SNC·LAVALIN
Environment

Certified ISO 9001

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June 26, 2013

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

Attention: Mr. Cameron Deacoff

Dear Mr. Deacoff:

RE: Final Report: Water Quality Monitoring within Bedford West, Bedford, Nova Scotia – May 2013 Sampling Event

1. INTRODUCTION

SNC-Lavalin Inc., Environment Division (SLE) was retained by the Halifax Regional Municipality (HRM) to conduct water quality monitoring within Bedford West. The Paper Mill Lake watershed is the primary watershed within the area. The water sampling program consisted of collecting surface water samples from eleven (11) specified locations as part of the May 2013 sampling event. The purpose of the program is to determine water quality for watersheds impacted by the development in the Bedford West area. The overall purpose of the monitoring program is to conduct water quality testing prior to construction activities (establish baseline conditions) in order to detect any impacts on and/or changes to water quality during and after construction of the development project.

This report presents water quality data from Kearney Lake, Kearney Lake Run, Highway 102, Lakeshore Drive, Larry Uteck Boulevard and Paper Mill Lake, collected on May 15, 2013. The water quality test locations are presented on Figure 1.

2. METHODOLOGY

The May 2013 monitoring event methodology consisted of the sampling and analyses of general chemistry (RCAp), total metals, total phosphorous, total suspended solids, E. coli bacteria, TKN and chlorophyll-a from eleven (11) specified surface water sampling locations. Standard field measurements (pH, water temperature, dissolved oxygen, conductivity, secchi depth, air temperature, cloud cover, and wildlife sightings) were to be measured at the eleven (11) specified sampling locations for the May 2013 monitoring event. The field measurements were collected using an AM100 Aqua Meter and AP800 Aqua Probe. For 2009 SLE sampling events, Oakton Portable Waterproof Meters were used for collecting field measurements (Dissolved Oxygen Meter – 35601-Series; pH and Conductivity – 35630-00 and 35630-02, respectively), and for 2010-2011 SLE sampling events, Hach intelliCAL probes for pH, conductivity and dissolved oxygen (Product Numbers pHC30101, CDC40101 and LDO10101, respectively) were used. The samples and field parameter readings were collected from a 1.0 metre depth whenever possible.

The field parameters and site conditions for each sampling location were recorded on a field report. The field reports are provided in Attachment 1. Photographs of each sampling location are attached in Attachment 2.

A new pair of latex gloves was used at each sample location. Surface water samples were collected and placed in clean laboratory-supplied jars and stored in a chilled container together with a chain of custody record for transport to the laboratory. All surface water samples collected were submitted to AGAT Laboratories, located in Dartmouth, Nova Scotia.

Secchi depth measurements were taken from the shady side of the boat at two sample locations. The secchi disk was lowered in the water until no longer visible. The depth was measured to the nearest tenth of a metre. The disk was raised until visible in the water and the depth was measured. The secchi depth is the midpoint between the two measured depths.

3. ASSESSMENT STANDARDS

The Canadian Council of Ministers of the Environment (CCME) guidelines for water are broken down based on water use including Freshwater Aquatic Life, Marine Water Aquatic Life, Irrigation, Livestock Watering and Aesthetics and Drinking Water. The surface water quality results were compared to the CCME Freshwater Aquatic Life (FWAL) guidelines since the specified sampling locations are located at and/or near adjacent freshwater bodies.

Analytical data for total suspended solids (TSS) and turbidity are compared to the CCME for the Protection of Aquatic Life (CCME Narrative Total Particulate Matter – Table 1 Suspended Sediments and Turbidity, High Flow Conditions, 1999, updated 2002).

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

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

4. RESULTS OF THE INVESTIGATION

4.1. FIELD MEASUREMENTS

Field parameters were measured at each of the eleven (11) sampling locations during the May 2013 monitoring event. Field measurements of dissolved oxygen, pH, conductivity and temperature are presented in Table 1.

Dissolved oxygen readings of 9.76 mg/L (KL1), 10.20 mg/L (KL3), 10.09 mg/L (KL4), 9.67 mg/L (KL5), 10.15 mg/L (LU), and 9.98 mg/L (PML1) were recorded, which are outside the CCME FWAL guideline range of 5.5-9.5 mg/L. All other dissolved oxygen readings for the remaining five sample locations were within the applied CCME FWAL guideline range.

4.2. LABORATORY ANALYTICAL RESULTS

4.2.1. GENERAL CHEMISTRY

The analytical results reported pH levels within the acceptable range of 6.5-9.0 for at all sample locations with the exception of sample location KL2, where the pH was 6.37.

The analytical results for dissolved chloride indicated all samples were within the applicable CCME guideline of 120 mg/L with the exception of sample location LU, where the concentration was 190 mg/L.

All other general chemistry parameters analyzed were also within their respective applicable guidelines.

4.2.2. METALS

Analytical results reported total aluminum concentrations of above the CCME FWAL guideline of 5-100 µg/L at KL1, KL2, KL3, KL4, KL5, HWY102-2, LSD, LU, PML1 and PML2 (total aluminum: 191 µg/L, 256 µg/L, 140 µg/L, 141 µg/L, 136 µg/L, 130 µg/L, 131 µg/L, 107 µg/L, 141 µg/L, and 131 µg/L, respectively).

The analytical results reported total cadmium concentrations of above the CCME FWAL guideline of 0.017 µg/L at KL1, KL3, KL4, KL5, HWY102-2, LU, PML1 and PML2 (total cadmium: 0.020 µg/L, 0.028 µg/L, 0.027 µg/L, 0.024 µg/L, 0.019 µg/L, 0.300 µg/L, 0.021 µg/L and 0.039 µg/L, respectively).

Total copper exceeded the CCME FWAL guideline of 2.0-4.0 µg/L at sample location KL4 (9 µg/L).

Total iron exceeded the CCME FWAL guideline of 300 µg/L at sample location HWY102-2 (383 µg/L).

Total zinc exceeded the CCME FWAL guideline of 30 µg/L at sample location LU (57 µg/L).

All other metals parameters were reported to be within the applied CCME FWAL guidelines. Surface water metals results have been provided in Table 1. Laboratory certificates have been provided in Attachment 3.

4.2.3. MICROBIOLOGICAL

The laboratory analytical results reported E. Coli concentrations were reported to be within the referenced Health Canada Recreational Water Quality guidelines of 400 MPN/100 mL for all sample locations.

Surface water microbiological results have been provided in Table 1. Laboratory certificates have been provided in Attachment 3.

5. CONCLUSIONS

Water quality monitoring within Bedford West was conducted on May 15, 2013, and included the collection of field parameters (pH, water temperature, dissolved oxygen, conductivity, secchi depth, air temperature, cloud cover, and wildlife sightings) and the collection of surface water samples for the analysis of RCAp, total metals, total phosphorous, total suspended solids, E. Coli, total coliforms and chlorophyll-a.

Dissolved oxygen readings outside of the CCME FWAL guideline range were recorded at six (6) sample locations: KL1, KL3, KL4, KL5, LU, and PML1.

The laboratory analytical results reported a pH level below the acceptable CCME FWAL guideline range of 6.5-9.0 at sample location KL2, where the pH was 6.37. The analytical results for dissolved chloride exceeded the applicable CCME guideline of 120 mg/L at sample location LU, where the concentration was 190 mg/L.

Analytical results reported total aluminum concentrations of above the CCME FWAL guideline at ten (10) sample locations: KL1, KL2, KL3, KL4, KL5, HWY102-2, LSD, LU, PML1 and PML2. The analytical results reported total cadmium concentrations of above the CCME FWAL guideline at eight (8) sample locations: KL1, KL3, KL4, KL5, HWY102-2, LU, PML1 and PML2. Total copper exceeded the applicable guideline at one (1) sample location: KL4. Total iron exceeded the applicable guideline at one (1) location: HWY102-2. Analytical results showed that total zinc exceeded the CCME FWAL guideline at one (1) location: LU.

The laboratory analytical results reported E. Coli concentrations to be within the referenced Health Canada Recreational Water Quality guidelines of 400 MPN/100 mL for all sample locations.

If you have any questions or require anything further, please contact the undersigned at (902) 492-4544.

