	6.2	6.7	6.5	6.79	6.79
Total Calcium (Ca)	mg/L	0.1	--	--	--		1.6	4.0	4.8	7.4	3.8	4.0	3.1	2.2	3.8	7.0	8.4	5.6	7.6	8.5	8.2	14.1	9.5	20,000.0	33.3	9.8	23.9	23.8	8.6	13.3	14.7	14.7	11.5	12.5
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.4	0.7	0.9	1.0	0.6	1.0	0.7	0.7	1.4	1.2	1.4	1.2	1.2	1.3	2.2	3.1	1.8	2,500.0	32.7	2.2	3.2	2.5	1.7	2.5	1.9	2.1	1.4	1.7
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.02	0.040	0.034	0.010	0.028	0.003	0.009	0.019	0.043	0.021	0.054	0.030	0.014	0.028	0.199	0.023	0.201	0.010	1.560	0.012	0.222	0.024	0.012	0.013	0.042	0.011	0.034	0.025
Total Potassium (K)	mg/L	0.1	--	--	--		0.5	0.8	1.1	1.0	1.0	1.4	0.8	1.3	1.9	1.2	1.7	1.6	1.3	1.5	2.5	2.9	1.7	1,900.0	12.5	1.1	4.0	2.1	1.4	1.1	1.6	1.6	1.3	1.6
Total Sodium (Na)	mg/L	0.1	--	--	--		15.0	51.0	55.0	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	150.0	124.0	36.8	149.0	124.0	26.4	68.8	66.0	55.2	59.4	81.6
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	6.4	1.6	8.8
Total Suspended Solids	mg/L	5	--	--	Comment 1		<2	58	62	34	27	3	<1	10	14	<5	39	<5	<5	<5	194	34	<5	2	3,000	15	378	69	<5	6	7	8	12	<5
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	9	9	4.0
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	2.0	1.5	3.3	144.0	1.1	1.1	1.2	1,490.0	9.9	131.0	54.2	1.1	2.4	9.9	12.5	7.0	13.8
Conductivity (uS/cm)	uS/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	366	422	444
Calculated Parameters																																
Anion Sum	me/L	--	--	--	--		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	3.01	2.62	3.06
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	8	5	<5	13	21	6	<5	22	11	9	21
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	187	170	209
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	<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	29.10	2.35	9.27	7.23	1.80	3.92	3.93	3.60	3.36	4.53
Hardness (CaCO3)	mg/L	N/A	--	--	--		6.00	13.00	16.00	23.00	12.00	14.00	11.00	8.00	15.00	22.40	26.70	18.90	23.90	26.60	29.50	48.00	31.10	59.00	218.00	33.50	72.90	69.70	28.50	43.50	44.50	45.40	34.5	38.2
Ion Balance (% Difference)	%	N/A	--	--	--		14.90	5.58	4.90	10.30	17.50	10.30	5.81	4.60	6.01	3.30	3.60	3.10	2.30	11.30	31.70	1.60	15.10	0.06	69.40	0.50	11.30	0.10	4.30	1.80	4.20	8.90	12.4	19.4
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	-2.90	-2.81	-2.41
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	-3.90	-2.70	-3.22	-3.13	-2.73
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	9.80	9.11	9.41	9.60	9.2
Saturation pH (@ 4C)	N/A	N/A	--	--	--		NC	NC	10.10	10.00	10.30	NC	NC	10.50	NC	9.85	10.20	10.50	10.30	9.83	10.20	9.32	10.00	9.54	9.77	10.20	9.48	9.27	10.20	10.10	9.43	9.73	9.92	9.52
Metals (ICP-MS)																																
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		270	--	--	189	368	--	260	--	--	145	466	259	130	138	2,760	400	216	100	--	129	3,880	--	--	99	149	542	167	152
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	--	<2	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	2	--	<1.0	--	--	<2	<2	<2	<2	<2	6	<2	<2	<1.0	--	<2	3	--	--	<2	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		20	--	--	53	28	--	27	--	--	49	74	33	44	43	213	381	63	140	--	147	762	--	--	151	--	122	96	146
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		<5	--	--	8	8	--	<50	--	--	10	17	15	9	10	13	11	12	<50	--	<5	9	--	--	<5	--	12	7	11
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	0.048	<0.09	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	1	--	<1.0	--	--	<1	<1	<1	<1	1	9	2	<1	<1.0	--	<1	8	--	--	<1	--	2	<1	2
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	1	--	<0.40	--	--	<1	1	1	<1	1	3	1	<1	2	--	3	4	--	--	<1	--	2	<1	2
Total Copper (Cu)	µg/L	1	2	--	2		2	--	--	2	<2.0	<2.0	<2.0	3	3	<2	3	3	<2	1	12	4	2	<2.0	404	2	13	<1	2	<1	1	3	2	1
Total Iron (Fe)	µg/L	50	300	--	300		880	--	--	1,380	3,850	303	229	897	1,110	214	5,210	1,550	383	1,720	28,400	1,660	485	960	217,000	714	21,300	7,380	375	369	2,650	4,760	870	3600
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		1.9	--	--	1.6	2.7	--	0.6	--	--	<0.5	5.2	2.1	0.6	0.7	19.4	3.5	1.0	<0.50	--	0.6	39.7	--	--	<0.5	--	3.3	2.3	1
Total Manganese (Mn)	µg/L	2	820	--	--		110	--	--	387	135	53	41	106	176	78	219	207	83	173	327	212	93	470	2,800	303	586	359	71	125	160	215	55	262
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	--	<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	--	3	<2	<2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		11	--	--	37	21	--	17	--	--	33	45	31	39	40	45	75	43	96	--	38	96	--	--	72	--	80	53	81
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	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		4	--	--	<2	6	--	5	--	--	<2	10	4	4	<2	60	9	6	<2	--	<2	41	--	--	<2	--	15	4	3
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<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	--	<0.1	0.2	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	2	<2	<2	<2	11	<2	<2	<2.0	--	<2	10	--	--	2	--	3	<2	2
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	14	12	9	6	9	13	<5	7	12	12	<5	46	36	17	27	1,210	10	170	22	11	14	9	19	12	6
MICROBIOLOGICAL																																
Total Coliform	MPN/100mL	1	--	--	--		28	>250	--	>250	75	41	110	>250	--	1,553	>2420	>2420	2,420	1,990	>2420	687	>2420	---	>2420	328	>2420	>2420	>2420	>2420	>2420	>2420	>2420	6	410
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	41	1	26
Chlorophyll A - Acidification method	µg/L	0.05	--	--	--		0.90	82.63	48.17	0.85	16.36	0.25	0.97	4.91	1.90	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	1.40	2.11	28.94	2.56	2.58
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	37.67	4.28	--

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.

**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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	2014/10/27	2015/05/20	2015/08/25	2015/10/22	2016/05/16	2016/08/16	2016/10/25	2017/06/08	2017/08/15	2017/10/18	2018/05/09	2018/08/17
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	13:30	09:50	16:02	13:40	15:00	12:10	12:25	10:20	11:55	11:05	11:30	10:30
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	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	10.5	12.5	24.3	5.8	13.2	24.0	9.4	15.6	23.0	9.7	14.4	22.4
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.8	5.7	5.5	8.6	5.4	8.5	9.4	7.9	8.2	4.1	2.7	7.6	8.8	7.3	7.6	14.8	7.2	6.3	7.3	7.2	8.2	1.9	8.7	11.4	7.0	5.3	9.1	6.9
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.9	6.7	6.3	6.4	6.6	6.2	7.1	6.9	6.6	8.2	7.2	6.9	5.2	7.3	6.2	7.0	6.3	6.9	6.3	6.5	6.6	6.2	6.3	6.8	6.6	5.9	5.8	6.4
Specific Conductance	uS/cm	--	--	--	--		723.0	210.0	167.7	217.8	203.2	110.3	145.9	126.4	111.9	62.0	177.5	116.7	123.6	132.5	147.8	180.0	111.0	0.1	155.3	132.3	162.0	254.0	162.2	150.0	188.0	92.0	75.0	182.9
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	20	9	27
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	36	23	32
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	21	36	40
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	0.22	0.32	<0.05
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	0.22	0.32	<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	0.09	<0.05	<0.05	<0.05	<0.05	0.09	0.09	<0.05	<0.05	<0.05
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	0.04	<0.03	0.06
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	0.5	3.5	0.5	--	0.7	3.0	1.0	<0.4	0.3	77.4	2.8	2.2	11.8	0.5	1.0	34.5	10.0	<0.4	1.70
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	6.9	5.8	5.8
Orthophosphate (as P)	mg/L	0.01	--	--	--		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<0.01	<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		6.7	6.7	6.9	7.1	7.3	6.7	6.7	6.8	6.5	6.2	6.9	6.9	6.9	7.0	6.5	6.5	6.7	7.0	6.6	6.7	6.7	7.0	6.4	6.9	7.1	7.0	6.91	7.20
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.5	6.9	5.4	8.0	10.5	5.3	5.9	5.1	5.0	2.6	18.1	5.1	6.4	6.0	5.6	5.4	5.1	6,100.0	52.2	5.4	6.6	9.9	4.8	7.1	8.0	6.7	4.4	10.2
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.4	1.6	1.3	2.0	2.1	1.2	1.3	1.2	1.2	0.7	3.3	1.4	1.2	1.4	1.6	1.5	1.1	1,300.0	23.0	1.5	1.4	1.8	1.3	1.6	1.7	1.6	1.1	2.3
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.02	0.030	0.009	0.018	0.100	0.009	0.018	0.008	0.014	0.022	0.063	0.003	0.007	0.015	0.078	0.100	0.031	0.011	0.501	0.005	1.250	0.023	0.012	0.102	0.059	0.015	0.052	0.305
Total Potassium (K)	mg/L	0.1	--	--	--		1.2	1.1	1.3	1.2	1.2	1.0	1.1	1.0	1.2	0.6	1.9	1.3	1.2	1.1	1.4	1.1	1.1	1,100.0	9.7	1.0	1.2	1.3	1.1	1.3	1.4	1.2	0.9	1.6
Total Sodium (Na)	mg/L	0.1	--	--	--		24.0	21.0	18.0	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	19.0	24.4	13.4	25.1	23.4	19.7	25.2	26.0	23.0	16.5	21.7
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	4.0	2.4	2.4
Total Suspended Solids	mg/L	5	--	--	Comment 1		16	98	5	6	110	7	4	77	5	<5	16	19	<5	17	9	51	8	5	715	69	93	9,020	15	138	41	<5	<5	444
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		6	4	5	7	3	4	6	4	4	5	5	3	6	7	5	5	4	5	<2	3	5	6	7	4	3	4	5	<2
Turbidity (NTU)	NTU	0.1	--	50	--		0.6	12.0	2.5	12.0	6.2	1.0	0.6	2.5	1.7	6.7	283.0	2.1	1.1	31.6	82.6	6.6	1.4	1.2	4,430.0	5.4	65.3	206.0	7.9	53.8	21.3	15.1	2.0	72.2
Conductivity (uS/cm)	uS/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	171	122	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	1.51	0.96	1.44
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	20	9	27
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	87	58	95
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	<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	31.00	1.42	1.94	2.04	1.27	1.75	1.74	1.59	1.08	2.27
Hardness (CaCO3)	mg/L	N/A	--	--	--		22.00	15.00	19.00	28.00	35.00	18.00	20.00	18.00	18.00	9.40	58.80	18.50	20.90	20.70	20.60	19.70	17.30	21.00	225.00	19.70	22.20	32.10	17.30	24.30	27.00	23.30	15.5	34.9
Ion Balance (% Difference)	%	N/A	--	--	--		0.97	9.39	0.83	3.15	4.58	3.96	1.77	5.56	2.04	20.70	63.00	6.10	1.00	5.20	25.00	3.40	11.80	2.40	94.20	17.50	15.20	5.30	3.80	6.10	1.40	2.30	6.0	22.2
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	-2.44	-3.06	-1.94
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	-2.76	-3.38	-2.26
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	9.45	9.97	9.14
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	10.10	9.63	10.20	9.77	9.41	10.20	10.00	9.57	10.30	9.97	9.59	9.77	10.3	9.46
Metals (ICP-MS)																																		
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		99	--	--	349	189	--	217	--	--	490	19,200	186	131	93	3,420	487	141	320	--	1,960	2,150	--	--	731	48	401	142	2590
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	--	<2	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		14	--	--	15	19	--	14	--	--	11	86	12	12	7	24	15	11	12	--	27	34	--	--	32	--	11	8	53
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		13	--	--	41	22	--	<50	--	--	6	24	16	10	15	15	14	16	<50	--	<5	12	--	--	<5	--	20	10	20
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	<0.017	<0.09	0.13
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	11	<1	<1	<1	2	<1	<1	<1.0	--	3	2	--	--	<1	--	1	<1	2
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	<0.40	1	--	<0.40	--	--	<1	14	<1	<1	<1	1	<1	<1	<0.40	--	4	4	--	--	1	--	<1	<1	6
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	3	<2.0	183	6	3	<1	<1	<1	<1	1	<1	4
Total Iron (Fe)	µg/L	50	300	--	300		180	--	--	554	965	120	211	388	384	161	38,900	312	236	254	4,200	593	363	230	176,000	4,570	2,790	2,190	303	1,080	375	874	239	5460
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		<0.5	--	--	3.0	0.5	--	<0.5	--	--	0.6	82.4	<0.5	<0.5	<0.5	5.2	0.5	<0.5	<0.5	--	5.9	4.3	--	--	0.6	--	0.7	0.7	4.3
Total Manganese (Mn)	µg/L	2	820	--	--		51	--	--	113	632	23	30	53	39	26	13,200	67	71	81	124	140	60	130	13,800	985	921	2,420	75	436	212	250	55	2630
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	--	<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	--	<2	<2	4
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	2	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		30	--	--	36	42	--	24	--	--	12	82	22	24	24	25	26	19	25	--	16	29	--	--	28	--	31	17	54
Total Thallium (Tl)	µg/L	0.1	0.8	--	0.8		<0.1	--	--	<0.1	<0.1	--	<0.1	--	--	<0.1	0.2	<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 Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	7	4	--	5	--	--	3	405	4	<2	2	36	6	3	3	--	41	30	--	--	14	--	7	3	36
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<0.1	--	--	<0.1	<0.1	--	<0.1	--	--	<0.1	1.6	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	--	0.2	0.2	--	--	<0.1	--	<0.1	<0.1	0.2
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	30	<2	<2	<2	2	<2	<2	<2	--	6	4	--	--	<2	--	<2	<2	4
Total Zinc (Zn)	µg/L	5	30	--	30		7	--	--	7	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	7	<5	23
MICROBIOLOGICAL																																		
Total Coliform	MPN/100mL	1	--	--	--		53	>250	--	>250	>250	280	85	>250	--	1,414	>2420	>2420	1,990	>2420	>2420	1,203	8	---	>2420	>2420	>2420	>2420	>2420	534	>2420	641	46	3020
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	1	23	20
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	1.60	2.02	1.91	0.32	1.02	90.33	5.12	8.22	127.14	0.38	18.67	20.15	1.85	0.93	141.49
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	2.00	2.98	1.91	0.33	1.07	121.83	4.62	13.77	185.98	0.48	25.84	24.37	2.89	1.6	--

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.

