

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

Item No. 1
North West Community Council
June 11, 2018

TO: Chair and Members of North West Community Council

Original Signed

SUBMITTED BY:

Kelly Denty, Acting Director, Planning & Development

Original Signed

Jacques Dubé, Chief Administrative Officer

**DATE:** May 17, 2018

SUBJECT: Bedford West Water Quality Status Update – Fall 2017

## **INFORMATION REPORT**

### **ORIGIN**

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

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

## **LEGISLATIVE AUTHORITY**

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

## **BACKGROUND**

### Monitoring Event Reporting

The Bedford West Secondary Planning Strategy, Policy BW-3, requires that a water quality monitoring program be undertaken for the Paper Mill Lake watershed to track the eutrophication process. Eutrophication is the process by which lakes naturally accumulate nutrients and biological material. The eutrophication process is typically accelerated through the impacts of human activities, resulting in relatively rapid changes in trophic state, from lower states (fewer nutrients) to higher states (more nutrients), with corresponding changes in appearance, functional uses, and amenity values.

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

The terms of the monitoring program are specified within Development Agreements that have been negotiated in consultation with the Bedford Watershed Advisory Board<sup>2</sup> 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 ( $\mu$ g/L) of Total Phosphorus as a "trigger value", representing the transition point between the second-lowest trophic state (oligotrophic) to the next-highest trophic state (mesotrophic) per Environment Canada criteria (Table 1).

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

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

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

#### Assessment

Contractor reports submitted from spring 2012 through fall 2014 indicated that a high proportion of water quality samples had TP results exceeding the trigger value of 10µg/L (equivalent to 0.01 mg/L), as shown in Table 2.

<sup>&</sup>lt;sup>1</sup> The current Regional Municipal Planning Strategy states this objective as follows: "This Plan will seek to ... maintain the existing trophic status of our lakes and waterways to the extent possible".

<sup>&</sup>lt;sup>2</sup> RWAB assumed the functions previously performed by BWAB since 2013.

	2012	2012	2012	2013	2013	2013	2014	2014	2014	#	%
Sites	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Exceedences 2013-2014	Exceedances 2012-2014
KL1	0.037	0.043	0.007	0.007	0.011	0.008	0.011	0.026	0.013	6	66.67%
KL2	0.021	0.059	0.013	0.010	0.020	0.029	0.013	0.039	0.025	8	88.89%
KL3	0.019	0.045	0.007	0.006	0.006	0.012	0.009	0.023	0.148	5	55.56%
KL4	0.022	0.043	0.007	0.006	2.390	0.016	0.022	0.031	0.015	5	55.56%
KL5	0.018	0.040	0.006	0.005	0.013	0.010	0.010	0.026	0.135	5	55.56%
HWY102-1	0.019	0.039	0.020	0.006	0.021	0.022	0.013	0.038	0.031	8	88.89%
HWY102-2	0.021	0.054	0.030	0.014	0.028	0.199	0.028	677	0.201	8	100.00%
LSD	0.022	0.063	0.003	0.007	0.015	0.078	0.100	699	0.031	6	75.00%
LU	0.043	0.036	0.030	0.006	0.027	0.046	0.260	0.028	0.039	8	88.89%
PML1	0.019		0.030	0.006	0.007	0.047	0.012	0.030	0.021	6	75.00%
PML2	0.025	679	679	0.006	650	0.026	0.011	0.026	0.018	5	83.33%
		*				*			Overall	70	75.27%

**Table 2.** Summary of Total Phosphorus results and exceedances from Spring 2012 through Fall 2014 (mg/L)

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

#### Phase 1:

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

### Phase 2:

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

## Phase 3:

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

#### DISCUSSION

The purpose of this report is to report the results of the fall 2017 monitoring even to Council. The monitoring event held in October 2017 found that TP concentrations exceeded the trigger value of 10 10ug/L at three of eleven stations monitored.

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

Sample Station	October 2017 Concentration (µg/L)	Exceedance	Trophic State
KL1	5	No	Oligotrophic
KL2	10	No	Oligotrophic
KL3	7	No	Oligotrophic
KL4	6	No	Oligotrophic
KL5	5	No	Oligotrophic
HWY 102-1	8	No	Oligotrophic
HWY 102-2	11	Yes	Mesotrophic
LSD	15	Yes	Mesotrophic
LU	8	No	Oligotrophic
PML1	99	Yes	Eutrophic
PML2	6	No	Oligotrophic

**Table 3**. Summary of TP results and exceedances October 2017.

Development Agreements in effect for areas now undergoing development authorize the Municipality to direct the selected water quality monitoring contractor to undertake follow-up testing if threshold levels are exceeded. As noted above, three sample stations yielded exceedances of the TP trigger value in October 2017. A follow-up assessment process is underway regarding previous test results exceeding the 10µg/L trigger value. The results of the sampling cannot be attributed to any one source, and these agreements do not establish the authority for the Municipality to halt development activities.

As previously reported, staff are contemplating a revision to the water quality monitoring requirements in current and future Development Agreements to align with the recommendations from Dalhousie University's Centre for Water Resource Studies report.

## **FINANCIAL IMPLICATIONS**

There are no financial implications for this report.

#### **COMMUNITY ENGAGEMENT**

No community engagement was required for this report.

## **ATTACHMENTS**

Attachment A. Bedford West Water Quality Report Fall 2017

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

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

Original Signed

Report Approved by:

Shannon Miedema, Program Manager, Energy & Environment, 902.490.3665

# Appendix A



**SNC-Lavalin Inc.** 

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December 8, 2017

SENT VIA EMAIL: deacofc@halifax.ca

Halifax Regional Municipality Halifax, Nova Scotia

Attention: Mr. Cameron Deacoff

**Environmental Performance Officer** 

Planning and Development

Dear Mr. Deacoff:

RE: Final Report: Water Quality Monitoring Program, Fall 2017 Sampling Event

Bedford West, Bedford, Nova Scotia

SNC-Lavalin Inc. (SLI) is pleased to submit one electronic copy of the final report presenting the results of the 2017 fall surface water quality sampling event for the Bedford West Water Quality Monitoring Program in Bedford, Nova Scotia.

It should be noted that this Final Report (version C02) addressed the comments received on the draft report (version C01) from Mr. Deacoff and dated November 21, 2017.

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.

Michael Smith, AScT, B.Tech

Area Lead, Environmental Engineering

Infrastructure Engineering – Eastern Canada
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# Surface Water Quality Monitoring Program, Bedford West. Bedford, Nova Scotia, Canada

# Halifax Regional Municipality

Final Report - 2017 Fall Monitoring Report





08/12/2017

Final Report> Internal ref. C01 > SLI ref. 631477-0001-T-4E-REP-000-0010 Revision C02



## **EXECUTIVE SUMMARY**

On October 18, 2017 SNC-Lavalin Inc. (SNCL) completed the Bedford West water quality monitoring program (2017 fall event) on behalf of Halifax Regional Municipality (HRM). The sampling program consisted of collecting surface water samples from eleven (11) water quality sampling stations. Field parameters were recorded and surface water samples were collected for laboratory analyses. The laboratory analysis included the following analysis: inorganics, calculated parameters, standard elements and microbiological.

The applicable water quality assessment standards included:

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

During this water quality monitoring event, four (4) stations reported concentrations that exceeded the Total Phosphorous management threshold criteria of 10  $\mu$ g/L (0.01 mg/L) listed in the HRM RFP14-338. Exceedances were in  $\mu$ g/L were as follows:

) KL2: 10

) HWY-101-2: 11

LSD: 15PML-1: 99

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

- Dissolved Oxygen (In situ): CCME guideline of 5.5 9.5 mg/L was exceeded at HWY-102-1 (5.3 mg/L) and PML-2 (11.3 mg/L);
- Chloride: CCME guideline of 120 mg/L was exceeded at LU (143 mg/L);
- Total Aluminum: CCME guideline of 100 μg/L was exceeded at KL2 (240 μg/L); HWY-102-2 (542 μg/L); LSD (401 μg/L) and PML-1 (4,190 μg/L). All eleven (11) stations exceeded the NSE EQS guideline of 5 μg/L.
- Total Copper: CCME guideline of 2  $\mu$ g/L was exceeded at stations HWY-102-2 (3  $\mu$ g/L); LU (3  $\mu$ g/L) and PML-1 (8  $\mu$ g/L)
- Total Iron: CCME guideline of 300  $\mu$ g/L was exceeded at stations KL2 (572  $\mu$ g/L); HWY-102-2 (4,760  $\mu$ g/L); LSD (874  $\mu$ g/L); and PML-1 (12,600  $\mu$ g/L).

*		
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Total Lead: CCME guideline of 1  $\mu$ g/L was exceeded at stations HWY-102-2 (3.3  $\mu$ g/L) and PML1 (9.1  $\mu$ g/L).

In terms of microbiological analyses, E. Coli exceeded the Heath Canada Guideline of 400 CFU /100 mL at one sampling station: KL5 (517 MPN). In addition, Total Coliforms concentrations in MPN/100 mL were reported above the laboratory RDL of 1 MPN/100 mL in all eleven stations as follows:

KL1: 154
 KL2: 659
 KL3: 411
 KL4: >2420
 KI5: >2420
 HWY-102-1: >2420

HWY-102-2: >2420
 LU: 1990
 LSD: 641
 PML-1: 166
 PML-2: 1,730



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## 1 INTRODUCTION AND BACKGROUND

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

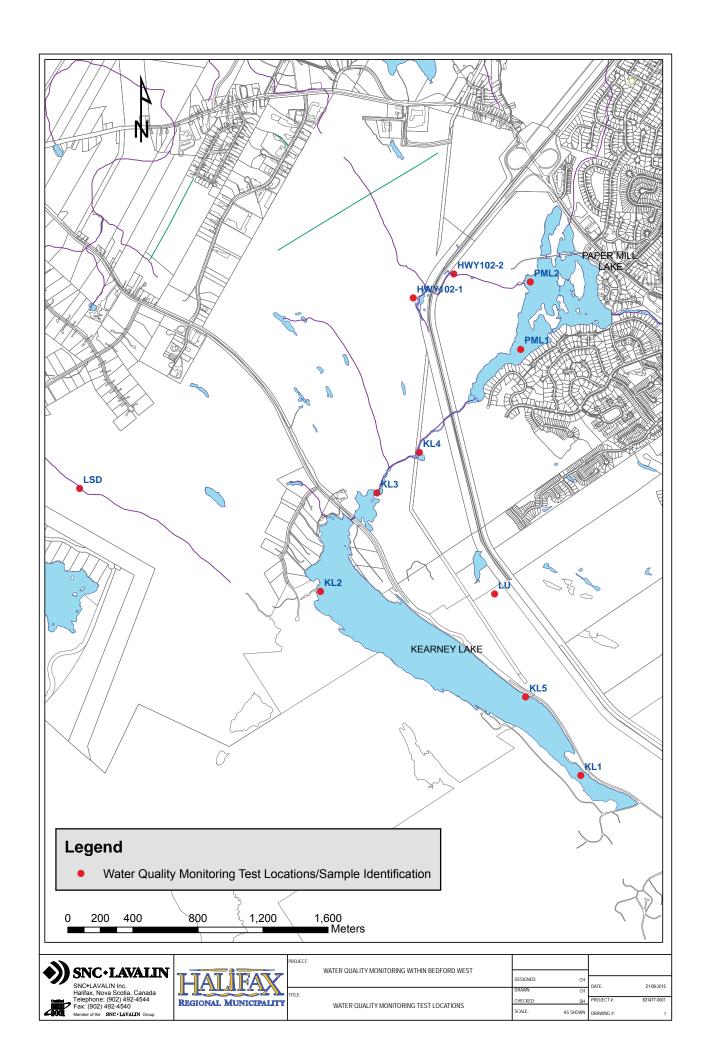
Water quality monitoring in the Bedford West development area has been ongoing since 2009. SNCL was retained by HRM to complete water quality monitoring programs each spring, summer and fall for two years beginning in 2015. The results of the 2017 fall monitoring program are detailed herein.

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

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

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

Water Course	Sample Location	Updated Coordinates (UTM NAD 83)		
water course	Name	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	





## 2 METHODOLOGY

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

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

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

**Table 2: Analytical Parameter Groups** 

Field Parameters (A)	Inorganic (B)	Calculated Parameters (C)	Standard Metals (D)	Microbiological (E)
pH     TDS     Dissolved Oxygen     Temperature     Secchi Depth     Conductance     Air Temperature     Cloud Cover     Incidental Wildlife     Sightings	Total Alkalinity (as CaCO <sub>3</sub> ) Dissolved Chloride Colour Total Kjeldahl Nitrogen Nitrate + Nitrite Nitrate Nitrite Nitrogen (as NH4) Total Organic Carbon Orthophosphate (P) H Low Total Phosphorus Reactive Silica Total Suspended Solids Dissolved Sulphate Turbidity Conductivity	· Anion Sum · Cation Sum · Ion Balance · Bicarbonate Alkalinity(as CaCO <sub>3</sub> ) · Carbonate Alkalinity (as CaCO <sub>3</sub> ) · 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 October 18, 2017.

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

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conducted by the provider (Open Road Environmental Limited on October 16, 2017) prior to conducting the water quality sampling event. See Appendix A, Instrument Calibration Report.

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

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

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

## 3 ASSESSMENT STANDARDS

- There is currently no national environmental quality guideline for total phosphorus in freshwater aquatic environments. In the Canadian framework, trigger ranges are based on the trophic classification of the baseline condition. A trigger range is a desired concentration range for phosphorus; if the upper limit of the range is exceeded, it indicates potential for environmental quality issues, which "triggers" the need for further investigation. According to the Canadian Council of Ministers of the Environment (CCME) 10 μg/L of total phosphorous is the threshold between oligotrophic and mesotrophic trophic classifications. For this water quality monitoring program, HRM defined a Total Phosphorous management threshold value of 10 μg/L or 0.01 mg/L.
- The Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Aquatic Life – Freshwater (PAL-F) (Version 2015) were used for parameter such as Dissolved Oxygen, pH (in situ and Laboratory analysis), Chloride, Nitrate, Nitrite, Nitrogen, as well as for total metals (i.e. Aluminum, Arsenic, Boron, Cadmium, Cooper, Iron, Lead, Molybdenum, Nickel, Selenium, Silver, Thallium, Uranium, and Zinc).
- For Total Suspended Solids (TSS), the CCME PAL-F at high flow conditions was applied. The TSS guideline value is equal to a maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. When background concentrations are greater than 250 mg/L, the concentration should not increase more than 10% from background levels.
- The Health Canada guidelines for Canadian Recreational Water Quality (2012, Third Edition) were used for parameters such as Secchi Depth (i.e. the guidelines indicate that the clarity of the



water should be sufficiently clear such that a Secchi disk is visible at a minimum depth of 1.2 metres); pH (guideline of 5.0-9.0 pH); Turbidity (limit of 50 Nephelometric Turbidity Units); E. coli (400 MPN/100mL) and Fecal Coliform (400 MPN/mL).

The Nova Scotia Environment (NSE) Environmental Quality Standards (EQS) for Contaminated Sites (NSE 2014) Table A2, Reference for Pathway Specific Standards for Surface Water (μg/L) for Fresh Water were used for assessment of total metals (i.e. Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Uranium, Vanadium and Zinc).

### 4 FIELD OBSERVATIONS

The 2017 fall 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.

## 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 two (2) stations as follows HWY-102-1 (5.3 mg/L) and PML-2 (11.3 mg/L). The other nine (9) surface water sampling stations were within the recommended range of dissolved oxygen.



## **6 ANALYTICAL RESULTS**

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

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

# **6.1 Total Phosphorous**

Four (4) stations reported concentrations that exceeded the management threshold criteria of 10  $\mu$ g/L (0.01 mg/L) listed in the HRM RFP #14-338. Reported concentrations in  $\mu$ g/L were as follows:

) KL2: 10

) HWY-101-2: 11

) LSD: 15

) PML-1: 99

## 6.2 General Chemistry

Chloride: One (1) station exceeded the CCME PAL-F recommended value for Chloride of 120 mg/L. Chloride concentration at LU was reported as 143 mg/L.

#### 6.3 Metals

Aluminum: Four (4) stations exceeded the CCME PAL-F recommended value for aluminum of 100 μg/L (base on pH ≥6.5). Reported exceedances in μg/L were as follows:

) KL2: 240

) HWY-102-2: 542

) LSD: 401

) PML-1: 4,190

Aluminum concentrations at all eleven (11) stations were above the NSE EQS guideline of 5  $\mu$ g/L. Exceedances in  $\mu$ g/L were as follows:

) KL1: 46

) KL2: 240

) KL3: 43

) KL4: 55



KL5: 44
 HWY-102-1: 100
 HWY-102-2: 542
 LU: 29
 LSD: 401
 PML-1: 4190
 PML-2: 34

Copper: Three (3) stations exceeded the CCME-PAL-F recommended limit of 2  $\mu$ g/L (i.e. based on a hardness < 82 mg/L). The NSE EQS guideline is also 2  $\mu$ g/L. Exceedances reported in  $\mu$ g/L were as follows:

- ) HWY102-12: 3) LU: 3
- > PML-1: 8

Iron: Four (4) stations exceeded the CCME-PAL-F recommended limit of 300  $\mu$ g/L. The NSE EQS guideline is also 300  $\mu$ g/L. Exceedances reported in  $\mu$ g/L were as follows:

KL2: 572HWY102-2: 4,760LSD: 874PML-1: 12,600

Lead: Two (2) stations exceeded the CCME-PAL-F recommended limit of 1  $\mu$ g/L. The NSE EQS guideline is also 1  $\mu$ g/L. Exceedances reported in  $\mu$ g/L were as follows:

HWY102-2: 3.3PML-1: 9.1

## 6.4 Microbiological

E.coli exceeded the Heath Canada Guideline of  $\leq$  400 E.Coli MPN /100 mL at one (1) of eleven (11) sampling stations as follows:

KL5: 517 MPN/100 ml.

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Total coliforms concentrations in MPN/100 mL were reported above the laboratory RDL of 1 MPN/100 mL at all eleven (11) stations as follows:

KL1: 154
 KL2: 659
 KL3: 411
 KL4: >2,420
 KI5: >2,420
 HWY-102-1: >2,420
 HWY-102-2: >2,420
 LU: 1,990
 LSD: 641
 PML1: 166
 PML2: 1,730

## 7 STATISTICAL PRESENTATION

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

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

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

TABLE 3: Statistical Presentation of Key Water Quality Parameters - Fall 2017

KL-1	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.005	0.005	0.013	0.008	0.008
Chloride (mg/L)	1	60	33	64	50	51
Lab pH	N/A	7.0	6.4	7.0	6.8	6.8
Total Suspended Solids (mg/L)	5	<5	0.5	5.0	2.5	2.7
Conductivity (uS/cm)	1	249.0	140.0	250.0	230.0	213.0
Chlorophyll-A acidification method (µg/L)	0.05	1.10	0.84	2.08	1.19	1.33

KL-2	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.01	0.008	0.029	0.013	0.016
Chloride (mg/L)	1	19	10	48	14	19
Lab pH	N/A	6.7	6.1	6.9	6.3	6.3
Total Suspended Solids (mg/L)	5	<5	1	103	3	15
Conductivity (uS/cm)	1	97	54	212	73	94
Chlorophyll-A acidification method (ug/L)	0.05	0.31	0.07	1 97	0.41	0.61

KL-3	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.007	0.002	0.148	0.007	0.022
Chloride (mg/L)	1	59	37	60	49	50
Lab pH	N/A	6.9	6.4	6.9	6.9	6.8
Total Suspended Solids (mg/L)	5	<5	1	3	3	2
Conductivity (uS/cm)	1	247	160	247	216	210
Chlorophyll-A acidification method (µg/L)	0.05	1.34	0.51	2.29	1.23	1.18

KL-4	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.006	0.001	0.026	0.007	0.009
Chloride (mg/L)	1	59	37	60	49	50
Lab pH	N/A	7.0	6.5	7.0	6.9	6.8
Total Suspended Solids (mg/L)	5	<5	1	10	3	3
Conductivity (uS/cm)	1	248	160	250	218	213
Chlorophyll-A acidification method (µg/L)	0.05	0.35	0.35	2.18	1.03	0.94

KL-5	RDL	Seasonal Results	Seasonal Minimum	Seasonal Maximum	Seasonal Median	Seasonal Mean
Total Phosphorous (mg/L)	0.002	0.005	0.003	0.135	0.006	0.027
Chloride (mg/L)	1	60	46	60	51	52
Lab pH	N/A	6.9	6.5	7.0	6.9	6.8
Total Suspended Solids (mg/L)	5	<5	3	3	3	3
Conductivity (uS/cm)	1	246	189	246	215	217
Chlorophyll-A acidification method (µg/L)	0.05	1.22	0.64	2.71	1.16	1.48

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

51         28           6.9         6.5           3         3           258         143         1           8.45         0.70         1           Seasonal Maximum         Seasonal Median         Seasonal Median           92         48         5           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         3           105         125         1	0.015 31 6.3 2 159 1.69 nal Mean 0.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7 16
6.9     6.5       3     3       258     143     1       8.45     0.70     1       Seasonal Maximum     Seasonal Median     Seasonal Median       0.201     0.03     0.0       92     48     5       6.8     6.3     6       194     8     3       366     194     2       48.17     1.90     12       Seasonal Maximum     Seasonal Median     Seasonal Median       0.003     0.014     0       22     25     2       6.4     6.7     6       3     8     3       105     125     1	6.3 2 159 1.69 nal Mean .0.60 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7 16
3         3           258         143         1           8.45         0.70         1           Seasonal Maximum         Seasonal Median         Seasonal Median           0.201         0.03         0.           92         48         9           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         3           6.4         6.7         6           3         8         3           105         125         1	2 159 1.69 1.69 0.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7
258         143         1           8.45         0.70         1           Seasonal Maximum         Seasonal Median         Seasonal Median           0.201         0.03         0.0           92         48         5           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         3           105         125         1	159 1.69 1.69 1.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7 16
8.45         0.70         1           Seasonal Maximum         Seasonal Median         Seasonal Median           0.201         0.03         0.0           92         48         5           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         3           105         125         1	1.69 nal Mean 0.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7 16
Seasonal Maximum         Seasonal Median         Seasonal Median         Seasonal Median           0.201         0.03         0.0           92         48         9           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         3           6.4         6.7         6           3         8         3           105         125         1	nal Mean 0.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7 16
0.201         0.03         0.0           92         48         5           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         3           6.4         6.7         6           3         8         3           105         125         1	0.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7
0.201         0.03         0.0           92         48         5           6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         3           6.4         6.7         6           3         8         3           105         125         1	0.060 52 6.2 34 219 2.04 nal Mean 0.03 27 6.7
92     48       6.8     6.3       194     8       366     194       48.17     1.90       12     12       Seasonal Maximum     Seasonal Median     Seasonal Median       0.003     0.014     0       22     25     2       6.4     6.7     6       3     8     2       105     125     1	52 6.2 34 219 2.04 nal Mean 0.03 27 6.7
6.8         6.3         6           194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         3           6.4         6.7         6           3         8         3           105         125         1	6.2 34 219 2.04 nal Mean 0.03 27 6.7
194         8         3           366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         3           105         125         1	34 219 2.04 nal Mean 0.03 27 6.7
366         194         2           48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         3           105         125         1	219 .2.04 nal Mean 0.03 27 6.7 16
48.17         1.90         12           Seasonal Maximum         Seasonal Median         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         2           105         125         1	2.04 nal Mean 0.03 27 6.7 16
Seasonal Maximum         Seasonal Median         Seasonal Median           0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         2           105         125         1	nal Mean 0.03 27 6.7 16
0.003         0.014         0           22         25         2           6.4         6.7         6           3         8         3           105         125         1	0.03 27 6.7 16
22     25       6.4     6.7       3     8       105     125	27 6.7 16
6.4 6.7 6 3 8 3 105 125 1	6.7 16
3 8 2 105 125 1	16
105 125 1	
0.13 1.41 1	127
	1.79
Seasonal Maximum Seasonal Median Season	nal Mean
	0.026
	106
	6.8
	5
	446
	1.98
4.54 1.00 1	1.30
Seasonal Maximum Seasonal Median Season	nal Mean
0.099 0.021	0.0
59 48	45
6.9 6.8	6.8
104 6	19
248 209 1	194
5.07 0.91 2	2.08
Seasonal Maximum Seasonal Median Season	nal Mean
	0.026
	106
258 92 1	6.8
7.2 7.0 6	5
7.2 7.0 6 13 3	
	59     48       6.9     6.8       104     6       248     209       5.07     0.91       Seasonal Maximum     Seasonal Median     Seasonal Median       0.046     0.03     0       258     92

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



## 8 GRAPHS

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

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

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

It should be noted that where results were found to be less than the laboratory Reportable Detection Limit (<RDL), they were graphed as half the reportable detection limit ( $^{1}/_{2}$  RDL value) as a conservative approach.



## 9 CONCLUSIONS

The 2017 fall water quality monitoring program included collection of surface water samples at eleven (11) water quality sampling stations for the analysis of general chemistry, total metals, total phosphorus, total suspended solids, E.coli, and chlorophyll-A. Additionally, field parameters collected at each station included in situ pH, water temperature, dissolved oxygen, conductivity, Secchi depth (where applicable), air temperature, cloud cover and wildlife sightings.

# 9.1 Total Phosphorous

The following eight (8) stations meet the HRM management threshold criteria of 10 µg/L.

- ) KL1: 5
- ) KL2: 10
- > KL3: 7
- ) KL4: 6
- ) KL5: 5
- ) HWY-102-1: 8
- ) LU: 8
- ) PML-2: 6

The following three (3) stations reported total phosphorous concentrations that <u>exceeded</u> the HRM management threshold criteria of 10  $\mu$ g/L:

- $\rangle$  HWY 102-2 11 µg/L  $\rangle$  LSD 15 µg/L
- > PML-1 99 μg/L

## 9.2 Field Measurements

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

All 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 concentrations were outside of the CCME PAL-F recommended range of 5.5-9.5 mg/L at two (2) stations HWY-102-1 (5.3 mg/L) and PML-2 (11.3 mg/L)

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# 9.3 General Chemistry and Metals

The following parameters exceeded the recommended Canadian Council of Ministers of the Environment Guidelines for the Protection of Aquatic Life - Freshwater (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):

- Chloride: One station (LU) exceeded the CCME PAL-F recommended value of 120 mg/L.
- Aluminum: Four stations (i.e. KL2, HWY-102-2, LSD and PML-1) exceeded the CCME PAL-F recommended value of 100 μg/L. All eleven stations exceeded the NSE EQS guideline of 5 μg/L.
- $\rangle$  Copper: Three stations (HWY-102-2, LU and PML-1) exceeded the CCME-PAL-F and NSE EQS guideline of 2  $\mu g/L$
- ) Iron: Four stations (KL2, HWY102-2, LSD, PML-1) exceeded the CCME-PAL-F and NSE EQS guideline of 300 µg/L
- Lead: Two stations (HWY-102-2 and PML-1) exceeded the CCME-PAL-F and NSE EQS guideline of 1 μg/L

# 9.4 Microbiological

The Heath Canada guideline of ≤ 400 E.Coli /100 mL was exceeded at one station (KL5), which reported 517 MPN of E.Coli /100 ml.

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## 10 REFERENCES

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

http://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwj0zdeAjvHXAhVI 4oMKHWTjAEgQFggnMAA&url=http%3A%2F%2Fceqg-rcqe.ccme.ca%2Fdownload%2Fen%2F205&usg=AOvVaw1H9Vn3HNCi35lsLScrzlvG

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-guality-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.

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2017/12/08



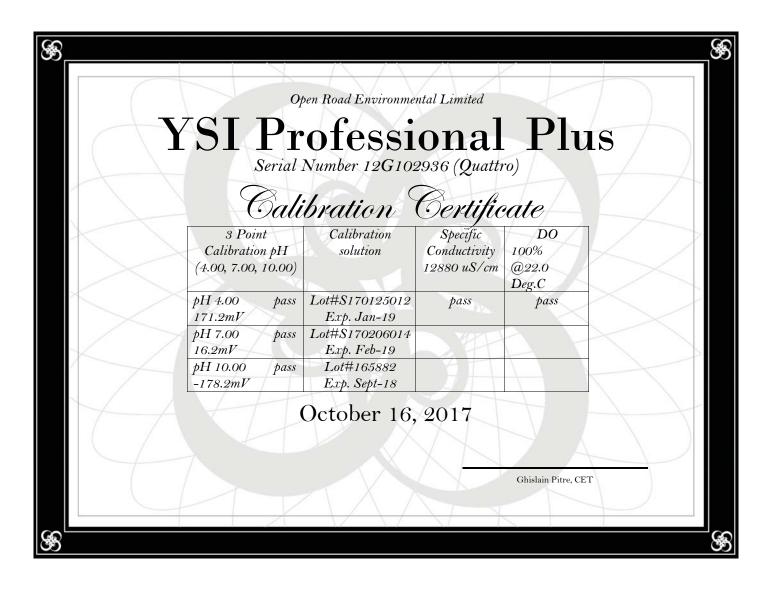
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# **Appendix A**

Instrument Calibration Report



# **Appendix B**

Field Reports

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

# **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	11°
Cloud Cover :	50%
Wildlife Sightings:	N/A
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.