Yours truly,

SNC♦LAVALIN ENVIRONMENT

original signed

Derek Heath, P.Geo.
Project Manager

DH/ap

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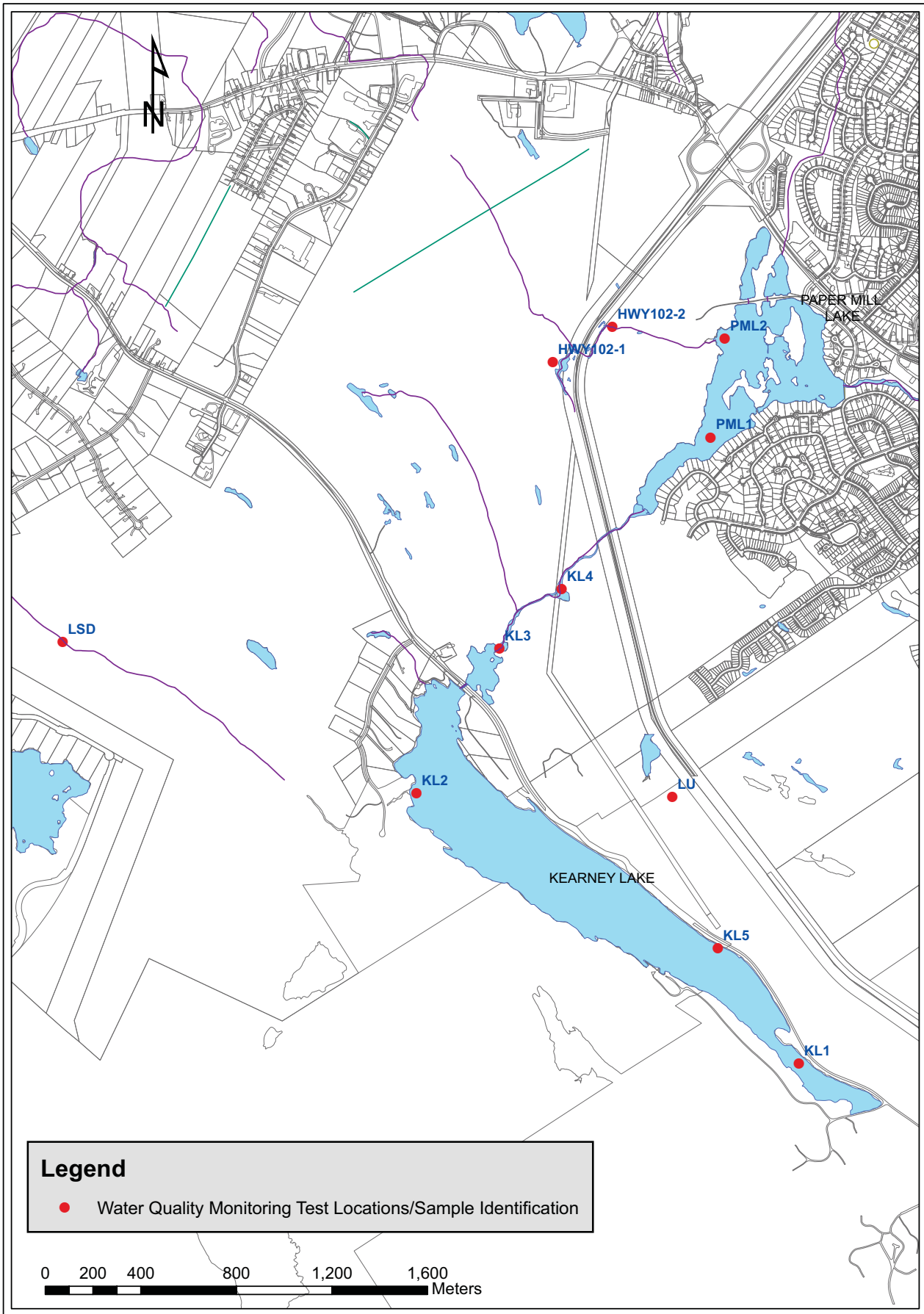

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HALIFAX REGIONAL MUNICIPALITY