**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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	2017/10/18	2018/05/08	2018/08/17
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	12:00	10:00	8:40
FIELD DATA																											
Secchi Depth	Meters	--	--	1.2	--		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NCC	N/A	N/A	N/A	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	16.1	23.4	8.2	13.3	21.9	11.6	18.2	22.4	13.3	14.3	23.1
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		4.2	6.2	8.2	9.0	10.2	8.3	4.5	12.0	8.1	7.6	7.3	9.5	8.5	8.8	16.6	9.7	9.6	8.3	7.4	11.3	6.8
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.1	7.8	6.7	6.8	6.4	7.5	5.5	6.5	7.2	6.2	6.6	6.8	7.0	7.2	6.2	6.2	6.8	7.1	6.9	6.7	6.9
Specific Conductance	uS/cm	--	--	--	--		203.0	955.0	480.0	262.0	670.0	320.0	845.0	999.0	611.0	371.0	0.6	569.0	436.2	588.0	574.0	483.4	755.0	660.0	590.0	434.6	588.0
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	20	11	23
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	143	96	124
Colour	TCU	5	--	--	--		94	18	14	18	7	7	19	6	8	18	8	8	6	17	13	26	12	12	8	28	21
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	1.72	1.01	0.41
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	1.72	0.87	0.16
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	<0.05	0.14	0.25
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	0.04	<0.03	0.17
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	0.6	1.1	0.60
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	5.4	9.3	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	<0.010	<0.01	<0.01	<0.01	<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		6.4	6.7	7.2	7.2	6.9	7.1	6.5	6.4	7.4	6.4	7.0	7.3	7.2	6.9	7.4	7.0	7.3	7.4	7.1	7.01	7.46
Total Calcium (Ca)	mg/L	0.1	--	--	--		7.6	30.7	22.1	14.5	22.0	17.6	21.8	23.9	27.6	12.6	27,000.0	20.3	15.9	20.6	17.2	17.9	25.7	23.8	22.8	12.7	20.8
Total Magnesium (Mg)	mg/L	0.1	--	--	--		2.3	4.2	3.6	2.2	2.8	2.7	4.0	4.2	3.8	2.2	3,800.0	3.4	1.9	2.9	3.4	2.6	3.8	3.0	2.5	1.6	2.7
Total Phosphorus	mg/L	0.002	--	--	--	0.010	0.034	0.043	0.036	0.030	0.006	0.027	0.046	0.049	0.028	0.039	0.007	0.009	0.011	0.029	0.011	0.012	0.024	0.027	0.008	0.078	0.019
Total Potassium (K)	mg/L	0.1	--	--	--		2.1	3.2	3.6	2.5	2.6	2.8	2.9	3.1	3.7	3.0	3,300.0	2.8	1.6	2.8	2.6	2.7	3.2	3.0	2.6	2.2	2.9
Total Sodium (Na)	mg/L	0.1	--	--	--		22.7	124.0	62.2	32.3	95.1	51.7	170.0	147.0	88.1	62.7	110.0	102.0	57.8	96.4	81.1	65.6	137.0	113.0	86.9	73.0	94.7
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	5.9	3.5	5.4
Total Suspended Solids	mg/L	5	--	--	Comment 1		13	5	165	<5	<5	<5	<5	626	<5	<5	<1.0	<5	6	29	<5	<5	22	16	<5	52	11
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		21	26	25	23	26	29	33	29	20	27	27	31	30	28	23	41	32	18	33	19	15.0
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	3.0	21.4	2.4
Conductivity (uS/cm)	uS/cm	1	--	--	--		190	813	482	255	732	433	840	819	605	394	790	575	462	582	739	371	849	673	610	518	620
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	5.24	3.40	4.3
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	20	11	23
Calculated TDS	mg/L	1	--	--	--		109	426	246	144	347	229	496	477	262	187	400	305	216	321	310	242	463	341	311	216	277
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	<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	5.21	4.04	5.52
Hardness (CaCO3)	mg/L	N/A	--	--	--		29.00	94.00	70.00	45.30	66.50	55.10	70.90	77.00	84.60	40.50	84.00	64.70	47.50	63.40	56.90	55.40	79.80	71.80	67.20	38.3	63.1
Ion Balance (% Difference)	%	N/A	--	--	--		0.29	1.30	2.20	1.40	4.70	6.80	4.50	0.60	19.40	15.20	0.59	10.60	1.40	4.70	8.80	1.80	2.20	11.80	0.30	8.7	12.5
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	-1.85	-2.47	-1.49
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	-2.17	-2.79	-1.81
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	8.98	9.48	8.95
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	10.10	9.15	9.44	9.63	9.53	9.29	9.55	9.45	9.15	9.30	9.80	9.27
Metals (ICP-MS)																											
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		--	218	227	252	107	447	31	1,400	46	109	59	--	66	1,420	--	--	61	978	29	231	94
Total Antimony (Sb)	µg/L	2	20	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		--	225	201	116	133	134	119	185	157	80	150	--	111	127	--	--	132	--	111	110	143
Total Beryllium (Be)	µg/L	2	5	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<2	--	<2	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		--	11	17	22	10	22	18	22	20	21	<50	--	9	14	--	--	<5	--	19	9	16
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		--	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	--	0.052	0.14	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		--	<1	<1	<1	<1	1	<1	<1	<1	<1	<1.0	--	<1	3	--	--	<1	--	1	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		--	<1	1	<1	<1	<1	<1	<1	<1	<1	<0.40	--	<1	2	--	--	<1	--	<1	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		3	<2	3	16	2	6	2	2	<1	4	2	3	3	10	<1	3	<1	14	7	4	2
Total Iron (Fe)	µg/L	50	300	--	300		2,150	347	1,320	500	194	890	157	2,000	207	229	170	671	171	1,940	374	223	<50	3,540	289	494	1090
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		--	0.8	0.7	1.0	<0.5	1.4	<0.5	1.8	<0.5	<0.5	<0.5	--	<0.5	3.4	--	--	<0.5	--	<0.5	1.3	<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	1,870	91	91	240
Total Molybdenum (Mo)	µg/L	2	73	--	73		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	--	<2	<2	--	--	<2	--	<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	--	<2	<2	2
Total Selenium (Se)	µg/L	1	1	--	1		--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		--	<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	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		--	112	94	60	93	90	96	116	111	54	120	--	43	89	--	--	104	--	111	56	115
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	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		--	4	3	7	3	11	2	22	<2	3	<2	--	<2	31	--	--	<2	--	<2	6	2
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		--	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	0.2	--	--	<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	--	<2	4	--	--	3	--	<2	2	<2
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	22	41	13
MICROBIOLOGICAL																											
Total Coliform	MPN/100mL	1	--	--	--		--	>2420	>2420	2,420	866	>2420	866	>2420	961	>2420	---	>2420	>2420	>2420	>2420	>2420	488	>2420	1,990	210	5020
E. coli	MPN/100mL	1	--	400	--		<100	<1	2	19	3	86	<1	<1	7	1,730	<10	19	6	<1	40	50	6	51	4	<1	20
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	2.47	78.76	5.50
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	2.85	131.56	--

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.

**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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	2012/10/11	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	2017/10/18	2018/05/08	2018/08/17
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	13:25	13:00	11:40
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	2.9	2.7	4.2	3.8	4.1	4.7	3.9	4.1	2.4
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	15.1	24.0	9.3	12.8	21.6	12.1	17.2	23.0	14.4	14.4	24.7
Dissolved Oxygen	mg/L	--	--	--	5.5 - 9.5		10.6	8.1	6.9	8.8	7.8	10.4	10.4	8.2	9.5	8.4	8.6	10.0	7.7	9.9	12.1	7.5	8.1	7.2	8.0	8.6	8.8	6.5	13.0	7.0	7.8	8.2	9.4	5.6
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		7.4	6.6	6.6	7.1	7.4	5.9	6.3	6.2	6.1	7.6	6.6	6.4	7.2	6.3	6.6	6.4	6.6	6.9	6.3	8.0	7.6	5.9	4.6	6.9	6.7	7.3	6.3	6.8
Specific Conductance	uS/cm	--	--	--	--		561.0	279.0	223.0	265.0	234.0	124.5	176.6	173.6	105.5	366.0	186.4	215.1	199.0	250.5	431.0	263.0	210.0	0.2	432.1	289.1	231.0	289.0	234.3	234.0	273.0	255.0	203.7	203.8
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	6	6	<5	8	7	<5	13	9	<5	10
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	59	57	54
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	24	28	7
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	0.20	0.51	0.15
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	0.20	0.40	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	<0.05	0.09	<0.05	0.11	0.15	<0.05	0.11	0.10
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	0.05	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	0.4	--	0.4	0.8	0.4	0.4	<5	0.5	1.2	6.0	2.6	3.4	0.4	0.5	0.8	1.1	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		6.5	3.6	4.7	0.7	3.3	6.7	4.6	5.0	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	6.3	4.9	3.2
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	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.4	6.8	6.8	6.6	7.0	6.6	6.5	6.8	6.7	6.6	6.8	6.7	6.9	6.9	6.7	7.0	6.6	6.7	7.0	6.8	6.4	6.9	6.9	6.8	7.2	6.8	6.84	7.28
Total Calcium (Ca)	mg/L	0.1	--	--	--		4.5	6.9	6.4	8.4	9.0	5.9	6.0	5.0	4.6	6.0	6.0	6.8	6.6	6.9	6.9	9.1	7.0	6,900.0	7.8	4.8	7.9	10.5	7.6	8.0	8.2	9.5	6.3	8.7
Total Magnesium (Mg)	mg/L	0.1	--	--	--		0.6	1.1	1.0	1.3	1.2	0.8	1.0	0.9	0.8	1.0	1.1	1.0	0.9	1.5	1.3	1.4	1.0	970.0	1.4	0.9	1.5	1.8	1.3	1.3	1.2	1.5	1.1	1.4
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<0.02	<0.02	0.002	0.018	0.002	<0.002	0.014	0.011	0.010	0.019	0.030	0.006	0.007	0.047	0.012	0.030	0.021	0.005	0.060	0.018	0.173	0.104	0.013	0.041	0.036	0.059	0.012	0.011
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	0.9	0.9	1.2	1.1	1.3	1.2	0.8	1.4	0.8	1.0	0.8	1.0	1.5	0.9	1.3	0.9	800.0	1.0	0.6	1.0	1.3	1.1	1.0	1.1	1.3	0.9	1.2
Total Sodium (Na)	mg/L	0.1	--	--	--		25.0	38.0	34.0	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	35.0	38.6	25.6	37.6	35.1	32.1	40.9	45.3	36.0	35.5	37.5
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	1.8	2.7	1.2
Total Suspended Solids	mg/L	5	--	--	Comment 1		<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	104	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	--		13	11	11	13	12	12	12	10	12	7	10	8	10	10	10	8	8	8	9	8	11	11	11	10	9	11	9	7.0
Turbidity (NTU)	NTU	0.1	--	50	--		0.4	0.5	0.6	8.2	0.9	0.5	0.6	1.0	1.2	0.7	1.0	0.7	1.1	19.2	1.4	0.9	1.5	0.5	3.8	24.2	199.0	112.0	2.6	3.3	3.2	31.3	0.7	0.5
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	248	242	274
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	2.09	1.83	1.88
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	6	6	<5	8	7	<5	13	9	<5	10
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	142	112	117
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	<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	3.15	1.99	2.23
Hardness (CaCO3)	mg/L	N/A	--	--	--		14.00	22.00	20.00	26.00	28.00	18.00	19.00	16.00	15.00	19.10	19.50	21.10	20.20	23.40	22.60	28.50	21.60	21.00	25.20	15.70	25.90	33.60	24.30	25.30	25.40	29.90	20.3	27.5
Ion Balance (% Difference)	%	N/A	--	--	--		3.78	1.63	2.58	5.17	4.02	4.80	1.25	7.22	1.60	5.50	9.00	5.50	7.00	19.80	9.20	17.00	9.20	3.18	15.20	1.20	30.00	18.60	3.80	5.80	6.10	20.30	4.2	8.4
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	-3.20	-2.42	-2.92	-3.26	-2.67
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	-3.24	-3.58	-2.69
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	10.10	9.99	9.91	9.27	9.79	9.90	9.80	9.93	10.10	10.00	9.68	9.86	10.00	9.57	9.67	10.1	9.65
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	10.40	10.30	10.20	9.59	10.10	10.20	10.10	10.20	10.50	10.30	10.00	10.20	10.30	9.89	9.99	10.4	9.97
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		260	--	--	665	46	--	233	--	--	177	306	141	103	3,920	305	129	142	140	--	2,320	7,690	--	--	250	94	4,190	151	26
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	--	<2	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	4	--	--	<2	--	3	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		23	--	--	35	24	--	27	--	--	22	19	20	12	40	23	23	18	21	--	34	60	--	--	22	--	58	19	12
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		8	--	--	11	9	--	<50	--	--	6	9	6	8	9	8	13	11	<50	--	<5	10	--	--	<5	--	12	6	11
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	0.179	<0.09	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	3	<1	<1	<1	<1.0	--	2	6	--	--	<1	--	5	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	<0.4	--	<0.4	--	--	<1	2	<1	<1	9	<1	<1	<1	<0.40	--	3	6	--	--	<1	--	6	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	2	<2.0	<2.0	4	<2.0	2	<2	<2	<2	1	6	1	<1	2	<2.0	3	4	10	<1	<1	<1	<1	9	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		140	--	--	837	89	161	141	315	528	137	742	130	205	5,300	239	296	182	93	4,460	6,020	13,600	8,250	171	206	359	12,600	93	184
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		<0.5	--	--	1.7	<0.5	--	<0.5	--	--	<0.5	0.9	<0.5	<0.5	13.5	0.9	<0.5	<0.5	<0.5	--	6.3	13.9	--	--	<0.5	--	9.1	1.2	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		17	--	--	142	69	41	14	128	62	48	214	33	58	693	54	260	49	34	296	278	424	281	53	64	125	894	21	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	--	<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	--	6	2	<2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	--	1	1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		18	--	--	36	37	--	25	--	--	26	30	31	25	34	35	37	30	32	--	22	40	--	--	34	--	47	27	42
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	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<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	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	8	<2.0	--	4	--	--	<2	4	<2	<2	65	4	<2	3	<2	--	25	106	--	--	2	--	75	<2	<2
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<0.1	--	--	<0.1	<0.1	--	<0.1	--	--	0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	--	0.6	0.9	--	--	<0.1	--	0.6	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	10	<2	<2	<2	<2	--	7	16	--	--	<2	--	12	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		8	--	--	10	5	6	6	6	5	<5	13	8	<5	62	<5	<5	6	11	13	12	34	20	<5	11	<5	29	6	6
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	--		200	73	--	>250	>250	>250	85	>250	--	411	2,420	866	1,730	1,011	613	2,420	>2420	---	>2420	>2420	>2420	1,410	>2420	665	>2420	166	9	400
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	<1	1	10
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	1.70	4.97	4.40	4.86	1.93	1.14
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	6.58	0.98	--