	Remarks
Date (d.m.y):	18.10.17
Time (hh:mm):	9:35
Sample Depth (m):	1
pH:	7.84
Dissolved Oxygen (mg/L):	8.22
Secchi Depth (meters):	2.2
Water Temperature (degrees Celsius):	14.1°
Conductivity (μs/cm):	312

Additional Co	Additional Comments / Notes						



Project:	Water Quali	ty Monitoring - Bedfo	rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5		
Client:	Halifax Regio	Halifax Regional Municipality				
Site: Kearney Lake			Site ID: KL2			
Watercourse: Kearney Lake		Location: Kearney Lake Road				
Monitoring W	Monitoring Well □Pumping Well ☒ Surface Water □Spring/Seep □Discharge Pipe □Other:					
<b>GPS Coordinates</b> : 20T 0443942E, 4949			803N (UTM)	, NAD83)		
SNC Field Pers	sonnel:	nel: Ryan Flinn / Maria Gutierrez				

# **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	12°
Cloud Cover:	80%
Wildlife Sightings:	Birds
Site Accessibility: Yes, Accessible	Off Colin's Rd.
Site Access Detail:	Sample taken on the lake side of the culvert between residential buildings 20 and 28. Walked down rock to left of culvert. Note: Sample when standing downstream of bottle.

	Remarks
Date (d.m.y):	18.10.17
Time (hh:mm):	10:30
Sample Depth (m):	0.4
pH:	6.29
Dissolved Oxygen (mg/L):	6.23
Secchi Depth (meters):	1.2
Water Temperature (degrees Celsius):	10.6°
Conductivity (µs/cm):	109

Additional	Comments	/	Notes
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Project:	Water Quali	ty Monitoring - Bedfo	rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5
Client:	Halifax Regio	onal Municipality		
Site: Kearney Lake Run			Site ID: KL3	
Watercourse: Kearney Lake Run		Location: Kearney Lake Road		
Monitoring Well □Pumping Well ☑ Surface \			/ater □Spr	ing/Seep □Discharge Pipe □Other:
<b>GPS Coordinates:</b> 20T 0444390E, 4950		406N (UTM,	, NAD83)	
SNC Field Personnel: Ryan Flinn / Maria G		utierrez		

# **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	13°
Cloud Cover:	60%
Wildlife Sightings:	Birds
Site Accessibility: Yes, Accessible	Off walking trail from Amesbury Gate Rd.
Site Access Detail:	Access to site is via a walking path clearly evident off of Amesbury Gate Rd. (off Larry Uteck Blvd.) roughly 205m down road on left. Walk down path, follow gravel walkway down hill and take sample at the low point facing the dam. Look for large rock outcrop on right.

	Remarks
Date (d.m.y):	18.10.17
Time (hh:mm):	10:15
Sample Depth (m):	0.5
pH:	6.97
Dissolved Oxygen (mg/L):	8.17
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	13.8°
Conductivity (μs/cm):	248

Additional Comments / Notes					



Project:	Water Quality Monitoring - Bedfo		rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5	
Client:	Halifax Regio	onal Municipality			
Site: Kearney Lake Run			Site ID: KL4		
Watercourse: Kearney Lake Run			Location: Kearney Lake Road		
Monitoring Well □Pumping Well ☑ Surface \			/ater □Spr	ing/Seep □Discharge Pipe □Other:	
<b>GPS Coordinates:</b> 20T 0444463E, 4950		571N (UTM,	, NAD83)		
SNC Field Personnel: Ryan Flinn / Maria G		utierrez			

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	13°
Cloud Cover:	70%
Wildlife Sightings:	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):	18.10.17
Time (hh:mm):	10:05
Sample Depth (m):	0.5
pH:	6.84
Dissolved Oxygen (mg/L):	7.32
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	13.8°
Conductivity (µs/cm):	252



Project:	Water Quali	Water Quality Monitoring - Bedfo		Sub-Area(s): 9
Client:	Halifax Regio	onal Municipality		
Site: Kearney Lake		Site ID: KL5		
Watercourse: Kearney Lake		Location: Kearney Lake Road		
Monitoring Well □Pumping Well ☑ Surface V			/ater □Spi	ring/Seep □Discharge Pipe □Other:
<b>GPS Coordinates:</b> 20T 4949142E, 4452		80N (UTM,	NAD83)	
SNC Field Personnel: Ryan Flinn / Maria G		utierrez		

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	12°
Cloud Cover:	50%
Wildlife Sightings:	N/A
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):	18.10.17
Time (hh:mm):	9:50
Sample Depth (m):	0.7
рН:	7.05
Dissolved Oxygen (mg/L):	7.17
Secchi Depth (meters):	2.7
Water Temperature (degrees Celsius):	14.6°
Conductivity (µs/cm):	257



Project:	Water Quality Monitoring - Bedfor		rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5
Client:	Halifax Regional Municipality			
Site: Highway 102		Site ID: H	WY 102-1	
Watercourse: Marsh area		Location: H	lighway 102, south of exit 3	
Monitoring Well □Pumping Well ☑ Surface Wa		/ater □Spr	ing/Seep □Discharge Pipe □Other:	
<b>GPS Coordinat</b>	<b>PS Coordinates:</b> 20T 0444708E, 4951644N (UTM, NAD83)		, NAD83)	
SNC Field Pers	C Field Personnel: Ryan Flinn / Maria Gutierrez			

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	13°
Cloud Cover:	40%
Wildlife Sightings:	N/A
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):	18.10.17
Time (hh:mm):	11:40
Sample Depth (m):	0.4
pH:	6.32
Dissolved Oxygen (mg/L):	5.56
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	10.1°
Conductivity (μs/cm):	266





Project:	Water Quality Monitoring - Bedfo		rd 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 W		/ater □Spr	ring/Seep □Discharge Pipe □Other:	
<b>GPS Coordinates:</b> 20T 0444829E, 4951778N		778N (UTM,	, NAD83)	
SNC Field Pers	SNC Field Personnel: Ryan Flinn / Maria Gutierrez			

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	13°
Cloud Cover:	30%
Wildlife Sightings:	N/A
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.

	Remarks
Date (d.m.y:	18.10.17
Time (hh:mm):	12:25
Sample Depth (m):	0.2
pH:	8.32
Dissolved Oxygen (mg/L):	11.32
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	15.2°
Conductivity (µs/cm):	338

Additional Comments / Notes		



Project:	Water Quality Monitoring - Bedfo		rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5
Client:	Halifax Regio	alifax Regional Municipality		
Site: Lake Shore Drive		Site ID: LS	SD .	
Watercourse: Marsh @ Lakeshore Dr.		Location: K	ingswood Subdivision	
Monitoring Well □Pumping Well ☑ Surface Water □Spring/Seep □Discharge Pipe □Other			ing/Seep □Discharge Pipe □Other:	
<b>GPS Coordinates:</b> 20T 0442583E, 49504		431N (UTM,	, NAD83)	
SNC Field Pers	SNC Field Personnel: Ryan Flinn / Maria Gutierrez			

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	14°
Cloud Cover:	80%
Wildlife Sightings:	Birds
Site Accessibility: Yes, Accessible	Via Lakeshore Drive in Kingswood Subdivision
Site Access Detail:	Take Kingswood Drive off Hammonds Plains Road. Travel down to Diana Drive on left go to end and take a left on Lakeshore drive. Travel approximately 1.0 km. There will be a clearing on left down to power lines. Drive truck (4X4) down until larger clearing is reached and park. Continue (walk) 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):	18.10.17
Time (hh:mm):	11:05
Sample Depth (m):	0.3
pH:	5.91
Dissolved Oxygen (mg/L):	5.34
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	9.7°
Conductivity (µs/cm):	92





### FIELD REPORT -Fall 2017

Project:	Water Quality Monitoring - Bedfo		rd West	Sub-Area(s): 9	
Client:	Halifax Regional Municipality				
Site: Larry Uteck Blvd.			Site ID: LU		
Watercourse:	Watercourse: Pond		Location: Larry Uteck off-ramp		
Monitoring Well □Pumping Well ☑ Surface W		/ater □Spr	ing/Seep □Discharge Pipe □Other:		
<b>GPS Coordinates:</b> 20T 0444954E, 4949		891N (UTM,	, NAD83)		
SNC Field Personnel: Ryan Flinn / Maria G		utierrez			

### **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	15°
Cloud Cover:	30%
Wildlife Sightings:	Birds
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):	18.10.17
Time (hh:mm):	12:00
Sample Depth (m):	0.4
pH:	6.90
Dissolved Oxygen (mg/L):	7.43
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	13.3°
Conductivity (μs/cm):	590

## **Additional Comments / Notes**

• Visible round algae plumes beneath water surface



## FIELD REPORT -Fall 2017

Project:	Water Quality Monitoring - Bedford West		rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5	
Client:	Halifax Regional Municipality				
Site: Paper Mill Lake			Site ID: PML1		
Watercourse:	Watercourse: Paper Mill Lake		Location: Moirs Mill Subdivision		
Monitoring W	Monitoring Well □Pumping Well ☑ Surface W			ing/Seep □Discharge Pipe □Other:	
<b>GPS Coordinates:</b> 20T 0445129E, 4951		154N (UTM,	, NAD83)		
SNC Field Personnel: Ryan Flinn / Maria G		utierrez			

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	13°
Cloud Cover:	20%
Wildlife Sightings:	N/A
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):	18.10.17
Time (hh:mm):	13:25
Sample Depth (m):	0.7
pH:	7.31
Dissolved Oxygen (mg/L):	8.19
Secchi Depth (meters):	3.9
Water Temperature (degrees Celsius):	14.4°
Conductivity (μs/cm):	255

Additiona	I Comments	/ Notes
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## FIELD REPORT -Fall 2017

Project:	Water Quality Monitoring - Bedfo		rd West	<b>Sub-Area(s):</b> 2, 3, 4, 5	
Client:	Halifax Regional Municipality				
Site: Paper Mill Lake			Site ID: PML2		
Watercourse:	Watercourse: Paper Mill Lake		Location: Moirs Mill Subdivision		
Monitoring Well □Pumping Well ☑ Surface V		/ater □Spr	ing/Seep □Discharge Pipe □Other:		
<b>GPS Coordinates:</b> 20T 0445363E, 4951		740N (UTM,	, NAD83)		
SNC Field Personnel: Ryan Flinn / Maria G		utierrez			

## **Site Conditions**

Weather:	Sun and cloud
Air Temperature:	14°
Cloud Cover:	35%
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):	18.10.17
Time (hh:mm):	14:00
Sample Depth (m):	1
рН:	6.87
Dissolved Oxygen (mg/L):	6.56
Secchi Depth (m):	2.9
Water Temperature (degrees Celsius):	14.0°
Conductivity (μs/cm):	252

Additional Comments / Notes					



# **Appendix C**

Site Photographs



Photo 1: KL1 Kearney Lake Sample Location



Photo 2: KL2 Kearney Lake Sample Location.

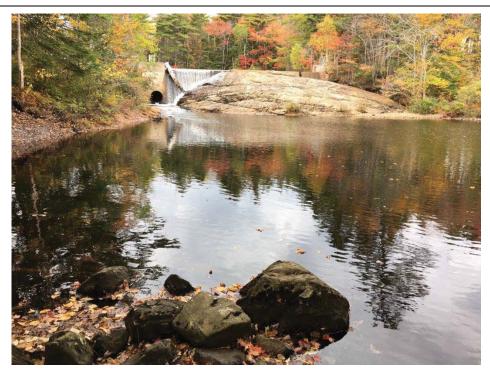


Photo 3: KL3 Kearney Lake Sample Location



Photo 4: KL4 Kearney Lake Sample Location



Report Fall 2017



Photo 5: KL5 Kearney Lake Sample Location

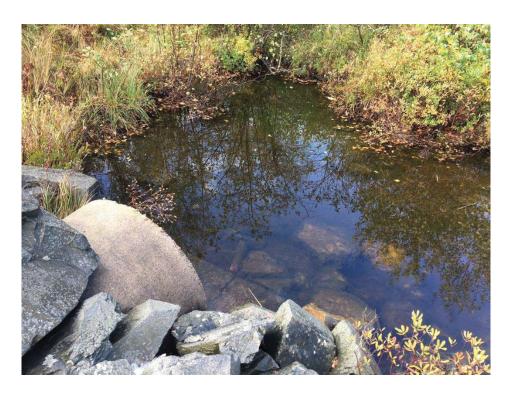


Photo 6: HWY 102-1 Sample Location



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

Tested Parameters		RDL	KL1	KL2	KL3	KL4	KL5	HWY-102-1	HWY-102-2	LSD	LU	PML-1	PML-2	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL-F (Applied)
Sampling Date			2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18	2017/10/18			
Sampling Time			9:35 AM	10:30 AM	10:15	10:05 AM	9:50	11:05	12:00	14:00	13:25	11:40	12:25			
Field Data (in Situ)																
Secchi Depth	Meters	-	2.2 14.1	1.2 10.6	N/A 13.8	N/A 13.8	2.7	N/A 9.7	N/A 13.3	2.9	3.9	N/A 10.1	N/A 15.2		minimum of 1.2	-
Water Temp Dissolved Oxygen	mg/L	-	8.2	6.2	8.2	7.3	7.2	5.3	7.4	14.0	14.4 8.2	5.6	15.2			5.5 - 9.5
oH	pH	-	7.8	6.3	7.0	6.8	7.1	5.9	6.9	6.9	7.3	6.3	8.3		5.0-9.0	6.5 - 9.0
Specific Conductance (µs/cm)	uS/cm	-	312.0	109.0	248.0	252.0	257.0	92.0	590.0	252.0	255.0	266.0	338.0			
Inorganic Parameters																
Alkalinity	mg/L	5	10	9	9	10	9	16	11	20	20	9	11			-
Chloride True Color	mg/L	1 5	60 12	19 57	59 15	59 16	60	51 29	92 22	36 21	143	59 24	60 19			120
Nitrate + Nitrite as N	TCU mg/L	0.05	0.10	<0.05	0.24	0.15	0.09	0.58	0.07	0.22	1.72	0.20	0.16			-
Nitrate as N	mg/L	0.05	0.10	<0.05	0.24	0.15	0.09	0.58	0.07	0.22	1.72	0.20	0.16			13
Nitrite as N	mg/L	0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			0.06
Ammonia as N	mg/L	0.03	0.04	0.04	0.03	0.04	0.04	0.07	0.14	0.04	0.04	0.05	< 0.03	**	**	18
Total Kjeldahl Nitrogen as N	mg/L	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	3.8	0.6	10.0	0.6	1.1	<0.4			-
Total Organic Carbon Ortho-Phosphate as P	mg/L	0.5	4.8	8.5 <0.01	4.1	4.0	3.9 <0.01	6.9 <0.01	5.9 <0.01	6.9 <0.01	5.4	6.3	4.1 <0.01			
ou morriosphate as P	mg/L	0.01	<0.01 7.0	<0.01 6.7	<0.01 6.9	<0.01 7.0	<0.01 6.9	<0.01 6.9	<0.01 6.5	<0.01 7.0	<0.01 7.1	<0.01	<0.01 7.0		5.0-9.0	6.5 - 9.0
Calcium	mg/L	0.1	7.U 8.3	3.9	8.1	7.0	7.5	14.6	14.7	6.7	22.8	9.5	7.U 8.1	<del></del>	3.0-5.0	0.3 - 5.0
Magnesium	mg/L	0.1	1.3	0.9	1.2	1.3	1.1	2.2	2.1	1.6	2.5	1.5	1.2			
Total Phosphorus	mg/L	0.002	0.005	0.010	0.007	0.006	0.005	0.008	0.011	0.015	800.0	0.099	0.006			0.01
Potassium	mg/L	0.1	1.2	0.7	1.0	1.1	0.9	2.0	1.6	1.2	2.6	1.3	1.1			-
Sodium	mg/L	0.1	35.7	13.0	35.9	38.9	37.2	29.6	55.2	23.0	86.9	36.0	35.5			-
Reactive Silica as SiO2 Total Suspended Solids	mg/L	0.5	1.8	4.6 <5	1.9	2.1 <5	1.7	5.6 <5	6.4	4.0 <5	5.9 <5	1.8 104	2.0		-	-
Sulphate	mg/L mg/L	2	10	3	10	10	10	19	9	4	33	104	11			_
Turbidity	NTU	0.1	0.8	1.6	2.6	1.6	0.9	1.1	12.5	15.1	3.0	31.3	1.8		50	
Conductivity	umho/cm	1	249	97	247	248	246	258	366	171	610	248	255	-		
Calculated Parameters																
Anion Sum	me/L		2.11	0.78	2.07	2.08	2.09	2.20	3.01	1.51	5.24	2.09	2.15			-
Bicarb. Alkalinity (as CaCO3)	mg/L	5	10 123	9	9 122	10	9 123	16	11 187	20 87	20	9	11 124			**
Calculated TDS Carb. Alkalinity (as CaCO3)	mg/L mg/L	10	<10	<10	<10	126 <10	<10	131 <10	<10	<10	311 <10	<10	<10	-		
Cation sum	me/L		2.12	0.90	2.10	2.27	2.12	2.28	3.60	1.59	5.21	3.15	2.09			-
Hardness	mg/L	-	26.10	13.40	25.20	26.80	23.30	45.50	45.40	23.30	67.20	29.90	25.20			
% Difference/ Ion Balance (NS)	%	-	0.20	7.50	0.80	4.30	0.70	1.80	8.90	2.30	0.30	20.30	1.60			-
Langelier Index (@20C)	NA		-2.68	-3.35	-2.85 -3.17	-2.71	-2.84	-2.33	-2.90	-2.44	-1.85	-2.92	-2.66			-
Langelier Index (@ 4C) Saturation pH (@ 20C)	NA NA	-	-3.00 9.68	-3.67 10.00	-3.17 9.73	-3.03 9.66	-3.16 9.77	-2.65 9.23	-3.22 9.41	-2.76 9.45	-2.17 8.98	-3.24 9.67	-2.98 9.65			-
Saturation pH (@ 4C)	NA NA		10.00	10.30	10.10	9.98	10.10	9.55	9.73	9.77	9.30	9.99	9.97			-
Metals (ICP-MS)								7.53				3.33				
Total Aluminum	ug/L	5	46	240	43	55	44	100	542	401	29	4,190	34	5		100 ug/L (pH ≥6.5)
Total Antimony	ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	20		-
Total Arsenic Total Barium	ug/L ug/L	5	<2 17	<2 14	<2 20	<2 20	<2 17	<2 77	<2 122	<2 11	<2 111	3 58	<2 23	5.0 1000		5
Total Beryllium	ug/L ug/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5.3		
Total Bismuth	ug/L	2	<2	<2	<2	<2	- 2	<2	<2	<2	<2	<2	<2			
Total Boron	ug/L	5	26	17	12	11	10	24	12	20	19	12	11	1200		1500
Total Cadmium	ug/L	0.017	< 0.017	< 0.017	< 0.017	< 0.017	<0.017	< 0.017	0.048	<0.017	0.052	0.179	< 0.017	0.01		0.09
Total Chromium	ug/L	1	<1	1	<1	<1	<1	1	2	1	1	5	<1			1
Total Cobalt	ug/L	1	<1	<1	<1	<1	<1	<1	2	<1	<1	6	<1	10		-
Total Copper	ug/L	1	1	1	1	<1	1	1	3	1	3	8	1	2		2 ug/L (hardness < 82 mg/L)
Total Iron	ug/L	50 0.5	116 <0.5	572	130 <0.5	141 <0.5	106 <0.5	281 <0.5	4.760 3.3	87Z4 0.7	289 <0.5	12,600	145 <0.5	300	-	
Total Lead	ug/L	0.5	< 0.5	<0.5 64	<0.5	<0.5 48	<0.5	<0.5		250		9.1 894	<0.5 26	1 820	-	1 ug/L (base on hardness)
Total Manganese Total Molybdenum	ug/L ug/L	2	17 <2	64 <2	54 <2	48 <2	13 <2	28 <2	215 <2	250 <2	91 <2	894 <2	26 <2	820 73	-	73
Total Nickel	ug/L	2	<2	<2	<2	<2	- 2	<2	3	<2	<2	6	<2	25		25 ug/L (base on hardness)
Total Selenium	ug/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.0		1
Total Silver	ug/L	0.1	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.1	< 0.1	<0.1	<0.1	<0.1	<0.1	0.1		0.25
Total Strontium	ug/L	5	40	20	41	40	38	76	80	31	111	47	39	21000		-
Total Thallium Total Tin	ug/L	0.1	<0.1 <2	<0.1 <2	<0.1 <2	<0.1 <2	<0.1	<0.1	<0.1 <2	<0.1	<0.1 <2	<0.1	<0.1	0.8	-	0.8
Total Titanium	ug/L ug/L	2	<2	<2	<2	<2	<2	<2	15	7	<2	75	<2			-
Total Uranium	ug/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	300	-	15
Total Vanadium	ug/L	2	<2	<2	<2	<2	<2	<2	3	<2	<2	12	<2	6		
Total Zinc	ug/L	5	6	6	6	<5	<5	8	19	7	22	29	5	30	**	30
Microbiological Parameters																
Total Coliforms	MPN/100 mL	1	154	659	411 46	>2420	>2420	>2420	>2420	641	1,990	166	1,730	-	400	-
E Coli																
E. Coli Chlorophyll A - Acidification Method	MPN/100 mL ug/L	0.05	3 1.10	0.31	1.34	0.35	517 1.22	3 0.62	41 28.94	1.85	2.47	<1 4.86	1.27		400	-