PROJECT: WATER QUALITY MONITORING WITHIN BEDFORD WEST

TITLE: WATER QUALITY MONITORING TEST LOCATIONS

DESIGNED:	CH
DRAWN:	CH
CHECKED:	DH
SCALE:	AS SHOWN
DATE:	10-09-2012
PROJECT #:	510192-0001
DRAWING #:	1

TABLE 1: BEDFORD WEST SAMPLING PROGRAM

May 2013	Units	RDL	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	Kearney Lake																								
Sample Sites					KL1												KL2												
Sampling Date	yyyy-mm-dd				2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15
Sampling Time	hh:mm				08:00	11:45	08:30	11:00	13:10	12:00	11:00	14:30	14:00	8:30	11:20	9:50	10:20	11:00	10:30	10:45	10:15	12:25	10:50	09:30	14:00	13:15	9:50	10:30	10:20	09:10
FIELD DATA																														
Secchi Depth	Meters	---	1.2	--	4.1	4.2	5.0	N/A	5.0	4.9	2.4	3.2	2.4	2.35	5.36	N/A	2.50	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	0.1	--	--	14.0	22.2	16.7	12.9	23.3	8.8	11.5	25.6	15.9	8.9	23.3	15.4	13.2	16.8	18.2	15.4	13.5	20.4	8.0	9.9	19.1	14.1	7.6	21.8	12.3	10.1
Dissolved Oxygen	mg/L	0.01	--	5.5-9.5	10.77	8.20	7.00	9.13	7.86	10.48	10.69	8.22	9.22	8.98	7.93	8.72	9.76	10.16	8.50	5.70	6.28	4.46	9.38	9.46	7.06	8.43	6.47	5.82	7.63	9.37
pH	N/A	---	--	--	6.20	6.76	6.67	7.23	7.32	6.61	6.60	6.16	6.04	8.67	6.91	6.32	6.32	6.33	6.35	6.19	6.61	6.96	6.25	6.77	5.90	5.62	7.72	6.41	6.29	5.75
Specific Conductance	uS/cm	1	--	--	263	299	261	248	242	219	288	179	146	277	279	198.1	243	46	106	89	199	104	75	80	67	54	58	96.6	61.1	77.9
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	6	8	8	7	8	6	<5	9	7	24	7	<5	<5	<5	8	<5	5	7	<5	<5	7	<5	20	<5	8	<5
Dissolved Chloride (Cl)	mg/L	1	--	120	81	74	64	62	60	55	73	45	33	66	70	50	66	17	23	16	21	25	17	19	14	10	16	20	12	19
Colour	TCU	5	--	--	18	18	16	26	8	21	28	40	45	50	11	20	11	99	74	110	61	63	95	80	110	120	52	60	94	37
Nitrite + Nitrate	mg/L	0.05	--	--	0.18	0.09	0.12	0.21	0.16	0.23	0.2	0.11	0.13	0.20	0.09	0.10	0.18	0.06	0.11	<0.05	0.10	0.07	0.06	0.12	0.07	<0.05	0.11	0.08	<0.05	0.12
Nitrate (N)	mg/L	0.05	--	13000	0.18	--	--	0.21	0.16	--	0.2	--	--	0.20	0.09	0.10	0.18	0.06	--	--	0.10	0.07	--	0.12	--	--	0.11	0.08	<0.05	0.12
Nitrite (N)	mg/L	0.01	--	60	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.03	<0.03	0.03	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L	0.5	--	--	2.4	2.9	4.7	3.3	3.2	3.1	3.4	5.9	5.5	5.4	2.9	5.2	4.4	8.2	7.2	9.9	4.8	6.6	9.7	6.5	10	12	8.1	7.1	10.9	7.5
Orthophosphate (as P)	mg/L	0.01	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.09	<0.01	<0.01
pH (Lab)	pH	N/A	5.0-9.0	6.5-9	6.94	6.65	6.68	6.91	7.00	6.79	6.52	6.51	6.52	6.7	7.2	6.9	6.78	6.22	6.58	6.61	6.59	6.78	6.11	6.27	6.4	6.05	6.5	6.7	6.5	6.37
Total Calcium (Ca)	mg/L	0.1	--	--	9.2	8.5	7.2	7.72	8.66	8.30	7.65	4.82	5.31	6.8	8.4	6.3	7.5	2.8	4.2	2.9	3.44	4.08	3.55	2.51	2.48	2.21	2.4	3.6	2.9	2.7
Total Magnesium (Mg)	mg/L	0.1	--	--	1.5	1.4	1.2	1.42	1.36	1.30	1.29	0.86	1.06	1.1	1.5	1.5	1.1	0.7	1.1	0.7	0.92	0.98	0.84	0.63	0.64	0.36	0.7	1.0	1.0	0.7
Total Phosphorus (1M depth)	mg/L	0.006	--	--	<0.02	<0.02	<0.002	0.009	0.007	0.005	0.008	0.012	0.009	0.037	0.05	<0.02	<0.02	<0.02	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.05	<0.02	<0.02
Total Potassium (K)	mg/L	0.1	--	--	1.1	0.9	1.3	0.876	0.888	0.901	0.788	0.773	0.871	0.7	0.9	0.9	0.8	0.6	0.8	0.7	0.716	0.634	0.826	0.534	0.497	0.734	0.5	0.7	0.8	0.5
Total Sodium (Na)	mg/L	0.1	--	--	51	46	37	31.8	35.2	33.8	43.7	22.8	19.8	40.1	42.0	29.8	35.8	11	15	9.9	10.7	14.7	10.6	11.1	7.8	6.9	9.8	14.2	9.5	8.9
Reactive Silica (SiO2)	mg/L	0.5	--	--	2.6	2.2	2.3	2.9	2.7	2.9	2.8	1.9	2.3	2.4	1.3	2.2	2.5	3.3	4.5	4.4	2.0	4.2	4.7	2.7	4.3	4	2.6	4.0	4.9	2.8
Total Suspended Solids	mg/L	5	--	--	1	1	<1	4	17	3	2	2	3	<5	<5	<5	<5	<2	2	5	6	7	<1	<1	<2	<1	<5	<5	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	---	--	14	13	12	11	11	11	12	10	8	8	9	9	11	<2	<2	<2	3	<2	<2	<2	<2	<2	3	3	2	4
Turbidity (NTU)	NTU	0.1	50	--	0.7	0.8	1.0	1.3	0.6	1	1	1	0.9	2.4	0.8	1.3	1.6	0.3	7.6	1.0	17	1.0	1.0	0.4	0.7	0.6	0.5	1.1	1.0	1.9
Conductivity (uS/cm)	uS/cm	1	--	--	310	290	250	240	240	230	290	180	140	246	274	196	259	76	100	74	90	100	97	79	66	54	71	91	61	83
Calculated Parameters																														
Anion Sum	me/L	N/A	--	--	2.72	2.52	2.23	2.12	2.08	1.91	2.33	1.66	1.27	2.52	2.31	1.60	2.10	0.49	0.82	0.45	0.77	0.85	0.49	0.53	0.53	0.28	0.92	0.63	0.54	0.63
Bicarb. Alkalinity (calc, as CaCO3)	mg/L	5	--	--	6	8	8	7	8	6	<1	9	7	24	7	<5	<5	<1	8	<1	5	7	<1	<1	7	<1	20	<5	8	<5
Calculated TDS	mg/L	1	--	--	166	151	131	123	125	118	143	92	77	139	137	98	124	36	55	35	46	55	38	37	34	25	45	44	34	37
Carb. Alkalinity (calc, as CaCO3)	mg/L	10	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	2.85	2.57	2.12	1.92	2.10	2.02	2.42	1.33	1.25	2.24	2.41	1.79	2.08	0.71	0.99	0.67	0.74	0.95	0.74	0.68	0.55	0.49	0.65	0.94	0.73	0.63
Hardness (CaCO3)	mg/L	N/A	--	--	29	27	23	25	27	26	24	16	18	21.5	27.2	21.9	23.3	10	15	10	12	14	12	9	9	8	8.9	13.1	11.4	9.6
Ion Balance (% Difference)	%	N/A	--	--	2.33	0.98	2.53	4.95	0.48	2.80	1.89	11.00	0.79	5.9	2.1	5.3	0.7	18.30	9.39	19.60	1.99	5.56	20.30	12.40	1.85	27.30	17.6	19.7	15.1	0.3
Langelier Index (@ 20C)	N/A	N/A	--	--	-2.68	-2.87	-2.94	-2.72	-2.51	-2.87	NC	-3.18	-3.21	-2.69	-2.63	-3.19	-3.24	NC	-3.20	NC	-3.44	-3.05	NC	NC	-3.66	NC	-3.37	-3.60	-3.68	-4.05
Langelier Index (@ 4C)	N/A	N/A	--	--	-2.93	-3.12	-3.19	-2.97	-2.76	-3.12	NC	-3.43	-3.46	-3.01	-2.95	-3.51	-3.56	NC	-3.45	NC	-3.70	-3.30	NC	NC	-3.91	NC	-3.69	-3.92	-4.00	-4.37
Saturation pH (@ 20C)	N/A	N/A	--	--	9.62	9.52	9.62	9.63	9.51	9.66	NC	9.69	9.73	9.39	9.83	10.10	10.0	NC	9.78	NC	10.00	9.83	NC	NC	10.10	NC	9.87	10.3	10.2	10.4
Saturation pH (@ 4C)	N/A	N/A	--	--	9.87	9.77	9.87	9.88	9.76	9.91	NC	9.94	9.98	9.71	10.2	10.4	10.3	NC	10.00	NC	10.30	10.10	NC	NC	10.30	NC	10.2	10.6	10.5	10.7
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	--	5-100	230	--	--	289	47.8	--	338	--	--	321	43	168	191	290	--	--	175	151	--	271	--	--	209	205	338	256
Total Antimony (Sb)	µg/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2
Total Arsenic (As)	µg/L	2	--	5	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2
Total Barium (Ba)	µg/L	5	--	--	16	--	--	18.5	15.9	--	13	--	--	12	15	9	12	9	--	--	11.7	14.3	--	9.5	--	--	9	11	10	8
Total Beryllium (Be)	µg/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2
Total Boron (B)	µg/L	5	--	1500	8	--	--	11.4	9.1	--	<50	--	--	<5	11	33	6	8	--	--	14.7	12.7	--	<50	--	--	6	14	22	6
Total Cadmium (Cd)	µg/L	0.017	--	0.017	<0.3	--	--	0.053	<0.017	--	0.056	--	--	0.032	0.027	0.021	0.020	<0.3	--	--	0.011	<0.017	--	<0.017	--	--	<0.017	<0.017	<0.017	<0.017
Total Chromium (Cr)	µg/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1
Total Cobalt (Co)	µg/L	1	--	--	1	--	--	0.54	<0.40	--	0.79	--	--	<1	<1	<1	<1	<1	--	--	<0.40	<0.40	--	<0.40	--	--	<1	<1	<1	<1
Total Copper (Cu)	µg/L	2	--	2.0-4.0	<2	--	--	3.1	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2
Total Iron (Fe)	µg/L	50	--	300	130	--	--	313	62	125	177	162	384	229	137	195	207	250	--	--	227	403	238	202	416	358	154	541	813	269
Total Lead (Pb)	µg/L	0.5	--	1.0-7.0	<0.5	--	--	10.3	<0.50	--	<0.50	--	--	<0.5	<0.5	1.9	<0.5	<0.5	--	--	1.01	<0.50	--	<0.50	--	--	<0.5	<0.5	1.1	<0.5
Total Manganese (Mn)	µg/L	2	--	--	100	--	--	79.2	57.1	59	78.4	52.3	55.8	48	65	68	73	26	--	--	43.2	83.3	34.7	12.1	68.4	22.6	17	90	114	24
Total Molybdenum (Mo)	µg/L	2	--	73	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2
Total Nickel (Ni)	µg/L	2	--	25-150	5	--	--	3.2	<2.0	--	3.2	--	--	<2	<2	2	2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2
Total Selenium (Se)	µg/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	1	<1
Total Silver (Ag)	µg/L	0.1	--	0.1	<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.5	--	--	0.13	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	--	--	46	--	--	39.1	37.7	--	36	--	--	32	41	32	37	14	--	--	17.8	19.5	--	11.9	--	--	10	18	15	12
Total Thallium (Tl)	µg/L	0.1	--	0.8	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	3	<2
Total Titanium (Ti)	µg/L	2	--	--	11	--	--	6.4	<2.0	--	5.4	--	--	8	<2	3	4	2	--	--	<2.0	<2.0	--	2.8	--	--	<2	2	3	4
Total Uranium (U)	µg/L	0.1	--	15	0.1	--	--	0.11	<0.10	--	0.12	--	--	0.1	<0.1	0.1	0.1	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1
Total Vanadium (V)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2
Total Zinc (Zn)	µg/L	5	--	30	27	--	--	14.4	7.5	11.1	12.1	13.3	9.7	5	<5	11	11	8	--	--	5.4	5.3	6.5	<50	<5.0	<5.0	<5	<5	7	<5
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	200	65	--	>250	63	>250	91	>250	--	2420	>2420	1120	1200	1800	170	--	>250	11	>250	59	>250	--	>2420	1986	>2420	>2420
E. coli	MPN/100mL	1	400	--	39	24	--	9	15	37	8	>250	<100	41	11	17	48	1500	100	--	>250	6	6	2	>250	<100	3	7	3	12
Fecal Coliform	MPN/ml	---	400	--	--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.30	--	--	0.53	0.79	1.11	1.73	1.47	0.99	0.76	1.44	1.36	0.62	2.3	1.54	1.22	0.82	6.05	1.97	0.73	0.55	0.22	0.44	0.89	0.97	0.53	2.2	0.07	0.62
Chlorophyll A - Welschmeyer method	µg/L	0.30	--	--	0.48	0.69	1.17	1.61	1.42	0.81	0.69	1.15	1.14	0.63	2.3	2.16	1.40	0.87	5.97	1.95	0.66	0.54	0.21	0.42	0.73	0.82	0.56	2.2	0.12	0.72
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--	--	--	--	--	--	--	--	--	0.9	3.1	0.4	--	--	--	--	--	--	--	--	--	--	<0.4	2.2	0.7	--

Notes:

RDL = Recordable Detection Limit (represents most recent sampling event RDL)
" -- " = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)
Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September, 2009)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result.
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result.