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.

**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

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 shac = Present Result - Parameter concentration exceeds CCME FWAL Guideline.

Underlined (blue = 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 D2: Historical Data - Bedford West Water Quality Sampling Program

Tested Parameters	Units	RDL (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	2013/05/15	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	2017/10/18	2018/05/09	2018/08/17
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	11:20	11:00	9:20	8:30	11:30	13:45	9:08	13:45	10:00	9:50	14:30	14:30	14:00	13:30	12:10
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	2.4	3.2	N/A	N/A	N/A	3.1	NCC	N/A	2.4	2.7	2.3	2.6	2.5	2.5	2.9	2.9	3.0
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	15.1	27.0	9.0	13.8	22.1	11.8	17.1	24.0	14.0	15.3	5.4
Dissolved Owxgen	mg/L	--	--	--	5.5 - 9.5		10.2	8.3	8.4	8.8	8.1	10.6	9.9	8.7	8.9	7.8	9.3	8.9	12.4	7.0	7.9	8.1	9.8	8.3	8.6	7.7	10.3	10.4	8.9	6.6	9.9	7.0
pH (in Situ)	pH	--	--	5.0-9.0	6.5 - 9.0		6.4	6.8	6.8	7.1	7.4	6.5	6.3	6.7	6.1	8.6	6.5	6.1	6.5	7.2	5.9	6.6	6.8	7.3	7.6	5.9	5.4	6.7	7.0	6.9	6.3	24.7
Specific Conductance	uS/cm	--	--	--	--		267.0	264.0	241.0	237.0	234.0	200.5	158.7	173.2	155.9	231.0	234.0	250.5	966.0	266.0	215.0	0.2	255.6	454.9	264.0	298.0	230.3	242.0	285.0	252.0	214.4	293.8
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	11	5	11
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	60	46	55
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	19	31	21
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	0.16	0.17	0.13
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	0.16	0.17	<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	<0.010	0.15	<0.05	<0.05	0.11	<0.05	0.11	<0.05	<0.05	<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	<0.03	<0.03	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--		--	--	--	--	--	--	--	--	--	<0.4	--	1.7	<0.4	0.4	<5	0.2	1.2	3.0	0.6	<0.4	0.5	0.6	0.6	<0.4	<0.4	<0.4
Total Organic Carbon	mg/L	0.5	--	--	--		3.6	2.6	4.5	3.2	3.4	3.6	4.0	6.0	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	4.1	4.9	3.5
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	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	--	5.0-9.0	6.5 - 9.0		6.5	6.8	6.8	6.7	7.0	6.8	6.4	6.6	6.6	6.6	6.7	6.7	7.1	7.0	6.8	6.6	7.0	7.0	6.8	7.2	6.9	6.9	7.2	7.0	6.81	7.29
Total Calcium (Ca)	mg/L	0.1	--	--	--		6.1	7.1	6.1	7.2	7.7	8.0	5.3	4.8	5.0	6.1	6.7	7.7	19.2	8.8	6.9	7,300.0	8.2	6.2	8.9	8.1	7.4	8.1	8.5	8.1	6.7	8.1
Total Magnesium (Mg)	mg/L	0.1	--	--	--		1.1	1.1	1.1	1.3	1.2	1.2	0.9	0.9	0.9	1.0	1.0	1.4	1.7	1.4	1.0	1,000.0	1.3	1.2	1.2	1.2	1.3	1.3	1.1	1.2	1.1	1.2
Total Phosphorus	mg/L	0.002	--	--	--	0.010	<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	0.018	0.008	0.012	0.008	0.012	0.003	0.005	0.018	0.013	0.006	0.047	0.005
Total Potassium (K)	mg/L	0.1	--	--	--		0.9	1.0	0.9	1.0	0.9	1.0	0.9	0.8	1.0	0.8	0.8	1.3	1.4	1.2	1.1	830.0	1.0	0.9	1.0	1.0	1.1	0.9	1.4	1.1	0.9	1.1
Total Sodium (Na)	mg/L	0.1	--	--	--		35.0	40.0	34.0	31.1	35.1	30.8	25.7	21.3	20.9	34.6	37.5	42.0	133.0	42.6	33.9	38.0	43.3	31.3	42.9	37.5	32.1	41.5	47.2	35.5	37.5	37.7
Reactive Silica (SiO2)	mg/L	0.5	--	--	--		2.6	2.5	2.3	2.6	2.3	3.3	2.9	2.5	3.0	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	2.0	2.5	1.0
Total Suspended Solids	mg/L	5	--	--	Comment 1		2	3	<1	15	<2	11	<1	8	<1	<5	<5	<5	16	<5	<5	1	<5	<5	45	<5	<5	<5	14	<5	<5	<5
Dissolved Solids (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	11	7	7.0
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	1.0	3.3	2.6	0.7	1.0	0.9	1.9	1.3	9.4	1.1	1.4	1.9	1.9	1.8	1.4	0.7
Conductivity (uS/cm)	uS/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	255	249	289
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	2.15	1.56	1.93
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	11	5	11
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	124	103	118
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	<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	2.09	2.10	2.19
Hardness (CaCO3)	mg/L	N/A	--	--	--		20.00	22.00	20.00	23.00	24.00	25.00	17.00	15.00	16.00	19.30	20.80	25.00	54.90	27.70	21.30	23.00	25.80	20.40	27.20	25.20	23.80	25.60	25.80	25.20	21.3	25.2
Ion Balance (% Difference)	%	N/A	--	--	--		4.20	1.36	2.84	4.81	0.50	2.48	0.68	10.50	1.17	4.80	2.80	7.50	7.70	16.50	2.20	0.23	10.60	3.00	5.10	1.70	3.40	3.20	3.50	1.60	14.9	6.4
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	-2.66	-3.25	-2.35
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	-2.98	-3.57	-2.67
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	10.10	9.81	8.86	9.65	9.34	NC	9.98	9.95	9.81	9.69	9.82	9.99	9.60	9.65	10.1	9.64
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	10.40	10.10	9.18	9.97	9.66	NC	10.30	10.30	10.10	10.00	10.10	10.30	9.92	9.97	10.4	9.96
Metals (ICP-MS)																																
Total Aluminum (Al)	µg/L	5	5	--	5 - 100		130	--	--	1,030	56	--	202	--	--	189	131	107	181	52	122	130	--	278	610	--	--	215	40	34	141	75
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	--	<2	<2	<2
Total Arsenic (As)	µg/L	2	5	--	5		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Barium (Ba)	µg/L	5	1,000	--	--		16	--	--	23	12	--	23	--	--	22	22	37	50	27	19	25	--	24	35	--	--	27	--	23	21	8
Total Beryllium (Be)	µg/L	2	5	--	--		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	<2	<1.0	--	<2	<2	--	<2	<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	--	<2	<2	<2
Total Boron (B)	µg/L	5	1,200	--	1,500		5	--	--	8	9	--	<50	--	--	6	6	9	7	13	11	<50	--	<5	8	--	--	<5	--	11	6	10
Total Cadmium (Cd)	µg/L	0.017	0.010	--	0.090		<0.300	--	--	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	--	<0.017	<0.09	<0.09
Total Chromium (Cr)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Cobalt (Co)	µg/L	1	10	--	--		<1	--	--	1	<0.4	--	<0.4	--	--	<1	<1	2	<1	<1	<1	<0.40	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Copper (Cu)	µg/L	1	2	--	2		<2	--	--	3	<2	<2	<2	<2	<2	<2	<2	1,380	1	<1	2	<2.0	2	2	<1	<1	1	<1	<1	1	<1	<1
Total Iron (Fe)	µg/L	50	300	--	300		100	--	--	1,090	151	76	143	699	181	178	181	1,760	264	316	134	170	334	368	647	174	123	<50	203	145	104	163
Total Lead (Pb)	µg/L	0.5	1.0	--	1.0 - 7.0		<0.5	--	--	2.4	<0.5	--	<0.5	--	--	<0.5	<0.5	49.7	0.7	<0.5	<0.5	<0.5	--	0.5	1.1	--	--	<0.5	--	<0.5	<0.5	<0.5
Total Manganese (Mn)	µg/L	2	820	--	--		58	--	--	159	81	28	34	89	31	22	87	866	206	278	24	43	67	61	109	36	23	85	68	26	20	42
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	--	<2	<2	<2
Total Nickel (Ni)	µg/L	2	25	--	25 - 150		2	--	--	2	<2.0	--	<2.0	--	--	<2	<2	3	<2	<2	<2	<2.0	--	2	<2	--	--	4	--	<2	<2	<2
Total Selenium (Se)	µg/L	1	1	--	1		<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<1	<1	<1.0	--	<1	<1	--	--	<1	--	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	0.1	--	0.3		<0.5	--	--	<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	--	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	21,000	--	--		30	--	--	35	33	--	26	--	--	27	31	35	68	37	29	34	--	21	38	--	--	35	--	39	29	38
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	<0.1	<0.1	--	<0.1	<0.1	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	3	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	--		<2	--	--	21	<2	--	4	--	--	<2	<2	2	3	<2	<2	2	--	4	7	--	--	<2	--	<2	<2	<2
Total Uranium (U)	µg/L	0.1	300.0	--	15.0		<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	--	--	<0.1	--	<0.1	<0.1	<0.1
Total Vanadium (V)	µg/L	2	6	--	--		<2	--	--	<2	<2	--	<2	--	--	<2	<2	<2	<2	<2	<2	<2	--	<2	<2	--	--	<2	--	<2	<2	<2
Total Zinc (Zn)	µg/L	5	30	--	30		12	--	--	18	<5.0	6	7	8	10	8	11	762	<5	<5	5	14	<5	8	7	<5	<5	8	9	5	5	<5
MICROBIOLOGICAL																						1										
Total Coliform	MPN/100mL	1	--	--	--		49	40	--	>250	46	97	64	>250	--	261	1,410	411	291	517	>2420	---	>2420	1,120	687	>2420	>2420	1,990	>2420	1,730	1	4000
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	5	<1	1
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	1.27	1.37	1.28
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	1.47	2.22	--

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.

**CCME PAL-F narrative for TSS: maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.

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 shad
Underlined (blac
Blue shaded

Appendix E

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:

AGAT WORK ORDER: 18X374834

MICROBIOLOGY ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

MISCELLANEOUS ANALYSIS REVIEWED BY: Kelly Hogue, B.Sc, P.Chem, Operations Manager

WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

DATE REPORTED: Aug 27, 2018

PAGES (INCLUDING COVER): 16

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.