TABLE 1A: Historical Data - Bedford West \	Water Quality 1	Sampling Progra																															
Fall 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL F (Applied)	HRM Phosphorus Trigger Range (Applied)														Kearney i	Lake												
Sample Sites																				ML1													
ampling Date ampling Time	yyyy-mm-dd hhomm						2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24 13:10	2010/11/01	2011/05/13	2011/08/14 14:30	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2013/08/16	2013/10/16	2014/05/14 10:30	2014/08/14	2014/10/27	2015/05/20 08:30	2015/08/25	2015/10/22 12:30	2016/05/16	2016/08/16	2016/10/25 13:20	2017/06/08 8:30	2017/08/15 9:30 AM	2017/10/18 9:35 AM
RED DATA							00.00	11.79	08.30	11.00	15.20	12.00	11.00	24.80	24.00	8.50	11.20	9.90	20.20	11.10	23.50	20.00	19.17	14.33	08.90	14.34	12.90	9.30	7.30	25.20	8.80	1.10.00	9.33700
																																	1
ecchi Depth Vater Temp	Meters		-	1.2	-		4.1 14.0	4.2	5.0 16.7	N/A 12.9	5.0 23.3	4.9	2.4 11.5	3.2 25.6	2.4 15.9	2.4 8.9	5.4 21.3	N/A 15.4	2.5	2.0	2.9	2.4 12.7	212	2.5	NCC 14.1	N/A 26.1	9.4	1.8	2.1	2.5 11.9	2.1 16.6	2.2	2.2
issolved Osvern	mg/L		-	-	55-95		10.6	8.2	7.0	9.1	7.9	10.5	10.7	8.2	92	9.0	7.9	8.7	9.0	8.6	8.1	15.7	7.2	8.1	2.6	8.1		14.0	10.3	11.9	8.3	7.9	8.2
H (in Situ)	pH	-	-	5.0-9.0	6.5 - 9.0		6.2	6.8	6.7	7.2	7.3	3.3	6.6	6.2	6.0	9.7	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
pecific Conductance	uS/cm	-		-	-		263.0	299.0	261.0	245.0	242.0	218.7	255.0	179.6	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	299.0	212.4	240.0	292.0	312.0
NORGANICS																																i l	1
Total Alkalinity (as CaCO3)	mg/L	5	-	-	-		6	1	8	7		6	- 6	9	7	24	7	- 6	- 6	- 6	- 1	30	14	4	5	6	7	5	8	6	- 6	8	30
Dissolved Chloride (CI)	mg/t	1	-	-	120		\$1	74	64	62	60	53	73	45	22	66	70	8	3	59			76	46	S	62	58	55	57	45	71	72	60
Colour Nitrite + Nitrate	TCU mgt	0.05	-	-	-		18 0.18	18 0.09	16 0.12	26 0.21	0.16	0.23	0.20	40 0.11	45 0.13	0.20	0.09	20	0.18	27 0.14	0.19	13 0.11	8 0.11	23 0.08	37 0.15	0.15	22 0.17	31 0.10	17 0.15	18 0.13	15 0.20	029	12
Sirvate (N.)		0.05			- 13		0.18	0.09	0.22	0.21	0.16	0.23	0.20	-	0.23	0.20	0.09	0.10	0.18	0.14		0.11	0.11		0.15		0.17	0.10	0.15	0.13	0.20	0.09	0.10
illoite (N)		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	<0.05	40.05	0.07	<0.05	0.12	0.21	10.05
Vitrogen (Ammonia Nitrogen) *	Jgm.	0.03	-	-	28		<0.05	40.05	40.05	<0.05	<0.05	905	<0.05	<0.05	<0.05	0.04	0.03	60.03	0.03	0.03	<0.03	£0.03	<0.03	<0.03	<0.050	<0.03	40.03	0.05	0.09	<0.03	<0.03	<0.03	0.04
Total Kjeldahl Nitrogen as N Total Organic Carbon	mgt	0.4	_	-			2.4	2.9	4.7	3.3	3.2		3.4	5.9	5.5	0.9 5.4	3.1 2.9	0.4 5.2	4.4	0.7 4.1	4.1	1.1 4.6	<0.4 2.4	0.4 4.4	3.0	4.5 5.1	0.4	0.7	<0.4	3.0	49.4	<0.4 4.6	48.4
Fotal Organic Carbon Orthophosphate (as P)	mg/L			-		<del>                                     </del>	2.4 <0.01	2.9 <0.01	4.7	<0.01	3.2 <0.01	3.1 <0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.2 40.01	0.01	<0.01	4.3	4.6 <0.01	<0.01	4.4	<0.000	40.01	5.5 <0.01	4.3	3.4 <0.01	7.3 <0.01	4.5 <0.01	4.6	40.00
oH (Lab)	pH		-	509.0	6.5 - 9.0	1	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
Total Calcium (Ca)	mp/t	0.1	-	-	-		9.2	8.5	7.2	7.7	8.7	83	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	8.1
Total Magnesium (Mg)	/am	0.1		-	-		1.5	1.4	12	1.4	1.4	13	1.3	0.9	1.1	1.1	1.5	15	1.1	1.2	12	1.6	1.6	0.9	920.0	1.3	0.9	1.1	1.1	12	13	1.2	1.8
Fotal Phosphorus Fotal Potassium (K)	mg/L mg/L	0.002	-	-		0.000	<0.020	<0.020 0.9	<0.002 1.3	0.009	0.007	0.005	0.008	0.012	0.009	0.027	0.043	0.007	0.007	0.011	0.006	0.011	0.026	0.013	0.008	0.002	0.011	0.024	0.005	0.008	0.010	0.000	0.005 1.3
Total Sodium (Na)	mp/s	0.1	-		-		51.0	46.0	37.0	31.8	35.2	22.5	43.7	22.8	19.8	40.1	42.0	29.8	25.8	26.2	31.6	50.2	54.2	37.6	22.0	43.3	39.8	35.5	32.2	310	44.9	50.3	8.7
Reactive Silica (SIO2)	mgt	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
Total Suspended Solids	Jgm.	5	-	-	-		1	1	<1	4	17	1	2	2	1	- 4	<5	- 6	4	- 6	5	- 6	- 6	S	<1.0	- 6	- 6	31	- 4	<	- 6	- 6	a
Dissolved Sulphate (SD4)	mg/L NTU		-	50		_	14 0.7	13 0.8	12	13	11 0.6	11	1.0	10	0.9		9	9	11	2.3	9 0.5	12	11 0.7	7	9 0.8	1.9		10.6	0.9	10	11	9	30 0.8
Furbidity (NTU) Conductivity (uS/cm)	MTU uS/on		-	50	-		0.7 310	290	1.0 250	240	240	230	290	1.0	140	2.4 246	274	13	1.6 259	241	212	2.9 290	229	1.9	220	1.9 257	1.1 244	212	270	2.6 161	271	1.1 260	0.X 269
Colouted Decemeters	payon	-					810	497	230	240	247	230	290	190	240	240	4/3	190	2.00	271	***	290	447	437	220	431	244	212	270	161	2/1		
Anion Sum Bicarb. Alkalinity (calc. as CaCO3)		N/A	-	-	-		2.72	2.52	2.23	2.12	2.08	1.91	2.33	1.66	1.27	2.52 24	2.31	1.60	2.10	1.86 <5	1.71	3.11	2.66 14	1.45	1.98	2.09	1.95	1.87	1.99	1.61	2.25	2.43	2.11
Calculated TDS	mg/L			-	-	-	166	151	131	123	125	118	143	92	77	139	137	98	124	104	103		165	99	120	130	119	113	115	99	139	148	30 328
Carb. Alkalinity (calc. as CaCO3)	Jam J		-	-			<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<00	<1.0	<10	<10	<10	<10	<10	<10	<10	<30
Cation Sum	me/L		-	-	-		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
Hardness (CaCO3)	Jam Jam	N/A	-	-	-		29.00	27.00	23.00	25.00	27.00	25.00	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	36.30 0.20
ion Balance (% Difference)	%	N/A N/A	-	-	-	-	2.33	0.98	2.53	4.95	0.48 -2.51	2.90	1.89 NC	11.00	0.79	5.90	2.10	5.30 -3.19	0.70	7.30	3.40 -3.02	5.80 -2.51	7.50	17.20	2.66 -3.21	7.50	4.50	4.10	1.50	6.20 -3.20	6.10	4.80 -2.78	-2.68
Langelier Index (g) 4C)	N/A		-		-		-2.93	-3.12	-3.19	-2.97	-2.76	-3.12	NC 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	-1.29	-9.74	-2.88	-1.52	-1.65	-3.10	-1.00
Saturation pH (@ 20C)		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		9.42	10.10	9.83	9.92	9.96	10.10	9.79	10.00	9.97	9.85	148
Saturation pH (@ 4C)	N/A	N/A		-	-		9.87	9.77	9.87	9.55	9.76	9.91	NC	9.94	9.91	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	33.00
Metals (ICP-MS)																																, ,	
Total Aluminum (Al)	us/L	5	5	-	5 - 100		230	_		289	48	-	328	-	-	321	41	168	191	120	56	229	42	155	100	-	88	206	-	-	151	- 41	-
Total Antimony (Sb)	µg/L	2	20	-			<2	-	-	<1.0	<1.0	-	<1.0	-	-	<2	<2	<2	<2	<2	<2	<2	<2	- 2	<1.0	-	- 42	a	-	-	<2		· a
Total Arsenic (As)	1/8/4		5.0	-	5		- 42	_	_	<1.0	<1.0	_	<1.0	-	-	- 2	<2	- 2	- 42	<2	- 2	0	- 2	- 2	<1.0	_	4	- 2	_	-	<2		- Q
Total Sanum (Sa) Total Sanulium (Sa)	Jan Jan		1000	-		1	16		-	19	16 c1.0		13	-	-	12	15	9	12	7	16	14	20	9	16		17	- 14		- 0	16		17 g
Total Skynuth (SI)	HB/L	2	-	1	-	1	<2	_	-	<2.0	<2.0	-	<2.0	-	-	<2	<2	- 42	- 42	<2	- 42	a	- 42	Q	<2.0		4	a		-	- 42		a
Fotal Soron (S)	µg/L	5	1200	-	1500		8	-	**	11	9	_	<50	_		- 6	11	23	6	10	9	7	22	10	-50	-	- 6		-		- 6		26
fotal Cadmium (Cd)	µg/L	0.017	0.01		0.09	1	40.3	_	_	0.053	<0.017	_	0.054	_	-	0.022	0.027	0.021	0.020	<0.017	0.017	0.037	<0.017	0.025		-	0.197	0.029		_	0.058		<0.017
Fotal Chromium (Cr) Fotal Cobalt (Co)	PB/L	1	10	-	1	-	2		-	<1.0	<0.40	-	<1.0	-		<1	<1 <1	d	<1	- 41	- d		d	<1	<0.40	_	4	- 4		_	- 4		a a
Total Cobalt (Co) Total Copper (Cu)	Jan.	1	10	-	2	<del>                                     </del>	- 2		-	6	<0.40	42.0	42.0	<2.0	<2.0	- cl	- cl - c2	- 4	- 4	- 41	- 41	- <1	d d	- 41	<2.0	- 4	2	- d	d	1	d d	2	1
fotal iron (Fe)	1/gsq	50	300	-	300		130	-		313	62	125	177	162	354	229	137	195	207	132	92	147	124	168	110	157	81	149	62	269	78	70	136
Total Lead (Pb)	MB/L	0.5	1	-	1.0 - 7.0		40.5	_		10.3	<0.50	-	<0.50	-	-	<0.5	-0.5	19	<0.5	-03.5	<0.5	5.1	50	<0.5	40.50	_	<0.5	<0.5	_	-	1.3		40.5
Fotal Manganese (Mn) Fotal Molybdenum (Mol	HB/L HB/L	2 2	820 73	-	73		100	-	-	79 <2.0	57 <2.0	59	78 <2.0	52	56	48 <2	<2	68	73	48	24 <2	41	115	42	29 <2.0	41	-22	47	23	45	46	31	17 G
Fotal Nickel (Ni)	HB/L		25		25 - 150	_	- 4			3	<2.0		3	-	-	- 4	- 2	2	2	- 4	- 4	- 2	- 2	- 4	<2.0		4	1	-		15	-	g g
Total Selenium (Se)	HB/L	1	1.0	-	1	<b>1</b>	- 2	-	-	<1.0	<1.0	-	<1.0	-	-	<1	- 41	d	d	- 4	d	d	d	- 4	<1.0	-	4	d	-	-	<1		a
otal Silver (Ag)	Pan.		0.1	-	0.25		40.5	-		40.1	<0.1	-	<0.1	-	-	40.1	49.1	<0.1	40.1	<0.1	<0.1	<0.1	49.1	<0.1	<0.1	-	<0.1	Q.1	-	-	<0.1		40.1
otal Strontium (Sr)	P8/4		21000	-			46	-		39	38	-	34	-	-	32	41	32	37	22	30		45	26	29	-	19	30	-	-	28		40
otal Thallum (TI) otal Tin (Sn)	784 784	0.1	0.8	-	0.8	1	<0.1 <2	-		40.1 42	-0.1 -(2		<0.1	-	-	-0.1 -2	<0.1	7.0 1.0	<0.1	<0.1	<0.1	<0.1 <2	40.1	<0.1	40.1	-	<0.1	<0.1			40.1 <2		40.1
Total Titanium (TI)	HB/L		-	-	+ -	<del>                                     </del>	11	+		6	<2.0		5	1	1	8	- 42	3	4	2	- 42	2	a a	5	2	-	4	2	-		- 42	-	a a
Fotal Uranium (U)	Jan.		300	-	15		0.1	-	-	0.1	40.1	-	0.1	-	-	0.1	<0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	-	<0.1	0.1	-	-	<0.1		40.1
otal Vanadium (V)	PB/L	2	6		-	1	- 2	_	-	-2	<2	_	<2	-	-	<2	<2	۵	- 42	<2	ů,	۵	۵	<2	<2	-	- 4	- 2	_	-	2		ď
otal Zinc (Zn)	J/BH	5	30	-	30		27		-	14		11	12	13	10	- 5	- 6	11	11	6	5	14	à	9	13		- 6	11	- 6	19	58	્	
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL MPN/100mL		-	400	-		200	65 24		>250	63 15	>250	91	>250	<100	2,420	>2420 11	1,120	1,200	866 2	488	525 <1	1,550	>2420	- 60	980	122	4	548 33	>2420	299 29	488 18	154
i. coli Diorophyli A - Acidification method	MYN/100mL	0.05	-	- 400	-	1	0.53	0.79	1.11	1.73	147	0.99	0.76	1.66	<100 1.36	0.62	2.30	1.54	1.22	140	1.19		0.41		0.64		1.79	2.76	0.90	2.08	145	18	110
Discrophyli A - Welschmeyer method	HØ/L		-	-		t	0.48	0.69	1.17	1.61	1.42	0.81	0.09	1.15	1.14	63.0	2.30	2.16	1.40	1.40	1.19	1.32	0.36	0.80	0.62	1.11	0.95	2.41	1.15	2.19	2.55	1.87	1.18
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TABLE 1A: Historical Data - Bedford West	Water Quality	Sampling Progra	im																														
Fell 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL F (Applied)	HRM Phosphorus Trigger Range (Applied)														Kearney Lai	ke												
Sample Sites																				K12													
Sampling Date Sampling Time	yyyymm-dd hh.mm	-					2009/06/29	2009/06/13	2009/10/01	2010/05/21	2010/06/24	2010/11/01	2011/05/13	2011/06/14	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	2017/06/15	2017/10/18
	88,798	_					11300	10.40	1095	1003	1225	1050	09:40	14300	1835	950	10.00	10:20	09:10	1800	14:30	2000	920	14:04	09:15	16.29	1,605	10:40	10.00	1250	10047	11:15 AM	10:30 AM
FIELD DATA																																	
Secchi Depth Water Temp	Meters	-		1.2	_		N/A 16.8	N/A 18.2	N/A 15.4	N/A 13.5	N/A 20.4	N/A 8.0	N/A 9.9	N/A 19.1	N/A 14.1	N/A 7.6	N/A 21.8	N/A 12.1	N/A 10.1	N/A 22.9	N/A 9.7	N/A 11.7	N/A 21.1	N/A 10.8	NCC 13.1	N/A 24.7	1.3 8.1	2.1	20.3	1.9	2.0 15.7	1.5 21.2	1.2
Dissolved Oxygen	mg/t	-	-	-	55-95		10.2	8.5	5.7	6.3	4.7	2.6	9.7	7.1	8.4	6.5	5.1	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
pH (in Situ) Specific Conductores	pH uS/cm	-	-	5.0-9.0	65-90		6.3	6.4 106.0	6.2 89.2	6.6	7.0	6.3 75.1	6.8 79.7	5.9	5.6 54.3	7.7	6.4 96.6	63.1	5.8 77.9	7.5 65.3	5.6 64.5	188.0	7.2	5.8	6.4	5.9	216	7.6 82.0	6.0	103.7	6.7 79.0	6.0 114.0	6.3 109.0
Specific Conductance	sayem	-		_	_		66.0	100.0	89.2	298.5	104.0	75.1	74.7	99.7	54.4	58.0	95.5	61.1	773	99.4	84.5	188.0	266.0	64.0	0.1	207.9	74.6	82.0	117/0	104.7	78.0	114.0	109.0
																																	<b></b>
Total Alkalinity (as CaCO3) Dissolved Chloride ICII	mgt.	5	-	-	120		41	8 48		41	7 25	- G 17	- G 19	7 14	<5 10	20 16	- G 20	12 12	- S	- G 21	<5 14	29 20	7 17	28 12	<5.0 15	7 14	<5	- G 17	10	6 30	5 20	12 19	19
Colour	TCU	5	-	-	-		20	20	20	20	63	95	90	110	120	52	60	94	37	90	71	25	44	168	50	63	61	47	48	93	46	46	17
Ntrite + Ntrate	/gm	0.05	-	-	-		0.19	0.19	0.19	0.19	0.07	0.06	0.12	0.07	40.05	0.11	0.06	<0.05	0.12	<0.05	<0.05	0.08	<0.05	<0.05	0.06	0.06	<0.05	<0.05	0.06	0.19	0.05	0.06	<0.05
Nitrate (N) Nitrite (N)	Jam Jam	0.05	-	-	0.06		0.19 <0.05	0.19 <0.05	0.19 <0.05	0.19	0.07 <0.01	-	0.12 <0.01	-	-	0.11 <0.05	<0.05	<0.05		<0.05	<0.05	0.08 <0.05	<0.05	<0.05	<0.010		<0.05	<0.05	<0.05 0.06		0.05	<0.05	<0.05
Nitrogen (Ammonia Nitrogen) *	/am	0.03	-	-	18		40.03	<0.03	40.03	40.03	<0.05	<0.05	40.05	<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	40.03	<0.03	0.03	0.66
Total Kjeldahl Nitrogen as N	rgn /	0.4	-		-		4.3	4.3	4.1	43	6.6	9.7	6.5	10.0	12.0	40.4 8.1	2.2 7.1	0.7 10.9	7.5	1.1	40.4 10.9	<0.4 6.2	0.4 6.6	<0.4	4.0	0.8 13.3	0.8	0.4	0.9	0.5	40.4	0.5 8.2	
Total Organic Carbon Orthophosphate (as Pl	mg/L	0.5	-	-	-	-	4.3	4.3	40.01	4.3	<0.01	9.7	40.01	900	12.0	8.1 <0.01	7.1	10.9	7.5 <0.01	11.1	10.9 <0.01	6.2 <0.01	<0.01	12.9	<0.010	13.3	14.0	6.2 <0.01	7.0 <0.01	13.2 <0.01	8.5 <0.01	40.01	45.00
pH (Lab)	pH	N/A	-	5.0-9.0	65-90		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	
Total Calcium (Ca)	ngt	0.1	1	-			6.5	6.5	6.5	6.5	4.1 1.0	2.6 0.8	2.5 0.6	2.5	2.2 0.4	2.4	3.6	2.9	2.7	2.5 0.5	2.4	3.4 1.1	4.0	2.4 0.6	2,600.0 640.0	3.4 0.9	1.1	2.9	4.5	5.6 1.5	3.6	4.3	19
Total Magnesium (Mg) Total Phosphorus	Jam Jam	0.002		-	_	0.010	0.020	0.023	0.020	0.020	0.009	0.009	0.009	0.008	0.4	0.7	0.059	0.013	0.010	0.020	0.029	0.012	0.022	0.025	0.008	0.012	0.7	0.7	0.016	0.013	0.012	0.021	0.00
Total Potasskam (K)	right.	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
Total Sodium (Na) Beartine Siline (SD2)	/am	0.1	-	-	-		21.6	31.6	21.6	31.6	14.7	10.6 4.7	11.1	7.8	6.9	9.8	14.2	9.5	8.9 2.8	7.0	7.9 4.9	17.5	14.0	7.6 4.6	2.0	11.5	6.6	11.5	16.1	17.7	13.6	15.4	15.0
rotal Suspended Solids	/am	672		-	-		103	103	103	103	7.	47	- 41 - 41	4.1	4.0	- 2.6	4.0	- 63	- 28	135	- 63	- 44	- 44	- 4.5	<1.0	- 6	5.1 17	2.0	2.1	- 6	13	12	63
Dissolved Sulphate (SO4)	mg/L	2	-	-	-		9	9	9	9	-2	- 2	- 2	- 2	- 2	3	3	2	- 4	5	- 4	- 4	2	3	1	<2	3	4	3	7	3	2	
Turbidity (NTU) Conductivity (uS/cm)	NTU u5/cm	0.1	-	50	-		0.5 212	0.5 212	0.5 212	0.5 212	1.0	1.0 97	0.4	0.7 66	0.6	0.5 71	1.1 91	1.0 61	1.9	2.2	1.0	0.9 87	0.8 94	1.2	<1.0	1.6 81	6.2	0.7 79	2.0	1.9	0.8	4.4 110	1.6
Conductivity (us/cm)	ja/cm	- 1		_	_		212	212	212	212	100	97	- /4	66	- 54	/1	91	61	8.4	69	6.2	8/	94	66	64	- 81	72	79	135	125	93	110	
																																	0.78
Anion Sum Bicarb, Alkalinity (calc. as CaCO3)	me/L mg/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 <5	0.54	0.63 <5	0.70 <5	0.48 <s< td=""><td>1.23</td><td>0.66</td><td>0.96 28</td><td>0.48 &lt;1.0</td><td>0.54</td><td>0.40 &lt;5</td><td>0.56</td><td>1.00</td><td>1.13</td><td>0.73</td><td>0.92</td><td></td></s<>	1.23	0.66	0.96 28	0.48 <1.0	0.54	0.40 <5	0.56	1.00	1.13	0.73	0.92	
Calculated TDS	/am	1	-	-	-		36	55	25	46	55	28	37	34	25	45	44	24	37	37	31	65	- 44	44	32		25	38	59	68	46	51	
Carb. Alkalinity (calc. as CaCO3) Cation Sum	/am	N/A	-	-	-		<1 0.71	<1 0.99	0.67	<1 0.74	<1 0.95	<1 0.74	<1 0.68	<1 0.55	<1 0.49	<10 0.65	<10 0.94	<10 0.73	<10 0.63	<10 0.54	<10	<10 1.07	<10	<10 0.57	<1.0 0.57	<10 0.82	<10	<10 0.76	<10	<10 1.25	<10	<10 1.05	
Lation sum Handness (CaCO3)	me/L	N/A		-	-		10.00	15.00	10.00	12.00	14.00	12.00	9.00	9.00	8.00			11.40		8.30	9.30	12.00	14.10	8.50	9.10	12.20	0.47 5.60	10.10	15.80		13.10	15 30	0.90
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
Langeller Index (@ 20C) Langeller Index (@ 4C)	N/A N/A	N/A N/A	-	-	-		NC NC	-3.20 -3.45	NC NC	-3.44 -3.70	-3.05 -3.30	NC NC	NC NC	-3.66 -3.91	NC NC	-3.37 -3.69	-3.60 -3.92	-3.68 -4.00	-4.05 -4.37	-3.83 -4.15	-6.12 -6.64	-3.04 -3.36	-3.23 -3.55	-3.66 -3.98	NC NC	-3.18 -3.50	-4.51	4.04	-3.04 -3.36	-3.85 -4.17	-3.73 -4.05	-2.98 -3.30	4.8
Langever index (gr-4c.) Saturation pH (gr-20C)	N/A	N/A		-	-		NC NC	9.78	NC NC	10.00	9.83	NC NC	NC NC	10.10	NC NC	9.87	10.30	10.20	10.40	10.50	10.50	9.57	10.10	9.72	NC NC	10.20	-4.83 10.90	10.40	9.91	10.00	10.30	9.85	-8.67 30.00
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	10.90	10.90	9.29	10.40	10.00	NC	10.50	11.10	10.70	10.20	10.40	10.60	10.20	10.30
Metals (ICP-MS)																																	i l
Total Alum inum (AI)	ир/с	5	5	-	5 - 100		250	-	-	175	151	-	271	-	-	209	205	221	256	270	259	265	236	242	150	-	284	187	-	-	185	150	202
Total Antimony (Sb) Total Antimony (Sb)	Jun/L	2	5.0	-	į		a	-	-	<1.0	<1.0	-	<1.0	-	-	- 0	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	<1.0	-	-2	- 2	-	-	- 0	-	a a
Total Barium (Ba)	HD/L	- 4	1000	-	,		9	-		12	14	-	10	-	-	- 4	11	10	- 4	- 4	11	13	- 18	9	9	-	<2	-(2 10	-	-	10		- 14
Total Beryllium (Be)	µg/t.	2	5.3	-			- 2	-	-	<1.0	<1.0	-	<1.0			- 2	<2	- (2	- 42	- 42	<2	- 2	<2	<2	<1.0		- 2	- 2		- 2	- 42	-	· · ·
Total Bismuth (BI) Total Boros (B)	µg/t.	2	1200	-	1500		- 2	-	-	<2.0 15	<2.0 13	-	<2.0 <50	-	-	-(2	<2 14	<2 22	<2 6	<2	-(2	-2 11	<2 12	<2 12	<2.0	-	<2	- 2	-	-	- 2	-	- Q
Total Cadmium (Cd)	µg/t √gµ	0.017	0.01	-	0.09		<0.3	-	-	0.018	<0.017	-	<0.017	-	-	<0.017	<0.017	40.017	<0.017	<0.017	0.019	<0.017	<0.017	0.018	0.014	-	0.176	40.017	-	-	0.041		-0.617
Total Chromium (Cr)	тан т	1	_	-	1		-2	-	-	<1.0	<1.0	-	<1.0	-	-	<1	<1	<1	<1	<1	<1	9	<1	<1	<1.0	-	<1	1	-	-	<1	-	1 d
Total Cobalt (Co) Total Copper (Cu)	7,011	1	20	-	- 2	-	- 4	-	-	49.40	<0.40	-20	40.40	-2.0	-20	- 4	<1 -Q	<1 -Q	<1	- 4	<1	<1	<1	<1 4	<0.40		<1	4	- 4	-	- 4	<del></del>	
Total Iron (Fe)	1/0H	50	300	-	300		250	-	-	227	402	238	202	418	358	154	541	813	269	528	523	174	723	205	250	641	478	232	1,000	290	168	759	172
Total Lead (Pb)	J/gsu	0.5	1	-	10-7.0		<0.5	-	-	1.0	<0.50	-	<0.50	-	-	<0.5	40.5 90	1.1	<0.5	0.5 67	40.5	5.8	<0.5	0.5	<0.5	-	0.6	<0.5	-	-	<0.5		48.5
Total Manganese (Mn) Total Molybdenum (Mo)	µg/t √gµ	2	820 73	-	- 73	-	-26	-	-	41	42	25	12	68	23	17	90	114	24 <2	67 <2	53	23	146	- 25	47 <2.0	120	57	21 <2	109	29	29	96	66
Total Nickel (NI)	HD/L	2	25	-	25 - 150		- 2	-	-	- 2	- 2	-	- 2	-	-	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	<2.0	-	- 2	- 4	-	-	- 2	-	a
Total Selenium (Se)	AD/r	1	1.0	-	1		- 2	-	-	- 4	4	-	4	-	-	<1	d	1	- 4	4	<1	4	-d	<1	<1.0	-	- 4	4	-	-	4		41
Total Silver (Ag) Total Strontium (Sr)	HD/L	0.1	0.1 21000	-	0.25	-	<0.5 14	-		9.4	<0.1 20	-	<0.1 12	-	-	<0.1 10	<0.1 18	49.1 15	<0.1 12	40.1 9	<0.1 12	<0.1 16	<0.1 17	<0.1 12	<0.10 12	-	<0.1 0	40.1 12	-	-	<0.1 15	+=	-0.1 20
Total Thallium (TI)	тан т	0.1	0.8	-	0.8		<0.1	-	-	<0.1	<0.1	-	<0.1	-	-	<0.1	40.1	40.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-		<0.1	-	40.1
Total Tin (Sn)	704	2	-		-		- 2	-	-	- 0	- 2	-	- 2		-	- 2	- 2	3	-2	- 4	- 2	- 2	- 42	- (2	<2.0	-	<2	- 4	-	-	- 2		
Total Titanium (Ti) Total Uranium (U)	HD/L	0.1	300	-	15	-	2 40.1	-	-	- 401	- c2 - c0.1	-	40.1		-	- c2 - d0,1	2 40.1	3 40.1	4 40.1	<2 <0.1	-0.1	<0.1	<2	-0.1	<0.1	-	<2	- G1	-	-	-G1	+=	- d1
Total Vanadium (V)	µg/t.	2	6		-		- 2			<2.0	<2.0		<2.0			-2	- 42	- 2	<2	- 42	<2	- 2	<2	<2	<2.0		<2	- 4			- 2		
Total Zinc (Zn)	7/3H	- 5	30	-	30			-	-	5	- 5	7	<5.0	<.0	<5.0	- 6	- 6	7	- 6	- 6	- 6	- 6	- 6	- 6	<5.0	- 6	- 6	- 6	- 6	- 1	- 6		- 4
MICROBIOLOGICAL			1																														
Total Coliform	MPN/100mL MPN/100mL	1		400	-	-	1,800	170 100	-	>250	11	N250	59	>250	<100	>2420	1,986	>2420	>2420	>2420	>2420	525 <1	>2420	>2420	30	>2420 11	>2420	>2420	>2420	>2420	>2420	>2420	658 3
Chlorophyll A - Acidification method	MP/L MD/L	0.05		400			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		0.96	0.46	0.90	1.86	0.32		1.47	0.11
Chlorophyll A - Welschmeyer method	HØ/t	0.05	-	-	-		0.97	5.97	1.95	0.66	0.54	0.21	0.42	0.72	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	1.91	0.69
	1	1	1	ſ	1	T							1	1	1		1				T	1	T	1	T	ı							i .