SNC·LAVALIN

TABLE 1: BEDFORD WEST SAMPLING PROGRAM

May 2013	Units	RDL	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	Kearney Lake Run																										
Sample Sites					KL3												KL4												KL5				
Sampling Date	yyyy-mm-dd				2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012-08.14	2012/10/10	2013/05/15	2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011/08/14	2011/10/16	2012/05/01	2012/08/14	2012/10/10	2013/05/15	2011-10-17	2012/05/01	2012/08/14	2012/10/10	2013/05/15
Sampling Time	hh:mm				09:00	11:00	09:30	11:30	14:12	11:40	10:30	12:20	12:00	10:26	12:20	11:20	9:50	10:00	11:30	10:00	11:20	13:50	11:15	10:10	11:40	11:40	10:16	12:00	11:40	9:41	9:40	10:52	13:10	12:10	10:03
FIELD DATA																																	
Secchi Depth	Meters	---	1.2	--	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	0.1	--	--	14.0	21.6	17.3	14.7	23.1	9.9	10.3	21.1	15.5	9	24.5	15.6	11.7	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	14.7	10.5	26.1	16.6	13.3
Dissolved Oxygen	mg/L	0.01	--	5.5-9.5	10.79	8.00	8.00	9.26	7.83	10.35	11.06	8.42	9.60	8.89	8.17	7.72	10.20	10.17	8.10	8.30	9.01	6.27	10.89	10.99	8.55	9.65	8.70	7.32	8.87	10.09	9.38	7.88	7.90	8.16	9.67
pH	pH	N/A	--	--	7.27	6.74	6.97	7.27	7.33	6.76	6.83	6.96	6.30	7.68	6.85	6.51	5.86	8.00	6.71	6.94	7.19	6.98	6.07	6.49	6.43	6.02	9.0	6.71	6.77	5.72	6.52	7.76	6.69	6.72	6.20
Specific Conductance	uS/cm	1	--	--	95	282	246	220	228	199	220	175	161	204	225	177.2	207.3	771	262	247	224	226	215	218	172	126	206	225	185.9	207.1	112	230	229	189.0	219.5
INORGANICS																																	
Total Alkalinity (as CaCO3)	mg/L	5	--	--	<5	7	7	6	7	7	6	7	7	23	6	5	<5	5	7	7	6	8	7	5	8	7	22	8	<5	<5	9	21	8	<5	<5
Dissolved Chloride (Cl)	mg/L	1	--	120	66	63	60	55	55	53	56	43	37	50	57	46	54	67	65	60	56	56	53	56	44	37	51	57	46	54	37	55	57	48	58
Colour	TCU	5	--	--	22	20	20	28	12	20	31	38	40	57	15	31	19	22	18	20	27	11	20	32	38	43	48	11	20	17	35	43	10	27	10
Nitrite + Nitrate	mg/L	0.05	--	--	0.14	0.12	0.14	0.24	0.15	0.22	0.24	0.15	0.16	0.19	0.09	0.09	0.21	0.15	0.12	0.14	0.23	0.19	0.21	0.23	0.15	0.17	0.19	0.11	0.09	0.20	0.17	0.19	0.15	0.83	0.21
Nitrate (N)	mg/L	0.05	--	13000	0.14	--	--	0.24	0.15	--	0.24	--	--	0.19	0.09	0.09	0.21	0.15	--	--	0.23	0.19	--	0.23	--	--	0.19	0.11	0.09	0.20	--	0.19	0.15	0.83	0.21
Nitrite (N)	mg/L	0.01	--	60	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	19	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	0.04	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.03	<0.03	<0.03	<0.05	<0.03	0.03	<0.03	<0.03
Total Organic Carbon	mg/L	0.5	--	--	2.6	3.9	4.3	3.6	3.1	3.3	3.8	5.1	5	5.9	3.4	4.9	4.3	2.5	2.6	4.0	3.3	2.6	3.1	3.7	6	5.4	7.5	3.2	4.8	4.2	4.8	5.8	3.4	4.7	4.0
Orthophosphate (as P)	mg/L	0.01	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<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 (Lab)	pH	N/A	5.0-9.0	6.5-9	6.38	6.67	6.82	6.82	6.99	6.87	6.52	6.5	6.38	6.7	7.1	6.9	6.68	6.61	6.75	6.83	6.83	6.93	6.83	6.57	6.57	6.46	6.7	7.0	6.9	6.69	6.57	6.7	7.1	6.5	6.71
Total Calcium (Ca)	mg/L	0.1	--	--	6.7	7.1	6.8	6.81	7.98	8.29	7.09	4.73	5.63	5.7	6.9	6.0	7.0	6.8	7.7	7.0	6.81	8.00	8.45	6.84	4.93	5.24	5.7	6.8	5.8	6.8	5.79	6.1	6.6	5.9	7.1
Total Magnesium (Mg)	mg/L	0.1	--	--	1.2	1.2	1.11	1.22	1.28	1.27	1.21	0.83	1.01	1.0	1.2	1.3	1.0	1.2	1.3	1.2	1.22	1.24	1.31	1.19	0.86	0.99	1.0	1.2	1.2	1.0	1.05	1.0	1.1	1.2	1.0
Total Phosphorus (1M depth)	mg/L	0.0006	--	--	<0.02	<0.02	0.01	0.01	<0.002	0.00	0.01	0.00	0.01	0.02	0.05	<0.02	0.03	<0.02	<0.02	<0.002	0.00	<0.002	<0.002	0.01	0.00	0.03	0.02	0.04	<0.02	0.02	0.009	0.018	0.04	<0.02	0.03
Total Potassium (K)	mg/L	0.1	--	--	0.9	1.1	0.9	0.791	0.837	0.990	0.879	0.681	0.921	0.7	0.9	0.9	0.8	1	1	1	0.807	0.905	0.968	0.826	0.733	1.130	0.7	1.0	0.9	0.8	0.858	0.7	0.9	0.8	0.8
Total Sodium (Na)	mg/L	0.1	--	--	38	38	35	28.3	33.1	33.0	33.0	20.8	21.3	31.2	34.5	26.37	35.1	39	41	37	28.5	34.3	33.9	32.1	21.5	21.1	31.5	34.5	25.2	31.8	22.0	34.6	32.0	27.7	33.6
Reactive Silica (SiO2)	mg/L	0.5	--	--	2.7	2.6	2.6	3.2	2.9	3.2	2.9	2.5	2.6	2.7	2.0	2.6	2.9	2.7	2.6	2.6	3.1	2.9	3.1	2.9	2.5	2.7	2.7	2.2	2.6	3.0	2.5	2.7	2.0	2.4	2.7
Total Suspended Solids	mg/L	5	--	--	<1	1	1	2	<2	<1	<1	<1	<1	<5	<5	<5	<5	<1	1	<1	<2	<2	<1	2	<1	<2	<5	<5	<5	<5	1	<5	<5	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	11	12	12	10	10	10	9	10	8	7	8	7	7	11	12	11	10	10	10	9	10	8	7	8	7	7	9	7	8	8	8
Turbidity (NTU)	NTU	0.1	50	--	0.7	1.4	0.6	0.3	0.5	0.6	0.6	0.6	0.4	0.8	0.7	1	0.7	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	0.9	1.1	0.7	0.9	0.7
Conductivity (uS/cm)	uS/cm	1	--	--	250	250	240	220	220	220	220	170	160	197	222	182	219	260	250	230	220	230	250	210	170	160	200	224	183	218	160	215	226	189	232
Calculated Parameters																																	
Anion Sum	me/L	N/A	--	--	2.11	2.17	2.08	1.90	1.93	1.87	1.90	1.58	1.36	2.03	1.90	1.55	1.68	2.23	2.22	2.09	1.91	1.94	1.85	1.88	1.62	1.36	2.04	1.94	1.45	1.68	1.42	2.13	1.95	1.58	1.82
Bicarb. Alkalinity (calc, as CaCO3)	mg/L	5	--	--	<1	7	7	6	7	7	6	7	7	23	6	5	<5	5	7	7	6	8	7	5	8	7	22	8	<5	<5	9	21	8	<5	<5
Calculated TDS	mg/L	1	--	--	128	130	123	110	117	116	115	88	82	111	113	91	106	132	135	125	111	118	116	113	90	81	111	114	87	103	84	118	111	96	110
Carb. Alkalinity (calc, as CaCO3)	mg/L	10	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<1	<10	<10	<10	<10