AGAT Laboratories
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Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Total Coliforms and E.coli Membrane Filtration

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-18

		SAMPLE DESCRIPTION:		KL1		KL2		KL3	KL4	KL5
		SAMPLE TYPE:		Water		Water		Water	Water	Water
		DATE SAMPLED:		2018-08-17		2018-08-17		2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	RDL	9479763	RDL	9479764	9479765	9479766
Total Coliforms (MF)	CFU/100 mL		1	611	10	2420	1	NDOGT	NDOGT	601
E. Coli (MF)	CFU/100 mL		1	11	10	20	1	51	19	1

		SAMPLE DESCRIPTION:		HW-102-1		HW-102-2		LSD	LU		PML-1
		SAMPLE TYPE:		Water		Water		Water	Water		Water
		DATE SAMPLED:		2018-08-17		2018-08-17		2018-08-17	2018-08-17		2018-08-17
Parameter	Unit	G / S	RDL	9479767	RDL	9479768	RDL	9479769	9479770	RDL	9479771
Total Coliforms (MF)	CFU/100 mL		10	9010	10	410	10	3020	5020	1	400
E. Coli (MF)	CFU/100 mL		10	10	1	26	10	20	20	10	10

		SAMPLE DESCRIPTION:		PML-2
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2018-08-17
Parameter	Unit	G / S	RDL	9479772
Total Coliforms (MF)	CFU/100 mL		10	4000
E. Coli (MF)	CFU/100 mL		1	1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9479764-9479765 NDOGT- No Data Overgrown With Target

Original signed

Certified By:

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Subcontracted Data Received

DATE RECEIVED: 2018-08-17

DATE REPORTED:

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HW-102-1	HW-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	9479763	9479764	9479765	9479766	9479767	9479768	9479769
Subcontracted Data				Y	Y	Y	Y	Y	Y	Y	Y

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479770	9479771	9479772
Subcontracted Data				Y	Y	Y

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

Original signed

Certified By:

AGAT Laboratories

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CANADA B3B 1M2
TEL (902)468-8718
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Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-22

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HW-102-1	HW-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	9479763	9479764	9479765	9479766	9479767	9479768	9479769
pH				7.31	7.04	7.21	7.13	7.15	7.14	6.79	7.20
Reactive Silica as SiO2	mg/L		0.5	1.7	2.8	1.7	1.8	1.7	5.3	8.8	2.4
Chloride	mg/L		1	54	19	48	50	49	54	90	32
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	7	<2	7	7	7	7	4	<2
Alkalinity	mg/L		5	9	11	8	9	7	26	21	27
True Color	TCU		5	16	59	26	10	14	56	85	40
Turbidity	NTU		0.1	0.7	1.2	0.5	0.5	0.4	1.1	13.8	72.2
Electrical Conductivity	umho/cm		1	261	115	246	252	247	306	444	192
Nitrate + Nitrite as N	mg/L		0.05	0.16	0.05	0.06	0.25	0.20	0.11	0.21	<0.05
Nitrate as N	mg/L		0.05	0.07	<0.05	0.06	0.13	0.09	<0.05	<0.05	<0.05
Nitrite as N	mg/L		0.05	0.09	0.05	<0.05	0.12	0.11	0.11	0.21	<0.05
Ammonia as N	mg/L		0.03	0.08	0.06	0.04	0.04	0.04	0.07	0.24	0.06
Total Organic Carbon	mg/L		0.5	3.1	6.6	3.2	2.7	2.9	7.7	7.5	5.8
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	34.7	13.9	36.6	39.2	38.5	35.5	81.6	21.7
Total Potassium	mg/L		0.1	1.0	0.8	1.0	1.0	0.9	2.0	1.6	1.6
Total Calcium	mg/L		0.1	7.2	4.2	7.3	7.9	6.7	15.6	12.5	10.2
Total Magnesium	mg/L		0.1	1.2	1.1	1.2	1.2	1.1	2.2	1.7	2.3
Bicarb. Alkalinity (as CaCO3)	mg/L		5	9	11	8	9	7	26	21	27
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	112	47	106	113	108	133	209	95
Hardness	mg/L			22.9	15.0	23.2	24.7	21.3	48.0	38.2	34.9
Langelier Index (@20C)	NA			-2.47	-2.85	-2.61	-2.61	-2.77	-1.85	-2.41	-1.94
Langelier Index (@ 4C)	NA			-2.79	-3.17	-2.93	-2.93	-3.09	-2.17	-2.73	-2.26
Saturation pH (@ 20C)	NA			9.78	9.89	9.82	9.74	9.92	8.99	9.20	9.14
Saturation pH (@ 4C)	NA			10.1	10.2	10.1	10.1	10.2	9.31	9.52	9.46
Anion Sum	me/L			1.86	0.76	1.66	1.75	1.68	2.20	3.06	1.44
Cation sum	me/L			2.01	0.97	2.09	2.24	2.13	2.60	4.53	2.27

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

Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-22

SAMPLE DESCRIPTION:				KL1	KL2	KL3	KL4	KL5	HW-102-1	HW-102-2	LSD
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	9479763	9479764	9479765	9479766	9479767	9479768	9479769
% Difference/ Ion Balance (NS)	%			3.8	12.4	11.4	12.1	11.8	8.3	19.4	22.2
Total Aluminum	ug/L		5	29	123	26	32	30	80	152	2590
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	14	15	19	13	100	146	53
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	10	13	10	10	9	14	11	20
Total Cadmium	ug/L		0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	0.13
Total Chromium	ug/L		1	<1	<1	<1	<1	<1	<1	2	2
Total Cobalt	ug/L		1	<1	<1	<1	<1	<1	<1	2	6
Total Copper	ug/L		1	<1	<1	<1	<1	<1	<1	1	4
Total Iron	ug/L		50	142	783	148	119	81	634	3600	5460
Total Lead	ug/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.0	4.3
Total Manganese	ug/L		2	49	78	50	84	15	99	262	2630
Total Molybdenum	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L		2	<2	<2	<2	<2	<2	<2	<2	4
Total Phosphorous	mg/L		0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.12
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	24	38	39	35	88	81	54
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	3	36
Total Uranium	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Total Vanadium	ug/L		2	<2	<2	<2	<2	<2	<2	2	4
Total Zinc	ug/L		5	<5	<5	<5	<5	<5	<5	6	23

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-22

		SAMPLE DESCRIPTION:		LU		PML-1	PML-2
		SAMPLE TYPE:		Water		Water	Water
		DATE SAMPLED:		2018-08-17		2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479770	RDL	9479771	9479772
pH				7.46		7.28	7.29
Reactive Silica as SiO2	mg/L		0.5	5.4	0.5	1.2	1.0
Chloride	mg/L		2	124	1	54	55
Fluoride	mg/L		0.12	<0.12	0.12	<0.12	<0.12
Sulphate	mg/L		2	15	2	7	7
Alkalinity	mg/L		5	23	5	10	11
True Color	TCU		5	21	5	7	21
Turbidity	NTU		0.1	2.4	0.1	0.5	0.7
Electrical Conductivity	umho/cm		1	620	1	274	289
Nitrate + Nitrite as N	mg/L		0.05	0.41	0.05	0.15	0.13
Nitrate as N	mg/L		0.05	0.16	0.05	0.05	<0.05
Nitrite as N	mg/L		0.05	0.25	0.05	0.10	0.13
Ammonia as N	mg/L		0.03	0.17	0.03	0.04	0.04
Total Organic Carbon	mg/L		0.5	5.5	0.5	3.2	3.5
Ortho-Phosphate as P	mg/L		0.01	<0.01	0.01	<0.01	<0.01
Total Sodium	mg/L		0.1	94.7	0.1	37.5	37.7
Total Potassium	mg/L		0.1	2.9	0.1	1.2	1.1
Total Calcium	mg/L		0.1	20.8	0.1	8.7	8.1
Total Magnesium	mg/L		0.1	2.7	0.1	1.4	1.2
Bicarb. Alkalinity (as CaCO3)	mg/L		5	23	5	10	11
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	10	<10	<10
Hydroxide	mg/L		5	<5	5	<5	<5
Calculated TDS	mg/L		1	277	1	117	118
Hardness	mg/L			63.1		27.5	25.2
Langelier Index (@20C)	NA			-1.49		-2.37	-2.35
Langelier Index (@ 4C)	NA			-1.81		-2.69	-2.67
Saturation pH (@ 20C)	NA			8.95		9.65	9.64
Saturation pH (@ 4C)	NA			9.27		9.97	9.96
Anion Sum	me/L			4.30		1.88	1.93
Cation sum	me/L			5.52		2.23	2.19

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

Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-22

SAMPLE DESCRIPTION:				LU		PML-1	PML-2
SAMPLE TYPE:				Water		Water	Water
DATE SAMPLED:				2018-08-17		2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479770	RDL	9479771	9479772
% Difference/ Ion Balance (NS)	%			12.5		8.4	6.4
Total Aluminum	ug/L		5	94	5	26	75
Total Antimony	ug/L		2	<2	2	<2	<2
Total Arsenic	ug/L		2	<2	2	<2	<2
Total Barium	ug/L		5	143	5	12	8
Total Beryllium	ug/L		2	<2	2	<2	<2
Total Bismuth	ug/L		2	<2	2	<2	<2
Total Boron	ug/L		5	16	5	11	10
Total Cadmium	ug/L		0.09	<0.09	0.09	<0.09	<0.09
Total Chromium	ug/L		1	<1	1	<1	<1
Total Cobalt	ug/L		1	<1	1	<1	<1
Total Copper	ug/L		1	2	1	<1	<1
Total Iron	ug/L		50	1090	50	184	163
Total Lead	ug/L		0.5	<0.5	0.5	<0.5	<0.5
Total Manganese	ug/L		2	240	2	64	42
Total Molybdenum	ug/L		2	<2	2	<2	<2
Total Nickel	ug/L		2	2	2	<2	<2
Total Phosphorous	mg/L		0.02	0.03	0.02	0.04	0.03
Total Selenium	ug/L		1	<1	1	<1	<1
Total Silver	ug/L		0.1	<0.1	0.1	<0.1	<0.1
Total Strontium	ug/L		5	115	5	42	38
Total Thallium	ug/L		0.1	<0.1	0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	2	<2	<2
Total Titanium	ug/L		2	2	2	<2	<2
Total Uranium	ug/L		0.1	<0.1	0.1	<0.1	<0.1
Total Vanadium	ug/L		2	<2	2	<2	<2
Total Zinc	ug/L		5	13	5	6	<5

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11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
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FAX (902)468-8924
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AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-22

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

9479763 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.

9479764-9479766 Ion Balance is biased high, contributing parameters have been confirmed.

9479768-9479770 Ion Balance is biased high, contributing parameters have been confirmed.

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

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AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

TKN

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-25

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HW-102-1	HW-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	9479763	9479764	9479765	9479766	9479767	9479768	9479769
Total Kjeldahl Nitrogen as N	mg/L		0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.7	0.9	1.7

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479770	9479771	9479772
Total Kjeldahl Nitrogen as N	mg/L		0.4	0.6	<0.4	<0.4

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

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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

Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

TSS

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HW-102-1	HW-102-2	LSD
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	9479763	9479764	9479765	9479766	9479767	9479768	9479769
Total Suspended Solids	mg/L		5	<5	<5	<5	<5	<5	<5	<5	444

		SAMPLE DESCRIPTION:		LU	PML-1	PML-2
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479770	9479771	9479772
Total Suspended Solids	mg/L		5	11	<5	<5

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

Original signed

Certified By:

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

Certificate of Analysis

AGAT WORK ORDER: 18X374834

PROJECT:

CLIENT NAME: SNC Lavalin Inc.

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Total Phosphorus in Water (Low Level)

DATE RECEIVED: 2018-08-17

DATE REPORTED: 2018-08-21

		SAMPLE DESCRIPTION:		KL1	KL2	KL3	KL4	KL5	HW-102-1	HW-102-2
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479739	9479763	9479764	9479765	9479766	9479767	9479768
Total Phosphorus	mg/L		0.002	0.007	0.015	0.010	0.004	0.005	0.014	0.025

		SAMPLE DESCRIPTION:		LSD		LU	PML-1	PML-2
		SAMPLE TYPE:		Water		Water	Water	Water
		DATE SAMPLED:		2018-08-17		2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9479769	RDL	9479770	9479771	9479772
Total Phosphorus	mg/L		0.010	0.305	0.002	0.019	0.011	0.005

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

9479769 Elevated RDLs indicate the degree of sample dilutions prior to the analysis to keep analytes within the calibration range, reduce matrix interference and/or to avoid contaminating the instrument.