No. 4 to Appare Mr. Committee Control and Control and

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		empling Program																															
Fall 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL- F (Applied)	HRM Phosphorus Trigger Range (Applied)														Kearney Lake													
Sample Sites																				KL3													
Sampling Date	yyyy-mm-dd hh.mm										2010/08/24			2011/08/14		2012/05/01	2012/06/14		2013/05/15	2013/08/16			2014/08/14	2014/10/27	2015/05/20							2017/08/15	
Sampling Time	55,798						09:00	11:00	09:30	11:30	16:12	11:40	10:30	12:20	12:00	10.29	1220	11:20	9.50	10:00	14:00	11:00	1150	16:25	101.00	11:45	10:40	11:00	11:30	11:00	9:36	10:15	10:15
FIELD DATA																																	
Secchi Depth	Meters		-	1.2	-	_	N/A 14.0	N/A 21.6	N/A 17.3	N/A 14.7	N/A 23.1	N/A	N/A 10.3	N/A 21.1	N/A 15.5	N/A 9.0	N/A 24.5	N/A 15.6	N/A 11.7	N/A 21.5	N/A 13.6	N/A 11.0	N/A 22.7	N/A 12.8	NCC 14.7	N/A 25.0	N/A 8.4	N/A 12.1	N/A 21.7	N/A 12.5	N/A 16.1	N/A 22.5	N/A 13.8
Water Temp Dissolved Oxygen	Celsius mg/L		-		5.5 - 9.5		10.6	8.0	8.0	9.3	7.8	10.4	10.4	8.4	26	8.9	8.2	27	10.2	9.2	8.9	5.9	7.9	8.1	8.0	25.0	8.4	9.3	7.7	11.5	9.0	7.4	8.2
pH (in Situ)	plit		-	5.0-9.0	65-90		7.3	6.7	7.0	7.3	7.3	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
Specific Conductance	uS/cm		-		-		95.0	292.0	245.0	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	245.0	248.0
INORGANICS																																	
Total Alkalinity (as CaCO3)	mg/L	5	-	-	-		- 6				7	7	6	7	7	23	6	5	- 6	5	7	15	5	6	<5.0	6	6		9		- 6		
Dissolved Chloride (Cl)	right.	1	-		120		66	G1	60	55	55	53	34	41	27	50	57	46	54	40	46	58	46	-6	60	56	56	54	56	49	63	34	59
Colour Nitrite + Nitrate	TCU mm/L	5	-	-	-		22 0.14	20 0.12	20	28 0.24	12 0.15	20 0.22	31 0.24	28 0.15	40 0.16	0.19	15	31	19 0.21	23 0.11	40.05	0.12	0.13	20 0.13	0.16	0.12	14 0.21	29 0.14	0.13	0.10	24 0.24	0.30	13
Nitrate (N)	mg/L		-	-	13		0.14	-	0.54	0.24	0.15		0.24	0.13	0.00	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	0.34
Nitrite (N)	mg/L		-	-	0.06		<0.01		-	<0.01	<0.01	-	<0.01	-	-	40.05	<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	10.05
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	40.03	0.04	40.03	40.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.050	<0.03	<0.01	0.06	<0.03	<0.01	<0.03	0.03	0.08
Total Kjeldahl Nitrogen as N Total Organic Carbon	mg/L	0.4	-	-			2.6	2.9	4.1	3.6	3.1	- 11	10	51	5.0	<0.4 5.9	2.0	<0.4 A 9	4.1	1.3	<0.4 4.6	0.6 4.6	0.4 2.8	0.4	0.2	12	0.9	43	40.4	8.0	<0.4 5.3	0.8 4.9	41.4
Orthophosphate (as P)	mg/L	0.01		-	-	_	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.01	<0.01	40.01	40.01	40.01	<0.01	4.6	40.01	40.01	<0.000	<0.01	<0.01	4.3 <0.01	<0.01	<0.01	<0.01	<0.01	40.00
pH (Lab)	plit	N/A	-	5.0-9.0	65-90	t	6.4	6.7	6.8	6.8	7.0	6.9	6.5	6.5	G.A	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
Total Calcium (Ca)		0.1	-	-	-			7.1	6.8	6.8	8.0	1.3	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
Total Magnesium (Mg)	mg/L	0.1	-	-	-	0.010	1.2	1.2	1.1	1.2	40.002	13	1.2	0.8	1.0	1.0	1.2	0.007	1.0	0.9	1.1	1.4	1.2	1.0	940.0	1.2	0.9	1.0	1.3	1.3	1.0	1.1	13
Total Phosphorus Total Potassium (K)	mg/L Zam	0.002		-		v.010	-0.02	<0.02	0.005	0.005	<0.002 0.8	0.003	0.008	0.003	0.012	0.019	0.045	0.007	0.006	0.006	1.2	0.009	1.1	0.148	770.0	0.004	0.002	0.008	0.005	0.004	0.006	0.009	0.007 1.0
Total Sodium (Na)	mg/L	0.1	-	-	-		38.0	38.0	35.0	28.3	33.1	22.0	33.0	20.8	21.3	31.2	34.5	26.4	35.1	20.1	32.1	36.4	33.0	35.3	34.0	40.0	27.1	32.1	37.2	32.8	64.0	41.4	13.9
Reactive Silica (SIO2)	mg/t	0.5	-		-		2.7	2.6	2.6	1.2	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
Total Suspended Solids	mg/L	5	-	-	-		<1	1	1	2	-2	<1	<1	<1	<1	- 6	۵	d	4	- G	- 6	4	4	- 6	- 2	4	- 6	d	4	4	ø	- 6	- 30
Dissolved Sulphate (SD4) Turbidity (NTU)	mg/L NTU	0.1	-	50	-	-	11 0.7	12	12	10 0.3	30 0.5	10	9 0.6	10 0.6	9.4	7 0.8	0.7	7	0.7	2.4	9.4	9 0.4	7 0.3	0.9	8 0.7	9.05	0.7	10	10	10	10	1.3	2.6
Conductivity (uS/cm)	u5/cm		-	-	-		250	250		220	220	220	220			197	222	182	219	216	204	218	243	216	220	242	238	206	262	185	245	251	247
Calculated Parameters																																	
Anino Sura	meli	N/A						2.17			193	1.07	1.90	150	1 36	2.03	190	155	168	130	160	214	166	154	1.07	190	1.00	1.74	108	176	2.00	105	2.07
Anion Sum Bicarb, Alkalinity (calc. as CaCO3)	me/L mg/L		-	_	-	-	2.11				1.93	1.97	1.90	1.58	1.36	2.03	1.90	1.55	1.68	1.38	1.60	2.14	1.55	1.54	<1.0	1.90	1.88	174	1.98	1.76	2.00	1.95	2.07
Calculated TOS	Zum Zum	- 1	-	-	-		128	130	121	110	117	116	115	55	82	111	113	91	106	78	100	122	106	100	110	119	103	105	120	107	127	122	122
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	-	-	-		<1	<1		<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<10	<10	
Cation Sum Hardness (CaCQ3)		N/A N/A	-		-		2.12	2.16		1.69	1.97	1.98	1.92	123	1.32	1.77	1.98	1.60 20.30	2.00	124	1.89	2.07	2.23	2.00	1.89	2.27	1.55	1.83	2.18	1.94 23.60	2.38	2.28 22.50	2.30
Hardness (CaCO3) Ion Balance (% Difference)	mg/L	N/A N/A	-	-	-	-	0.24	0.23	22.00	22.00 5.85	1.03	25.00	0.52	15.00	18.00	18.40 6.80	22.20	20.30	21.60 8.60	16.90 5.50	22.30 8.30	21.70 1.50	17.90	21.10 12.80	0.53	9.00	9,80	2.60	26.10 4.80	4.90	21.30 8.60	22.50 7.90	25.20
Langeller Index (#9 20C)	N/A	N/A	-	-	-		NC NC	-3.00	-2.89	-2.92	-2.60	-2.73	-3.23	-1.11	-1.35	-2.77	-2.55	-1.21	-3.37	-3.19	-1.05	-2.93	-3.12	-1.39	NC NC	-1.00	-3.15	-3.41	-2.44	-2.89	-1.29	-2.71	-2.85
Langelier Index (@ 4C)	N/A	N/A	-		-		NC	-3.25		-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	-2.44	-3.71	NC	-3.32	-3.47	-3.73	-2.76	-3.21	-3.61	-2.03	-8.17
Saturation pH (@ 20C)	N/A		-				NC NC		9.71		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
Saturation pH (@ 4C)	N/A	N/A	-		-		NC NC	9.92	9.96	9.99	9.84	9.85	10.00	10.10	9.98	9.79	10.30	10.40	10.40	10.50	10.20	9.91	10.30	10.30	NC	10.20	10.40	10.40	10.00	10.10	10.40	10.20	33.33
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L		5	-	5 - 100		259	259	-	124	54	-	266	-	-		54		140	65	100	260	52	105	180		90	163	-	-	128	35	41
Total Antimony (Sb)		2	20 5.0		-		a a	- 2	-	<1.0	<1.0	-	<1.0	-	-	- 4		- 4	- 2	a a	a	- 2	a	9	<1.0		-(2	-(2	-	-	- 2	-	· a
Total Arsenic (As) Total Barium (Ba)	HB/L HB/L		1000	-	,	_	12		_	16	13	_	19		-	- 4	17	15	19	9	10	17	17	16	19		<2 10	- 62			17		- 42
Total Beryllium (Be)	HB/L	2	5.3	T -	-	<b>1</b>	- 2	<2		<1.0	<1.0		<1.0		-	- 4	- 2	- 4	- 2	- 2	-2	- 2	- 2	- 42	<1.0		<2	- 42			-2		ď
Total Bismuth (Bil)	1/gu	2	-	-			a	<2	-	<2.0	<2.0	-	<2.0	-	-	- 4	- 2	- 2	Q	-2	- 2	- 2	Q	- 2	<2.0		- 2	- 42	-	- (2	-2	-	ď
Total Boron (B) Total Cadmium (Cd)	JAB/L		1200		1500	<b>.</b> – –	0.019	0.019		0.023	9 <0.017		<50		- 7	0.019	9	17	7 0.024	7 <0.017	10 <0.017	0.028	10 <0.017	12	<50		- 6	0.021			7 0.020		12 40.017
Total Cadmium (Cd) Total Chromium (Cr)	Part.		0.01	-	0.09	<del>                                     </del>	0.019		-	<1.0	<0.017	-	<1.0			0.019 <1	0.021 <1	0.007	0.028 <1	<0.017	<0.017	7	<0.017	0.017	<1.0		<0.017 <1	0.021		-	<1		40.007
Total Cobalt (Co)	HB/L	1	10	-	-	<b>1</b>	<1	<1	-	<0.40	<0.40	-	<0.40	-	-	4	- 4	4	- 4	- 4	d	d	d	4	<0.40		- 4	- 4	-	-	- 4	-	
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	4	2	<2.0	1	- 4	2	<1	<1	<1	<1	- d - 1
Total Iron (Fe)	Part.	50	300		300 1.0 - 7.0	<b>.</b> – –	523	523		73 0.6	133	58	136	104	154	137	136	119	131	71	172	137	96	118	120	165	115	112	117	99	125		130
Total Lead (Pb) Total Manesnese (Mn)	μ <u>ρ</u> t μ <u>ρ</u> t	0.5	1 820	<del></del>	1.0 - 7.0	-	<0.5 53	<0.5 53	-	0.6 37	<0.5 67	- 12	<0.5 42	- 22	22	<0.5 25	<0.5 47	0.7 46	<0.5 37	<0.5 20	92	3.6 41	40.5 45	40.5 27	40.5 36	48	<0.5 24	40.5 31	41	20	<0.5 30	- 25	48.5
Total Molybdenum (Mo)				-	73	1		- 42	-	<2.0	<2.0	-	<2.0	-	-	- 42	- 42	- 42	- 42	- 2	- 2	- 4	- 42	- 2	<2.0		- 20	- 41	-	-	- 42		· a
Total Nickel (NI)	μач	2	25	-	25 - 150		- 2	<2	-	2	<2.0	-	2	-	-	- 2	- 2	- 2	Q	- 2	- 2	2	Q	a	<2.0		<2	2	-	-	- 2	-	· a
Total Selenium (Se)	μες	1	1.0	-	1		<1	<1	_	<1.0	<1.0	_	<1.0			4	Ф	4	<1	- 4	4	4	4	d	<1.0		<1	- 4	-	_	- 4	_	
Total Silver (Ag) Total Streetium (Sr)	µg/L	0.1	21000	-	0.25	1	40.1 12	40.1 12		<0.10	<0.10 36		<0.10	-	-	40.1 25	<0.1	40.1 79	40.1 33	<0.1	40.1 32	<0.1	40.1	49.1	<0.10 20		40.1	49.1	-		40.1	-	61
Total Thallium (TI)	Jan Jau	0.1	21000	-	0.8	-	40.1	<0.1	-	40.1	-01	-	40.1		-	40.1	<0.1	<0.1	40.1	- 18 - 0.1	<0.1	40.1	49.1	40.1	40.1	-	40.1	40.1	-		<0.1		48.1
Total Tin (Sn)	μgt	2	-	-	-	t	<2	<2	-	<2.0	<2.0	-	<2.0	-	-	- 2	- (2	- 2	-2	- 42	- 2	-2	- 2	- 42	<2.0		- 42	- 42	-	-	- 2	-	ď
Total Titanium (Ti)	μgt	2	-		-		2	2	-	<2.0	<2.0	-	5	-	-	- 2	- 2	a	2	- 2	2	1	Q	2	1	**	- 2	-2		-	- 2		· a
Total Uranium (U)	μης	0.1	300		15	<b>.</b> – –	<0.1 <2	<0.1		40.1	40.1		0.1			0.1	40.1	40.1	40.1	40.1	40.1	40.1	40.1	40.1	0.1		0.1	40.1			40.1		- G1
Total Vanadium (V) Total Zinc (Zn)	μgt. μgt	5	30	-	30	-	- 6	- 6	_	10	- 2	- i	-(2	7	-	- 4	- 4	- 2	10	- 6	- 2	10	- 4	- 6	9	7	- 2	- 2		- 6	- 6	- 6	- 0
MICROBIOLOGICAL	HEN	_	-			<b>—</b>		-			_	_	_			- 14		_					-	_			_	_				_	_
	MPN/100mL	-				_	120	24		190	16	58	22	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
	MPN/100mL	- 1	-	400		1	1.20	17		2	<1		5	37	<100	2	D.	3	8	2,420	<1	<1	<1	13	<0.10	7	6	2	38	30	7	13	46
Chlorophyll A - Acidification method	ир*	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	1.86
Chlorophy® A - Welschmeyer method	2ац	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	2.45	1.32	1.87

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Claylin (Section Section Communication Commu

### HRM Water Quality Monitoring Program Results

			NSE	Health Canada	CCME	HRM																											
Fall 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Applied)	Guideline for Recreational Water Quality (Reference)	Guideline PAL- F (Applied)	Phosphorus Trigger Range (Applied)														Kearney L	ake												
Sample Sites Sampline Date	www.mm.dd							Taxana barana							Laurence I					12.4	2012/10/16 20	ones I e	conserva T				T		T and the last				
Sampling Time	hh:mm	-								11:20					11:40		12:00		9:41	10:30			11:35		10:25		11:15			11:11			10:05 AM
FIELD DATA																																	
Sarchi Danth	Maters			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			21.8	12.5	14.8	24.7	9.5	12.2	20.6	12.3	16.5	22.4	13.8
Dissolved Oxygen	mg/L	-	-		55-95		10.9	8.1	8.3	9.0	6.3	10.9	11.0	8.6	9.7	8.7	7.3	2.9	10.1	2.9	9.6		5.9	7.5	9.8	9.1	8.8	8.3	5.5	10.1	2.3	6.4	7.3
pH (in Situ) Specific Conductance	pH uS/cm	-	-	5.0-9.0	6.5 - 9.0		8.0 771.0	6.7 262.0	6.9 247.0	7.2 224.0	7.0 226.0	6.1 214.8	6.5 218.0	6.4 171.9	6.0 126.2	9.0 206.0	6.7 225.0	6.8 185.9	5.7 207.1	7.1 196.2			7.3 251.0	208.0	6.6 0.2	6.8 243.5	7.1 232.4	7.3 215.0	6.7 260.0	221.0	6.9 213.0	6.9 262.0	6.8 252.0
INORGANICS	uayum		_				771.0	292.0	247.0	2217/	220.0	219.8	218.0	171.9	120.3	200.0	223.0	100.9	207.1	190.2	2010	27830	2320	208.0	0.2	249.3	434.7	213.0	200.0	228.0	211.0	202.0	232.0
																														$\bot$			
Total Alkalinity (as CaCO3)	mg/L ms/L	5	-	-	120		5	7 65	7 60	6	1 56	7 53	5	8	7 27	22	. II	- 6	- G	<5 41	47	30	47	29	<5.0	6	7 66	- 6	9 50	8 49	<5 64	9	10
Colour	TCU	ŝ	-	-			22	18	20	27	11	20	32	38	43	48	11	20	17	21			11	28	33	10		25	12	22	19	11	16
Nitribe + Nitrabe	mg/L	0.05	-	-			0.15	0.12	0.14	0.23	0.19	0.21	0.21	0.15	0.17	0.19	0.11	0.09	0.20	0.11			0.17	0.16	0.16	0.14	0.21	0.15	0.21	0.10	0.27	0.12	0.15
Nitrate (N) Nitrite (N)	mg/L mg/L	0.05	-	-	0.06		0.15	-	-	0.23	0.19	-	0.23		-	0.19 <0.05	0.11 <0.05	0.09	0.20 40.05	0.11	0.17 <0.05	0.25	0.17	0.16	0.16	0.14 <0.05	0.21	0.15	0.14	0.10	0.15	0.12	0.15 <0.05
Ntrogen (Ammonia Nitrogen) *	mg/L	0.03		-	18		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	40.05	0.05	<0.05	0.05	<0.03	<0.03	40.03	<0.03			<0.03	<0.03	0.10	<0.03		0.06	<0.03	40.03	<0.03	0.03	0.00
Total Kjeldahl Nitrogen as N	mg/L	0.4	-	-	-		-	-	-	-	-	-	-		-	0.5	49.4	0.7		1.8	1.1	<0.4	<0.4	49.4	0.2	0.4	1.0	<0.4	49.4	0.4	40.4	0.5	40.4
Total Organic Carbon Orthophosphate (as Pl	mg/L mg/L	0.5	-	-	-		2.5	<0.01	4.0	3.3 <0.01	2.6 <0.01	40.01	2.7 <0.01	<0.01	5.4 <0.01	7.5	2.2	4.8	4.2 0.01	4.5 <0.01			2.1 <0.01	4.4	2.8	5.2 <0.01	5.7 <0.01	4.3 <0.01	3.3 <0.01	8.1 <0.01	5.1 <0.01	4.3 <0.01	40 E
pH (Lab)	mg/L 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	6.9	6.6	6.9	<0.01 7.0	<0.01 6.7	<0.01 7.0	40.01 6.9	<0.01 6.8	7.0	7.0
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	2.7	6.5	7.1	7.3	7.7	7.5	8.6
Total Magnesium (Mg) Total Phosphorus	mg/L mg/L	0.1	-	-	-	0.010	1.2		1.2	1.2	1.2	1.3	1.2	0.9	0.026	1.0	1.2	1.2	0.006	2.390		1.3	1.2	0.015	920.0 0.006	0.007	1.0	1.0	1.1 0.004	1.3	0.020	1.1 0.008	3.8 0.00s
Total Potassium (K)	mg/L	0.002				0.010	0.9	<0.02	1.0	0.004	0.9	1.0	0.007	0.004	0.026	0.022	0.043	0.007	0.006	0.6	0.016	0.022	1.1	0.015	760.0	0.907	0.004	0.007	0.004	1.0	0.8	0.008	11
Total Sodium (Na)	mg/L	0.1	-	-	-		39.0	41.0	37.0	28.5	34.3	22.9	32.1	21.5	21.1	31.5	34.5	25.2	31.6	20.1	30.7	25.9	38.6	34.1	34.0	40.0	28.2	32.4	41.4	31.1	37.6	41.4	88.9
Reactive Stica (SIO2)	mg/t	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	2.0	2.6			2.1	2.5	2.5	2.6	2.0	2.6	2.0	2.4	2.3	1.7	2.5
Total Suspended Solids Dissolved Sulphate (SOH)	mg/L Mm/L	5	-	-	-		<1	12	<1	<2 10	-2	<1	2 9	<1	- 2	- 45	- 6	<5 7	- 6	- 45	- 6	45	4	- 6	<1.0	7 9	- 6	7 10	- 6	10	10	- 45	<3. 10
Turbidity (NTU)	NTU	0.1	-	50	-		0.5	1.0	0.3	0.3	0.2	0.8	0.7	0.7	0.4	0.7	0.4	0.8	0.7	2.6			0.6	0.8	0.6	0.7	1.2	1.2	1.5	1.6	1.3	0.9	1.6
Conductivity (u5/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	201
Calculated Parameters																																	
Anion Sum	/jem	N/A	-		-		2.21	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			1.60	2.11	1.88	1.90	1.87	1.74	2.04	1.76	2.03	2.12	2.08
Bicarb. Alkalinity (calc. as CaCO3) Calculated TDS	mg/L mg/L	5	-	-	-		5 132	7	7 125	6 111	118	7 116	5 113	8 90	7 81	22 111	8 114	- G 87	-G 103	- 6		30 132	5 108	29 117	<1.0 110	6 121	7 102	<5 106	9 125	105	<5 123	9	10
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	-		-		- 112	145 <1	41	<1	- 41	<1	<1	90 <1	<1	<10	<10	<10	<10	<10		<10	<00	<00	<1.0	<101	<10	106	125	105 <10	<10	128 <10	126
Cation Sum	me/L	N/A	-		-		2.16	2.32	2.07	1.70	2.02	2.03	1.86	128	1.30	1.78	1.97	1.53	1.84	1.23			2.21	1.94	1.91	2.35	1.53	1.86	2.28	1.87	2.17	2.31	2.27
Hardness (CaCO3) ion Balance I'N Difference)	mg/L %	N/A N/A	-	-	-		22.00 1.59	25.00 2.20	22.00 0.48	22.00 5.82	25.00	27.00 4.64	22.00 0.53	16.00 11.70	17.00 2.26	18.40	21.90	19.40	21.10 4.50	16.00			24.70	21.10 4.20	20.00	25.10 10.70	13.40	20.30	22.30 5.50	21.60	24.20	23.30 4.10	26.80
Langelier Index (#P 20C)	N/A	N/A			-		-3.21	-2.89	-2.84	-2.92	-2.64	-2.75	-3.22	-3.18	-2.25	-2.79	-2.86	-3.22	-1.37	3.20 -3.21			-3.08	-2.45	NC NC	-2.98	-3.20	-3.38	-2.76	-2.93	3.20 -3.26	-2.78	-2.71
Langelier Index (@ 4C)	N/A	N/A	-	-	-		-3.46	-3.14	-3.09	-3.17	-2.89	-3.00	-3.47	-2.43	-3.56	-3.11	-3.18	-3.54	-3.69	-3.53		2.95	-3.40	-2.77	NC	-3.30	-3.52	-3.70	-3.08	-3.25	-3.58	-3.10	-8.08
Saturation pH (@ 20C)	N/A N/A	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			9.99	9.30 9.62	NC	9.92	10.20	10.10	9.79		10.00	9.77	1.66
Saturation pN (@ 4C)	N/A	N/A					10.10	9.309	9.92	10.00	9.82	9.84	20.00	10.00	10.00	9.81	10.20	10.40	10.40	10.90	10.40	9.64	10.40	9.62	NC	10.20	10.50	10.40	10.10	10.10	10.30	10.10	1.96
Metals (ICP-MS)																																	
Total Aluminum (Al) Total Antimory (Sh)	7@H	2	5 20	-	5 - 100		150			<1.0	29 <1.0	-	<1.0			42	48	149	2	106	150	216	46	93	160 <1.0		14 - 2	172	-		180	59	- 12
Total Americ (Au)	HD/r	2	5.0		5		- 42	-	-	<1.0	<1.0	-	<1.0	-	-	- 4	- 4	- 2	- 4	- 2			4	- 4	<1.0		4	- 2	-		- 4	-	- a
Total Barium (Ba)	HD/L	š	1000	-	-		16	-	-	17	18	-	- 18		-	18	17	16	18	10	19	17	19	16	20	-	17	16	-		20	-	20
Total Beryllium (Se)	1/04	2	5.3				-2	-		<1.0	<1.0		<1.0		-	- 2	- 2	-2	- 2	<2	a a	<2	-2	-2	<1.0	-	- 2	- 2	-	-2	- 42		ď
Total Barruth (BI) Total Boron (BI)	Ygy Yau	5	1200	-	1500	-	<2			<2.0 9	42.0		<2.0	-		-(2	6.2	<2 16	-2	- 6		42	42 11	- 2 11	<2.0	-	- 4	- (2	-	+=	Q Q		- G2 11
Total Cadmium (Cd)	MD/F	0.017	0.01	-	0.09		40.3		-	0.031	<0.017	-	0.035	**		0.021	40.017	0.027	0.027	0.017	0.050	0.027	<0.017	<0.017	0.022		<0.017	0.024			0.021	-	48.007
Total Oxomium (Cr) Total Cobult (Co)	Yan/L	1	10		1		<2	-	-	<1.0	<1.0	_	<1.0	-	-	<1	- 41	6	d	<1	<1	6	d	d	<1.0	-	4	<1	-		<1	_	- a
Total Cobalt (Co) Total Copper ICul	Ygq Ygq	1	30		-	+	<1	-		<2.0	<0.40	<2.0	40.40	-2.0	<2.0	- 4	- 41	<1 A	d	- d - d	<1	<1 <1	d d	- 4	<0.4		- 4	<1			<1	-	- a
Total Iron (Fe)	HD/L	50	300	-	300		56	-	-	82	51	55	119	109	118	129	118	133	211	144	248	129	55	104	100	217	83	122	61	114	136	131	161
Total Lead (Pb)	ир/ч	0.5	1	-	1.0 - 7.0		<0.5	-	-	1.2	-0.5		<0.5			-0.5	-0.5	0.8	0.9	-0.5			<0.5	40.5	<0.5	_==	<0.5	<0.5	-	<b>↓</b> □	-0.5		453
Total Manganese (Mn) Total Mohibdenum (Mn)	70H	2	#20 73		- 73	-	51 <2	-	-	25 <2.0	42.0	29	29 <2.0	27	30	23 <2	- 24	18 <2	- 24	77		34	29	28	25 <2.0	78	34 <2	34 <2	58	29	74	76	- 48
Total Nickel (NI)	704	2	25	-	25 - 150		3		-	2	<2.0	-	<2.0	-	-	- 2	- 2	5	- 2	-2	- 2	42	4	- 2	<2.0		4	2	-		7	-	- Q
Total Selenium (Se)	1/0H	- 1	1.0	_	- 1		- (2		-	<1.0	<1.0	-	<1.0	-	-	<1	<1	<1	d	<1	<1	<1	d	<li>d</li>	<1.0		- 2	<1			<1	-	q
Total Silver (Ag) Total Strontium (Sr)	J/gsu J/gsu	0.1 S	0.1 21000		0.25	-	+0.5 34	-		<0.1 23	49.1 27		<0.1 23	-		<0.1 25	49.1 32	<0.1 28	<0.1 32	<0.1 17		<0.1 31	<0.1 21	40.1 29	40.1 30		<0.1 20	40.1 28	-	+=	40.1 31	-	40.1
Total Thallium (TI)	HD/L	0.1	0.8	-	0.8		<0.1	-	-	<0.1	40.1	-	<0.1	-		<0.1	40.1	-0.1	<0.1	40.1			<0.1	40.1	<0.1	-	<0.1	<0.1	-	+=	40.1		40.1
Total Tin (Sn)	ND/L	2	-	-	-		<2	-	-	- 2	- (2	-	- (2		-	- 2	- (2	- (2	5	<2	- 2	<2	-2	- 2	<2.0	-	- 2	<2	-		- 2	-	- a
Total Titanium (Ti)	1/0/2	2				_	- 2		- 7	42	a		4 0.1	-	- 7	<2 0.1	- a	- 2	-2	- 2	3	2 <0.1	4	40.1	<2.0 <0.1		4	- 42			a		40.1
Total Uranium (U) Total Vanadium (V)	1/0H	0.1	300 6	-	- 15		<0.1 <2	-		<0.1	-0.1 <2	-	<2	-		0.1 <2	49.1	49.1 42	40.1 42	<0.1 <2		<0.1	<0.1 42	40.1	40.1 <2	-	<0.1	0.1	-	+=	40.1 42	-	- G1
Total Zinc (Zn)	HD/L	ŝ	30		30		14		-	10	7	7	11	7	7	3	9.6	66	21	- 6		9	3	3	10	- 1	12	7	- 6	- 6	7 2	7	a
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	-	_	-		28	58	-	100	16	75	83	95	-	345	>2420	921	548	>2420			1,550	>2420	-	>2420	281	488	1,730	>2420	792	>2420	>200
Total Coliform E. coli	MPN/100mL	1 1 005		400	-		- 4	23	106	1	16 <1 0.07	2	5	39	 <100	- 4	<1	- 4	6	38	<1	<1	1		<10	5	1	2	15	29	15	1	
Total Coliform		1 1 0.05 0.05	-	400	-				1.06 1.11		16 <1 0.07 0.07				-100 131 1.07						<1 0.40	<1 0.44			<10 0.55 0.51								

nber 2009) (keferenced) inonmental Quality Standards (EQQ) for Contaminated Sites (NGE 2014) Table A2 Reference for Pathway