Cation Sum	me/L	N/A	--	--	2.12	2.16	1.99	1.69	1.97	1.98	1.92	1.23	1.32	1.77	1.98	1.60	2.00	2.16	2.32	2.07	1.70	2.02	2.03	1.86	1.28	1.3	1.78	1.97	1.53	1.84	1.36	1.94	1.85	1.64	1.94
Hardness (CaCO3)	mg/L	N/A	--	--	22	23	22	22	25	26	23	15	18	18.4	22.2	20.3	21.6	22	25	22	22	25	27	22	16	17	18.4	21.9	19.4	21.1	19	19.3	21.0	19.7	21.8
Ion Balance (% Difference)	%	N/A	--	--	0.24	0.23	2.21	5.85	1.03	2.86	0.52	12.50	1.49	6.8	2.1	1.6	8.6	1.59	2.20	0.48	5.82	2.02	4.64	0.53	11.70	2.26	6.6	0.8	2.8	4.5	2.16	4.7	2.6	2.0	3.2
Langelier Index (@ 20C)	N/A	N/A	--	--	NC	-3.00	-2.89	-2.92	-2.60	-2.73	-3.23	-3.33	-3.35	-2.77	-2.88	-3.21	-3.37	-3.21	-2.89	-2.84	-2.92	-2.64	-2.75	-3.22	-3.18	-3.31	-2.79	-2.86	-3.22	-3.37	-3.06	-2.79	-2.77	-3.62	-3.33
Langelier Index (@ 4C)	N/A	N/A	--	--	NC	-3.25	-3.14	-3.17	-2.85	-2.99	-3.49	-3.58	-3.60	-3.09	-3.20	-3.53	-3.69	-3.46	-3.14	-3.09	-3.17	-2.89	-3.00	-3.47	-3.43	-3.56	-3.11	-3.18	-3.54	-3.69	-3.31	-3.11	-3.09	-3.94	-3.65
Saturation pH (@ 20C)	N/A	N/A	--	--	NC	9.67	9.71	9.74	9.59	9.60	9.75	9.83	9.73	9.47	9.98	10.10	10.0	9.82	9.64	9.67	9.75	9.57	9.58	9.79	9.75	9.77	9.49	9.86	10.10	10.1	9.63	9.49	9.87	10.1	10.0
Saturation pH (@ 4C)	N/A	N/A	--	--	NC	9.92	9.96	9.99	9.84	9.86	10.00	10.10	9.98	9.79	10.3	10.4	10.4	10.1	9.9	9.9	10.0	9.8	9.8	10.0	10.0	10.0	9.8	10.2	10.4	10.4	9.88	9.81	10.2	10.4	10.4
Metals (ICP-MS)																																	
Total Aluminum (Al)	µg/L	5	--	5-100	160	--	--	124	53.5	--	266	--	--	199	54	153	140	150	--	--	125	29.2	--	231	--	--	188	48	149	141	--	222	52	154	136
Total Antimony (Sb)	µg/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	--	<2	<2	<2	<2
Total Arsenic (As)	µg/L	2	--	5	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	--	<2	<2	<2	<2
Total Barium (Ba)	µg/L	5	--	--	16	--	--	15.7	13.2	--	19.1	--	--	18	17	15	19	16	--	--	16.6	17.8	--	18.2	--	--	18	17	16	18	--	18	16	15	19
Total Beryllium (Be)	µg/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	--	<2	<2	<2	<2
Total Bismuth (Bi)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	--	<2	<2	<2	<2
Total Boron (B)	µg/L	5	--	1500	6	--	--	7.8	8.7	--	<50	--	--	5	9	17	7	6	--	--	8.6	9.1	--	<50	--	--	6	9	16	7	--	6	9	15	7
Total Cadmium (Cd)	µg/L	0.017	--	0.017	<0.3	--	--	0.030	<0.017	--	0.046	--	--	0.019	0.021	0.027	0.028	<0.3	--	--	0.031	<0.017	--	0.035	--	--	0.021	<0.017	0.027	0.027	--	0.022	0.027	0.029	0.024
Total Chromium (Cr)	µg/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	6	<1	--	<1	<1	5	<1
Total Cobalt (Co)	µg/L	1	--	--	<1	--	--	<0.40	<0.40	--	<0.40	--	--	<1	<1	<1	<1	<1	--	--	<0.40	<0.40	--	<0.40	--	--	<1	<1	<1	<1	--	<1	<1	<1	<1
Total Copper (Cu)	µg/L	2	2.0-4.0	--	<2	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2	--	--	<2.0	2.4	<2.0	2.3	<2.0	<2.0	<2	<2	4	9	<2.0	<2	<2	<2	<2
Total Iron (Fe)	µg/L	50	--	300	94	--	--	73	133	58	136	104	154	137	136	119	131	86	--	--	82	51	55	119	109	138	129	118	133	213	175	160	78	120	111
Total Lead (Pb)	µg/L	0.5	1.0-7.0	--	<0.5	--	--	0.60	<0.50	--	<0.50	--	--	<0.5	<0.5	0.7	<0.5	<0.5	--	--	3.23	<0.50	--	<0.50	--	--	<0.5	<0.5	0.8	0.9	--	<0.5	<0.5	0.6	<0.5
Total Manganese (Mn)	µg/L	2	--	--	57	--	--	36.8	67.1	32.1	41.5	33.1	32.5	25	47	46	37	51	--	--	34.5	63.5	29.4	38.5	27.2	29.7	23	34	38	34	35.9	30	14	37	35
Total Molybdenum (Mo)	µg/L	2	--	73	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	--	<2	<2	<2	<2
Total Nickel (Ni)	µg/L	2	25-150	3	--	--	2.0	<2.0	--	2.3	--	--	<2	<2	<2	<2	<2	3	--	--	2.0	<2.0	--	<2.0	--	--	<2	<2	5	<2	--	<2	<2	5	<2
Total Selenium (Se)	µg/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	--	<1	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	--	0.1	<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	--	--	34	--	--	33.5	35.9	--	33.2	--	--	25	33	29	33	34	--	--	33.1	36.7	--	32.7	--	--	25	32	28	32	--	27	31	29	31
Total Thallium (Tl)	µg/L	0.1	--	0.8	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	5	--	<2	<2	<2	<2
Total Titanium (Ti)	µg/L	2	--	--	6	--	--	<2.0	<2.0	--	4.9	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	4.2	--	--	<2	<2	<2	<2	--	3	<2	<2	<2
Total Uranium (U)	µg/L	0.1	--	15	<0.1	--	--	<0.10	<0.10	--	0.11	--	--	0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	--	0.1	--	--	0.1	<0.1	<0.1	<0.1	--	0.1	<0.1	<0.1	0.1
Total Vanadium (V)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2	--	--	<2	<2	<2	<2	--	<2	<2	<2	<2
Total Zinc (Zn)	µg/L	5	--	30	14	--	--	9.7	6.9	6.4	9.3	6.6	9.2	<5	<5	8	10	14	--	--	10.4	6.9	7	11.3	7.4	7	<5	<5	68	21	9.3	5	<5	64	11
MICROBIOLOGICAL																																	
Total Coliform	MPN/100mL	1	--	--	120	24	--	190	16	58	72	110	--	291	1553	178	345	28	58	--	100	16	75	83	95	--	345	>2420	921	548	--	461	613	93	461
E. coli	MPN/100mL	1	400	--	1	17	--	2	<1	8	5	37	<100	2	<1	3	8	4	33	--	1	<1	2	5	39	<100	4	<1	4	6	100	14	2	6	6
Fecal Coliform	MPN/ml	---	400	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.30	--	--	1.04	1.11	1.18	1.30	1.14	0.51	0.78	1.26	1.24	0.52	1.3	0.81	1.44	0.78	1.11	1.06	0.92	0.07	0.50	0.60	1.04	1.31	0.52	0.7	0.55	1.34	0.91	0.30	1.2	1.09	1.44
Chlorophyll A - Welschmeyer method	µg/L	0.30	--	--	0.94	0.97	1.21	1.09	1.19	0.42	0.67	0.98	1.01	0.55	1.2	1.14	1.62	0.69	0.96	1.11	0.77	0.07	0.41	0.55	0.82	1.07	0.55	0.7	0.74	1.48	0.85	0.33	1.0	1.41	1.59
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--	--	--	--	--	--	--	--	--	<0.4	2.8	<0.4	--	--	--	--	--	--	--	--	--	--	0.5	<0.4	0.7	--	--	<0.4	2.3	1.0	--