Certified By: Original signed

AGAT Laboratories
11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.
AGAT WORK ORDER: 18X374834
PROJECT:
ATTENTION TO: Maria Gutierrez
SAMPLING SITE:
SAMPLED BY:

Water Analysis

RPT Date:			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
Standard Water Analysis + Total Metals															
pH	9481852		7.19	7.11	1.1%	<	102%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	1	9481852	3.0	3.1	3.3%	< 0.5	111%	80%	120%		80%	120%	97%	80%	120%
Chloride	9479739	9479739	54	60	10.1%	< 1	89%	80%	120%	NA	80%	120%	NA	80%	120%
Fluoride	9479739	9479739	<0.12	<0.12	NA	< 0.12	95%	80%	120%	NA	80%	120%	109%	80%	120%
Sulphate	9479739	9479739	7	8	NA	< 2	106%	80%	120%	NA	80%	120%	92%	80%	120%
Alkalinity	9481852		8	7	NA	< 5	96%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	9470134		8	13	NA	< 5	100%	80%	120%	NA			NA		
Turbidity	9476444		0.4	0.5	NA	< 0.1	96%	80%	120%	NA			NA		
Electrical Conductivity	9481852		22	22	0.5%	< 1	103%	80%	120%	NA	80%	120%	NA	80%	120%
Nitrate as N	9479739	9479739	0.07	0.08	NA	< 0.05	90%	80%	120%	NA	80%	120%	92%	80%	120%
Nitrite as N	9479739	9479739	0.09	0.10	NA	< 0.05	94%	80%	120%	NA	80%	120%	103%	80%	120%
Ammonia as N	1	9480138	0.04	0.04	NA	< 0.03	98%	80%	120%		80%	120%	92%	80%	120%
Total Organic Carbon	9476480		<0.5	<0.5	NA	< 0.5	80%	80%	120%	NA	80%	120%	80%	80%	120%
Ortho-Phosphate as P	1	9481852	<0.01	<0.01	NA	< 0.01	85%	80%	120%		80%	120%	99%	80%	120%
Total Sodium	9480890		27.9	26.9	3.7%	< 0.1	100%	80%	120%	103%	80%	120%	NA	70%	130%
Total Potassium	9480890		7.1	6.9	3.8%	< 0.1	99%	80%	120%	100%	80%	120%	NA	70%	130%
Total Calcium	9480890		125	115	7.7%	< 0.1	99%	80%	120%	104%	80%	120%	NA	70%	130%
Total Magnesium	9480890		18.3	17.8	2.9%	< 0.1	101%	80%	120%	103%	80%	120%	NA	80%	120%
Bicarb. Alkalinity (as CaCO3)	9481852		8	7	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	9481852		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	9481852		<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	9480890		9	8	NA	< 5	101%	80%	120%	104%	80%	120%	90%	70%	130%
Total Antimony	9480890		<2	<2	NA	< 2	80%	80%	120%	105%	80%	120%	103%	70%	130%
Total Arsenic	9480890		<2	<2	NA	< 2	93%	80%	120%	92%	80%	120%	104%	70%	130%
Total Barium	9480890		363	358	1.6%	< 5	92%	80%	120%	95%	80%	120%	NA	70%	130%
Total Beryllium	9480890		<2	<2	NA	< 2	104%	80%	120%	103%	80%	120%	98%	70%	130%
Total Bismuth	9480890		<2	<2	NA	< 2	98%	80%	120%	104%	80%	120%	96%	70%	130%
Total Boron	9480890		26	25	0.5%	< 5	102%	80%	120%	101%	80%	120%	108%	70%	130%
Total Cadmium	9480890		<0.09	<0.09	NA	< 0.09	91%	80%	120%	93%	80%	120%	91%	70%	130%
Total Chromium	9480890		<1	<1	NA	< 1	97%	80%	120%	99%	80%	120%	114%	70%	130%
Total Cobalt	9480890		<1	<1	NA	< 1	99%	80%	120%	100%	80%	120%	114%	70%	130%
Total Copper	9480890		8	7	5.3%	< 1	99%	80%	120%	102%	80%	120%	97%	70%	130%
Total Iron	9480890		138	88	NA	< 50	98%	80%	120%	102%	80%	120%	93%	70%	130%
Total Lead	9480890		<0.5	<0.5	NA	< 0.5	99%	80%	120%	102%	80%	120%	99%	70%	130%
Total Manganese	9480890		18	17	4.6%	< 2	98%	80%	120%	101%	80%	120%	NA	70%	130%
Total Molybdenum	9480890		<2	<2	NA	< 2	93%	80%	120%	97%	80%	120%	115%	70%	130%
Total Nickel	9480890		7	7	NA	< 2	98%	80%	120%	101%	80%	120%	116%	70%	130%
Total Phosphorous	9480890		<0.02	0.02	NA	< 0.02	96%	80%	120%	90%	80%	120%	96%	70%	130%
Total Selenium	9480890		<1	<1	NA	< 1	91%	80%	120%	93%	80%	120%	97%	70%	130%

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
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Quality Assurance

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X374834

PROJECT:

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date:			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 Silver	9480890		<0.1	<0.1	NA	< 0.1	100%	80%	120%	101%	80%	120%	100%	70%	130%
Total Strontium	9480890		328	323	1.4%	< 5	95%	80%	120%	98%	80%	120%	NA	70%	130%
Total Thallium	9480890		<0.1	<0.1	NA	< 0.1	99%	80%	120%	101%	80%	120%	102%	70%	130%
Total Tin	9480890		<2	<2	NA	< 2	90%	80%	120%	94%	80%	120%	101%	70%	130%
Total Titanium	9480890		<2	<2	NA	< 2	100%	80%	120%	102%	80%	120%	89%	70%	130%
Total Uranium	9480890		0.8	0.8	0.6%	< 0.1	95%	80%	120%	98%	80%	120%	109%	70%	130%
Total Vanadium	9480890		32	32	0.6%	< 2	91%	80%	120%	93%	80%	120%	NA	70%	130%
Total Zinc	9480890		16	16	NA	< 5	103%	80%	120%	105%	80%	120%	103%	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.															
TKN															
Total Kjeldahl Nitrogen as N	1	9485809	<0.4	<0.4	NA	< 0.4	80%	80%	120%		80%	120%	97%	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															
Total Suspended Solids	9479739	9479739	<5	<5	NA	< 5	99%	80%	120%				94%	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.															
Total Phosphorus in Water (Low Level)															
Total Phosphorus	9479739	9479739	0.007	0.006	NA	< 0.002	97%	90%	110%	107%	90%	110%	93%	80%	120%

Certified By: Original signed

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

Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X374834

PROJECT:

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Total Coliforms (MF)	MIC-121-7002	Sm 9222 H	MF/INCUBATOR
E. Coli (MF)	MIC-121-7002	SM 9222 H	MF/INCUBATOR
Miscellaneous Analysis			
Subcontracted Data			

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X374834

PROJECT:

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	INOR-121-6027	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	INOR-121-6001	SM 2320 B	
True Color	INOR-121-6014	SM 2120 C	NEPHELOMETER
Turbidity	INOR-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	INOR-121-6047	SM 4500-NH3 G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INOR-121-6012	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	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	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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Method Summary

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 18X374834

PROJECT:

ATTENTION TO: Maria Gutierrez

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Phosphorous	MET-121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Kjeldahl Nitrogen as N	INOR-121-6020	SM 4500 NORG D	COLORIMETER
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC
Total Phosphorus	INOR-93-6022	SM 4500-P B & E	SPECTROPHOTOMETER

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

20-August-2018 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#: 18X374834
PO#: 120158-(2018)

Acidification Technique:

Sample ID	Chl a (µg/L)
KL1	1.26
KL2	1.25
KL3	1.14
KL4	0.24
KL5	1.28
HWY 102-1	0.86
HWY 102-2	2.58
LSD	141.49
LU	5.5
PML-1	1.14
PML-2	1.28

- **Chl a = chlorophyll a**

Received: 17-August-18
Completed: 18- August -18

Original signed

Magda Waclawik

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

Appendix F

Graphs (Seasonal and Historical)

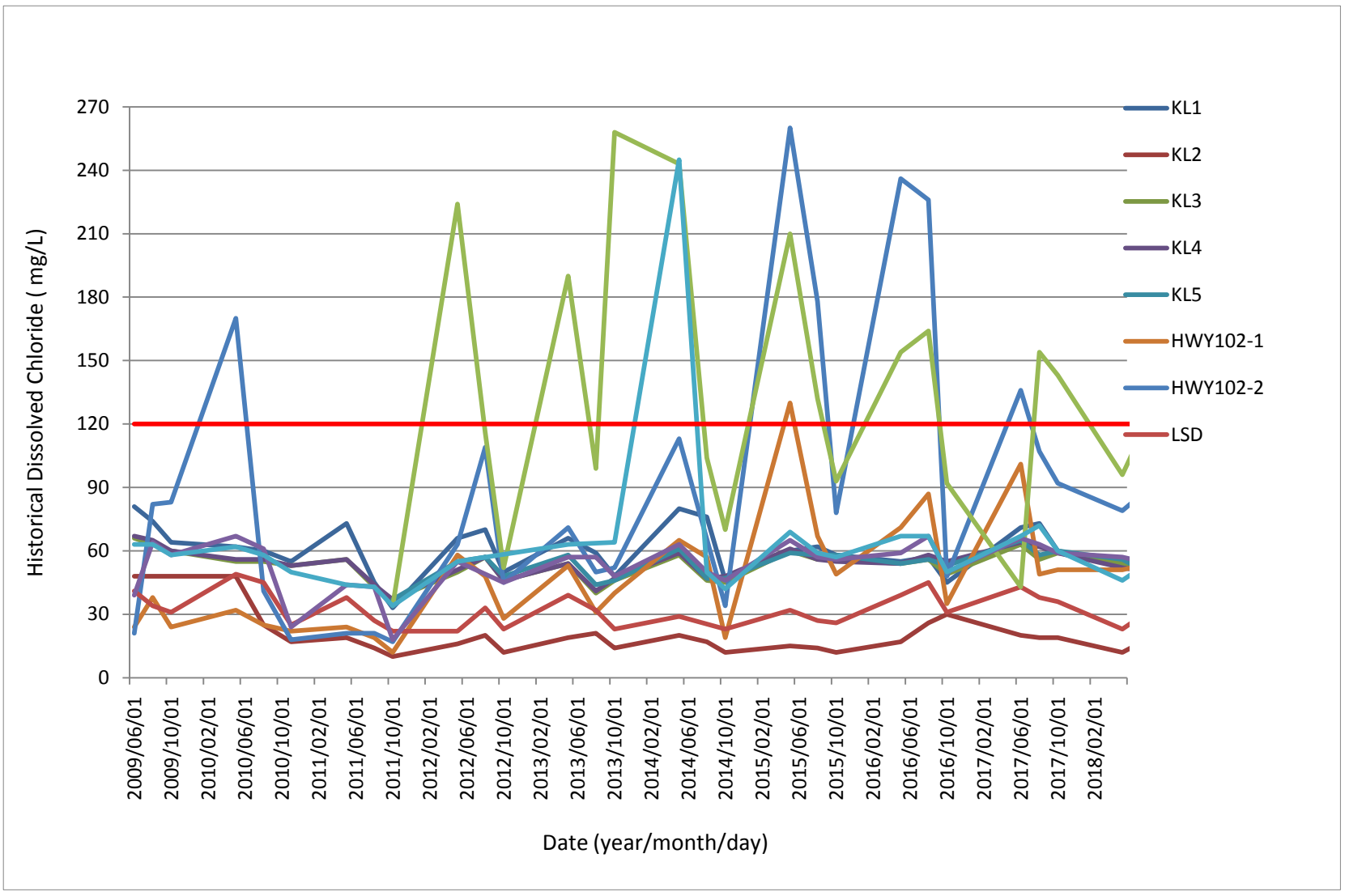

Figure 1 - Historical Dissolved Chloride Concentrations for Water Quality Monitoring Program.

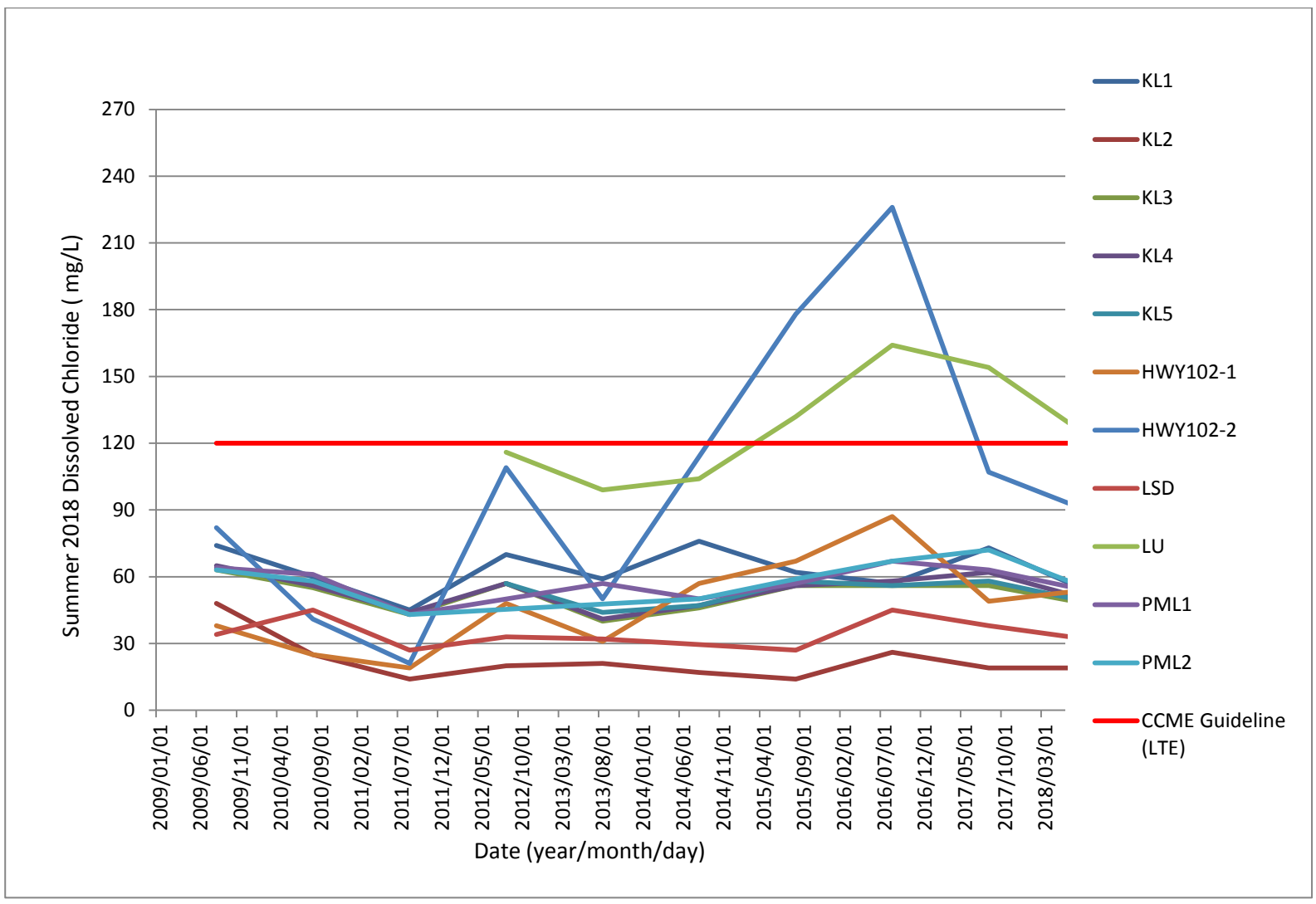

Figure 2 – Seasonal Dissolved Chloride Concentrations for Water Quality Monitoring Program.