### HRM Water Quality Monitoring Program Results

Fall 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Applied)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL- F (Applied)	HRM Phosphorus Trigger Range (Applied)										Kearney Lake									
Sample Sites																XLS									
Sampling Date Sampling Time	yyyy-mm-dd hlymm						2011/10/17 9:40	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 12:04	2015/10/22	2016/05/16	2016/08/16 8:00	2016/10/25	2017/06/08 9:00	2017/08/15 9:45	2017/10/18 9:50
	man						9:40	10:52	1,010	12:10	20004	10:50	14%5	11:30	1835	20245	09300	12306	12:00	10:00	8:00	1805	9700	9365	930
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
Water Temp Dissolved Oxygen	Celsius mg/L		-	-	5.5-9.5	-	14.7 9.4	10.5	26.1 7.9	16.6	13.3	22.7	14.7 8.6	13.7	22.9	12.8	14.1 8.3	25.4 8.8	9.4	12.2	22.2	12.7	16.8	21.0	7.2
pH (in Situ)	pH	-	-	5.0-9.0	6.5 - 9.0		6.5	7.8	6.7	6.7	6.2	1.6	6.5	6.8	7.9	6.6	7.8	6.8	7.1	5.8	5.1	2.7	7.0	6.0	7.1
Specific Conductance	u\$/cm		-	-	-		111.9	230.0	229.0	199.0	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
INORGANICS																									
Total Alkalinity (as CaCO3)	mg/L	5	-	-	-		9	21		- 6	- 6	6	5	32	- 6	- 6	5	6	7	- 6	7	9	- 6	7	
Dissolved Chloride (CI)	mg/L	1	-	-	120		37	55	57	41	58	- 64	46	61	47	47	59	28	58	54	54	53	65	58	60
Colour	TCU	5	-	-	-		25	43	10	27	10	22	18	14	11	22	35		19	27	13	17	18	14	38
Mitrite + Nitrate Mitrate (M)	mg/L mg/L	0.05	-	-	13		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 0.09
Nitrite (N)	mg/L	0.05			0.06	-	-	40.05	<0.05	40.05	<0.05	0.21	0.05	<0.05	40.05	40.05	d1010	60.05	c0.05	40.05	0.10	<0.05	0.12	0.07	10.05
Nitrogen (Ammonia Nitrogen) *	mg/L	0.03	-	-	18		<0.05	40.03	0.03	<0.03	<0.03	<0.03	60.0	<0.03	<0.03	0.06	<0.050	<0.03	0.04	0.06	<0.03	<0.03	40.03	<0.03	0.04
Total Kjeldahl Nitrogen as N	mg/L	0.4	-		-			<0.4	2.3	1.0		0.6	1.1	40.4	0.5	1.1	0.3	<0.4	1.8	0.5	<0.4	0.7	0.4	<0.4	40.4
Total Organic Carbon Orthophousbate (se 21	mg/L mg/L	0.5	-	-	-	$\vdash$	4.8	5.8	2.4	4.7	4.0	4.6	7.0	4.3	2.7	4.5	2.1	5.3	5.7	4.4	3.3 <0.01	7.0 <0.01	4.7	4.8	1.0
pH (Lab)	pH pH	N/A		5.0-9.0	6.5 - 9.0	$\vdash$	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	<0.01 7.2	<0.01 7.0	6.7	7.1	6.9
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
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	1.3
Total Phosphorus Total Potassium IIO	mg/L mg/L	0.002	-	-	-	0.010	0.009	0.018	0.040	0.006 8.0	0.005	0.013	0.010	0.010	0.026	0.135	0.005 720.0	0.005	0.005	0.004	0.004	0.003	0.010	0.012	0.005
Total Sodium (Na)	mg/L	0.1	-	-	-	-	22.0	34.6	32.0	27.7	33.6	19.2	31.3	27.5	40.3	38.3	33.0	42.6	28.3	0.7	22.1	1.0	28.9	42.4	87.2
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	2.2	1.9	2.2	2.7	2.0	2.3	2.1	1.6	1.7
Total Suspended Solids	mg/L	5	-	-	-		1	4	- 6	- 6	- 6	- 6	- 6	- 6	- 5	- 6	<1.0	V	- 6	4	4	- 45	4	- 6	- a
Dissolved Sulphate (SDN) Turbidity (NTU)	mg/L NTU	0.1	-	50	-		9 0.9	7	9.7	0.9	8 0.7	7 0.8	g 0.4	9 1.1	9.4	9.8	8 0.7	9	1.0	10 0.7	1.3	10 12	0.9	0.9	30
Conductivity (uS/cm)	uS/on	1	-	50	-	-	160	215	226	189	232	223	204	228	246	225	220	248	244	208	267	12	248	249	209
Calculated Parameters	pa,																		200	208	207	.,,,			
Anion Sum Bicarb, Alkalinity (calc. as CaCD3)	me/L mg/L	N/A	-	-	-		1.42	2.13	1.95	158	1.82	1.52	1.58	2.56	1.50	150	1.94	1.95	1.96	1.74	1.94	1.89	2.06	1.96	2.09
Salculated TDS	mg/L	1	-	-	_	-	84	118	111	96	110	52	98	136	106	103	120	124	106	105	114	113	125	122	128
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	<30
Cation Sum	me/L	N/A	-	-	-		1.35	1.94	1.85	1.64	1.94	1.23	1.91	2.12	2.27	2.14	1.87	2.40	1.58	1.95	1.93	2.01	2.20	2.30	2.33
Hardness (CaCO3) ion Balance (% Difference)	mg/L	N/A N/A	-	-	-		19.00 2.16	19.30	21.00 2.60	19.70	21.90 3.20	18.40	20.50	9.40	23.90 20.30	21.60	20.00	25.30 10.20	15.40 10.90	19.80	22.80 0.40	25.80 3.00	23.40	21.60 8.10	23.30
Langeller Index (#P 2001	N/A	N/A	-	-	_		-1.06	-2.79	-2.77	-3.62	-3.33	-3.11	-3.19	-2.64	-3.17	-3.42	-3.24	-1.20	-3.13	-2.43	-2.72	-2.69	-3.29	-2.82	-2.86
Langeller Index (g) 4C)	N,OA	N/A	-	-	-		-3.31	-3.11	-109	-3.94	-3.65	-3.43	-3.51	-2.96	-3.49	-3.74	-3.50	-2.34	-3.45	-3.75	-3.04	-3.01	-3.61	-3.14	-3.56
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	9.55	9.72	10.00	9.91	5.27
Saturation pH (g) 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	30.30
Metals (ICP-MS)																									
Total Aluminum (Al)	HD/L	.,	5	-	5 - 100			222	52	154	136	58	61	224	53	100	190	-	79	163			156	45	44
Total Antimony (Sb) Total Antimony (Sh)	MD/r	2	20 5.0	-	-		-	- 2	- 2	- 4		- 2	- 2	- 2	- (2	- 2	<1.0		- 2	- 2	-	-	- 2	-	g g
Total Barium (Ba)	µg/t J/qu		1000	-	- 3	-	-	- 18	16	15	19	- 4	16	-(2 16	17	17	17		-(2 19	- 2	-		17	-	17
Total Beryllium (Be)	HD/L	2	5.3		-	-	-	<2	<2	- 42	- 2	- 2	- 42	- 10	<2	- 2	<1.0		- 2	- 2		- 2	- 42		ď
Total Bismuth (Bi)	PD/L	2	-	-	-		-	Q	<2	<2	a	- 2	Ď	<2	- 2	- 2	<2.0		a	Q	-	-	-2	-	· a
Total Boron (B) Total Cadmium (Cd)	1/01	0.017	1200 0.01	-	1500		-	6	9	15	7	7 <0.017	0.034	0.636	<0.017	10	400		6332	7	-		٥	-	30 <0.017
Total Cadmium (Cd) Total Chromium (Cr)	HD/L	0.017	0.01	-	0.09	$\vdash$		0.022 <1	<1	0.029	0.024 Gl	<0.017	0.034	6	<0.017	0.024 <1	<1.0		0.332	0.024	-	-	0.025	-	40.017
Total Cobalt (Co)	10/2	1	10	-	-		-	<1	<1	<1	d	d	<1	<1	<1	d	<0.40		d	4	-	-	d	-	a
Total Copper (Cu)	Удн	1	2	-	2		2.0	Q	-2	- 2	- 2	d		d	<1	- 5	<2.0	1	d	4	- cl	q	d	<1	- 1
Total iron (Fe) Total Lead (Pb)	HD/L Jan/L	50 0.5	300	-	300 1.0 - 7.0	$\vdash$	175	160	78 40.5	120	111 <0.5	70	79 <0.5	111	<50	119	100	123	158	96	55	\$8	59 40.5	<0	106
Total Lead (Pb) Total Managere (Mn)	HD/L	0.5	1 820	-	1.0 - 7.0	$\vdash$	36	<0.5 30	-0.5 14	37	-0.5 25	40.5	<0.5 12	1.9	-0.5 18	0.5 25	<0.5 34	24	40.5	<0.5 23	15	17	<0.5 24	- 11	18
Total Molybdenum (Mo)	10t	2	72	-	73	-	-	- 42	<2	-2	- 2	-2	-2	-2	<2	- 2	<2.0		- 45	- 2	-	-	- 2	-	- a
Total Nickel (NI)	HD/L	2	25	-	25 - 150		-	- 2	- (2	5	-2	- 2	-2	2	<2	- 2	<2.0		3	3	-	-	14	-	· ·
Total Selenium (Se) Total Shor (Ae)	HD/L Jan/L	0.1	1.0	-	0.25		-	<1	41	<1	4	<1	<1	41	41	<1	<1.0		41	4	-		<1	-	40.1
Total Silver (Ag) Total Strontium (Sr)	Jun/L	0.1 5	21000	-	e.25 	$\vdash$	-	<0.1 27	40.1 31	<0.1 29	40.1 31	<0.1 18	40.1 31	31	40.1 30	40.1 30	40.10 29		40.1	<0.1 28	-	-	40.1 32		40.1 M
Total Thallium (TI)	MD/r	0.1	0.8	-	0.8	$\vdash$	-	<0.1	40.1	<0.1	<0.1	<0.1	<0.1	<0.1	40.1	<0.1	<0.1		40.1	<0.1	-		<0.1	-	40.1
Total Tin (Sn)	HD/L	2	-	-	-		-	- 2	- (2	- 2	- 2	- 2	- 2	- (2	<2	- 2	- (2		- 2	- 2	-	-	- 2	-	· a
	HD/L	2 0.1	300	-		$\vdash$		3	- 2	<2	- 0.1	- 2	4	- 2	<2 d) 1	2	2		- 2	- 2			- 2		
Total Titanium (Ti)		0.1	200	-	15	$\vdash$		6.1	40.1 42	<0.1	0.1 <2	40.1	<0.1	49.1 42	<2.1	40.1 42	0.1		0.1	0.1	-	-	40.1 42		48.1 42
Total Uranium (U)	un/i							- 4	- 6		11	- 2	- 42	10	- 4	10	- 4	6	12	10	_				
	HD/L	š	30	-	10		9														4	- 45	11	20	a
Total Uranium (U) Total Vanadium (V)	HD/L		30	-	10		9	5	- 6	- 61	11	7		10	- G	10			12	10	- 6	- G	11		a
Total Uranium (U) Total Vanadium (V) Total Zinc (Zn)	HD/L		30	-	10			461	613	93	461	308	461	42	629	>2470		356	163	10	517	2,420	260	577	-cs >2420
Total Uranium (U) Total Vanadium (V) Total Sinc (Zn) MICROSIOCOCCAL Total Colform E. col	HB/L HB/L MPN/100mL MPN/100mL	1 1	30 - -	400	- -		100	461 14	613	6	461 6	308	461	42 <1	629	>2470 17	<10	356 1	163	179	517 23	2,420	260 cl	577 5	>2410 2411
Total Uranium (U) Total Vanadium (V) Total Zinc (Zin) MICROBIOCOGICAL Total Coliform	MPN/100mL		30 - -	400	20 			461	613		461	306	461	42	629	>2470		356	163	179	517	2,420	260	577	>2420

TABLE 18: Historical Data - Bedford West	it Water Quality :	Sampling Progra	-																														
Fall 2017	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)														Nighway 3													
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			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
Sampling Time	hhomm	-					07:00					09:00		11:00		14:50		9:50		12:22			10:10			09:20		14:30		10:20		15:00	11:40
FIELD DATA																															i l	1	
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
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
Dissolved Oxygen gH (in Situ)	mg/L pH	-	-	5.0-9.0	55-95 65-90		11.4 8.0	5.8	5.3	8.2 6.3	5.3	5.6	8.2 5.8	5.8	5.3 6.0	5.7 8.8	5.7	5.8 6.4	7.6 6.2	7.1	3.1 6.8	6.0	6.6	5.1	6.4	6.2	5.0 6.9	8.2 7.3	10.1	7.4	5.8	5.8 7.8	5.6 6.3
Specific Conductance	u5/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		880.0	337.0	109.0	0.4	335.8	251.2	289.0	353.0	208.9	354.0	257.0	266.0
INORGANICS																																	
Total Alkalinity (as CaCO3)	mg/L	5	-	-			- 6	ত	ত	- 6	- 6	- 6	5	11	8	22	25	15	9	23	20	31	28	30	16	21	12	14	27	10	17	21	16
Dissolved Chloride (CI)	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	\$1
Colour Nitrite + Nitrate	TCU mg/L	5 0.05		-	-		67	68 40.05	57 <0.05	37 0.69	89 40.05	53 1.20	39	65 0.25	79 1.20	24 2.61	65	40	9	65 40.05	25 40.05	11 40.05	31 40.05	93	22 40.050	27 <0.05	29	0.05	0.13	64	0.35	31	29 0.58
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	40.05	0.53	<0.050	<0.05	0.17	0.05	<0.05	0.53	0.18	0.50	0.58
Mitrite (N)	mg/L	0.05		-	0.06		<0.01	-		<0.01	<0.01	-	<0.01	-	-	<0.05	<0.05	<0.05	40.05	40.05	40.05	<0.05	40.05	<0.05	<0.010	<0.05	<0.05	< 0.05	0.13	<0.05	0.17	0.21	<0.05
Nitrogen (Ammonia Nitrogen) Total Kieldahl Nitrogen as N	mg/L 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 <0.4	<0.050 0.3	<0.03 0.5	0.04	0.06	0.06	<0.03 0.7	<0.03 0.5	0.10	0.07
Total Kjeldahl Nitrogen as N Total Organic Carbon	mg/L mg/L	0.4	-	-	-		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	45	8.0	11.5	7.4	8.6	6.9
Orthophosphate (as P)	mg/L	0.01		-			<0.01	40.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.01	<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
pH (units) Total Calcium (Ca)	pH mg/L	N/A	-	5.0-9.0	65-9.0		4.5	5.2	5.4 1.6	5.5	6.2	5.3	6.4	6.6 5.2	6.3 5.6	6.4 12.5	6.9	6.8	6.9 11.1	6.9	6.7	6.6	7.5	5.9	6.6 18.000.0	7.5 18.0	6.8	6.9	7.0 25.8	9.9	6.8 20.9	6.9	6.9 14.6
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	10.5	2.3	1.6	3.2	0.6	2,400.0		12.4	12.9	25.8	9.9	3.0	1.7	2.2
Total Phosphorus	right.	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
Total Potassium (X)	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 37.7	1.5	1.4	1.9	1.7	2.0	2.1	2.0
Total Sodium (Na) Bearting Silva (SIC2)	mg/L mg/L	0.1		-			15.0 2.5	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 5.6
Total Suspended Solids	mg/L	5		-	-		7	80	2	- 2	11	- 2	<1	1	- 41	9	6	- 6	- 6	- 3	- 6	6	-65	- 6	<1.0	- 3	- 6	- 5	10	- 3		11	- 6
Dissolved Sulphate (SD4)	mg/L	2		-			5	3	3	ŝ	- (2	8	10	8	10	14	8	9	12	8	12	10	7	- 6	13	9	14	14	14	18	15	13	19
Turbidity (NTU) Conductivity (uS/cm)	NTU uS/cm	0.1	-	50	-		14.0	35.0 140	0.9 92	1.4	1.2	0.6 110	0.4 110	0.6 100	1.1 38	0.9 263	1.9 231	0.9 143	0.5 243	1.6	0.5 218	0.7 252	1.6 338	0.9 112	0.6 470	0.9 324	0.8	1.0	4.1	1.0	1.3	7.7 251	1.1 258
	payon		-				200	240	74	130	100	110	220	100	-	203	231	249	243		210	2.02	2,00	***	470	324	244	289	940	107	411	- 271	480
Calculated Parameters																																	
Anion Sum Bicarb, Alkalinity (calc. as CaCO3)	me/L me/L	N/A 5	-	-	-		0.77	1.12	0.73	1.11	0.71	0.88	1.03	0.95	0.80	2.55 22	2.02	1.31	1.96	1.50	1.78	2.66 31	2.31 28	1.30	4.20 16	2.50	1.93	2.58	3.29	1.60	3.53	2.12	2.30 16
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
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	-	-			- 41	- 41	4	a	<1	a	- 41	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<10	<10	<10	<10	<10	<10	<10
Cation Sum Marchess (CaCO3)	me/L	N/A N/A	-	-	-		0.84	1.32 6.00	0.74 6.00	1.06	0.93 12.00	1.02	1.00	0.83	0.80	2.43 38.20	6.04 37.50	1.19 24.50	2.05 33.50	1.40 32.40	1.87 44.20	2.25 24.60	3.22 71.40	1.04 8.00	3.94 55.00	2.88 56.10	2.11 40.40	2.81 39.20	3.51 75.50	1.79 31.70	4.14 64.50	2.22 32.70	2.28 45.50
Ion Balance (% Difference)	%	N/A	-	-			4.35	8.20	0.68	2.30	13.40	7.37	1.48	6.74	0.00	2.60	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
Langelier Index (@ 20C)	N/A	N/A		-	-		NC	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
Langeller Index (@ 4C) Saturation off (@ 20C)	N/A N/A	N/A N/A	-	-	-		NC NC	NC NC	NC NC	NC NC	NC NC	NC NC	-3.75	-3.25 9.54	-3.61 9.64	-3.09 9.17	-2.55 9.13	-3.04	-3.05	-2.65 9.70	-2.73	-3.01 0.25	-1.62 8.70	-4.17 9.75	-2.57 8.93	-1.89 9.03	-2.94 9.42	-2.80 9.35	-2.06 8.77	-3.46 9.59	-2.55 9.07	-2.67 9.76	9.23
Saturation pH (@ 4C)	N/A	N/A		-			NC NC	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	9.42	9.57	9.09	9.91	9.39	9.58	9.55
Metals (ICP-MS)																																	
Total Aluminum (AI)	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
Total Antimony (Sb)	µg/L	2	20	-			-2			<1.0	<1.0	-	<1.0	-	-	<2	<2	-2	-12	-(2	<2	- 42	<2	-2	<1.0	-	-2	-2	-	-	<2		- 2
Total Arsenic (As) Total Barium (Ba)	μg/L μg/L	2 5	5 1,000	-	5		<2 22	-		<1.0	<1.0 37	-	<1.0	-	-	<2 58	<2 284	42	<2 57	<2 57	<2 80	<2 46	<2 142	-2 17	<1.0 130	-	-2	<2 79	-	-	<2 130		-2
Total Beryllium (Be)	HE/F	2	1,000	<u> </u>	-	<b>—</b>	-2		-	<1.0	<1.0		<1.0		-	<2	<2	42	42	<2	<2	40	192	-2	<1.0	-	86 12	79 <2	1	- 2	- 130		- 42
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	-	a
Total Boron (B)  Total Cadmium (Cd)	µg/L	5 0.017	1,200		1,500		<5	-		11	11 e0.017		<50	-	-	0.034	28	13 e0.017	20 e0.017	20 40.017	11	9	14 r0.017	11	<50		- 6	10		-	45	— <b>-</b> ∓	24 <0.017
Total Cadmium (Cd) Total Chromium (Cr)	μg/L μg/L	0.017	0.010	1 -	0.090		<0.300	-	-	<1.0	<0.017	-	<1.0	-	-	<1	<1	<0.017	<0.017	<0.017	<1	8	<0.017	<1	<1.0	-	<0.017	<0.017	-	-	1	-	<0.017 1
Total Cobalt (Co)	μg/L	1	10	-			<1			1	0	-	<0.40		-	<1	<1	d	<1	<1	<1	<1	<1	d	<0.40	-	d	- 4	-		a		d
Total Copper (Cu) Total Iron (Fe)	μg/L ug/L	1 50	2 300		300		2	-		3	<2.0	<2.0 150	<2.0 107	<2.0	<2.0 219	<2 102	-2	3 255	<2 111	<1	2	<1 147	- 41	2 200	<2.0	- 41	1 118	<1	- 4	2 228	<1 151	1 960	1 281
Total Iron (Fe) Total Lead (Pb)	μg/L μg/L	0.5	1.0		1.0 - 7.0	-	720	-		2.4	0.6	150	107 <0.5	209	219	102	0.7	255 <0.5	<0.5	<0.5	0.6	2.6	<0.5	290	140 <0.5	1,280	<0.5	144	746	228	151 40.5		<0.5
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
Total Molybdenum (Mo)	µg/L	2	73	-	73		a		_	<2.0	<2.0	_	<2.0	_	_	-(2	- 42	-2	- 42	<2	-(2	- 2	<2	-2	<2.0		-2	-2		_	-2	_=_	a
Total Nickel (NI) Total Selenium (Se)	μg/L μg/L	2	25 1	-	25 - 150 1	-	- 2	-		<2.0 <1.0	<2.0		<2.0	-	-	<2 <1	-0.	-02	<2 <1	<2	<2 <1	-0.	<2	- 4	<1.0	-	- 4	- 41	-	-	12 <1		- 4
Total Silver (Ag)	μg/L	0.1	0.1		0.3		<0.5			<0.1	<0.1		<0.1			<0.1	40.1	<0.1	40.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	40.1			<0.1		<0.1
Total Strontium (Sr) Total Thallium (TI)	μg/L	5 01	21,000	-			11		_	29	20	_	24	_	_	48	58	36	52 e0.1	47	62	38	103	13	85 c0.10		39	58		_	92		% (0.1
Total Thallium (TI) Total Tin (Sn)	μg/L μg/L	0.1	0.8	<del></del>	0.8		<0.1 <2			<0.1	<0.1		<0.1 <2	-	-	<0.1 <2	<0.1 <2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10		<0.1	<0.1	+ -		<0.1 <2	-	<0.1 <2
Total Titanium (Ti)	μg/L	2	-	-	-		6	-		- 4	- 42		4	-	-	- 42	3	-2	- 42	- 42	4	2	- 42	- 2	- 42	-	-2	-2	-	-	- 42	-	- 2
Total Uranium (U)	µg/L	0.1	300.0	-	15.0		<0.1			<0.1	<0.1	-	<0.1			40.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-		40.1	-	<0.1
Total Vanadium (V) Total Zinc (Zn)	μg/L	2 5	6 30		30		<2 21	-		-(2 16	<2 7	7	<2 450	-50	7	- 42	<2 6	0	- 4	- 4	<2 10	<2 10	- 0	-2	<2.0	- 3	- 2	-2	- 6		<2		m C.
Total Zinc (Zn)	µg/L	- 5	30		30		21	-	-	- 16	,	,	<5.0	<5.0	7	- 6		6	- 6	- 6	10	10	- 6	7	- 11	- 6	- 6	- 0	- 5	- 6	У		-
																	L									L					-		
Total Coliform	MPN/100mL MPN/100mL	1	-	400	-	-	84 54	>250		>250 12	>250 17	180	120	180 78	<100	687	>2420	>2420 145	1,550	>2420	1,553	120	>2420 179	>2420 3	20	>2420	659	>2420	>2420 86		914 12	>2420 14	>2420
Chlorophyll A - Acid fication 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		51.51	0.33	1.56	5.32	0.62
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	83.03	0.43	2.04	5.48	0.99
L	1					1									1	1	1			1				1	1	1			1		لــــــــــــــــــــــــــــــــــــــ		

26d (Stock Andred)

- Present Result - Parameter concentration exceeds CCME FWAL Guideline

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- Present Result - Parameter concentration exceeds CCME FWAL Guideline

- Parameter concentration exceeds CCME FWAL Guideline

- Parameter concentration exceeds CCME FWAL Guideline

- Parameter CCME

TABLE 18: Historical Data - Bedford West	Water Quality :	ampling Program	m																													
Fall 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Reference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL- F (Applied)	Phosphorus Trigger Range (Applied)														Highway 102												
Sample Sites Sampling Date	yyyy-mm-dd						anno las las		anna lan lan	2010/05/31			L save too ten	Lancemater	and the fact		T 201 2 700 710			HWY102-2 2013/08/15		L and a feet for a	2014/08/14 2014/10/2	T 2000 100 100	Lanconom		T and the fee	2016/08/16	- and the last	L security to .	2017/08/15 2017/	
	hhmm								12:30			12:30			15:30					10:00	10:22			11:00		14:30		12:45		11:45		7/10/18 12:25
							11.50	11.13	11.50	12.40	09.20	11.90	11.20	13.00	13.30	11.20	11.10	20.23	20.40	10.00	20.22	12.13	14.23 20.07	11.00	12.70	24.30	12.30	12.43	20.40	11.77		
FIELD DATA																														لــــــــــــــــــــــــــــــــــــــ		
Secchi Depth	Meters	-	_	1.2	_		N/A	N/A 19.2	N/A	N/A	N/A	N/A 8.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A 11.5	N/A	N/A 10.7	N/A	N/A	NCC	N/A	N/A 9.3	N/A	N/A	N/A	N/A		N/A
Water Temp Dissolved Oncesn	Celsius mg/L	_	-	-	55.05		16.7	19.2	16.4	17.2	17.0	3.0	10.8	24.2	15.1	7.8	23.7	14.3	63	22.0	10.7	11.4	10.4	12.7	23.7	9.3	13.4	20.4 7.1	10.2	13.0 5.7		15.2
pH (in Situ)	pM	-	-	5.0-9.0	65-9.0		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		8.3
Specific Conductance	u\$/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	414.0 331	38.0
INORGANICS																																
Total Alkalinity (as CaCD3)	mg/L						- 6	- 6	7	- 6		- 6	- 6		- 6	17	- 7	- 0	6	14	7	30	- 8	8			13	21		- 6	22 1	11
Dissolved Chloride (CI)	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		92
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		22
Ntrite + Ntrate	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		0.15	0.21	0.23	0.11	0.20		0.07
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		0.07
Nitrite (N)	mg/L	0.05			0.06		<0.01	-	<0.05	<0.01	<0.01 0.20	<0.05	<0.01	0.30	0.08	<0.05	<0.05	<0.05	<0.05	<0.05 0.17	<0.05	<0.05	<0.05		<0.05	<0.05	0.21	0.23	<0.05	< 0.03		<0.06
Ntrogen (Ammonia Nitrogen) Total Kieldahl Nitrogen as N	mg/L mg/L	0.03	-	-	18	-	40.05	0.06	40.05	40102	0.20	4010	40.05	0.30	0.08	0.09	<0.03 1.1	<0.03 0.5	<0.03	0.17	2.0	<0.03 15.3	<0.03 40.4	0.06	62.6	0.05	0.14 24.3	0.37	<0.03 0.6	<0.03		0.54
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			2.0	79.3	11.1	13.4	5.4		9.2
Orthophosphate (as P)	mg/L	0.01	-	-	-		<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	< 0.01	<0.01		< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
pH (units)	рМ	N/A	-	5.0-9.0	6.5 - 9.0		5.4	6.0	6.3	6.1		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		6.5
Total Calcium (Ca)	mg/L	0.1	-	-	-		1.6	4.0	4.8	7.4	3.8	4.0	3.1		3.8	7.0	8.4	5.6	7.6	8.5	8.2	14.1	9.5		33.3	9.8	23.9	23.8	8.6	13.3		14.7
Total Magnesium (Mg) Total Phosphorus	mg/L mg/L	0.1	-	-	-	0.010	0.4	0.7	0.9	1.0	0.6	0.003	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		2.1
Total Potassium (K)	mg/L	0.002	-	-	-	0.010	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
Total Sodium (Na)	me/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			36.8	149.0		26.4	68.8		55.2
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.	6.4
Total Suspended Solids	mg/L	5		-	-		-2	58	62	34	27	3	<1	10	14	- 6	39	v	্ত	্ব	194	34	d	2	3,000	15	342	69	ব	6		8
Dissolved Sulphate (SO4)	mg/L	2	-	-	-		-2	- 3	8	11	- 4	7	5	5	8	12	- 6	10	10	9	10	12	8		7	8	22	21	8	10		9
Turbidity (NTU) Conductivity (uS/cm)	NTU uS/cm	0.1	-	50	-		0.7 85	3.8	4.2 310	2.6 590	3.1 160	0.5 94	91	12(1)	3.9 110	0.6 263	10.8	2.0 179	1.5 295	3.3 203	144.0 223	1.1 433	·· 1.1	920	1,490.0	9.9	181.0	54.2	1.1	2.4 451		12.5
	руст			-			85	290	310	590	100	94	91	100	110	203	403	179	295	203	223	433	194	920	667	315	817	952	177	451	413 15	184
Calculated Parameters																															1 1	
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		5.27	2.38	7.39	7.25	1.65	4.06		3.05
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	-	-			<1	q	. 7	6	5	d	<1	5	-0	17	7	ত	- 6	14	7	30	8	8	5	ত	13	21	6	ব	22 1	11
Calculated TDS	mg/L	10	-	-	-		42	150	165	282 <1	93	52 <1	48 <1	62	67	143	200 <10	86 <10	135	100 <10	145 <10	235 <10	85	460	712 <10	138	473 <10	422	99 <10	233 <10		197
Carb. Alkalinity (calc. as CaCO3) Cation Sum	mg/L me/L	N/A	-	-	-		<1 0.81	2.65	2.89	4.17	1.81	0.86	<1 0.82	0.83	<1 0.97	<10 2.32	<10 2.10	<10 1.40	<10 2.24	1.50	<10 3.50	4.17	<10 1.76	<1.0 7.87	<10 29.10	<10 2.35	9.27	<10 7.23	1.80	<10 3.92		3.60
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	26.20	18.90	23.90	26.60	29.50	48.00	31.10			33.50	77.90	69.70	28.50	43.50		45.40
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 81	8.90
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			-3.73	-2.70	-2.15	-3.72	-3.58		-2.90
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		-3.13	-4.05	-3.02	-2.47	-4.04	-3.90		-3.22
Saturation pH (@ 200)	N/A N/A	N/A	-	-	-		NC	NC NC	9.87	9.77	10.00	NC NC	NC NC	10.30	NC NC	9.53 9.85	9.85	10.10	9.94	9.51 9.83	9.84	9.00	9.70 10.00		9.45	9.91	9.16	8.95	9.87	9.80		9.41
	N/A	N/A		-			NC	NC.	10.10	10.00	10.30	N.	N.	10.50	NL	9.85	10.20	10.50	10.30	9.83	10.20	9.32	10.00	9.34	9.77	10.20	9.48	9.27	10.20	10.10	9.43 9.	3.73
Metals (ICP-MS)																																
Total Aluminum (Al) Total Antimony (Sb)	pg/L	5	5 20	-	5 - 100		270 12	-		189	368 <1.0		260 <1.0	-	-	145	466	259	130	138	2,760	400	216	<1.0	-	129	3.880	-	-	99		543
Total Antimony (Sb) Total Ansenic (As)	pg/L pg/L	2 2	20	-			-2	-		<1.0 <1.0	<1.0	-	<1.0	-	-	42	-2	- 2	- 2	- 2	6	- 2	a	<1.0	-	- 2	- 2	-	-	-2		a a
Total Barium (Ba)	PB/L	ŝ	1.000	-	-		20	-	-	53	28	-	27	-	-	49	74	33	44	43	213	381	63	140	-	147	762	-	-	151		122
Total Beryllium (Be)	µg/L	2	5	-	-		-2	-	-	<1.0	<1.0	-	<1.0	-	-	-(2	-2	-2	- 42	- 2	- 2	- 2	42	<1.0	-	-2	-2	-	<2	-2	<	4
Total Bismuth (Bi)	pg/L	2		-			-2	-		<2.0	<2.0		<2.0			<2	- 2	2	- 2	-2	- 2	-2	42	<2.0		-2	-2	-	-	- 2		a
Total Boron (B)	MB/L	5	1,200	-	1,500		d	_	_	- 8	8	_	<50	-	_	10	17	15	9	10	13	11	12	<50	_	ত	9			- 6		12
Total Cadmium (Cd) Total Chromium (Cr)	FB/L	0.017	0.010		0.090		<0.300	-	-	0.051 <1.0	<0.017	-	<0.017		-	0.037	0.031	0.032	0.019	<0.017	0.096	0.051	- 0.019	0.100 <1.0	-	<0.017	0.778	-	-	0.019		2
Total Chromium (Cr) Total Cobalt (Co)	pg/L ust/L	1	10	-	- 1	-	- 4	-	-	<1.0	-1-	-	<0.40	+	-	- 41	<1 1	-1	<1	1	3	2	4	<1.0	+=-	-4	- 8 - 4		+ -	- 4		2
Total Copper (Cu)	HB/L	1	2	-	2		2	-	-	2	<2.0	<2.0	<2.0	3	3	42	3	3	- 42	1	12	4	- 2	<2.0	404	2	13	<1	2	- 4		ž
Total Iron (Fe)	pg/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
Total Lead (Pb)	FR/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	2	3.3
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		215
Total Molybdenum (Mo) Total Nickel (NI)	pg/L pg/L	2	73 25	-	73 25 - 150	-	- 2	-	-	<2.0 <2.0	<2.0 <2.0	-	<2.0 <2.0	-	-	-2	-a	a a	a a	a a	4	- 2	- a	<2.0 <2.0	-	-2	-2	-	-	-2		2
Total Selenium (Sel	us/L	1	1	-	25 - 150		- 4	-	-	<1.0	<1.0	-	<1.0	-	-	<1	- 41	- 4	- 41	- 4	- 4	4	4	<1.0	1 -	- 2	8	1 -	-	- 4		d
Total Silver (Ag)	HB/L	0.1	0.1	-	0.3		40.5	-	-	<0.1	40.1	-	40.1	-	-	<0.1	<0.1	40.1	<0.1	<0.1	<0.1	<0.1	- 40.1	<0.1	-	<0.1	<0.1	1 -	-	<0.1		<0.1
Total Strontium (Sr)	FR/L	5	21,000		-		11			37	21		17			33	45	31	39	40	45	75	43	96	-	33	96	-		72	- 9	90
Total Thallium (TI)	pg/L	0.1	0.8	-	0.8		<0.1	-	-	<0.1	40.1	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	- 40.1			<0.1	<0.1	-	-	<0.1	- 0	<0.1
Total Tin (Sn)	pg/L	2			-		-2	-	-	-2	- 2	-	-2		-	-(2	-(2	-2	-(2	- 2	- 2	- 2	a	-2	-	- 2	-2	-	-	-2		a
Total Titanium (Ti) Total Uranium (U)	pg/L	0.1	300.0	-	15.0	-	4 40.1	-	-	<2 <0.1	-6 -0.1	-	5 40.1	-	-	<2 <0.1	10 <0.1	4 <0.1	<0.1	<2	60 0.1	9 <0.1	· 6	<0.1	-	<2 <0.1	41 0.2	-	-	<2 <0.1		15 <0.1
Total Uranium (U) Total Vanadium (V)	pg/L pg/L	0.1	300.0	-	15.0	-	40.1 42	-	-	<0.1	40.1	-	<0.1	+	-	<0.1	<0.1 2	40.1 42	<0.1	<0.1	0.1	<0.1	40.1	<0.1	+=-	40.1 42	0.2		+ -	40.1 2		2 2
Total Zinc (Zn)	HB/L	5	30	-	30		12	-	-	14	12	9	6	9	13	- 6	7	12	12	- 3	46	36	- 17	27	1,210	10	170	22	11	14		29
MICROBIOLOGICAL																													T	-		
	a manufacina											<b>—</b>																				2420
	MPN/100mL MPN/100mL	1	-	400	-	-	28	>250 290	-	>250	75	41	110	>250	e100	1,553	>2420	>2420	2,420	1,990	>2420	687	>2420	e10	>2420	328	>2420	>2420	>2420	>2420		2420
Chlorophyll A - Acidification method	MPN/100mL	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			6.24	539.78	20 54.98	0.43	1.40		28.94
Chlorophyll A - Welschmeyer method	PB/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		0.56	1.74		ນຄ
																								1						-		

NA. Net Application NC has Contribute NCE for Collection

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- " - " any positive available of NaT State".