Notes:

RDL = Recordable Detection Limit (represents most recent sampling event RDL)
" --- " = no guideline available / Not Tested.
CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)
Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September, 2009)
Bold = Parameter concentration exceeds CCME FWAL Guideline - Present Result.
Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result.

SNC·LAVALIN

TABLE 1: BEDFORD WEST SAMPLING PROGRAM

May 2013	Units	RDL	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PWAL (Applied)	Highway 102																									
Sample Sites					HWY102-1													HWY102-2												
Sampling Date	yyyy-mm-dd				2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011-08-14	2011-10-16	2012-05-01	2012-08-15	2012-10-11	2013-05-15	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
Sampling Time	hh:mm				07:00	12:45	08:00	13:00	10:20	09:00	13:40	11:00	11:00	14:50	11:00	9:50	14:15	12:30	12:15	12:30	12:40	09:30	12:30	11:20	15:00	15:30	11:20	12:20	10:35	10:40
FIELD DATA																														
Secchi Depth	Meters	--	1.2	--	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	0.1	--	--	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	16.7	19.2	16.4	17.2	17.0	8.7	10.8	24.2	15.1	7.8	23.7	14.3	11.5
Dissolved Oxygen	mg/L	0.01	--	5.5-9.5	**11.44**	5.80	**4.34**	8.18	**4.25**	6.05	8.15	**3.88**	**5.34**	5.65	**1.68**	**3.83**	7.55	**10.01**	5.90	**4.30**	**4.91**	**2.45**	**2.99**	6.92	7.03	**5.09**	**3.73**	**1.31**	**3.28**	6.30
pH	pH	N/A	--	--	7.98	5.35	5.25	6.31	5.26	5.62	5.75	5.77	5.99	8.76	5.73	6.38	6.19	6.57	5.71	5.40	6.33	5.86	5.64	6.22	5.89	5.29	7.3	6.37	6.72	6.01
Specific Conductance	uS/cm	1	--	--	194	153	104	135	106	109	114	108	89	288	225	155.5	226	37	457	162	415	167	101.2	92.2	123.1	96	225	226	159.1	388
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	<5	<5	<5	<5	<5	<5	5	11	8	22	25	15	9	<5	<5	7	6	5	<5	<5	5	<5	17	7	<5	6
Dissolved Chloride (Cl)	mg/L	1	--	120	24	38	24	32	25	22	24	19	12	58	48	28	53	21	82	83	**170**	41	18	21	21	17	63	109	45	71
Colour	TCU	5	--	--	67	68	57	37	89	53	39	65	79	24	65	40	9	120	190	91	96	160	68	65	98	77	32	100	70	11
Nitrite + Nitrate	mg/L	0.05	--	--	<0.05	<0.05	<0.05	0.69	<0.05	1.2	0.69	0.25	1.2	2.61	0.06	0.43	0.51	<0.05	<0.05	<0.05	0.10	<0.05	0.62	0.26	1.8	3.2	1.54	<0.05	0.14	0.17
Nitrate (N)	mg/L	0.05	--	13000	<0.05	--	--	0.69	<0.05	--	0.69	--	--	2.61	0.06	0.43	0.51	<0.05	--	--	0.10	<0.05	--	0.26	--	--	1.54	<0.05	0.14	0.17
Nitrite (N)	mg/L	0.01	--	60	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	<0.05	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	19	<0.05	0.29	<0.05	<0.05	<0.05	<0.05	0.05	0.1	0.07	0.31	0.19	0.04	<0.03	<0.05	0.06	<0.05	<0.05	0.20	<0.05	<0.05	0.30	0.08	0.09	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L	0.5	--	--	6.5	10	7.7	4.7	11	6.3	4.5	7.2	7.4	5.5	10.0	7.0	5.1	8.5	13	13	7.2	14	7.4	5.7	9.2	8.4	7.0	15.8	11.2	6.1
Orthophosphate (as P)	mg/L	0.01	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<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)	pH	N/A	5.0-9.0	6.5-9	**4.54**	**5.24**	**5.40**	**5.46**	**6.24**	**5.31**	**6.42**	6.55	**6.28**	**6.4**	6.9	6.8	6.86	5.43	5.96	6.30	6.05	6.32	5.47	5.93	6.18	5.92	5.9	6.7	6.8	6.61
Total Calcium (Ca)	mg/L	0.1	--	--	1.7	1.8	1.6	4.93	3.34	5.09	4.9	5.21	5.55	12.5	11.7	7.5	11.1	1.6	4.0	4.8	7.44	3.84	4.01	3.07	2.22	3.80	7.0	8.4	5.6	7.6
Total Magnesium (Mg)	mg/L	0.1	--	--	0.3	0.5	0.5	1.08	0.79	1.09	0.91	0.92	1.19	1.7	2.0	1.4	1.4	0.4	0.7	0.9	0.96	0.59	1.00	0.68	0.68	1.38	1.2	1.4	1.2	1.2
Total Phosphorus (1M depth)	mg/L	0.006	--	--	0.07	0.14	0.020	0.006	0.007	0.011	0.009	0.012	0.01	0.019	0.05	0.02	<0.02	<0.02	0.04	0.034	0.010	0.028	0.003	0.009	0.019	0.041	0.021	0.09	0.03	0.01
Total Potassium (K)	**mg/L**	0.1	--	--	0.5	1.2	0.7	1.140	1.630	1.310	1.100	1.500	1.880	1.6	2.5	1.5	1.3	0.5	0.8	1.1	0.984	0.966	1.390	0.844	1.310	1.880	1.2	1.7	1.6	1.3
Total Sodium (Na)	mg/L	0.1	--	--	15	25	13	15.9	14.5	14.6	14.8	10.2	8.26	36.3	27.7	14.6	30.8	15	51	55	83.7	32.0	12.1	13.3	13.1	13.3	41.5	63.6	20.4	39.0
Reactive Silica (SiO2)	mg/L	0.5	--	--	2.5	2.2	2.0	1.1	3.8	5.1	2.8	5.2	4.6	4.1	6.1	5.1	3.1	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
Total Suspended Solids	mg/L	5	--	--	7	80	2	<2	11	<2	<1	1	<1	9	6	<5	<5	<2	58	62	34	27	3	<1	10	14	<5	39	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	5	3	3	8	<2	8	10	8	<10	14	8	9	12	<2	3	8	11	<2	7	5	5	8	12	6	10	10
Turbidity (NTU)	NTU	0.1	50	--	14.0	35	0.9	1.4	1.2	0.6	0.4	0.6	1.1	0.9	1.9	0.9	0.5	0.7	3.8	4.2	2.6	3.1	0.5	0.4	1.2 (1)	3.9	0.6	10.8	2	1.5
Conductivity (uS/cm)	uS/cm	1	--	--	100	140	92	130	100	110	110	100	88	263	231	143	243	85	290	310	590	160	94	91	100	110	263	403	179	295
Calculated Parameters																														
Anion Sum	meq/L	N/A	--	--	0.77	1.12	0.73	1.11	0.71	0.88	1.03	0.95	0.80	2.55	2.02	1.31	1.96	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
Ricarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	<1	<1	<1	<1	<1	<1	5	11	8	22	25	15	9	<1	<1	7	6	5	<1	<1	5	<1	17	7	<5	6
Calculated TDS	mg/L	1	--	--	50	73	45	67	50	63	65	58	54	150	117	73	117	42	150	165	282	93	52	48	62	67	143	200	86	135
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<30	<10	<10
Cation Sum	meq/L	N/A	--	--	0.84	1.32	0.74	1.06	0.93	1.02	1.00	0.83	0.80	2.43	6.04	1.19	2.06	0.81	2.65	2.89	4.17	1.81	0.86	0.82	0.83	0.97	2.32	2.10	1.40	2.24
Hardness (CaCO3)	mg/L	N/A	--	--	6	6	6	17	12	17	16	17	19	38.2	37.5	24.5	33.5	6	13	16	23	12	14	11	8	15	22.4	26.7	18.9	23.9
Ion Balance (% Difference)	%	N/A	--	--	4.35	8.20	0.68	2.30	13.40	7.37	1.48	6.74	0.00	2.6	1.9	4.6	2.4	14.90	5.58	4.90	10.30	17.50	10.30	5.81	4.60	6.01	3.3	3.6	3.1	2.3
Langelier Index (@ 20C)	N/A	N/A	--	--	NC	NC	NC	NC	NC	NC	-3.50	-2.99	-3.36	-2.77	-2.23	-2.72	-2.73	NC	NC	-3.57	-3.72	-3.70	NC	NC	-4.07	NC	-3.63	-3.15	-3.34	-3.33
Langelier Index (@ 4C)	N/A	N/A	--	--	NC	NC	NC	NC	NC	NC	-3.75	-3.25	-3.61	-3.09	-2.55	-3.04	-3.05	NC	NC	-3.82	-3.97	-3.95	NC	NC	-4.32	NC	-3.95	-3.47	-3.66	-3.65
Saturation pH (@ 20C)	N/A	N/A	--	--	NC	NC	NC	NC	NC	NC	9.92	9.54	9.64	9.17	9.13	9.52	9.59	NC	NC	9.87	9.77	10.00	NC	NC	10.30	NC	9.53	9.85	10.10	9.94
Saturation pH (@ 4C)	N/A	N/A	--	--	NC	NC	NC	NC	NC	NC	10.20	9.80	9.89	9.49	9.45	9.84	9.91	NC	NC	10.10	10.00	10.30	NC	NC	10.50	NC	9.85	10.2	10.5	10.3
Metals (ICP-MS)																														
Total Aluminum (Al)	ug/L	5	--	5-100	**510**	--	--	--	**169**	**192**	--	**205**	--	--	--	**1.34**	**1.83**	**146**	86	270	--	--	189	368	--	260	--	--	145	**4.66**	**2.99**	**130**
Total Antimony (Sb)	ug/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2
Total Arsenic (As)	ug/L	2	--	5	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	2.1	--	<1.0	--	--	<2	<2	<2	<2
Total Barium (Ba)	**ug/L**	**5**	**--**	**--**	**22**	**--**	**--**	**52.9**	**36.9**	**--**	**37.3**	**--**	**--**	**58**	**284**	**42**	**57**	**20**	**--**	**--**	**53.1**	**27.7**	**--**	**26.6**	**--**	**--**	**49**	**74**	**33**	**44**
Total Beryllium (Be)	ug/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	<2	<2	<2
Total Bismuth (Bi)	ug/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2
Total Boron (B)	ug/L	5	--	1900	<5	--	--	11.4	10.9	--	<50	--	--	12	18	13	10	<5	--	--	7.9	7.8	--	<50	--	--	10	17	15	9
Total Cadmium (Cd)	ug/L	0.017	--	0.017	<0.3	--	--	**0.043**	**0.017**	--	**0.023**	--	--	**0.034**	**0.021**	<0.017	<0.017	<0.3	--	--	0.051	<0.017	--	<0.017	--	--	0.037	**0.031**	**0.013**	**0.019**
Total Chromium (Cr)	ug/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<2	--	--	<1.0	1.0	--	< 1.0	--	--	<1	<1	<1	<1
Total Cobalt (Co)	ug/L	1	--	--	<1	--	--	0.50	0.46	--	<0.40	--	--	<1	<1	<1	<1	<1	--	--	0.66	0.77	--	< 0.40	--	--	<1	1	1	<1
Total Copper (Cu)	ug/L	2	--	2.0-4.0	2	--	--	3.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2	3	<2	2	--	--	2.0	<2.0	<2.0	< 2.0	2.5	2.8	<2	3	3	<2
Total Iron (Fe)	ug/L	50	--	300	**720**	--	--	146	**637**	150	107	209	239	102	**1380**	255	111	**880**	--	--	**1380**	**3850**	**303**	229	**897**	**1110**	214	**521.0**	**155.0**	**383**
Total Lead (Pb)	ug/L	0.5	--	1.0-7.0	1.6	--	--	2.37	0.56	--	<0.50	--	--	<0.5	0.7	<0.5	<0.5	1.9	--	--	1.61	2.70	--	0.59	--	--	<0.5	5.2	2.1	0.6
Total Manganese (Mn)	ug/L	2	--	--	40	--	--	55.3	39.0	67.0	28.1	21.0	31.3	34	79	28	23	110	--	--	387	135	52.9	40.5	106	176	78	219	207	83
Total Molybdenum (Mo)	ug/L	2	--	73	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	< 2.0	--	--	<2	<2	<2	<2
Total Nickel (Ni)	ug/L	2	--	25-150	<2	--	--	<2.0	< 2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	< 2.0	--	--	<2	<2	<2	<2
Total Selenium (Se)	ug/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	<1	<1	<1	<2	--	--	<1.0	<1.0	--	< 1.0	--	--	<1	< 1	<1	<1
Total Silver (Ag)	ug/L	0.1	--	0.1	<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.5	--	--	<0.10	<0.10	--	< 0.10	--	--	<0.1	<0.1	<0.1	<0.1
Total Strontium (Sr)	ug/L	5	--	--	11	--	--	29.1	19.7	--	24.3	--	--	48	58	36	52	11	--	--	37.4	21.1	--	16.9	--	--	33	45	31	39
Total Thallium (Tl)	ug/L	0.1	--	0.8	<0.1	--	--	< 0.10	<0.10	--	<0.10	--	--	< 0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	--	< 0.10	--	--	<0.1	<0.1	<0.1	<0.1
Total Tin (Sn)	ug/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	< 2.0	--	--	<2	<2	<2	<2
Total Titanium (Ti)	ug/L	2	--	--	6	--	--	<2.0	<2.0	--	3.5	--	--	<2	3	<2	<2	4	--	--	<2.0	6.4	--	4.9	--	--	<2	10	4	4
Total Uranium (U)	ug/L	0.1	--	15	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	--	< 0.10	--	--	<0.1	< 0.1	<0.1	<0.1
Total Vanadium (V)	ug/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	<2	<2	<2	<2	--	--	<2.0	<2.0	--	< 2.0	--	--	<2	2	<2	<2
Total Zinc (Zn)	ug/L	5	--	30	21	--	--	16.4	6.9	6.9	<5.0	<5.0	6.9	<5	6	<5	<5	12	--	--	13.6	12.3	9.3	5.5	9	12.5	<5	7	12	12
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	84	>250	>250	>250	>250	180	120	180	--	687	>2420	>2420	1550	28	>250	--	>250	75	41	110	>250	--	1553	>2420	>2420	2420
E. coli	**MPN/100mL**	**1**	**400**	**--**	**54**	**>250**	**--**	**12**	**17**	**5**	**1**	**78**	**<100**	**3**	**68**	**145**	**4**	**4**	**230**	**--**	**9**	**5**	**<1**	**7**	**>250**	**<100**	**<1**	**16**	**50**	**111**
Fecal Coliform	MPN/ml	--	400	--	--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	ug/L	0.30	--	--	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	0.90	82.63	48.17	0.85	16.36	0.25	0.97	4.91	1.9	2.07	21.03	0.33	2.41
Chlorophyll A - Welschmeyer method	ug/L	0.30	--	--	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	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
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--	--	--	--	--	--	--	--	--	1.1	1.3	0.6	--	--	--	--	--	--	--	--	--	--	0.6	1.1	0.5	--