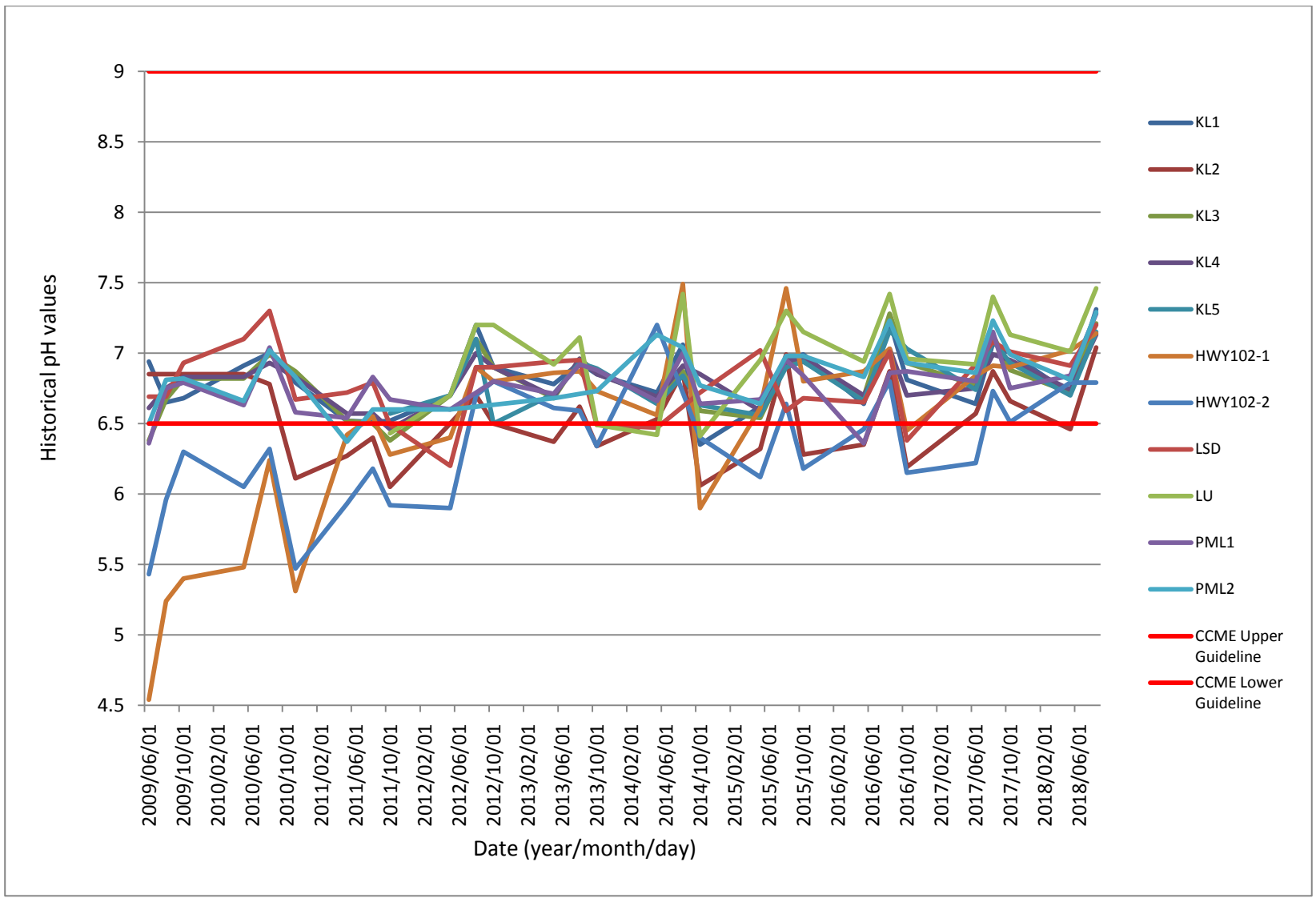

Figure 3 –Historical pH Measurements for Water Quality Monitoring Program

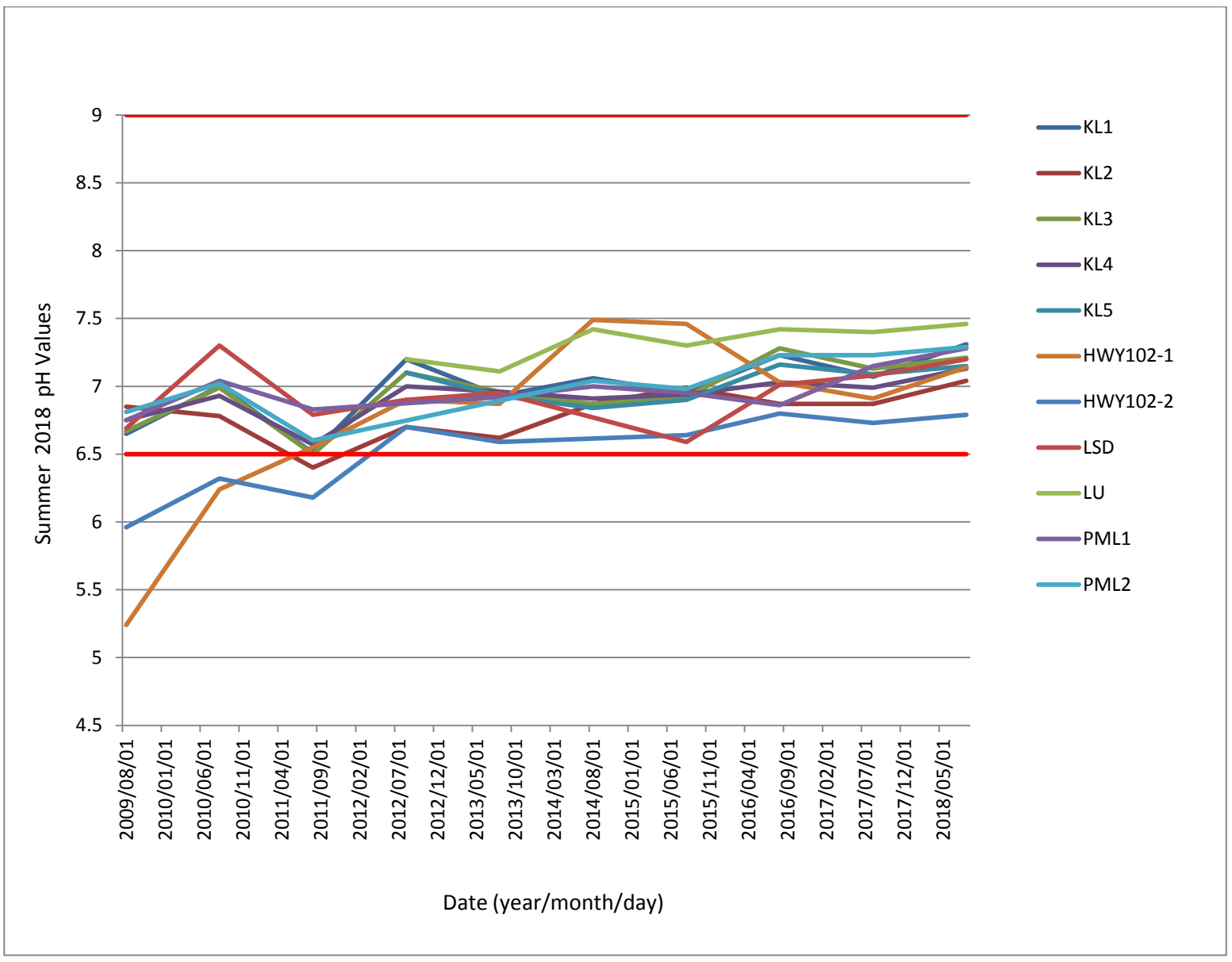

Figure 4 – Seasonal pH Measurements for Water Quality Monitoring Program.

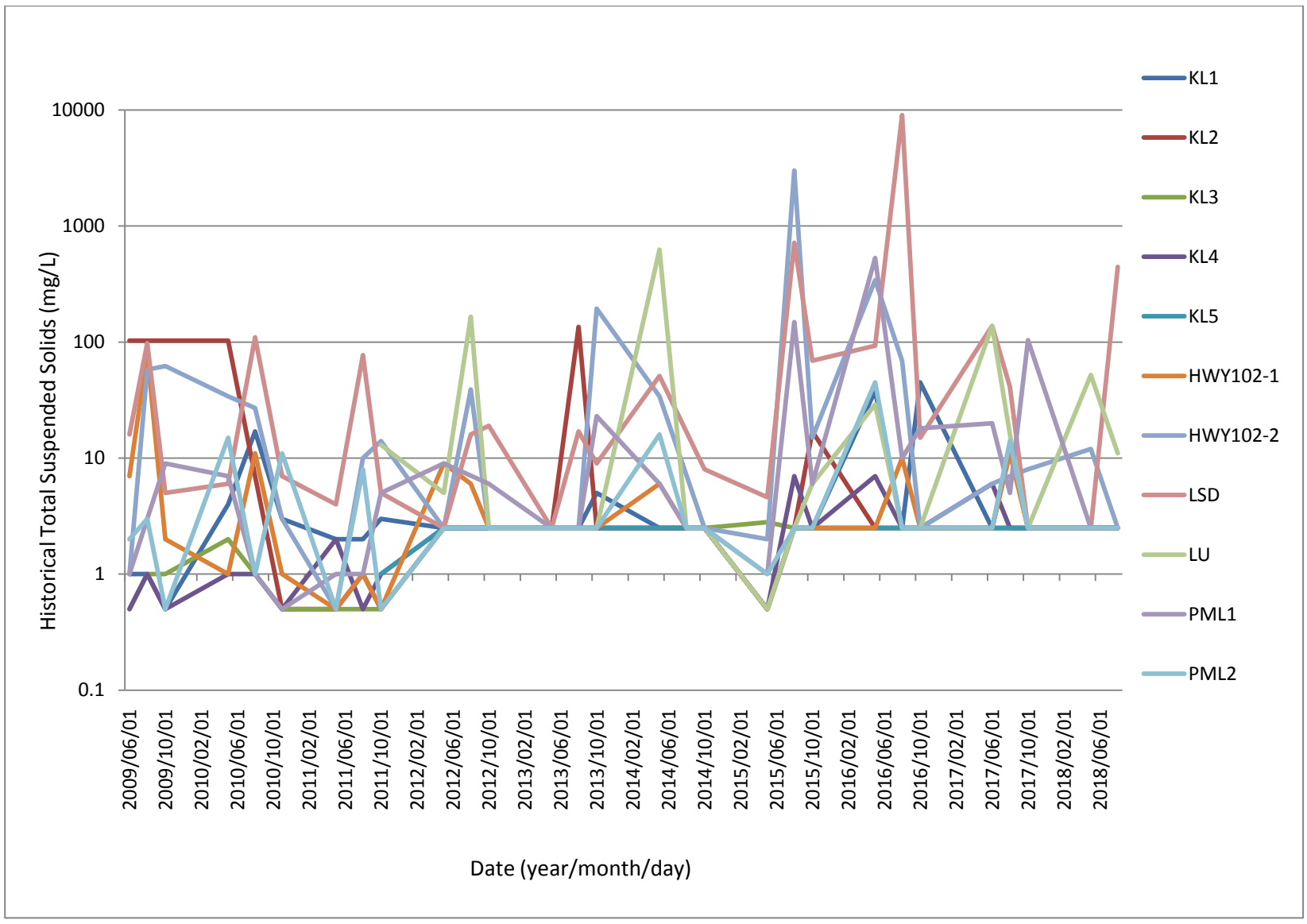

Figure 5 – Historical Total Suspended Solids Concentrations for Water Quality Monitoring Program.