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Note That Collection of NaT State (NCE NAT STATE (NC

Fall 2017	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														
Sample Sites Sampling Date	www.mm.dd						2009/05/20	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		2013/10/16	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
	hhonm	-						09:30			11:28		08:45	13:20	9:00	9:15		9:10		15:30				13:30								11:55	
FIELD DATA																																	
Secchi Depth	Meters	-		1.2	-		N/A	-	N/A	NCC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A															
Water Temp	Celsius	-	-	-			13.1	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
Dissolved Oxygen off (in Situ)	mg/L pM	-	-	5.0-9.0	5.5 - 9.5 6.5 - 9.0		7.9	5.7 6.7	5.5	8.6	5.4	8.5 6.2	9.4	7.9 6.9	8.2 6.6	4.1 8.2	7.2	7.6 6.9	8.8 5.2	7.3	7.6 6.2	7.0	-	7.2 6.3	6.3	7.3 6.3	7.2 6.5	8.2 6.6	6.2	8.7	11.4 6.8	7.0	5.3
pri (in seu) Specific Conductance	uS/cm	-	-	5.0-9.0	0.5 - 9.0		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			-	111.0		155.3			254.0	162.2	150.0	188.0	
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		- 11	22		12	26	20
Dissolved Chloride (CI)	mg/L	1			120		41	34	31	49	45	25	38	27	22	22	23	23	39	32	23	29	-	23	32	27	26	39	45	31	43	33	×
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
Nitrite + Nitrate Nitrate (N)	mg/L mg/L	0.05			13	_	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 <0.05	0.09		0.11	0.15 0.15	0.25	0.30	0.08	0.08	<0.05 <0.05	0.19	0.48	0.22
Ntrite (N)	mg/L	0.05	-	-	0.06		40.01	-	-	<0.01	<0.01	-	<0.01	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		-	<0.05	<0.010	0.09	<0.05	<0.05	<0.05	40.05	0.10	0.09	4005
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
Total Kjeldahl Nitrogen as N	mg/L	0.4	-	-	-				6.8	3.7	6.0	5.3	4.7	-	7.5	0.5 3.1	3.5	0.5	4.7	6.3	3.0	1.0	-	40.4	0.3	77.4	2.8	2.2	11.8	0.5	1.0	34.5 8.1	10.0 6.9
Total Organic Carbon Orthophosphate (as P)	mg/L mg/L	0.5	-	-	-		5.0 <0.01	3.8 <0.01	6.8 <0.01	<0.01	<0.01	5.3 40.01	<0.01	7.1 <0.01	7.5 <0.01	<0.01	8.0 <0.01	7.7 <0.01	<0.01	<0.01	6.9 <0.01	5.2 <0.01	-	8.1 <0.01	3.2 <0.010	14.1 <0.01	9.9	5.5 <0.01	14.0 <0.01	8.9 <0.01	7.7 <0.01	<0.01	10.01
pH (units)	pМ	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
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 1.6		**		6,100.0	52.2 23.0	5.4	6.6	9.9	4.8	7.1	8.0	6.7
Total Magnesium (Mg) Total Phosphorus	mg/L mg/L	0.1	-	-	-	0.010	1.4	1.6	0.009	2.0	2.1	0.009	1.3	1.2	1.2	0.7	3.3	0.003	1.2 0.007	1.4	1.6	0.100	-	1.1	1,300.0	23.0	1.5	1.4	1.8	1.3	1.6	1.7	0.015
Total Potassium (K)	mg/L	0.002	-	-	-	0.010	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
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
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
Total Suspended Solids Dissolved Sulphate (SD4)	mg/L mg/L	5 2	-		-		16 6	98	5	6 7	110	7 4	4	77 A	5	٥	16 5	19	٥,	17	9 5	51 5	-	8	5	719 <2	69	93	9,020	15	138	41	- 6
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
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
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
ticarb. Alkalinity (calc. as CaCO3)	mg/L	5			-		13	8	12	13	21	9	9	15	12	21	14	11	- 8	20	11		-	10	11	7	9	11	22	8	12	26	20
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 <90
Carb. Alkalinity (calc. as CaCO3) Cation Sum	mg/L me/L	10 N/A	-	-			<1 1.53	<1 0.99	<1 1.20	<1 1.69	<1 1.94	<1 1.05	1.44	<1 1.02	<1 1.00	<10 0.76	<10 3.59	<10 1.10	<10 1.43	<10 1.62	<10 1.62	<10 1.52	-	<10 1.19	<1.0 1.28	<10 31.00	<10 1.42	<10 1.94	<10 2.04	<10 1.27	<10 1.75	<10 1.74	1.59
Mardness (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		-	17.30	21.00	225.00	19.70	22.20	32.10	17.30	24.30	27.00	23.30
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
Langelier Index (Ø 20C) Langelier Index (Ø 4C)	N/A N/A	N/A N/A	-	-	-		-2.74 -2.99	-3.20 -3.45	-2.60 -2.85	-2.22 -2.47	-1.71 -1.96	-2.99 -3.24	-2.88 -3.13	-2.64 -2.89	-3.05 -3.31	-3.62 -3.94	-2.30 -2.62	-2.91 -3.23	-2.93 -3.25	-2.55 -2.87	-3.29 -3.61	-2.84 -3.16	-	-3.14 -3.46	-2.50 -2.75	-2.50 -2.82	-3.20 -3.52	-2.97 -3.29	-2.24 -2.56	-3.61 -3.93	-2.73 -3.05	-2.19 -2.51	-2.44
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	-	9.85		9.09	9.88	9.72	9.25	9.99	9.65	9.27	9.45
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
Metals (ICP-MS)																																	
Total Aluminum (Al)	pg/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
Total Antimony (Sb) Total Ansenic (As)	pg/L	2	20	-			- 2	-	-	<1.0 <1.0	<1.0	-	<1.0 <1.0	-	-	a a	-2	- 2	- 2	- 2	-a	+2 +2	-	-2	<1.0 <1.0	_	-2	- 2	-	-	- 2	-	a a
Total Barium (Ba)	HB/L	- 5	1,000	-	-		14	-	-	15	19	-	14	-	-	11	86	12	12	7	24	15	-	11	12	_	27	14	-	-	32	-	11
Total Beryllium (Be)	pg/L	2	5		-		-2	-		<1.0	<1.0		<1.0	-	-	-2	2	- 2	-2	- 2	- 42	<2	-	- 2	<1.0	-	- 2	-2	-	-2	-2	-	- 2
Total Bismuth (B)	pg/L	2 5	1 200		1500		42 13	-	-	<2.0	<2.0 22	-	<2.0	-	-	-2	<2 74	<2 16	<2 10	-(2 15	<2 15	<2 14	-	<2 16	<2.0	-	-2	-2	-	-	- 2	-	a
Total Boron (B) Total Cadmium (Cd)	pg/L ust/L	0.017	1,200	-	0.090		<0.300	-	-	0.018	<0.017	-	<0.017	-	-	0.029	1,050	0.023	<0.017	15 <0.017	0.073	0.032	-	16 <0.017	<50 0.011		<5 <0.017	0.120	-	-	0.031		20 <0.017
Total Chromium (Cr)	pg/L	1	1	-	1		-2	-	- 1	<1.0	<1.0	-	<1.0	-	-	<1	- 11	- 4	-1	<1	2	<1	-	-4	<1.0		3	2	-	-	-0.	-	1
Total Cobalt (Co)	Fg/L	1	10	-	-		- 4	-		<0.40	1		<0.40	-	-	- 41	34	-0	- 4	- 4	1	<1	-	4	<0.40	-	- 4	- 4	-	-	1	-	d
Total Copper (Cu) Total Iron (Fe)	pg/L pg/L	1 50	300	-	300	_	180	-	-	<2.0	<2.0	<2.0 120	<2.0 211	<2.0	<2.0	-2 161	18 500	2	<2 236	1 254	4 200	2	<1	3	<2.0 230	183	- 6	3	<1	d	41	<1	1 934
Total Iron (Fe) Total Lead (Pb)	us/L	0.5	1.0	-	1.0 - 7.0		180	-	-	3.0	0.5	120	211 <0.5	-331	314	0.6	38,900 82.4	10.5	10.5	40.5	5.2	0.5	-	40.5	230 40.5	176,000	5.9	2,790	2,190	303	0.6	37/5	0.7
Total Manganese (Mn)	pg/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
Total Molybdenum (Mo)	FB/L	2	73	-	73 25.150		-2	-		<2.0 c2.0	<2.0		<2.0	-	-	a 0	-2	-2	-2	- 2	- 2	- 2		-2	<2.0	_	-2	- 2	-		2	_	a
Total Nickel (NI) Total Selenium (Se)	pg/L	2	25	-	25 - 150	_	- 2	-		<2.0 <1.0	<2.0	-	<2.0 <1.0	-	-	4	13	- 4	- 4	- 4	-2	<2 <1	-	-2	<2.0		- 5	2 <1	-	-	4		d d
Total Silver (Ag)	FB/L	0.1	0.1	-	0.3		40.5	-	- 1	<0.1	<0.1	-	<0.1	-	-	<0.1	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)	pg/L	5	21,000	-			30	-	-	36	42	-	24	-	-	12	82	22	24	24	25	26	-	19	25	-	16	29	-	-	28	-	31
Total Thallium (TI) Total Tin (Sn)	pg/L	0.1	0.8	-	0.8	-	<0.1	-	-	40.1 42	<0.1	-	<0.1	-	-	<0.1	0.2 *2	<0.1	40.1 42	<0.1	<0.1 <2	<0.1		<0.1	<0.1	-	<0.1	<0.1	-	-	<0.1	-	40.1 42
Total Tin (Sn) Total Titanium (Ti)	pg/L pg/L	2 2			-	_	- a	-		7	4	-	5	-	-	-2	405	4	- 2	-2	-<2 36	-6	-	- 42	1		<2 41	<2 30	-	-	14	-	2
Total Uranium (U)	HR/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
Total Vanadium (V)	FB/L	2	6	-	-		-2	-	-	- 2	<2	-	-2	-	-	- 2	30	-2	- 2	-2	2	<2	-	-2	-2		- 6	4	-	-	-2	-	- 42
Total Zinc (Zn)	FR/L	5	30		30		7			7	7	<5.0	<5.0	<5.0	- 5	ব	110	7	6	ব	15	- ত	-	ত	<5.0	799	11	17	14	ব	8	ত	7
MICROBIOLOGICAL																																	
	MPN/100mL	1	-	-	-		53	>250	-	>250	>250	290	85	>250	-	1,414	>2420	>2420	1,990	>2420	>2420		-	8		>2420	>2420		>2420	>2420	534	>2420	641
	MPN/100mL		-	400	-	1	22	24	-	4	45	6	10	>250	<100	2	26	10	10	20	2	-0.	-	>2420	<10	16	17	9	30	16	1	479	1
		0.08					1.66	10.75																					13714				
	FB/L FB/L	0.05	-	-	-		1.46 1.85	10.70 11.10	4.68 5.62	1.21	6.64 7.71	0.21	1.19	1.93	1.41	1.88 2.28	6.62 7.58	0.13	<0.50 <0.50	1.60 2.00	2.02	1.91	-	0.32	1.02	90.33 121.83	5.12 4.62	8.22 13.77	127.14 185.98	0.38 0.48	18.67 25.84	20.15 24.37	1.85

DAM (Disks shaded) - Present Result - Parameter concentration screek CCNF FWAL Guideline.

- Present Result - Parameter concentration screek XX CCC Contaminated Stein Regulations and/or Results Cauditive for Recreational Water Quality

- Parameter Contentions on exect CCNF FWAL Guideline.

- Parameter Contentions on executions of the Contentions on the Contention of the Contentions of the Contentions

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TABLE 18: Historical Data - Bedford West	t Water Quality S	ampling Progra	n																						
Fail 2027	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 B	lvd								
Sample Sites																LU									
Sampling Date Sampling Time	Wyw.mm-dd							2012/05/01	2012/08/15		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 10:15 AM	2017/10/18
andred and	nn:mm						20:90	15:20	11:30	10:10	14:30	14:30	15:00	11345	10:40	324	13.95	10:23	10:05	12:20	11:20	11345	11:25	10:15 AM	1230
FIELD DATA																									i
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
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
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
pH (in Situ)	pM		-	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
Specific Conductance	u\$/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	0.033	590.0
INORGANICS																									i
Total Alkalinity (as CaCO3)	mg/L	5			-		12	14	14	14	6	22	7	30	21	ø	13	16	13	13	27	14	13	27	20
Dissolved Chloride (Cl)	rng/L	1		-	120		34	224	116	52	190	29	258	243	104	70	210	132	93	154	164	92	247	154	163
Colour	TCU	5	-		-		94	18	14	18	7	7	19	6	8	18	8	8	- 6	17	13	26	12	12	
Nitrite + Nitrate	rng/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
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
Nitrite (N) Nitrosen (Ammonia Nitrosen)	rng/L	0.05	-		0.06		0.06	<0.05	<0.05 0.16	<0.05	<0.05	<0.05	<0.05	<0.05	40.05	<0.05	<0.010	<0.05	<0.05	<0.05	0.06	<0.05	0.34 c0.03	0.36	-0.05
Total Keldahi Nitrosen as N	mg/L mg/L	0.03		<del></del>	48		0.00	0.4	4.2	0.7	-W.U3	0.5	<0.4	1.2	1.7	<0.03	0.3	8.0	<0.03 0.7	0.05	0.05	<0.03 0.6	0.7	3.8	0.04
Total Oreanic Carbon	me/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
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
pH (units)	pM	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
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
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
Total Phosphorus Total Potassium (K)	mg/L	0.002		-		0.010	0.034 2.1	3.2	3.6	0.010	0.006	0.027	2.9	0.260	0.028 3.7	3.0	0.007 3.300.0	0.009	0.011	0.029	0.011	0.012	3.2	3.0	0.008
Total Potassium (K) Total Sorium (Na)	mg/L	0.1	_	-	-		2.7	3.2 124.0	52.2	2.5 32.3	2.6 95.1	2.8 51.7	2.9 170.0	3.1 147.0	88.1	5.0 62.7	3,300.0	102.0	1.6 57.8	2.8 96.4	2.6 81.1	2.7 65.6	3.2 137.0	113.0	2.6
Reactive Silica (SiO2)	mg/L	0.1	-	-			6.9	4.9	0.7	6.3	95.1 5.1	51.7 8.6	7.0	2.1	2.5	62.7	3.6	102.0	57.8	96.4	1.3	6.7	137.0	3.6	9.2
Total Suspended Solids	mg/L	5	-				13	5.5	165	- 63	27	65		626	- 45	6.9	<1.0	4.9	6.9	29	- 13	45	22	16	
Dissolved Sulphate (SO4)	mg/L	2	-	-	-		21	26	25	23	26	29	33	29	20	27	27	31	30	28	23	41	32	18	33
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
Conductivity (uS/cm)	μS/cm	1		-			190	813	482	255	732	433	840	819	605	394	790	575	462	582	739	371	849	673	693
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
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5	-		-		12	14	14	14	6	22	7	30	21	- 4	13	16	13	13	27	14	13	27	20
Calculated TDS	mg/L	1	-		-		109	426	246	144	347	229	496	477	262	187	400	305	216	321	310	242	463	341	311
Carb. Alkalinity (calc. as CaCO3)	rng/L	10			-		- C	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1.0	<10	<20	<10	<10	<10	<10	<10	<90
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
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
Ion Balance (% Difference) Langelier Index (89 200)	% N/A	N/A N/A	_	-	-		0.29	1.30	2.20 -1.94	1.40	4.70 -2.60	6.80 -1.93	4.50 -2.98	0.60 -2.38	19.40 -1.45	15.20 -3.41	0.59 -1.95	10.60 -1.82	1.40 -2.16	4.70	8.80	1.80	2.20 -1.87	11.80 -1.43	0.30 -1.85
Langetier Index (gr 20L)	N/A	N/A	-	-	-		-2.95	-2.52	-2.26	-2.10	-2.00	-1.93	-2.98	-2.38 -2.70	-1.45	-3.41	-1.95	-1.02	-2.16	-2.27	-1.55 -1.87	-2.27	-1.87	-1.43	-0.00
Saturation pH (iB 200)	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
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
Metals (ICP-MS)																									
Total Aluminum (Al)	ue/L	5	5		5 - 100		_	218	***	373	107	447	31	1.400	46	100			66	1.420				674	29
Total Antimony (Sb)	PB/L	2	20	-	3-200			<2	- 42	-2	-2	-2	- 12	-2	12	*2	<1.0	-	-2	-2		-	-2	-	- 4
Total Arsenic (As)	HE/L	2	5		5		_	-12	-(2	-2	-2	-2	-2	- 2	<2	-2	<1.0	-	-2	- 2			-2	-	a
Total Barium (Ba)	FR/L	5	1,000	-	-		-	225	201	116	133	134	119	185	157	80	150	-	111	127			132	-	111
Total Beryllium (Be)	pg/L	2	5		_			<2	<2	- 2	-2	-2	-2	-2	<2	-2	<1.0	-	-2	- 2		-(2	- 2	-	- a
Total Bismuth (Bi)	pg/t	2		-				<2	<2	-2	-2	-2	-2	-2	<2	-2	<2.0	_	-2	4			- 2	-	a
Total Boron (8)	1/gq	5	1,200	-	1,500		-	11	17	22	10	22	18	22	20	21	<50	-	9	14	-	-	٥	-	19
Total Cadmium (Cd) Total Chromium (Cr)	pg/L	0.017	0.010	-	0.090		_	0.538	0.171 <1	0.168	0.300	0.236	0.148	0.171	0.031	0.079	<1.0	-	0.176	0.426	-	-	0.069	-	0.052
Total Chromium (Cr)  Total Cohalt (Co)	pg/L	-1	10	-	-			- <1	- 41	- 41	- 4	-1	- 4	- 41	<1 <1		<0.40	-	- d - d	2	-	-	4	-	- 1 - d
Total Copper (Cu)	pg/L	1	2	-	2		3	<2 <2	3	16	2	-	2	2	<1	4	2	3	- 1	10	<1	3	- 4	14	-ci
Total Iron (Fe)	us/L	50	300	-	300		2.150	347	1.320	500	194	890	157	2.000	207	229	170	671	171	1.940	374	223	450	3,540	289
Total Lead (Pb)	HR/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
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
Total Molybdenum (Mo)	µg/L	2	73		73			<2	<2	- 2	-2	-2	-2	-2	<2	-2	<2.0	-	-2	- 2		_	- 2	-	a
Total Nickel (Ni)	hft/r	2	25		25 - 150			<2	<2	- 2	-2	-2	<2	3	<2	-2	<2.0	-	-2	3	-	-	4	- 1	a
Total Selenium (Se)	µg/L	1	0.1		1			<1	<1	- 41	- 4	<1	<1	<1	<1	<1	<1.0	-	- 4	<1		-	- 4		-d
Total Silver (Ag) Total Strontium (Sr)	µg/t. uz/t.	0.1	0.1 21,000		0.3		_	<0.1 112	<0.1 94	<0.1 60	<0.1 93	<0.1 90	<0.1 96	<0.1 116	<0.1 111	40.1 54	<0.1 120	_	<0.1	<0.1 80	-	-	<0.1 104	-	<0.1 111
Total Strontium (Sr) Total Thallium (Ti)	µg/L µg/L	0.1	21,000	-	0.8			112 <0.1	40.1	40.1	93 <0.1	90 40.1	96 40.1	116 <0.1	40.1	54 40.1	120	-	43 <0.1	<0.1	-	-	104 <0.1		40.1
Total Tin (Sn)	HB/L	2	-		-			<2	<2	-0.1	-2	-2	-2	- 42	<2	-2	-2	-	40.1 42	- 42	-	-	- 42	-	4
Total Titanium (Ti)	µg/L	2	-	-	_		_	4	3	7	3	11	2	22	12	3	-2	-	- 2	31	-	-	-2	-	a
Total Uranium (U)	µg/t	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
Total Vanadium (V)	μg/L	2	6		-		-	-(2	<2	- 2	-2	-2	<2	-2	<2	<2	-2	-	-2	4		-	3	-	a
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
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
t. 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
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
							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				2.85
Chlorophyll A - Welschmeyer method	μg/t	0.05	-		-		4.00														2.23	1.61	31.14	24.37	

Dold (Mack shaded)

Present Result - Parameter concentration exceeds COME FWAL Guideline

Parameter concentration exceeds COME FWAL GUIDEL

TABLE 18: Historical Data - Bedford West	it Water Quality :	Sampling Program	m																														
Full 2017 Sarrole Sites	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 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		2013/10/16	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/	7/10/18
Sampling Time	hh:mm	-					13:45			13:35	15:15	13:00	13:00	16:50	17:00	12:50		10:55			10:45	10:30		12:35	12:45	08:45	8:20	13:15	9:30	9:15			13:25
FIELD DATA																																	
Secchi Death	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	3.9
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	14.4
Dissolved Oxygen	mg/t.	-	-	-	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		8.2
pH (in Situ) Specific Conductance	pH u5/cm	-	-	5.0-9.0	6.5 - 9.0		7.4 561.0	6.6 279.0	6.6 223.0	7.1 265.0	7.4 234.0	5.9 124.5	6.3 176.6	6.2 173.6	6.1 105.5	7.6 366.0		6.6 186.4	6.4 215.1	7.2 199.0	6.3 250.5	6.6 431.0	7.4 263.0	6.6 210.0	6.9	6.3 432.1	8.0 289.1	7.6 231.0	289.0	234.3	6.9 234.0	6.7 7 273.0 25	7.3 255.0
INDROMICS	usyem		-	-			3610	279.0	223.0	205.0	234.0	124.5	170.0	1/3.0	105.5	300.0	-	180.4	215.1	199.0	230.5	431.0	263.0	210.0	0.2	432.1	289.1	231.0	289.0	234.3	234.0	2/3.0 25	33.0
							6				9		- 6							6		- 31		7	-	6							
Total Alkalinity (as CaCO3) Dissolved Chloride (Cf)	mg/L mg/L	5	-	-	120		10	7 64	- 7	67	61	5 24	- 6	43	7 18	20		- 45 - 45	- 57	57	48	63	50	7 46	- 5	57	- 6 - 56	59	67	7 50	- 65		9 59
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		24
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		0.20
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		0.20
Nitrite (N) Nitrogen (Ammonia Nitrogen)	mg/L mg/L	0.05	-	-	0.06 18	-	<0.01 <0.05	 <0.05	<0.05	<0.01	<0.01 <0.05	<0.05	<0.01	0.06	<0.05	<0.05 0.06		<0.05 <0.03	<0.03	<0.05 0.04	<0.05	<0.05	<0.05	<0.05	<0.010	<0.03	<0.05 0.03	<0.05	0.09	<0.05	<0.03		<0.05 0.05
Total Keldahi Nitroeen as N	mg/L	0.03	-	-	- 18			-0.00	14.60					0.00		<0.4	-	0.4	-0.03	0.04	0.8	0.04	0.4	<0.03	0.5	12	6.0	2.6	<0.03	<0.03	0.03		1.1
Total Organic Carbon	mg/t.	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	6.3
Orthophosphate (as P)	mg/L	0.01 N/A		-			<0.01	<0.01	<0.01	<0.01	<0.01 7.0	<0.01	<0.01 6.5	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
pH (units) Total Calcium (Ca)	pH mg/L	N/A 0.1	-	5.0-9.0	6.5 - 9.0	-	6.4 4.5	6.8	6.8	6.6 8.4	7.0 9.0	6.6 5.9	6.5	5.0	6.7	6.6	-	6.8	6.7	6.9	6.9	6.7	7.0 9.1	6.6 7.0	6.7	7.0	6.8 4.8	6.4 7.9	6.9 10.5	6.9 7.6	6.8 8.0		9.5
Total Mannesium (Me)	mg/L	0.1	-	-	-		3.0	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	18	1.3	1.3		1.5
Total Phosphorus	mg/L	0.002	**			0.010	<0.02	<b>40.02</b>	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	0.050	0.018	0.173	0.104	0.013	0.041	0.036	0.099
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	8.0	-	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		1.3
Total Sodium (Na) Reactive Silica (SiO2)	mg/L mg/L	0.1	-	-	-		25.0 4.5	38.0	34.0 2.8	35.2	40.2	18.4	26.8 3.7	22.8	13.7 5.4	33.6		29.8	35.3 2.8	28.5 2.6	32.2 2.6	38.1 2.5	41.6 2.3	33.7	35.0	38.6 2.4	25.6 2.5	37.6 2.5	35.1 0.8	32.1 2.7	40.9		1.8
Total Suspended Solids	mg/L	5			-		45	2.0	2.0	7	5.4	5.9	3.7	-20	5.4	2.9		5.2	- 2.0	- 25	23	6	- 5	- 27	1	149	6.5	531	10	18	20		206
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 1	11
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		21.3
Conductivity (uS/cm)	μS/cm	1	-		-		170	250	230	260	250	130	180	170	100	214		179	227	218	209	230	261	224	240	246	241	224	310	189	256	277 3	248
Calculated Parameters																																	
Anion Sum	me/L	N/A		-	-		1.51	2.18	1.99	2.34	2.15	1.09	1.62	1.56		2.11		1.49		1.95	1.71	2.62	1.73	1.62	2.11	1.93	1.88	1.91	2.29	1.79	2.09		2.09
Bicarb. Alkalinity (calc. as CaCO3) Calculated TDS	mg/L	5					- 6	7 129	7	7	9 134	5 75	6 100	7 90	7 63	20 117		- G 95	-S	6 109	7 115	31 140	7 117	7 102	5 120	6 126	6	- 6	8	7	<5 129	13 1 137 5	9 142
Carb. Alkalinity (calc. as CaCO3)	mg/L mg/L	10	-	-	-		93	129		137	£1	/3	<1	-90	- 41	<10	-	410	<10	<10	<10	£10	r10	r102	<1.0	r20	109 <10	141 <10	148	108	<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 2.	2.15
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		29.90
Ion Balance (% Difference) Langeller Index (@ 20C)	% N/A	N/A N/A	-		-		3.78	1.63 -2.90	2.58	5.17 -2.96	4.02 -2.43	4.80 -3.25	1.25 -3.27	7.22	1.60	5.50 -2.91		9.00	5.50 -3.35	7.00	19.80	9.20 -2.61	17.00	9.20	3.18	15.20 -2.98	1.20	30.00	18.60	3.80	5.80 -3.20		20.30
Langeller Index (@ 4C)	N/A	N/A	-	-	-		-3.57	-2.90 -3.15	-3.19	-3.21	-2.68	-3.25 -3.50	-3.53	-2.94	-3.38	-3.23	-	-3.53	-3.35	-3.37	-3.03	-2.93	-3.11	-3.58	-3.13	-3.30	-3.29 -3.61	-3.65	-2.82 -3.14	-2.99 -3.31	-3.52		-3.24
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		9.68	9.86	10.00		9.67
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.	9.99
Metals (ICP-MS)																																	
Total Aluminum (Al)	HE/L	5	5	-	5 - 100		260	-	-	665	46		253		-	177		306	141	103	3,920	305	129	142	140	-	2,320	7,690	-		250	94 4	4.190
Total Antimony (Sb) Total Arsenic (As)	Hg/t	2 2	20	-	5		- 2			<1.0	<1.0 <1.0	_	<1.0	-	- 1	a	-	- 2	-2	-2	<2 2	- 2	- 2	a a	<1.0		2	-2 4			- 2		. D
Total Arsenic (As) Total Barkum (Ba)	µg/t µg/t	5	1.000	-	- 5	-	23	-	-	<1.0 35	<1.0 24	-	<1.0 27	-		22	-	19	-(2 20	12	40	23	23	18	<1.0 21	-	-c2 34	60	-	-	<2 22		3 9
Total Beryllium (Se)	Hg/L	2	5	-	-		-2	-	-	<1.0	<1.0	-	<1.0	-	- 1	-2		<2	<2	-2	<2	-2	-2	-2	<1.0	-	-2	-2	-	<2	-2		a
Total Bismuth (Bi)	Hg/t	2	-	-	-		-2	-		<2.0	<2.0	-	<2.0		-	-2		- 42	-2	<2	<2	-2	-2	-2	<2.0	-	-2	-2	-		<2		a
Total Boron (B)  Total Cadmium (Cd)	Hg/t	5 0.017	1,200	-	1,500		£ 200			11	g e0.017	_	<50 <0.017		- 1	6 6	-	9	6	8 0.018	9	8 40.017	13	11 e0.017	-50		۵	10			-65		12
Total Cadmium (Cd) Total Chromium (Cr)	Hg/L Hg/L	0.017	1	-	0.090	-	<0.300	-	-	<1.0	<0.017	-	<0.017	-		<0.017	-	<1	<1	<1	0.410	<0.017	0.020	<0.017	<1.0	-	0.146	0.227	-	-	<1		0.179 S
Total Cobalt (Co)	HK/t	1	10	-	-		<1	-	-	1	<0.4	-	<0.4	-	- 1	<1		2	-0.	<1	9	- 4	<1	<1	<0.40	-	3	- 6	-	-	<1	- 1	6
Total Copper (Cu)	HE/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		2
Total Iron (Fe)	HE/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	205	359 12	2,600
Total Lead (Pb) Total Maneanese (Mn)	με/L ur/L	0.5	1.0 820		1.0 - 7.0		<0.5 17	-	-	1.7	<0.5 69	41	<0.5	128	62	<0.5 48	-	0.9 214	<0.5 33	<0.5 58	693	0.9 54	<0.5 260	<0.5 40	<0.5 34	296	6.3 278	424	281	53	<0.5 64	125 8	9.1
Total Molybdenum (Mo)	Hg/L	2	73	-	73	<b>—</b>	-2	-	-	<2.0	<2.0		42.0		-	48	-	42 42	- 2	<2	<2	- 42	-200	-49	<2.0	-	-278	424	-		<2		a
Total Nickel (Ni)	Hg/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
Total Selenium (Se)	Hg/t	0.1	0.1	-	1		-2			<1.0	<1.0 <0.1	_	<1.0	-	- 7	d.	-	<1	d	<1	<1 <0.1	<0.1	<0.1	<0.1	<1.0	-	1	1			<1		n.
Total Silver (Ag) Total Strontium (Sr)	µg/L µg/L	0.1	0.1 21.000	-	0.3		<0.5 18	-		<0.1 36	<0.1 37	-	<0.1 25			<0.1 26	-	40.1 30	<0.1 31	<0.1 25	<0.1 34	<0.1 35	<0.1 37	<0.1 30	<0.1 32		<0.1 22	<0.1 40	+ -	-	<0.1 34		40.1 47
Total Thallium (Ti)	Hg/L	0.1	0.8	-	0.8		40.1	-		<0.1	<0.1		<0.1	-		<0.1	-	40.1	<0.1	40.1	40.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	-	-	<0.1	- 4	<0.1
Total Tin (Sn)	Hg/L	2	-	-	-		-2	-	-	<2.0	<2.0	-	<2.0		-	-2		<2	<2	<2	<2	-2	-2	-2	<2.0	-	-2	-2	-		<2		<2
Total Titanium (Ti)	µg/t	2		-	-		-2	-			<2.0	-	4	-	-	-2		4	-2	<2	65	4	-2	3	<2	-	25	106	-	-	2		75
Total Uranium (U) Total Variadium (V)	µg/L ur/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
Total Zinc (Zn)	Hg/L	5	30	-	30		- 8	-	-	10	5 5	- 6	6	- 6	5	- 0	-	13	8	- 45	62	- 0	- 0	6	11	13	12	14	20		11		29
MICROBIOLOGICAL																													20				_
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 9	166
Total Coliform E. coli	MPN/100mL MPN/100mL	1	-	400	-		200 33	73 45	-	3250 19	9250 9250	×250	85 2	×250	<100	411	-	2,420	12	1,730	1,011	613	2,420	>2420 10	<10	>2420	52420	>2420 >2420	1,410	>2420	665		G G
Chlorophyll A - Acidification method	Hg/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.	4.86
Chlorophyll A - Welschmeyer method	HK/r	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.	6.58
		r .		1	Í.	i .	•			1	1	1	1	1	1 1			1	1	1	Í.	1	1	1		Í.							