Notes:

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

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

CCME PWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)

Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September, 2009)

Bold = Parameter concentration exceeds CCME PWAL Guideline - Present Result.

Bold = Parameter concentration exceeds CCME PWAL Guideline - Previous Result.

SNC·LAVALIN

TABLE 1: BEDFORD WEST SAMPLING PROGRAM

May 2013	Units	RDL	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline PWAL (Applied)	Lake Shore Drive													Larry Uteck Blvd				
Sample Sites					LSD													LU				
Sampling Date	yyyy-mm-dd				2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011-08-14	2011-10-17	2012-05-01	2012-08-15	2012-10-11	2013-05-15	2011-10-17	2012-05-01	2012-08-15	2012-10-11	2013-05-15
Sampling Time	hh:mm				12:00	09:30	11:45	09:00	11:28	10:00	08:45	13:20	9:00	9:15	13:00	9:10	08:40	10:30	15:20	11:30	10:10	14:30
FIELD DATA																						
Secchi Depth	Meters	–	1.2	–	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Temp	Celsius	0.1	–	–	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	11.3	12.8	27.3	14.6	13.9
Dissolved Oxygen	mg/L	0.01	–	5.5-9.5	**10.84**	5.70	5.30	8.60	**5.41**	8.47	9.44	7.87	8.16	**4.06**	**2.69**	7.38	8.77	**4.24**	6.17	8.2	9.04	**10.15**
pH	pH	N/A	–	–	7.88	6.74	6.34	6.42	6.64	6.17	7.09	6.88	6.63	8.22	7.16	6.92	5.19	6.07	7.82	6.65	6.78	6.39
Specific Conductance	uS/cm	1	–	–	723	210	168	218	203	110	146	126	112	62	177.5	116.7	123.6	203	985	480	262	670
INORGANICS																						
Total Alkalinity (as CaCO3)	mg/L	5	–	–	13	16	12	13	21	9	9	15	12	21	14	11	8	12	14	14	14	6
Dissolved Chloride (Cl)	mg/L	1	–	120	41	34	31	49	45	25	38	27	22	22	33	23	39	34	**22.4**	116	52	**190**
Colour	TCU	5	–	–	32	27	37	20	26	33	32	41	49	13	20	40	10	94	18	14	18	7
Nitrite + Nitrate	mg/L	0.05	–	–	0.14	0.14	0.06	0.23	0.10	0.12	0.25	0.17	0.09	0.13	0.80	<0.05	0.18	0.61	1.00	0.64	1.89	1.11
Nitrate (N)	mg/L	0.05	–	13000	0.14	–	–	0.23	0.10	–	0.25	–	–	0.13	0.80	<0.05	0.18	–	1.00	0.64	1.89	1.11
Nitrite (N)	mg/L	0.01	–	60	<0.01	–	–	<0.01	<0.01	–	<0.01	–	–	<0.05	<0.05	<0.05	<0.05	–	<0.05	<0.05	<0.05	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	–	19	<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	0.06	0.04	0.16	<0.03	<0.03
Total Organic Carbon	mg/L	0.5	–	–	5.0	3.8	6.8	3.7	6.0	5.3	4.7	7.1	7.5	3.1	8.0	7.7	4.7	11.0	3.7	22.8	4.8	3.1
Orthophosphate (as P)	mg/L	0.01	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH (units)	pH	N/A	5.0-9.0	6.5-9	6.69	6.69	6.93	7.10	7.30	6.67	6.72	6.79	6.49	6.2	6.9	6.9	6.94	**6.43**	6.7	7.2	7.2	6.92
Total Calcium (Ca)	mg/L	0.1	–	–	6.5	6.9	5.4	7.99	10.5	5.29	5.9	5.14	5.04	2.6	18.1	5.1	6.4	7.63	30.7	22.1	14.5	22.0
Total Magnesium (Mg)	mg/L	0.1	–	–	1.4	1.6	1.3	1.99	2.14	1.15	1.25	1.19	1.23	0.7	3.3	1.4	1.2	2.34	4.2	3.6	2.2	2.8
Total Phosphorus (1M depth)	mg/L	0.006	–	–	<0.02	0.03	0.009	0.018	0.100	0.009	0.018	0.028	0.014	0.022	0.38	0.003	0.04	0.034	0.043	0.06	0.03	<0.02
Total Potassium (K)	**mg/L**	0.1	–	–	1.2	1.1	1.3	1.180	1.210	1.030	1.000	0.960	1.240	0.6	1.9	1.3	1.2	2.110	3.2	3.6	2.5	2.6
Total Sodium (Na)	mg/L	0.1	–	–	24	21	18	24.8	26.9	15.2	23.2	14.3	13.8	11.3	18.6	15.2	21.9	22.7	1.24	62.2	32.3	95.1
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	6.9	4.9	0.7	6.3	5.1
Total Suspended Solids	mg/L	5	–	–	16	98	5	6	110	7	4	77	5	<5	16	19	<5	13	5	165	<5	<5
Dissolved Sulphate (SO4)	mg/L	2	–	–	6	4	5	7	3	4	6	4	4	5	5	5	6	21	26	25	23	26
Turbidity (NTU)	NTU	0.1	50	–	0.6	12	2.5	12	6.2	1	0.6	2.5	1.7	6.7	**29.3**	2.1	1.1	3.3	4.1	23.0	2.3	1.8
Conductivity (uS/cm)	µS/cm	1	–	–	170	150	140	200	200	110	150	130	110	96	161	110	168	190	813	482	255	732
Calculated Parameters																						
Anion Sum	meq/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	1.69	7.21	4.12	2.36	6.10
Ricarb. Alkalinity (calc. as CaCO3)	mg/L	5	–	–	13	8	12	13	21	9	9	15	12	21	14	11	8	12	14	14	14	6
Calculated TDS	mg/L	1	–	–	92	55	74	104	107	62	84	66	60	56	163	58	82	109	426	246	144	347
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	–	–	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	<30	<1	<10	<10	<10	<10
Cation Sum	meq/L	N/A	–	–	1.53	0.99	1.20	1.69	1.94	1.05	1.44	1.02	1.00	0.76	3.59	1.10	1.43	1.70	7.40	4.30	2.43	5.55
Hardness (CaCO3)	mg/L	N/A	–	–	22	15	19	28	35	18	20	18	18	9.4	58.8	18.5	20.9	29	94.0	70.0	45.3	66.5
Ion Balance (% Difference)	%	N/A	–	–	0.97	9.39	0.83	3.15	4.58	3.96	1.77	5.56	2.04	20.7	63.0	6.1	1.0	0.29	1.3	2.2	1.4	4.7
Langelier Index (@ 20C)	N/A	N/A	–	–	-2.74	-3.20	-2.60	-2.22	-1.71	-1.99	-2.88	-2.64	-3.05	-3.62	-2.30	-2.91	-2.93	-2.95	-2.32	-1.94	-2.10	-2.60
Langelier Index (@ 4C)	N/A	N/A	–	–	-2.99	-3.45	-2.85	-2.47	-1.96	-3.24	-3.13	-2.89	-3.31	-3.94	-2.62	-3.23	-3.25	-3.30	-2.64	-2.26	-2.42	-2.92
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	9.38	9.02	9.14	9.30	9.52
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	10.1	9.52	10.1	10.2	9.63	9.34	9.46	9.62	9.84
Metals (ICP-MS)																						
Total Aluminum (Al)	µg/L	5	–	5-100	99	–	–	349	189	–	217	–	–	490	**19200**	**186**	**131**	–	218	**227**	**252**	**107**
Total Antimony (Sb)	µg/L	2	–	–	<2	–	–	<1.0	<1.0	–	<1.0	–	–	<2	<2	<2	<2	–	<2	<2	<2	<2
Total Arsenic (As)	µg/L	2	–	5	<2	–	–	<1.0	<1.0	–	<1.0	–	–	<2	**8**	<2	<2	–	<2	<2	<2	<2
Total Barium (Ba)	**µg/L**	5	–	–	**14**	–	–	**15.3**	**19.2**	–	**13.9**	–	–	**11**	**85**	**12**	**12**	–	**225**	**201**	**116**	**133**
Total Beryllium (Be)	µg/L	2	–	–	<1.0	<1.0	–	<1.0	<1.0	–	<1.0	–	–	<2	2	<2	<2	–	<2	<2	<2	<2
Total Bismuth (Bi)	µg/L	2	–	–	<2	<2.0	–	<2.0	<2.0	–	<2.0	–	–	<2	<2	<2	<2	–	<2	<2	<2	<2
Total Boron (B)	µg/L	5	–	1900	13	–	–	41.4	21.6	–	<50	–	–	6	24	16	10	–	11	17	22	10
Total Cadmium (Cd)	µg/L	0.017	–	0.017	<0.3	–	–	0.018	<0.017	–	<0.017	–	–	0.029	**1.050**	**0.023**	<0.017	–	0.538	**0.171**	**0.161**	**0.300**
Total Chromium (Cr)	µg/L	1	–	1	<2	–	–	<1.0	<1.0	–	<1.0	–	–	<1	**11**	<1	<1	–	<1	<1	<1	<1
Total Cobalt (Co)	µg/L	1	–	–	<1	–	–	<0.40	0.88	–	<0.40	–	–	<1	34	<1	<1	–	<1	1	<1	<1
Total Copper (Cu)	µg/L	2	–	2.0-4.0	<2	–	–	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	**21**	2	<2	2.9	<2	3	16	2
Total Iron (Fe)	µg/L	50	–	300	180	–	–	**554**	**965**	120	211	**388**	**384**	161	**38900**	**31.2**	236	**2150**	**347**	**1320**	**500**	194
Total Lead (Pb)	µg/L	0.5	–	1.0-7.0	<0.5	–	–	3.02	0.54	–	<0.50	–	–	0.6	**42.8**	<0.5	<0.5	–	0.8	0.7	1.0	<0.5
Total Manganese (Mn)	µg/L	2	–	–	51	–	–	113	632	22.8	30.2	53.4	38.5	26	**1300**	67	71	129	182	485	120	87
Total Molybdenum (Mo)	µg/L	2	–	73	<2	–	–	<2.0	<2.0	–	<2.0	–	–	<2	<2	<2	<2	–	<2	<2	<2	<2
Total Nickel (Ni)	µg/L	2	–	25-150	<2	–	–	<2.0	<2.0	–	<2.0	–	–	<2	13	<2	<2	–	<2	<2	<2	<2
Total Selenium (Se)	µg/L	1	–	1	<2	–	–	<1.0	<1.0	–	<1.0	–	–	<1	**2**	<1	<1	–	<1	<1	<1	<1
Total Silver (Ag)	µg/L	0.1	–	0.1	<0.5	–	–	<0.10	<0.10	–	<0.10	–	–	<0.1	0.1	<0.1	<0.1	–	<0.1	<0.1	<0.1	<0.1
Total Strontium (Sr)	µg/L	5	–	–	30	–	–	36.3	42.1	–	24.4	–	–	12	82	22	24	–	112	94	60	93
Total Thallium (Tl)	µg/L	0.1	–	0.8	<0.1	–	–	<0.10	<0.10	–	<0.10	–	–	<0.1	0.2	<0.1	<0.1	–	<0.1	<0.1	<0.1	<0.1
Total Tin (Sn)	µg/L	2	–	–	<2	–	–	<2.0	<2.0	–	<2.0	–	–	<2	<2	<2	<2	–	<2	<2	<2	<2
Total Titanium (Ti)	µg/L	2	–	–	<2	–	–	7.2	4.1	–	5.3	–	–	3	405	4	<2	–	4	3	7	3
Total Uranium (U)	µg/L	0.1	–	15	<0.1	–	–	<0.10	<0.10	–	<0.10	–	–	<0.1	1.6	<0.1	<0.1	–	<0.1	<0.1	<0.1	<0.1
Total Vanadium (V)	µg/L	2	–	–	<2	–	–	<2.0	<2.0	–	<2.0	–	–	<2	30	<2	<2	–	<2	<2	<2	<2
Total Zinc (Zn)	µg/L	5	–	30	7	–	–	7.2	6.7	<5.0	<5.0	<5.0	5	<5	**110**	7	6	9	**79**	**92**	**39**	**57**
MICROBIOLOGICAL																						
Total Coliform	MPN/100mL	1	–	–	53	>250	–	> 250	>250	280	85	> 250	–	1414	>2420	>2420	1990	–	>2420	>2420	2420	866
E. coli	**MPN/100mL**	**1**	**400**	**–**	**22**	**24**	**--**	**4**	**45**	**6**	**10**	**> 250**	**<100**	**2**	**26**	**10**	**10**	**<100**	**<1**	**2**	**19**	**3**
Fecal Coliform	MPN/ml	–	400	–	–	–	<1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chlorophyll A - Acidification method	µg/L	0.30	–	–	1.46	10.70	4.68	1.21	6.64	0.21	1.19	1.93	1.41	1.88	6.62	0.13	<0.50	1.99	2.44	32.52	1.80	1.54
Chlorophyll A - Welschmeyer method	µg/L	0.30	–	–	1.85	11.10	5.62	1.32	7.71	0.19	1.07	1.73	1.18	2.28	7.58	0.22	<0.50	2.08	2.71	31.31	2.15	1.77
Total Kjeldahl Nitrogen as N	mg/L	0.4	–	–	–	–	–	–	–	–	–	–	–	0.5	3.5	0.5	–	–	0.4	4.2	0.7	–