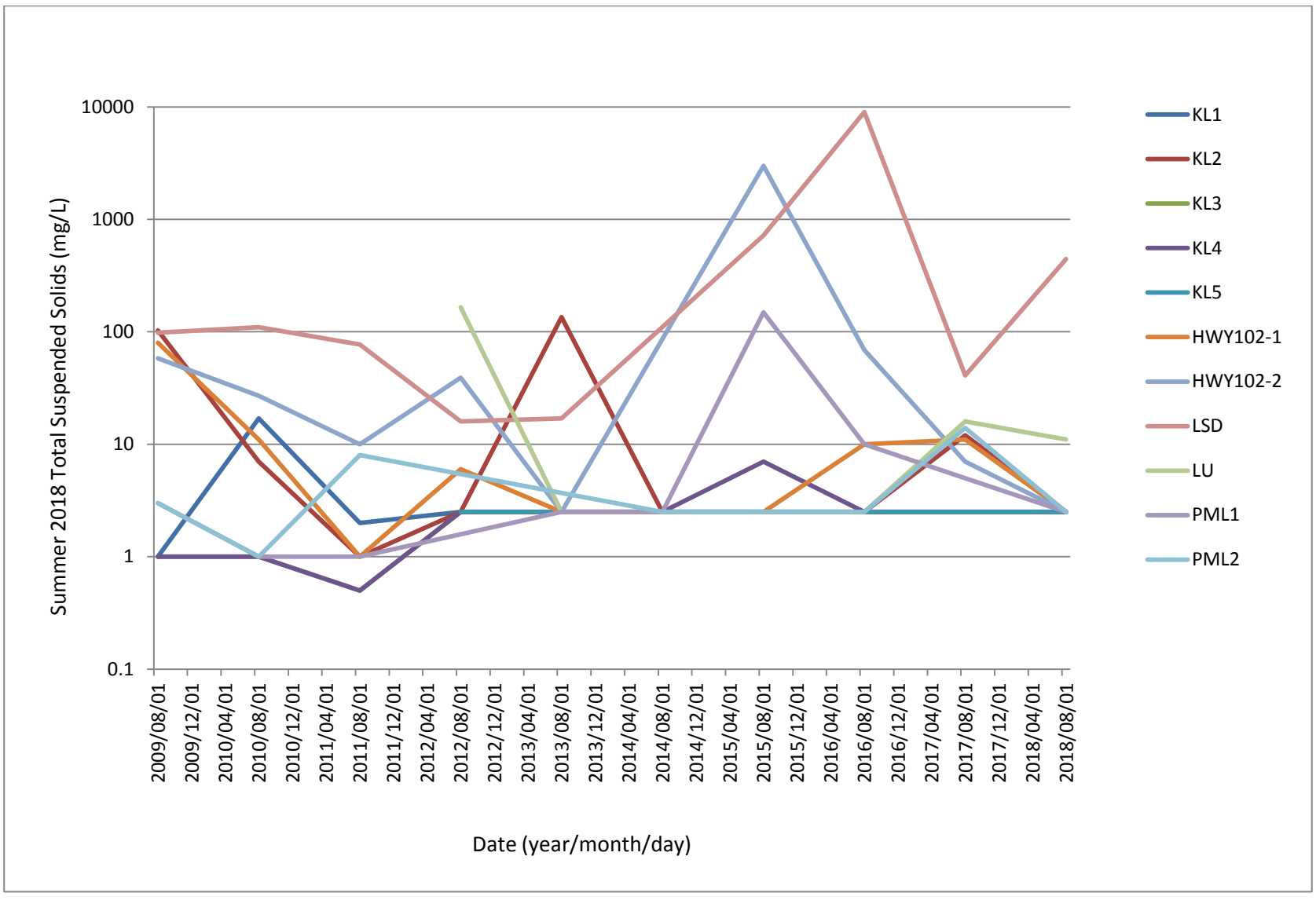

Figure 6 – Seasonal Total Suspended Solids Concentrations for Water Quality Monitoring Program.

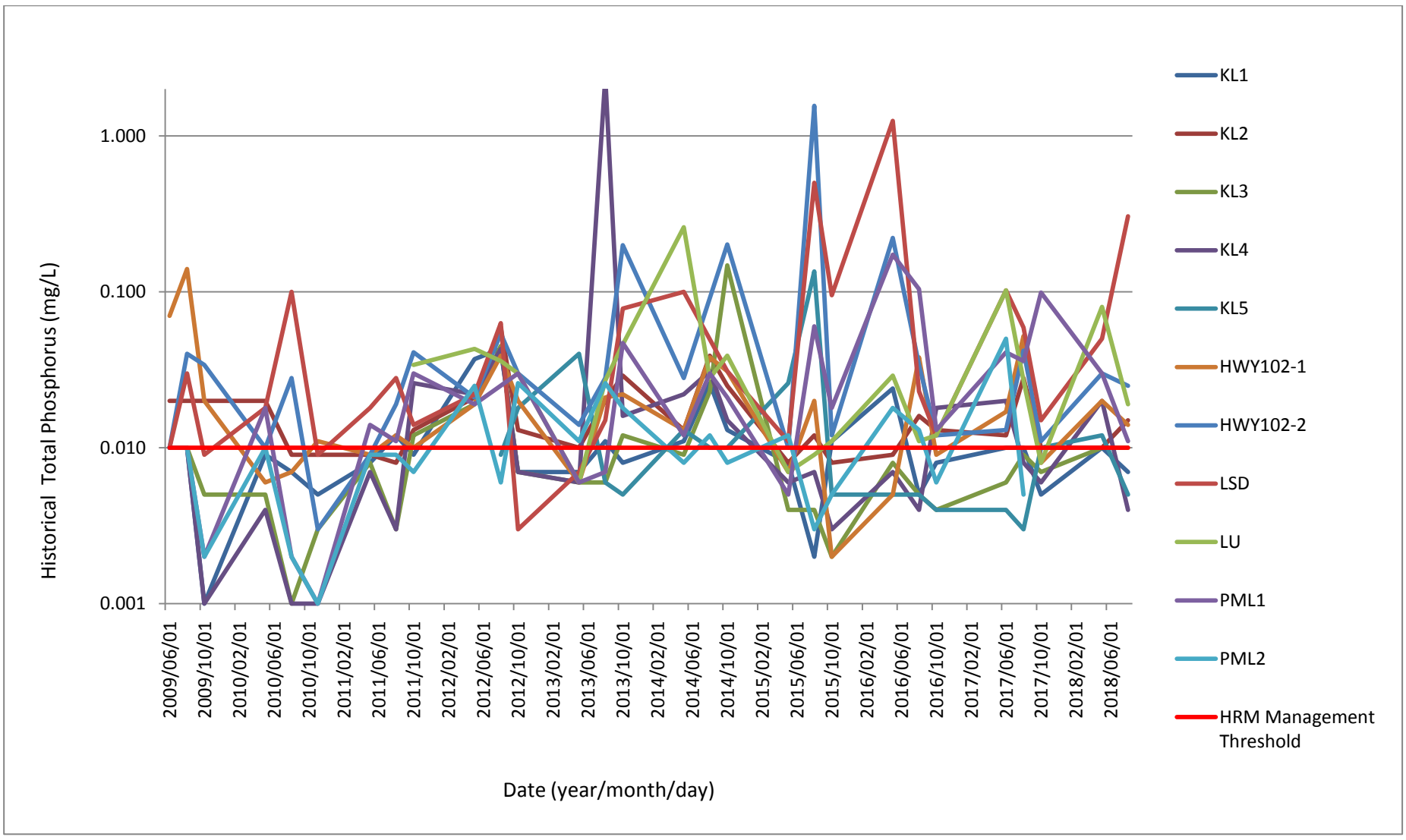

Figure 7 – Historical Total Phosphorus Concentrations for Water Quality Monitoring Program.

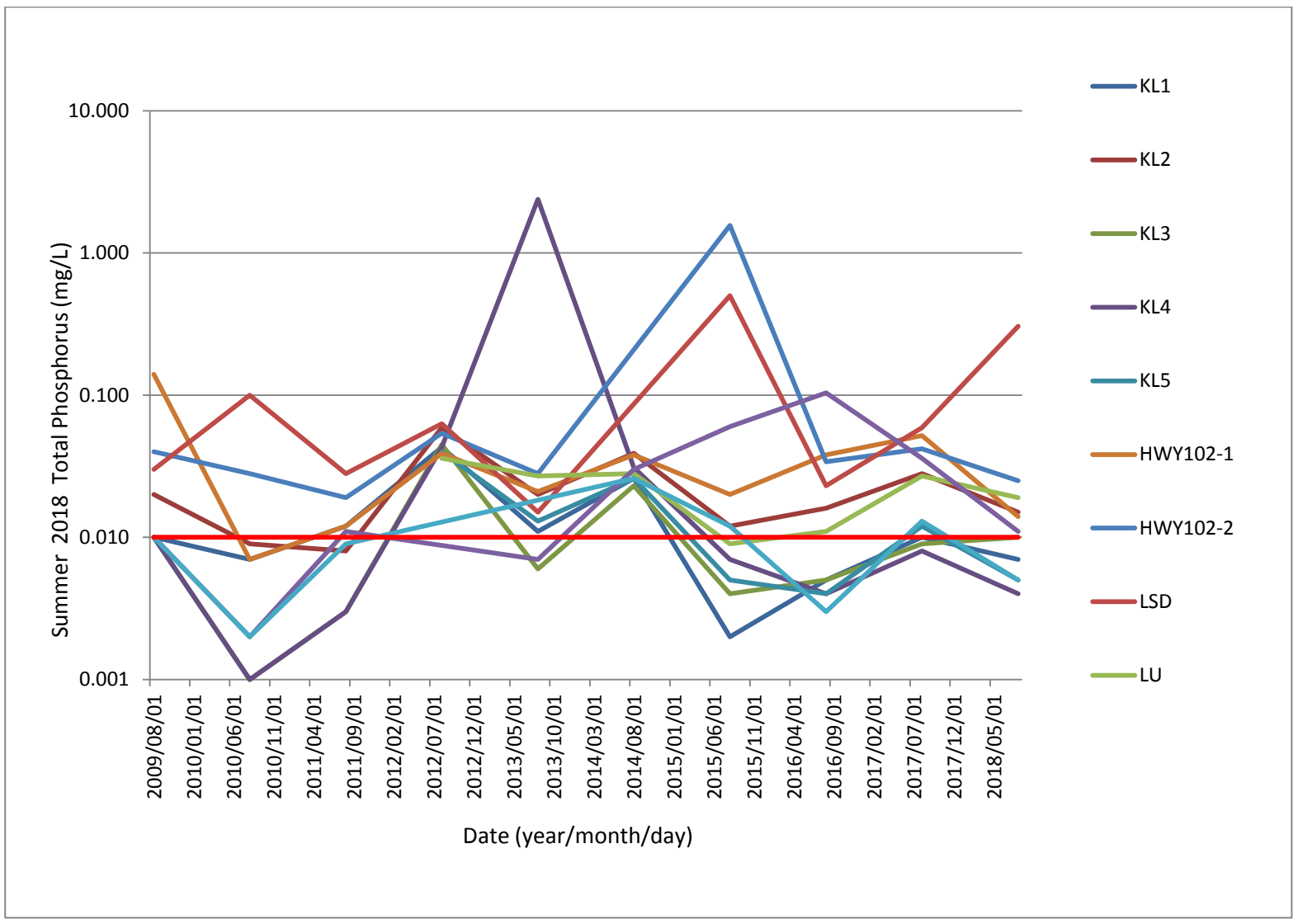

Figure 8 – Seasonal Total Phosphorus Concentrations for Water Quality Monitoring Program.

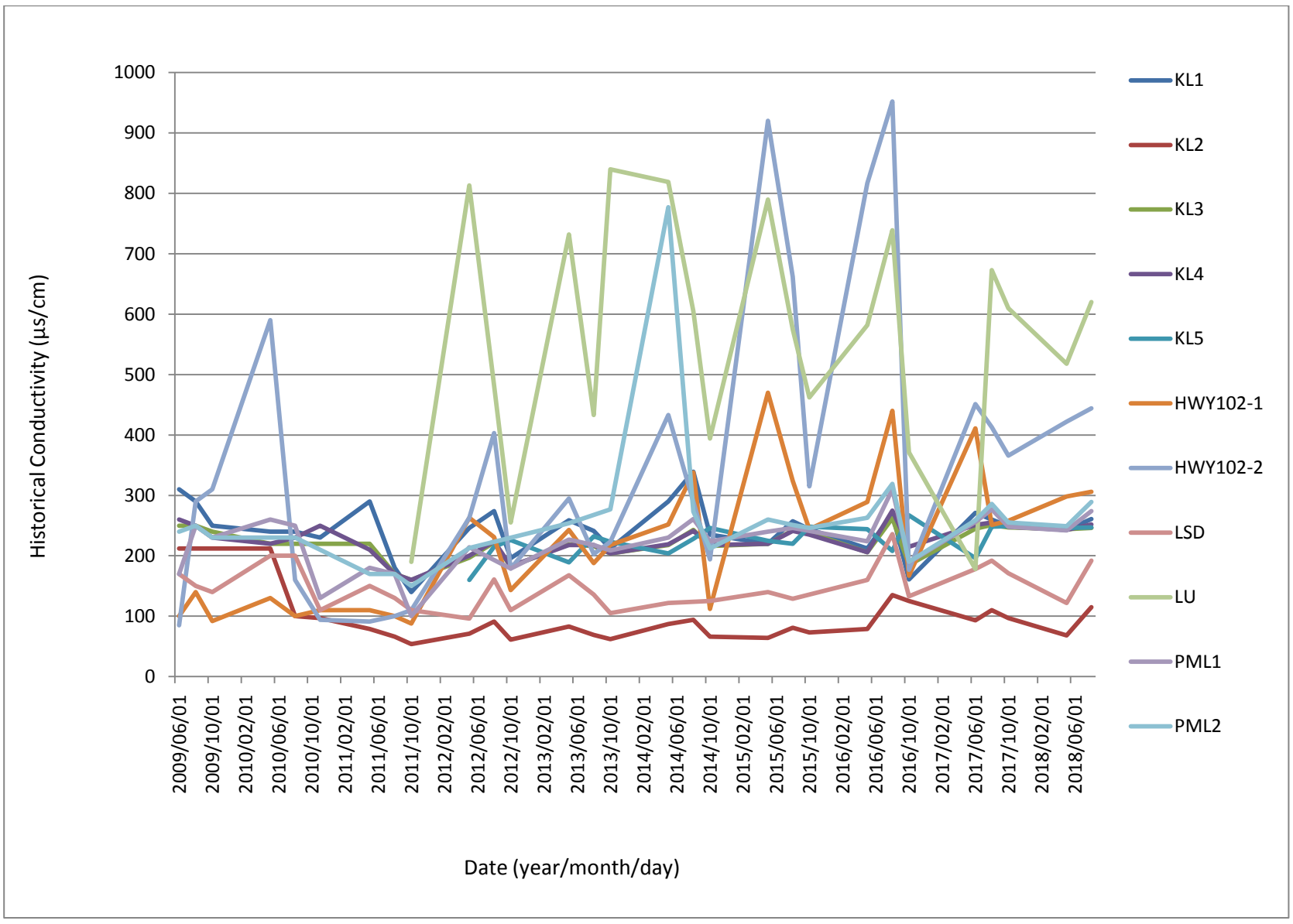

Figure 9 – Historical Measurement of Conductivity for Water Quality Monitoring Program.