Present Besult - Parameter concentration seconds COME FINAL Guidation

- Present Besult - Parameter concentration seconds COME FINAL Guidation

- Parameter Second Parameter concentration seconds COME FINAL Guidation and/or Neath Consideration Second Final Second Parameter Concentration seconds COME FINAL Guidation (COME FINAL Guidation and Final Second Parameter Concentration seconds FINAL Second Parameter Concentration seconds FINAL Second FINAL Second Parameter Concentration seconds FINAL Second FINAL Second FINAL Guidation Second FINAL SECOND

TABLE 18: Historical Data - Bedford West	Water Quality :	Sampling Program	m																														
Fall 2017	Units	RDL (2017)	NSE ESQs for Surface Water (Iteference)	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PAL- F (Applied)	HRM Phosphorus Trigger Range (Applied)														Paper Mill La	ke												
Sample Sites Sampling Date	yyyy-mm-dd						2000 (06 /20	2000/09/12	2000/20/02	2010/06/01	2010/56/24	2010/11/01	2011/06/11	2011/09/14	2017/10/16	2012/01/01	2012/200716	2012/10/11	2012/05/15	PML2 2013/08/15	2013/20/26	2014/05/15	2014/08/14	2014/10/27	2015 255 (20.	2015/06/25	2025/20/22	2016/06/26	2016/09/16	2016/10/25	2017/06/09	2017/08/15 20:	017/10/18
Sampling Time	hh:mm	-					13:15	13:40	13:45	14:30	16:20	13:00			16:15				13:40	10:45	11:20	11:00	9:20	8:30	11:30	13:45		13:45			14:30		14:00
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
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		14.0
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		6.6
pM (in Situ)	pН	-		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		6.9
Specific Conductance	u5/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
INORGANICS																															1		
Total Alkalinity (as CaCO3)	mg/L	5			-		5	7	7	- 6		7	- 6	- 8	7	21	-	-	9		8	32	10	26 42	<5.0	5	7	7	10	8	5		11
Dissolved Chiloride (Cl) Colour	mg/L TCU	5		-	120		63 22	63 17	58 19	62 20	58 13	50 23	44 35	43 38	34 48	55 39		-	63 18	-	64 8	245	50	42 31	26	59 10	57	67 22	67 13	50 22	67 18	72	60 19
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
Nitrate (N)	mg/t.	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
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		<0.06
Nitrogen (Ammonia Nitrogen) Total Kieldahl Nitrogen as N	mg/L 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 <0.4	0.03	<0.03	<0.050 0.2	<0.03	<0.03 3.0	0.05	40.03 40.4	40.03 0.5	<0.03	<0.03 0.0	<0.03 <0.4
Total Keldahi Nitrogen as N Total Organic Carbon	mg/L mg/L	0.5	-	-	-	t	3.6	2.6	4.5	3.2	3.4	3.6	4.0	6.0	5.6	5.9	-		4.4		4.0	40.4	2.4	5.8	2.8	6.0	6.1	4.0	40.4 3.6	8.3	5.5		4.1
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	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pН	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		7.0
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		8.1
Total Magnesium (Mg) Total Phosphorus	mg/L mg/L	0.1	-	-	-	0.010	1.1	1.1	0.002	1.3 0.010	0.002	1.2 e0.002	0.9	0.9	0.9	1.0		-	0.006	-	1.4	1.7	1.4	1.0	1,000.0	1.3	1.2 0.008	1.2	0.003	1.3 0.005	1.3		0.006
Total Potassium (K)	mg/L	0.1	-	-		0.010	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	0.008	1.0	1.0	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		26.5
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		2.0
Total Suspended Solids Dissolved Sulphate (SO4)	mg/L	5 2	-	-	-		2 11	3 11	-d 11	15 10	-(2 10	11 10	41	8 10	<1 9	- 5	-	-	0		<5 11	16 27	- 5	- 5	1 8	্ব	- 6	45	- 45	<5 10	<5 10	14 8	- G 11
Turbidity (NTU)	mg/L 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	9 1.3	9.4	1.1	1.4	1.9		1.8
Conductivity (uS/cm)	μ\$/cm	1	-	-	-		240	250	230	230	230	210	170	170	150	213	-	-	254		277	777	273	212	260	251	246	263	319	190	259		255
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 20	2.24	1.79	2.22	2.44	2.15
ticarb. Alkalinity (calc. as CaCO3)	mg/L	5	-	-	-		5	7	7	6	8	7	d	8	7	21		-	- 5	-	8	32	10	26	<1.0	5	7	7	10	8	5	12	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		124
Carb. Alkalinity (calc. as CaCO3)	mg/t.	10 N/A	-	-	-		<1 1.94	<1 2.23	<1 1.88	<1 1.88	<1 2.03	<1 1.86	<1 1.48	<1 1.28	<1 1.27	<10 1.94		-	<10 2.09	-	<10 2.55	<10 6.96	<10	<10 1.95	<1.0	<10 2.44	<10 1.84	<10 2.53	<10 2.17	<10 1.92	<10 2.37		<10 2.09
Cation Sum Hanfrass (CaCOS)	me/L mg/L	N/A N/A		-			20.00	223	20.00	23.00	24.00	25.00	17.00	15.00	16.00	1.94	-	-	2.09	-	25.00	54.90	2.47	21.30	23.00	2.44	20.40	27.20	25.20	1.92 23.80	2.37	2.62	25.20
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		1.60
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		-2.66
Langelier Index (@ 4C)	N/A N/A	N/A N/A		-	-		-3.59	-3.08 9.64	-3.18 9.75	-3.31 9.72	-2.80 9.57	-3.05 9.63	NC	-3.43 9.78	-3.42 9.77	-3.21 9.49			-3.71	-	-3.40 9.81	-2.05 8.86	-2.93	-2.89 9.34	NC	-3.32 9.98	-3.29	-3.30	-2.78	-3.21	-3.45 9.99		-2.98
Saturation pH (@ 200) Saturation nH (@ 40)	N/A N/A	N/A N/A		-			9.83	9.64	9.75	9.72	9.57	9.63	NC NC	9.78	9.77	9.49	-	-	10.10	-	9.81	918	9.65	9.34	NC NC	9.98	9.95 10.30	9.81	9.69	9.82	9.99		9.65
Metals (ICP-MS)							10.10					7.00															20.30	10.10	20.00	20.10		2772	
Total Aluminum (Al)		-			5.100		110			1.020	56		202			140			111		107	101	52	111	110		278				217		-
Total Antimony (Sb)	µg/L µg/L	2	20	-	3-200		-2	-	-	<1.0	41.0	-	<1.0		-	-2		-	-2	-	-2	-2	-2	-2	<1.0	-	-2	<2	-	-	-2		42
Total Arsenic (As)	µg/t	2	5		5		<2	-	-	<1.0	<1.0		<1.0	-		-2		-	-2	-	<2	<2	-2	-2	<1.0	-	<2	- 42			-2		a
Total Barium (Ba)	μg/t	5	1,000		-		16			23	12	-	23		-	22		-	22	-	37	50	27	19	25		24	35	-	-	27		23
Total Beryllium (Be) Total Bismuth (Bi)	µg/t	2	5	-		-	a a	-	-	<1.0	<1.0	-	<1.0	-	-	-2		-	-2	-	- 2	a a	- 0	- 2	<1.0		-2	-2	-	<2	a a		0
Total Bismuth (Bi) Total Boron (B)	µg/t µg/t	5	1.200	-	1.500	<del>                                     </del>	- 2	-	-	<2.0 8	<2.0 9		<2.0	_		6		-	6	-	9	7	13	11	<2.0	-	- 2	<2 8	-	-	- 6		11
Total Cadmium (Cd)	μg/t	0.017	0.010	-	0.090	1	< 0.300	-	-	0.037	<0.017	-	0.028	-	-	0.023	-		0.039	-	0.050	0.062	0.019	0.018	0.023	-	0.145	0.042	-	-	<0.017	-	<0.017
Total Chromium (Cr)	μg/t	1	1	-	1		-2	-		<1.0	<1.0	-	<1.0	-	-	-0		-	d	-	<1	<1	<1	- 4	<1.0	-	<1	<1	-	-	<1		<1
Total Cobalt (Co)	µg/t	1	10	-	- 2		-0.	-		1 1	40.4	- 4	40.4	- 0	- 2	- 4			- 0	-	1 310	<1	d	-1	<0.40		<1	- 41		- 1	<1 41		4
Total Copper (Cu) Total Iron (Fe)	µg/L µg/L	50	300	-	300	<del>                                     </del>	100	-	-	1 090	151	<2 76	143	690	-2 181	178	-	-	181		1,310	264	41 316	114	<2.0 170	334	2 165	647	<1 174	123	<1		145
Total Lead (Pb)	μg/L	0.5	1.0	-	1.0 - 7.0		<0.5	-	-	2.4	<0.5	- 70	<0.5	-		<0.5	-		<0.5	-	49.7	0.7	<0.5	<0.5	<0.5	-	0.5	1.1	2.54	-	<0.5		40.5
Total Manganese (Mn)	µg/t	2	820	-			58	-		159	81	28	34	89	31	22		-	87	-	866	205	278	24	43	67	61	109	36	23	85	68	26
Total Molybdenum (Mo)	μg/t	2	73		73		-2	-	-	<2.0	<2.0		<2.0	-		- 2	-	-	-2	-	<2	-2	-2	-2	<2.0	-	<2	-2	-	-	42		a
Total Nickel (NE) Total Selenium (Sel)	µg/L µg/L	1	25	-	25 - 150 1		-2	-		<1.0	<2.0 <1.0	-	<2.0	-	-	- 2		-	- 4	-	- 3	- 41	- 4	- 4	<2.0 <1.0	-	2 <1	- 0	-	-	- 4		a d
Total Silver (Ar)	Hg/L	0.1	0.1	-	0.3		40.5	-	-	<0.1	<0.1	-	40.1		-	<0.1			40.1	-	0.1	<0.1	<0.1	<0.1	40.1	-	<0.1	<0.1	-	-	40.1		40.1
Total Strontium (Sr)	µg/t	5	21,000	-			30	-		35	33	-	26	-	-	27		-	31	-	35	68	37	29	34	-	21	38	-	-	35	-	29
Total Thallium (TI)	µg/t	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) Total Titanium (Ti)	µg/L	2		-	-	-	a a	-	-	-2 21	- 2	-	4	-	-	- 2	-	-	- 2	-	3 2	-(2	- 2	- 2	-2	-	42 4	<2 7	-	-	a a		a
Total Titanium (Ti) Total Uranium (U)	HE/L HE/L	0.1	300.0	-	15.0	t	<0.1	-	-	0.1	<0.1	-	40.1		-	0.1	-		40.1		<0.1	-3 -(0.1	<0.1	<0.1	<0.1	-	<0.1	-0.1	-	-	<0.1		40.1
Total Vanadium (V)	μg/L	2	6	-		1	- 42	-	-	-2	-2		-2	-		- 2		-	-2		- 42	- 42	-2	-2	- 42	-	42	<2			-2	-	a
Total Zinc (Zn)	μg/t	5	30	-	30		12	-		18	<5.0	- 6	7	8	10	8		-	11	-	762	- 6	ඡ	5	14	- 6	8	7	ඡ	ඡ	8	9	S
MICROBIOLOGICAL																																	
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	1,790
t. coli	MPN/100mL	1		400			10	31		69	d	- 6	17	>250	<100	1		-	12	-	2	<1	3	16	<0.10	5	2	4	47	30	1	11	2
Chlorophyll A - Acidification method	µg/t	0.05		-			1.15			3.50		0.53		2.48	1.33		-		1.18		0.25	0.99	0.48	0.72	1.67	4.79	1.50	3.82	1.09	2.02	5.31		1.27
Chlorophyll A - Weischmeyer method	µg/t	0.05	-	-	-	<del>                                     </del>	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

Fold (Block shaded)

\*\*Present Result - Parameter concentration recent). COME FWAN. Guideline.

\*\*Present Result - Parameter concentration recent). KNI COG Contaminated Stem Regulations and/or fresh Canada Guideline for Recreational Water Quality

\*\*Parameter: — Parameter concentrations exceeds COLE FWAN. Solidoline yet for SECTION Contaminated Stem Regulations and/or Wealth Canada Guideline for Recreational Water Quality

\*\*Parameter: — Parameter concentrations exceeds COLE FWAN. Solidoline yet for SECTION CONTAMINATION CONTAMI

No. Not Angledonie C. Vol. Challadon C. Ser. Colored No. Hyperid Selection (Line Colored Selection C

# **Appendix E**

Laboratory Certificate of Analysis



**CLIENT NAME: SNC Lavalin Inc.** 

5657 SPRING GARDEN RD, SUITE 200

HALIFAX, NS B3J3R4

(902) 492-4544

**ATTENTION TO: Maria Gutierrez** 

**PROJECT: 631477** 

**AGAT WORK ORDER: 17X273114** 

WATER ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

DATE REPORTED: Oct 27, 2017

**PAGES (INCLUDING COVER): 13** 

**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 (V1)

±NOTE O

Page 1 of 13

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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



CLIENT NAME: SNC Lavalin Inc.

# **Certificate of Analysis**

AGAT WORK ORDER: 17X273114

PROJECT: 631477

**ATTENTION TO: Maria Gutierrez** 

SAMPLED BY:

SAMPLING SITE: SNC-Lavalin Bedford West Custom Inorganics Package DATE RECEIVED: 2017-10-18 **DATE REPORTED: 2017-10-27** SAMPLE DESCRIPTION: KL-1 KL-2 KL-3 KL-4 KL-5 PML-1 SAMPLE TYPE: Water Water Water Water Water Water DATE SAMPLED: 2017-10-18 2017-10-18 2017-10-18 2017-10-18 2017-10-18 2017-10-18 RDL 8827302 8827306 8827308 8827309 8827310 RDL 8827311 Parameter G/S Alkalinity ma/L 5 10 9 9 10 9 5 9 Chloride mg/L 640, 120 59 59 60 59 60 19 1 1 57 24 True Color TCU Narrative 5 12 15 16 14 5 Nitrate + Nitrite as N mg/L 0.05 0.10 <0.05 0.24 0.15 0.09 0.05 0.20 Nitrate as N 550, 13 0.05 0.10 <0.05 0.24 0.15 0.09 0.05 0.20 mg/L Nitrite as N mg/L 0.06 0.05 <0.05 <0.05 <0.05 <0.05 <0.05 0.05 <0.05 Ammonia as N Fact Sheet 0.03 0.04 0.04 0.03 0.04 0.04 0.03 0.05 mg/L Total Organic Carbon 4.0 3.9 0.5 4.8 8.5 4.1 6.3 0.5 mg/L <0.01 <0.01 <0.01 <0.01 < 0.01 < 0.01 Ortho-Phosphate as P mg/L 0.01 0.01 6.5-9.0 7.00 6.66 6.88 6.95 6.93 6.75 Total Calcium mg/L 0.1 8.3 3.9 8.1 8.6 7.5 0.1 9.5 Total Magnesium 0.9 1.2 1.3 mg/L 0.1 1.3 1.1 0.1 1.5 Total Phosphorus Fact Sheet 0.002 0.005 0.010 0.007 0.006 0.005 0.004 0.099 mg/L Total Potassium mg/L 0.1 1.2 0.7 1.0 1.1 0.9 0.1 1.3 Total Sodium 0.1 35.7 13.0 35.9 38.9 37.2 36.0 mg/L 0.1 Reactive Silica as SiO2 mg/L 0.5 1.8 4.6 1.9 2.1 1.7 0.5 1.8 Total Suspended Solids mg/L Narrative 5 <5 <5 <5 <5 <5 104 Sulphate mg/L 2 10 3 10 10 10 2 11 31.3 Turbidity Narrative 0.1 8.0 1.6 2.6 1.6 0.9 97 248 Electrical Conductivity umho/cm 249 247 246 1 248 0.78 2.07 2.08 Anion Sum me/L 2.11 2.09 2.09 Bicarb. Alkalinity (as CaCO3) mg/L 10 9 9 10 9 5 9 Calculated TDS mg/L 123 47 122 126 123 142 Carb. Alkalinity (as CaCO3) mg/L <10 <10 <10 <10 <10 <10 2.27 Cation sum me/L 2.12 0.90 2.10 2.12 3.15 Hardness ma/L 26.1 13.4 25.2 26.8 23.3 29.9 % Difference/ Ion Balance (NS) 20.3 7.5 0.8 0.7 0.2 4.3 Langelier Index (@20C) NA -2.68 -3.35 -2.85 -2.71 -2.84 -2.92 Langelier Index (@ 4C) NA -3.00 -3.67 -3.17 -3.03 -3.16 -3.24 Saturation pH (@ 20C) NA 9.68 10.0 9.73 9.66 9.77 9.67

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SAMPLING SITE:

# **Certificate of Analysis**

AGAT WORK ORDER: 17X273114

PROJECT: 631477

**ATTENTION TO: Maria Gutierrez** 

SAMPLED BY:

		,	SNC-Lav	valin Bedfo	ord West Cu	ıstom Inorg	anics Pack	age			
DATE RECEIVED: 2017-10-18								ı	DATE REPORT	ΓED: 2017-10-27	
Parameter	S Unit		CRIPTION: PLE TYPE: SAMPLED: RDL	KL-1 Water 2017-10-18 8827302	KL-2 Water 2017-10-18 8827306	KL-3 Water 2017-10-18 8827308	KL-4 Water 2017-10-18 8827309	KL-5 Water 2017-10-18 8827310	RDL	PML-1 Water 2017-10-18 8827311	
Saturation pH (@ 4C)	NA			10.0	10.3	10.1	9.98	10.1		9.99	
Total Aluminum	ug/L	Variable	5	46	240	43	55	44	5	4190	
Total Antimony	ug/L		2	<2	<2	<2	<2	<2	2	<2	
Total Arsenic	ug/L	5	2	<2	<2	<2	<2	<2	2	3	
Total Barium	ug/L		5	17	14	20	20	17	5	58	
Total Beryllium	ug/L		2	<2	<2	<2	<2	<2	2	<2	
Total Bismuth	ug/L		2	<2	<2	<2	<2	<2	2	<2	
Total Boron	ug/L	29000,	5	26	17	12	11	10	5	12	
Total Cadmium	ug/L	1.0, 0.09	0.017	<0.017	<0.017	< 0.017	<0.017	<0.017	0.017	0.179	
Total Chromium	ug/L		1	<1	1	<1	<1	<1	1	5	
Total Cobalt	ug/L		1	<1	<1	<1	<1	<1	1	6	
Total Copper	ug/L	Equation	1	1	1	1	<1	1	1	8	
Total Iron	ug/L	300	50	116	572	130	141	106	50	12600	
Total Lead	ug/L	Equation	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	9.1	
Total Manganese	ug/L		2	17	64	54	48	13	2	894	
Total Molybdenum	ug/L	73	2	<2	<2	<2	<2	<2	2	<2	
Total Nickel	ug/L	Equation	2	<2	<2	<2	<2	<2	2	6	
Total Selenium	ug/L	1	1	<1	<1	<1	<1	<1	1	<1	
Total Silver	ug/L	0.25	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	
Total Strontium	ug/L		5	40	20	41	40	38	5	47	
Total Thallium	ug/L	0.8	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	
Total Tin	ug/L		2	<2	<2	<2	<2	<2	2	<2	
Total Titanium	ug/L		2	<2	<2	<2	<2	<2	2	75	
Total Uranium	ug/L	33, 15	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.6	
Total Vanadium	ug/L		2	<2	<2	<2	<2	<2	2	12	
Total Zinc	ug/L	30	5	6	6	6	<5	<5	5	29	
Total Coliforms (MPN)	MPN/100 mL		1	154	659	411	>2420	>2420	1	166	
E. Coli (MPN)	MPN/100 mL		1	3	3	46	3	517	1	<1	
Chlorophyll A - Acidification Method	ug/L		0.05	Υ	Υ	Υ	Υ	Υ	0.05	Υ	

Certified By:	

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AGAT WORK ORDER: 17X273114

PROJECT: 631477

**ATTENTION TO: Maria Gutierrez** 

SAMPLED BY:

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11 Morris Drive, Unit 122

SAMPLING SITE: **SNC-Lavalin Bedford West Custom Inorganics Package** DATE RECEIVED: 2017-10-18 DATE REPORTED: 2017-10-27 SAMPLE DESCRIPTION: KL-1 KL-2 KL-3 KL-4 KL-5 PML-1 SAMPLE TYPE: Water Water Water Water Water Water DATE SAMPLED: 2017-10-18 2017-10-18 2017-10-18 2017-10-18 2017-10-18 2017-10-18 Parameter 8827302 8827306 8827308 8827309 8827310 8827311 Chlorophyll A - Welschmeyer Method Υ Υ Υ 0.05 Υ 0.05 ug/L Total Kjeldahl Nitrogen as N 0.4 <0.4 <0.4 <0.4 <0.4 <0.4 0.4 1.1 mg/L

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AGAT WORK ORDER: 17X273114

PROJECT: 631477

**ATTENTION TO: Maria Gutierrez** 

SAMPLED BY:

CLIENT NAME: SNC Lavalin Inc.