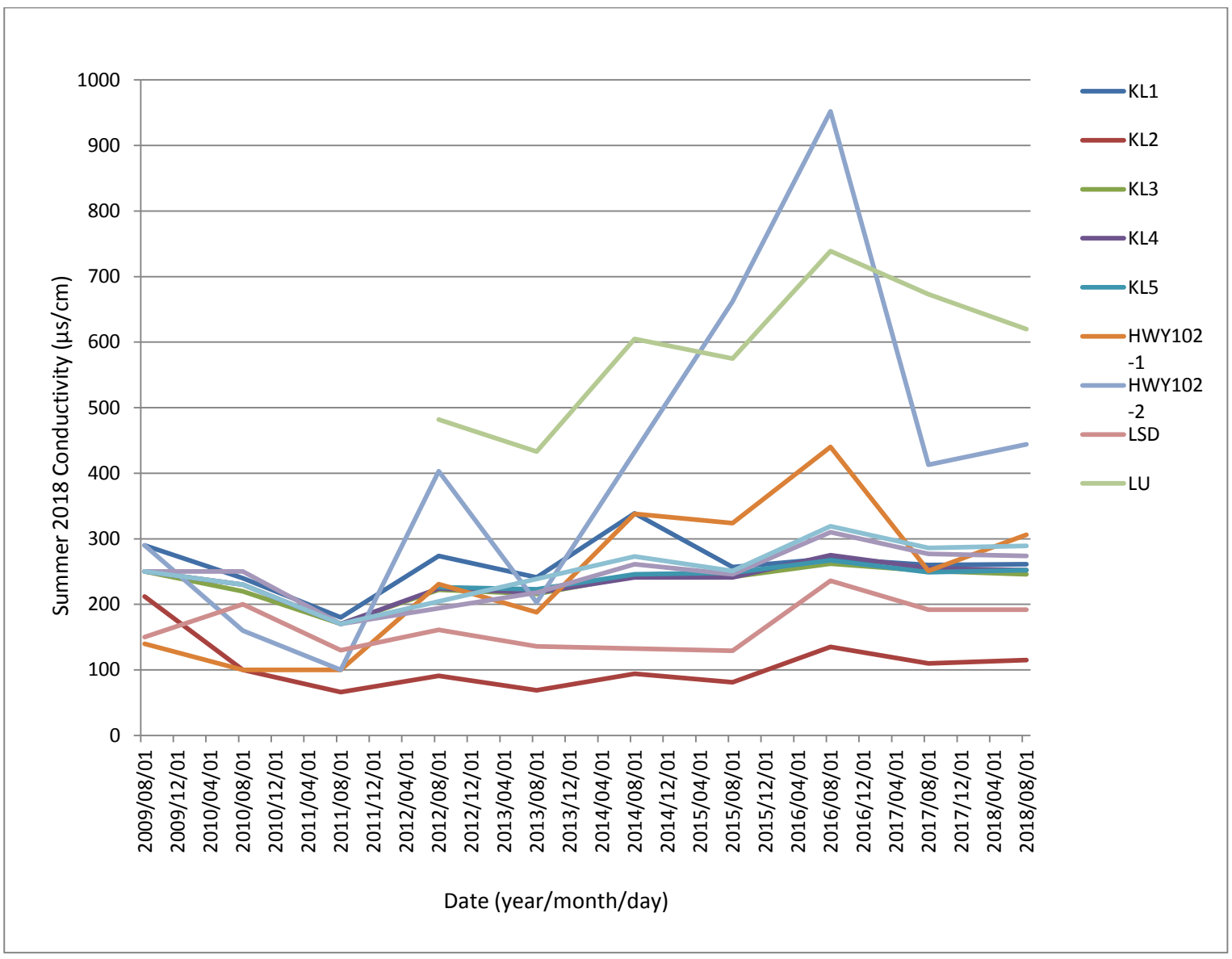

Figure 10 – Seasonal Conductivity Measurements for Water Quality Monitoring Program.

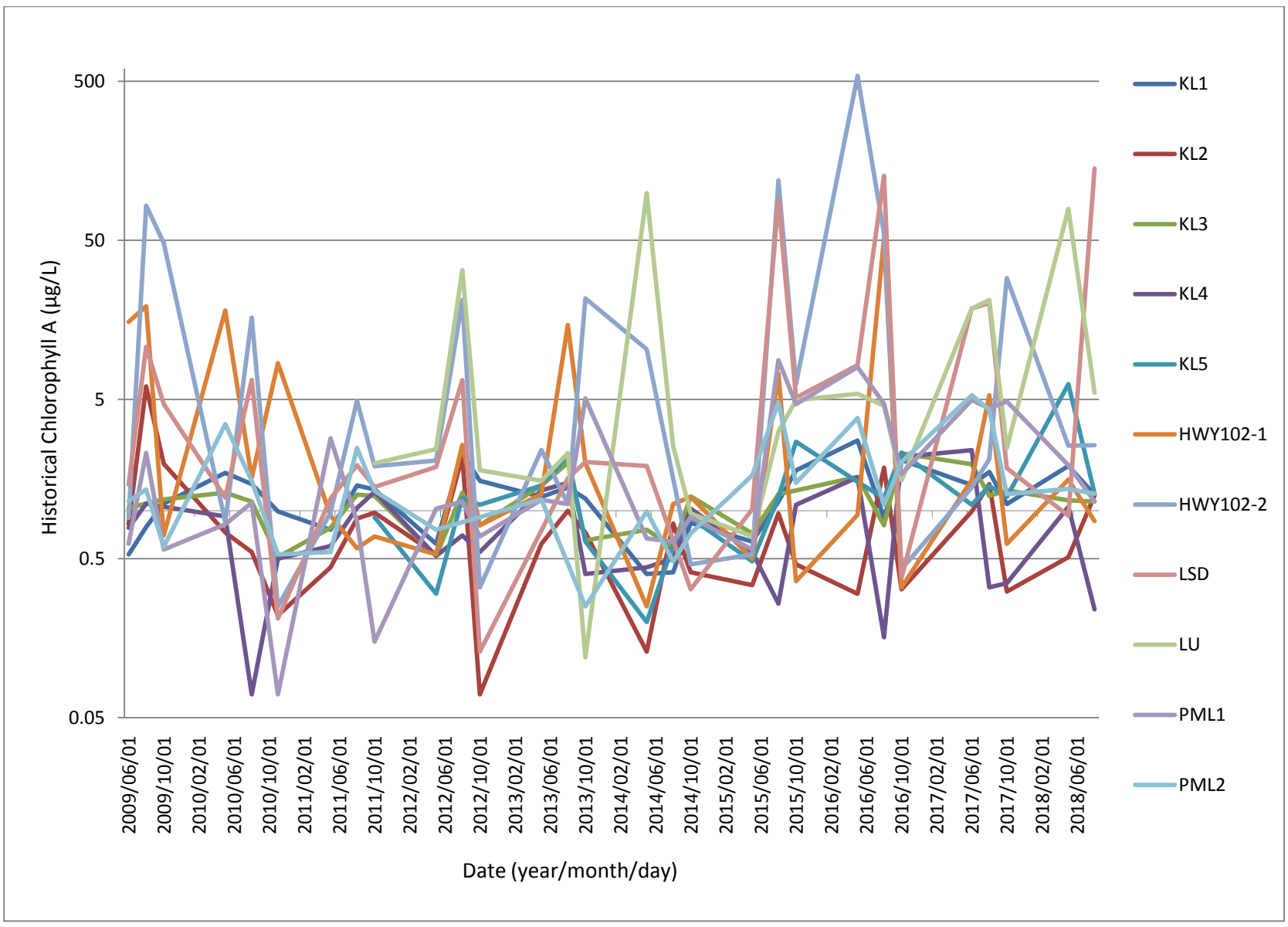

Figure 11 – Historical Chlorophyll A Concentrations for Water Quality Monitoring Program.

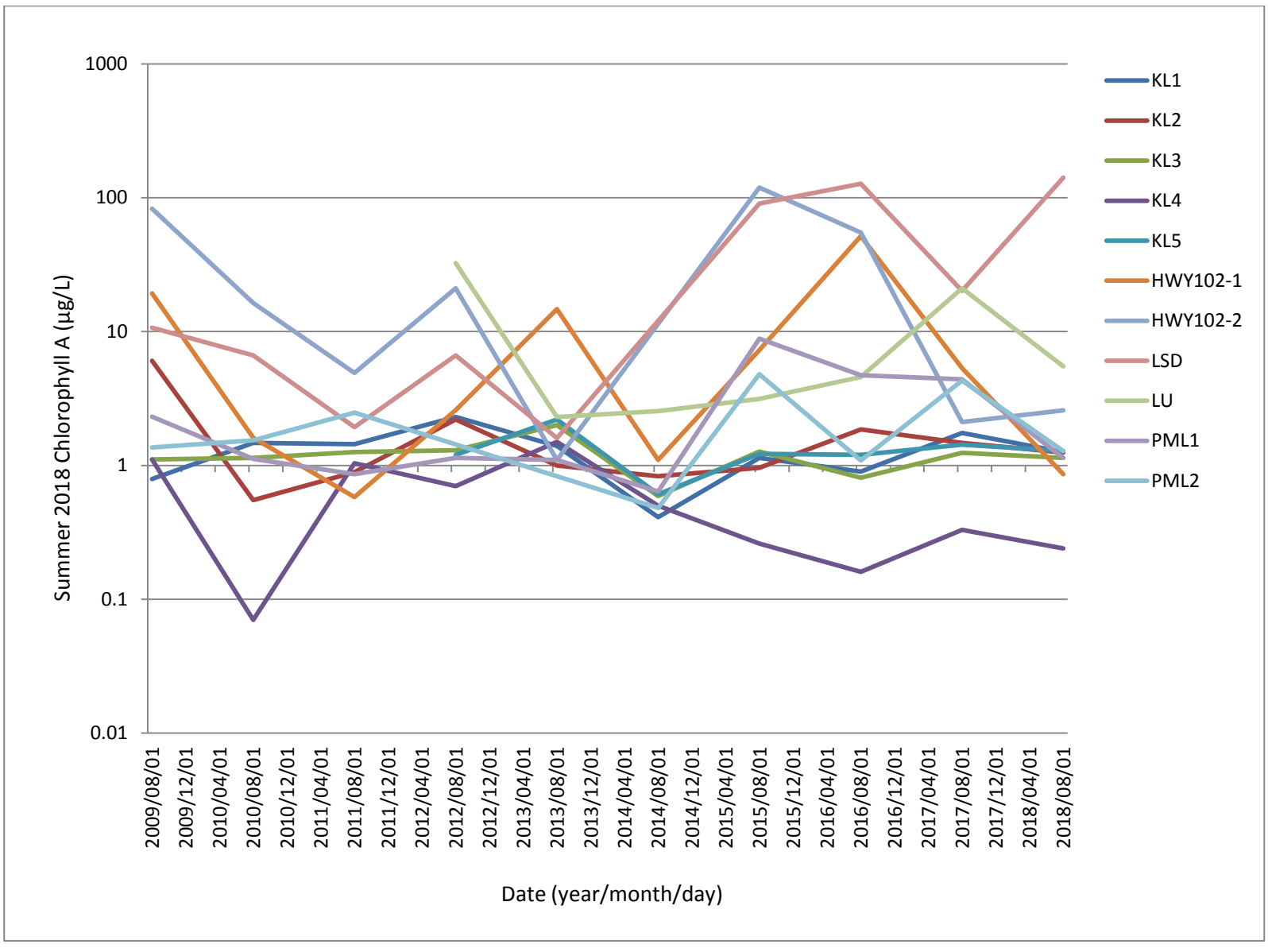

Figure 12 – Seasonal Chlorophyll A Concentrations for Water Quality Monitoring Program.

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