SAMPLING SITE:

SA

		S	NC-Lav	valin Bedfo	ord West Cu	stom Inorga	anics Pack	kage			
DATE RECEIVED: 2017-10-18								D	ATE REPORT	ΓED: 2017-10-27	
		DATE S	LE TYPE: AMPLED:	PML-2 Water 2017-10-18	HWY-102-1 Water 2017-10-18	HWY-102-2 Water 2017-10-18		LU Water 2017-10-18		LDS Water 2017-10-18	
Parameter	Unit	G/S	RDL	8827312	8827313	8827314	RDL	8827315	RDL	8827316	
Alkalinity	mg/L		5	11	16	11	5	20	5	20	
Chloride	mg/L	640, 120	1	60	51	92	2	143	1	36	
True Color	TCU	Narrative	5	19	29	22	5	8	5	21	
Nitrate + Nitrite as N	mg/L		0.05	0.16	0.58	0.07	0.05	1.72	0.05	0.22	
Nitrate as N	mg/L	550, 13	0.05	0.16	0.58	0.07	0.05	1.72	0.05	0.22	
Nitrite as N	mg/L	0.06	0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05	
Ammonia as N	mg/L	Fact Sheet	0.03	<0.03	0.07	0.14	0.03	0.04	0.03	0.04	
Total Organic Carbon	mg/L		0.5	4.1	6.9	5.9	0.5	5.4	0.5	6.9	
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01	
pH		6.5-9.0		6.99	6.90	6.51		7.13		7.01	
Total Calcium	mg/L		0.1	8.1	14.6	14.7	0.1	22.8	0.1	6.7	
Total Magnesium	mg/L		0.1	1.2	2.2	2.1	0.1	2.5	0.1	1.6	
Total Phosphorus	mg/L	Fact Sheet	0.002	0.006	0.008	0.011	0.002	0.008	0.002	0.015	
Total Potassium	mg/L		0.1	1.1	2.0	1.6	0.1	2.6	0.1	1.2	
Total Sodium	mg/L		0.1	35.5	29.6	55.2	0.1	86.9	0.1	23.0	
Reactive Silica as SiO2	mg/L		0.5	2.0	5.6	6.4	0.5	5.9	0.5	4.0	
Total Suspended Solids	mg/L	Narrative	5	<5	<5	8	5	<5	5	<5	
Sulphate	mg/L		2	11	19	9	2	33	2	4	
Turbidity	NTU	Narrative	0.1	1.8	1.1	12.5	0.1	3.0	0.1	15.1	
Electrical Conductivity	umho/cm		1	255	258	366	1	610	1	171	
Anion Sum	me/L			2.15	2.20	3.01		5.24		1.51	
Bicarb. Alkalinity (as CaCO3)	mg/L		5	11	16	11	5	20	5	20	
Calculated TDS	mg/L		1	124	131	187	1	311	1	87	
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	10	<10	10	<10	
Cation sum	me/L			2.09	2.28	3.60		5.21		1.59	
Hardness	mg/L			25.2	45.5	45.4		67.2		23.3	
% Difference/ Ion Balance (NS)	%			1.6	1.8	8.9		0.3		2.3	
Langelier Index (@20C)	NA			-2.66	-2.33	-2.90		-1.85		-2.44	
Langelier Index (@ 4C)	NA			-2.98	-2.65	-3.22		-2.17		-2.76	
Saturation pH (@ 20C)	NA			9.65	9.23	9.41		8.98		9.45	

Certified	Bv:
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AGAT CERTIFICATE OF ANALYSIS (V1)

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AGAT WORK ORDER: 17X273114

PROJECT: 631477

**ATTENTION TO: Maria Gutierrez** 

SAMPLED BY:

CLIENT NAME: SNC Lavalin Inc. **SAMPLING SITE:** 

**SNC-Lavalin Bedford West Custom Inorganics Package** DATE RECEIVED: 2017-10-18 **DATE REPORTED: 2017-10-27** SAMPLE DESCRIPTION: PML-2 HWY-102-1 HWY-102-2 LU LDS SAMPLE TYPE: Water Water Water Water Water DATE SAMPLED: 2017-10-18 2017-10-18 2017-10-18 2017-10-18 2017-10-18 G/S RDL 8827312 8827313 8827314 RDL 8827315 RDL 8827316 Parameter Saturation pH (@ 4C) NA 9.97 9.55 9.73 9.30 9.77 Total Aluminum 5 ug/L Variable 100 542 401 34 29 <2 <2 <2 2 <2 2 <2 Total Antimony ug/L Total Arsenic ug/L 5 <2 <2 <2 <2 <2 Total Barium ug/L 23 77 122 111 5 11 Total Beryllium ug/L <2 <2 <2 <2 <2 Total Bismuth ug/L <2 <2 <2 2 <2 2 <2 ug/L 29000. 24 12 19 20 Total Boron 11 5 5 Total Cadmium 1.0. 0.09 0.017 <0.017 <0.017 0.048 0.017 0.052 0.017 < 0.017 ug/L Total Chromium ug/L <1 2 1 1 Total Cobalt ug/L <1 <1 2 1 <1 1 <1 Total Copper ug/L Equation 281 289 874 Total Iron 300 50 145 4760 50 50 ug/L Total Lead ug/L Equation 0.5 <0.5 <0.5 3.3 0.5 <0.5 0.5 0.7 Total Manganese 26 28 215 2 91 2 250 ug/L Total Molybdenum ug/L 73 <2 <2 <2 2 <2 2 <2 Total Nickel ug/L Equation <2 <2 3 2 <2 2 <2 Total Selenium <1 <1 <1 <1 ug/L Total Silver <0.1 <0.1 <0.1 <0.1 <0.1 ug/L Total Strontium ug/L 5 39 76 80 5 111 5 31 Total Thallium 0.8 0.1 < 0.1 < 0.1 < 0.1 0.1 < 0.1 0.1 < 0.1 ug/L Total Tin ug/L <2 <2 <2 2 <2 2 <2 Total Titanium ug/L 2 <2 <2 15 2 <2 2 7 Total Uranium ug/L 33, 15 <0.1 <0.1 <0.1 0.1 <0.1 0.1 <0.1 Total Vanadium <2 <2 3 2 <2 2 <2 ug/L Total Zinc ua/L 5 8 19 22 Total Coliforms (MPN) MPN/100 mL >2420 1730 >2420 1990 641 1 1 E. Coli (MPN) MPN/100 mL 5 3 41 Chlorophyll A - Acidification Method 0.05 0.05 0.05

Certified By:	
	Page 6 of 13

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AGAT WORK ORDER: 17X273114

PROJECT: 631477

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**CLIENT NAME: SNC Lavalin Inc.** 

**SAMPLING SITE:** 

8827311

**ATTENTION TO: Maria Gutierrez** 

SAMPLED BY:

	SNC-Lavalin Bedford West Custom Inorganics Package														
ATE RECEIVED: 2017-10-18 DATE REPORTED: 2017-10-27															
	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:			PML-2 Water 2017-10-18	HWY-102-1 HWY-102-2 Water Water 2017-10-18 2017-10-18			LU Water 2017-10-18	LDS Water 2017-10-18						
Parameter	Unit	G/S	RDL	8827312	8827313	8827314	RDL	8827315	RDL	8827316					
Chlorophyll A - Welschmeyer Method	ug/L		0.05	Υ	Y	Υ	0.05	Y	0.05	Υ					
Total Kjeldahl Nitrogen as N	mg/L		0.4	<0.4	3.8	0.6	0.4	0.6	0.4	10.0					

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME FWAL - update 2015 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.

8827302-8827310 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.

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.

8827312-8827316 Total Phosphorus was analysed at AGAT Mississauga.
Chlorophyll A was analysed by a sub-contracted laboratory.

tified



NS-CCME FWAL

LDS

## **Guideline Violation**

Total Iron

AGAT WORK ORDER: 17X273114

PROJECT: 631477

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874

300

ug/L

CLIENT NAME	: SNC Lavalin Inc.		ATTENTION TO: Maria	·····	,agaaabo.oo		
SAMPLEID SAMPLE TITLE		GUIDELINE ANALYSIS PACKAGE		PARAMETER	UNIT	GUIDEVALUE	RESULT
8827306	KL-2	NS-CCME FWAL	SNC-Lavalin Bedford West Custom Inorganics Package	Total Iron	ug/L	300	572
8827311	PML-1	NS-CCME FWAL	SNC-Lavalin Bedford West Custom Inorganics Package	Total Iron	ug/L	300	12600
8827314	R827314 HWY-102-2 NS-CCMF FWAI SNC-Lavalin Bedford West Custom Inorg		SNC-Lavalin Bedford West Custom Inorganics	Total Iron	ug/L	300	4760

SNC-Lavalin Bedford West Custom Inorganics Package

8827316



# **Quality Assurance**

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X273114

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE: SAMPLED BY:

Water Analysis  RPT Date: Oct 27, 2017 DUPLICATE REFERENCE MATERIAL METHOD BLANK SPIKE MATRIX SPIKE															
RPT Date: Oct 27, 2017	DUPLICATE F			REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE			
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acceptable Limits		Recovery	Acceptable Limits		Recovery		ptable nits
TAKAMETEK	Batch	ld	Dup#1	Bup #2	INI D		Value	Lower	Upper	Recovery	Lower	Upper	Recovery	Lower	Uppe
SNC-Lavalin Bedford West Cus	stom Inorgar	nics Packa	ge					•			•				
Alkalinity	8825639		88	87	0.9%	< 5	92%	80%	120%	NA	80%	120%	NA	80%	120%
Chloride	8827302	8827302	60	62	3.2%	< 1	93%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	8828239		<5	<5	NA	< 5	105%	80%	120%	NA			NA		
Nitrate as N	8827302	8827302	0.10	0.10	NA	< 0.05	98%	80%	120%	NA	80%	120%	91%	80%	120%
Nitrite as N	8827302	8827302	<0.05	<0.05	NA	< 0.05	92%	80%	120%	NA	80%	120%	97%	80%	120%
Ammonia as N	1	8824699	1.63	1.58	3.1%	< 0.03	109%	80%	120%		80%	120%	80%	80%	120%
Total Organic Carbon	1	8825177	5.4	6.3	15.4%	< 0.5	99%	80%	120%		80%	120%	98%	80%	120%
Ortho-Phosphate as P	1	8835716	<0.01	<0.01	NA	< 0.01	98%	80%	120%		80%	120%	96%	80%	120%
PH	8825639		7.03	7.02	0.1%	<	101%	80%	120%	NA	80%	120%	NA	80%	120%
Total Calcium	8828902		18.6	17.6	5.7%	< 0.1	103%	80%	120%	112%	80%	120%	NA	70%	130%
Total Magnesium	8828902		2.1	2.1	0.9%	< 0.1	104%	80%	120%	109%	80%	120%	NA	80%	120%
Total Phosphorus		8827302	0.005	0.006	NA	< 0.002	97%	90%	110%	101%	90%	110%	105%	80%	120%
Total Potassium	8828902		0.9	0.9	0.1%	< 0.1	105%	80%	120%	109%	80%	120%	102%	70%	130%
Total Sodium	8828902		24.6	23.3	5.5%	< 0.1	105%	80%	120%	109%	80%	120%	NA	70%	130%
Reactive Silica as SiO2	1	8825716	6.6	6.7	1.5%	< 0.5	108%	80%	120%		80%	120%	91%	80%	120%
Total Suspended Solids	8827302	8827302	<5	<5	NA	< 5	101%	80%	120%	NA			93%	80%	120%
Sulphate	8827302	8827302	10	10	NA	< 2	115%	80%	120%	NA	80%	120%	93%	80%	120%
Turbidity	8828239		0.5	0.5	12.5%	< 0.1	101%	80%	120%	NA			NA		
Electrical Conductivity	8825639		185	185	0.1%	< 1	102%	80%	120%	NA	80%	120%	NA	80%	120%
Bicarb. Alkalinity (as CaCO3)	8825639		88	87	0.9%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	8825639		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	8828902		13	10	NA	< 5	107%	80%	120%	112%	80%	120%	103%	70%	130%
Total Antimony	8828902		<2	<2	NA	< 2	95%	80%	120%	96%	80%	120%	96%	70%	130%
Total Arsenic	8828902		<2	<2	NA	< 2	99%	80%	120%	101%	80%	120%	99%	70%	130%
Total Barium	8828902		8	8	NA	< 5	96%	80%	120%	100%	80%	120%	99%	70%	130%
Total Beryllium	8828902		<2	<2	NA	< 2	106%	80%	120%	109%	80%	120%	104%	70%	130%
Total Bismuth	8828902		<2	<2	NA	< 2	103%	80%	120%	108%	80%	120%	104%	70%	130%
Total Boron	8828902		8	8	NA	< 5	107%	80%	120%	109%	80%	120%	115%	70%	130%
Total Cadmium	8828902		<0.017	< 0.017	NA	< 0.017	98%	80%	120%	97%	80%	120%	93%	70%	130%
Total Chromium	8828902		<1	<1	NA	< 1	97%	80%	120%	99%	80%	120%	109%	70%	130%
Total Cobalt	8828902		<1	<1	NA	< 1	96%	80%	120%	100%	80%	120%	110%	70%	130%
Total Copper	8828902		164	161	1.8%	< 1	100%	80%	120%	103%	80%	120%	NA		130%
Total Iron	8828902		119	127	NA	< 50	100%	80%	120%	103%		120%	96%		130%
Total Lead	8828902		<0.5	<0.5	NA	< 0.5	107%	80%	120%	108%		120%	108%	70%	130%
Total Manganese	8828902		4	3	NA	< 2	95%	80%		97%		120%	109%		130%
Total Molybdenum	8828902		<2	<2	NA	< 2	94%	80%	120%	97%	80%	120%	115%	70%	130%
Total Nickel	8828902		<2	<2	NA	< 2	97%	80%	120%	105%		120%	109%	70%	130%
Total Selenium	8828902		<1	<1	NA	< 1	99%	80%	120%	107%	80%	120%	96%	70%	130%
Total Silver	8828902		<0.1	<0.1	NA	< 0.1	101%	80%	120%	104%		120%	81%		130%

## AGAT QUALITY ASSURANCE REPORT (V1)

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



# **Quality Assurance**

CLIENT NAME: SNC Lavalin Inc.

AGAT WORK ORDER: 17X273114

PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE: SAMPLED BY:

· · · · · · · · · · · · · · · · · · ·															
	Water Analysis (Continued)														
RPT Date: Oct 27, 2017			C	UPLICAT		REFERENCE MATERIAL			METHOD	BLANK	SPIKE	MATRIX SPIKE			
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Lie	eptable mits
		ld						Lower	Upper		Lower	Upper		Lower	Upper
Total Strontium	8828902		129	124	4.3%	< 5	93%	80%	120%	99%	80%	120%	NA	70%	130%
Total Thallium	8828902		<0.1	<0.1	NA	< 0.1	101%	80%	120%	106%	80%	120%	105%	70%	130%
Total Tin	8828902		<2	<2	NA	< 2	94%	80%	120%	96%	80%	120%	98%	70%	130%
Total Titanium	8828902		<2	<2	NA	< 2	101%	80%	120%	107%	80%	120%	98%	70%	130%
Total Uranium	8828902		<0.1	<0.1	NA	< 0.1	101%	80%	120%	101%	80%	120%	108%	70%	130%
Total Vanadium	8828902		<2	<2	NA	< 2	92%	80%	120%	95%	80%	120%	112%	70%	130%
Total Zinc	8828902		192	184	4.6%	< 5	98%	80%	120%	105%	80%	120%	NA	70%	130%
Total Kjeldahl Nitrogen as N	1	8827310	<0.4	<0.4	NA	< 0.4	97%	80%	120%		80%	120%	101%	80%	120%

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

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# **Method Summary**

CLIENT NAME: SNC Lavalin Inc.

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PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE: SAMPLED BY:

SAMPLING SITE:		SAMPLED BY:							
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE						
Water Analysis	·		·						
Alkalinity	INORG-121-6001	SM 2320 B							
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH						
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER						
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION						
Nitrate as N	INORG-121-6005	SM 4110 B	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	SM 3125	ICP-MS						
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Phosphorus	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER						
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Sodium	MET121-6104 &		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	INORG-121-6022	SM 2130 B	NEPHELOMETER						
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE						
Anion Sum	CALCULATION	SM 1030E	CALCULATION						
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE						
Calculated TDS		SM 1030E	CALCULATION						
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE						
Cation sum	CALCULATION	SM 1030E	CALCULATION						
Hardness	CALCULATION	SM 2340B	CALCULATION						
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION						
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION						
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION						
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION						
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION						
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Arsenic	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Barium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Beryllium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Bismuth	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Boron	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						
Total Cadmium	MET121-6104 & MET-121-6105	SM 3125	ICP-MS						

# **Method Summary**

CLIENT NAME: SNC Lavalin Inc.

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PROJECT: 631477

ATTENTION TO: Maria Gutierrez

SAMPLING SITE: SAMPLED BY:

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



# Dalhousie University

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

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

Attention: Janetta Fraser

Re: Determination of chlorophyll a in algae by fluorescence

AGAT Job#: 17X273114

PO#: 107799

# Acidification Technique:

Sample ID	Chl a (µg/L)
KL1	1.10
KL2	0.31
KL3	1.34
KL4	0.35
KL5	1.22
PML-1	4.86
PML-2	1.27
HWY-102-1	0.62
HWY-102-2	28.94
LU	2.47
LSD	1.85

## Welschmeyer Technique:

Sample ID	Chl a (µg/L)
KL1	1.18
KL2	0.49
KL3	1.87
KL4	0.43
KL5	1.33
PML-1	6.58
PML-2	1.47
HWY-102-1	0.99
HWY-102-2	37.67
LU	2.85
LSD	2.89

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

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

Received: 19-Oct-17 Completed: 20-Oct-17

**Shannah Rastin** 

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

Chain of Custod Report Information Company: 5NC-Low Contact: Mania Go Address: PARK-LAN Hali Fax Phone: Client Project #: 63	olid INC utierrez E Suitezoo ,NS		Report  1. Name Emai  2. Name Emai  Regulat	Information (Please print):  E. Maria Guties  E. Maria Guties  E. Suclaudii J. (  It is tory Requirements (Check):	gatlabs.com 902.468.871	8 - F:	Dartm (agati 902.4 eport Singi per p Multi per p	Forma e Sample age pole Samp age Format ded	S Ar 2 Ar Hill According To Res	rivel Crival Toold Tin GAT Jo lotes: UNI irnard egular ush TA	Condition of the condit	ion: return nber: Time	re:	by luired working	d (TA	311 DNC T)	Sa.	les) of the co
AGAT Quotation: Please Note: If quotation number in		Ill price to: analy	☐ Tie		Coarse		inking	Water S		******			Salt V	Vater !	Samp	le 🗆	Yes 🎉	S No
Contact: Address: Phone:	Sesuc Lovati)		☐ Res	nmercial  J HRM 101  J Storm Water  icultural  J Waste Water	Fleid litereci/Preserved Standard Water Analysis Metals: Floia   Diss   Davailable   Metals: Floia   Diss   Davailable	0.090	MIDS D VSS	TKN Total Phospherus PDL 0.002	S TPH/BTEX (PIRI) 🗆 low level	3TEX Fractionation	WS TPH/BTEX				0	D Pseudomonas	Charophily A	Hazardous (Y/N)
Sample Identification	Oate/Time Sampled	Sample Matrix	# Containers	Comments - Site/Sample Info. Sample Containment	Field Fat Standar Metals:	D 800	Hq SST C	TKN Total Pt	Phenols Tier 1: Ti	ler 2:	CCME-CWS 1	THM	HAA	82	TC + EC	D HPC	Other.	lazard
KL-I	Oct 18/17 9:35	WATER	7			1	1			+++	+	+		1	Y	1	0 0	+-
KL -Z	11 10:30	Ħ	7		111		17	1							1	1	1	-
KL-3	11 10:15	4	7		111		11	1							111	1	1	+-
KL-4	1 10:05	- tr	7		111		11	1		11				1	1	17	1	-
KL -5	v 9:50	ч	7		11/1		11	1		11				(P)	1	1	1	1
PML-1	4 1:25 PM	rl .	7		111	1 1	-1	1		1	1	1		181	1	1	1	-
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5-201-KMH	11 12:25	-1	7		1//	11	10	1			1				1	1	1	-
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150	4 11.05	4	7		1/1		11	1							U	1	1	
Earnylan Retinquished By (Poor Favori): MURIU GUTI 4 There gives Florings and only Elligan;	EREZ	Ca	+18117 (2	Tomples Received by placed Names. 2:39 pm) C Description Complete Received by pages.	rels		6	Oct 15:	18/17	Yel	nk Copy low Cop	y - AG	AT			of	-	

Date envised. May 19, 2016

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# **Appendix F**

Graphs (Seasonal and Historical)



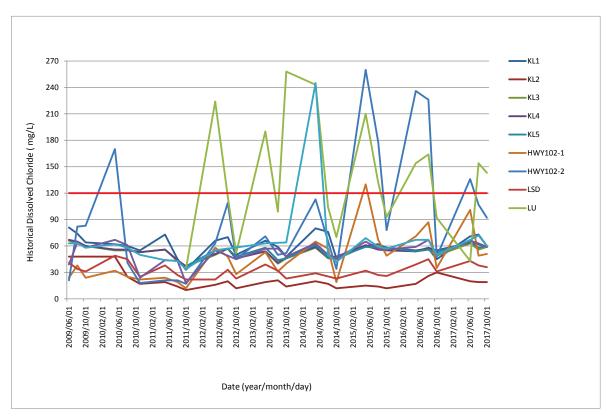


Figure 1 - Dissolved Chloride Concentrations

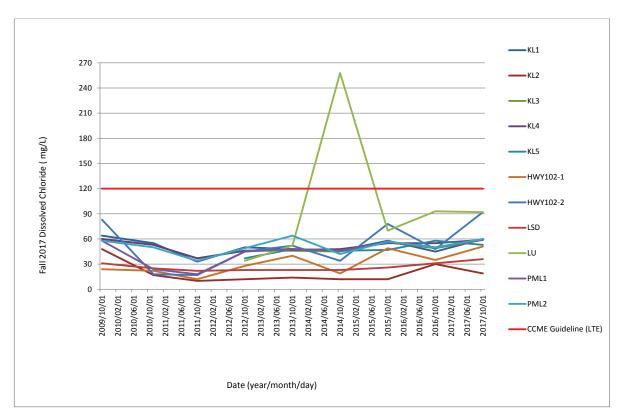


Figure 2 – Fall Dissolved Chloride Concentrations



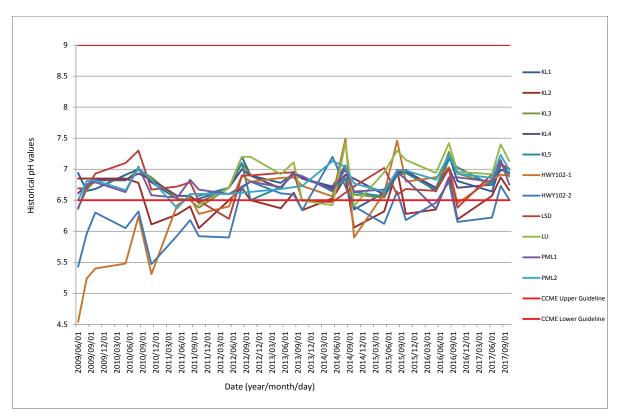


Figure 3 - pH values

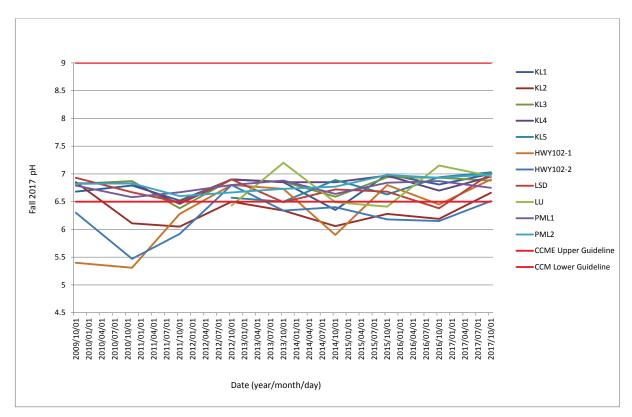


Figure 4 - Fall pH values



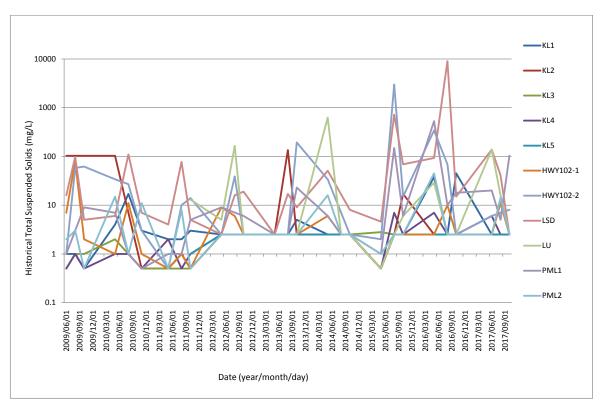


Figure 5 - Total Suspended Solids Concentrations

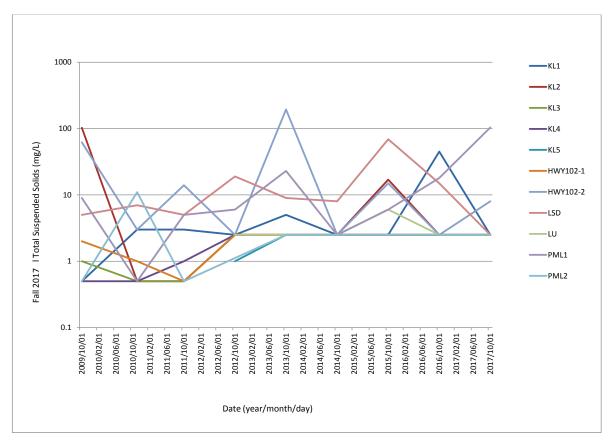


Figure 6 – Fall Total Suspended Solids Concentrations



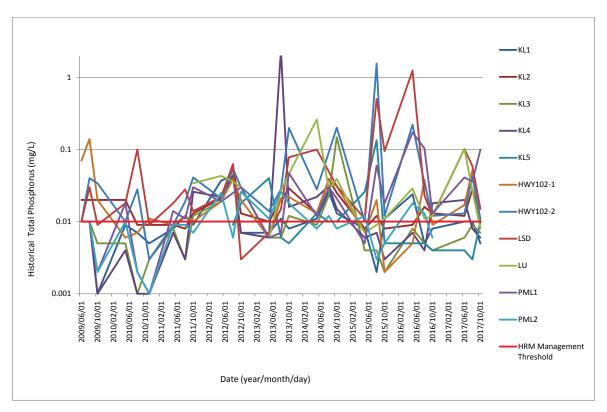


Figure 7 - Total Phosphorus Concentrations

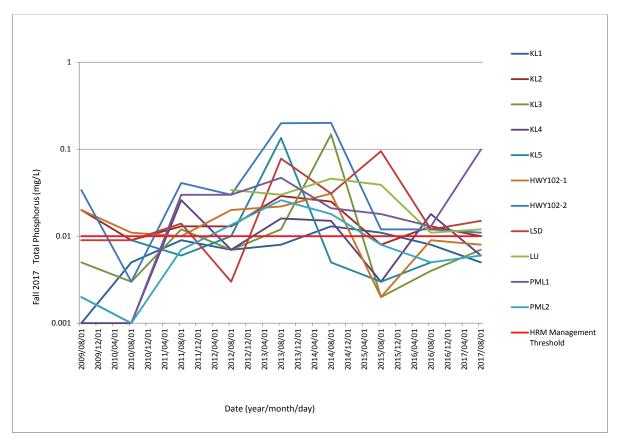


Figure 8 – Fall Total Phosphorus Concentrations



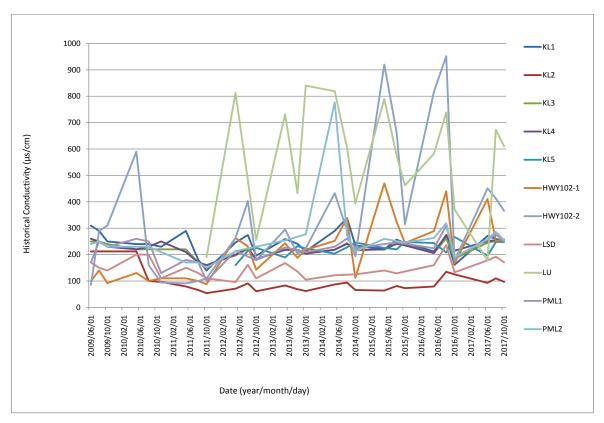


Figure 9 - Conductivity values

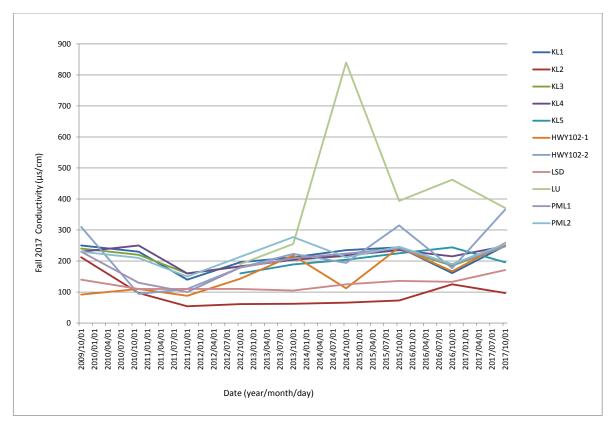


Figure 10 – Fall Conductivity values



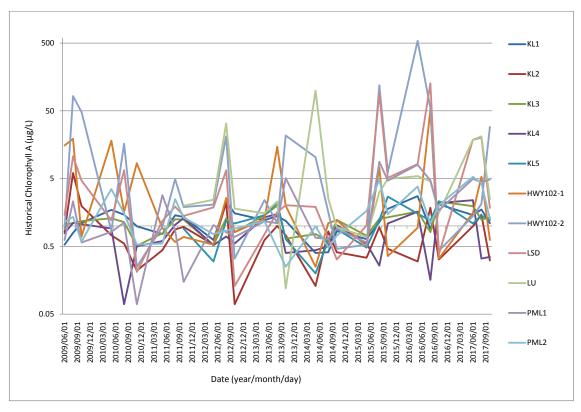


Figure 11 - Chlorophyll A concentrations

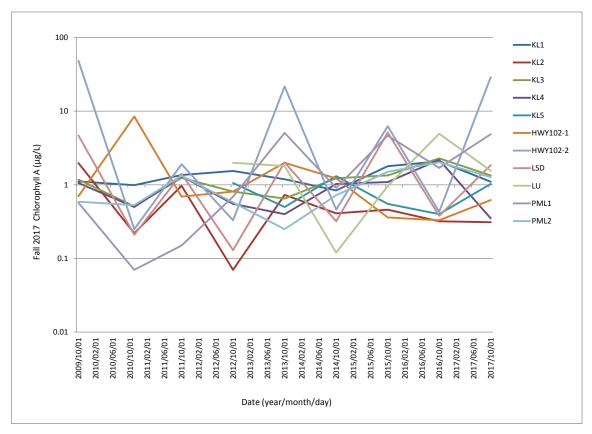


Figure 12 - Fall Chlorophyll A concentrations