Notes:

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

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

CCME PWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)

Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September, 2009)

Bold = Parameter concentration exceeds CCME PWAL Guideline - Present Result.

Bold = Parameter concentration exceeds CCME PWAL Guideline - Previous Result.

SNC·LAVALIN

TABLE 1: BEDFORD WEST SAMPLING PROGRAM

May 2013	Units	RDL	Health Canada Guideline for Recreational Water Quality (Reference)	CCME Guideline FWAL (Applied)	Paper Mill Lake																								
Sample Sites					PML1														PML2										
Sampling Date	yyyy-mm-dd				2009/06/29	2009/08/13	2009/10/01	2010/05/31	2010/08/24	2010/11/01	2011/05/13	2011-08-14	2011-10-16	2012-05-01	2012-08-15	2012-10-11	2013-05-15	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
Sampling Time	hh:mm				13:45	13:00	13:00	13:35	15:15	13:00	13:00	16:50	17:00	12:50	--	10:55	10:51	13:15	13:40	13:45	14:30	16:20	13:00	12:40	16:20	16:15	13:16	--	--	13:40
FIELD DATA																														
Secchi Depth	Meters	--	1.2	--	3.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	N/A	N/A	2.8	2.2	2.3	N/A	3.0	2.0	2.2	2.3	2.2	2.35	--	--	3.20
Water Temp	Celsius	0.1	--	--	15.7	17.1	16.2	13.2	22.7	9.1	10.3	22.1	13.6	8.3	--	14.9	11.6	14.8	24.2	19.7	17.8	25.3	10.1	10.9	23.1	15.2	11.6	--	--	14.8
Dissolved Oxygen	mg/L	0.01	--	5.5-9.5	**10.56**	8.10	6.90	8.76	7.83	**10.42**	**10.39**	8.17	**9.54**	8.41	--	8.60	**9.98**	**10.20**	8.30	8.40	8.78	8.09	**10.58**	**9.88**	8.7	8.94	7.75	--	--	9.26
pH	pH	N/A	--	--	7.39	6.57	6.64	7.06	7.35	5.89	6.28	6.20	6.11	7.58	--	6.63	6.39	6.36	6.82	6.84	7.09	7.39	6.53	6.31	6.67	6.13	8.61	--	--	6.49
Specific Conductance	uS/cm	1	--	--	561	279	223	265	234	125	177	174	106	366	--	186.4	215.1	267	364	241	237	234	301	159	173	156	231	--	--	234
INORGANICS																														
Total Alkalinity (as CaCO3)	mg/L	5	--	--	6	7	7	7	9	5	6	7	7	20	--	<5	<5	5	7	7	6	8	7	<5	8	7	21	--	--	<5
Dissolved Chloride (Cl)	mg/L	1	120		39	64	58	67	61	24	44	43	18	55	--	45	57	63	63	58	62	58	50	44	43	34	55	--	--	63
Colour	TCU	5	--	--	54	15	21	19	12	57	32	38	65	38	--	29	8	22	17	19	20	13	23	35	38	48	39	--	--	18
Nitrite + Nitrate	mg/L	0.05	--	--	0.49	0.10	0.17	0.42	0.27	0.66	0.55	0.15	0.62	0.22	--	0.14	0.21	0.14	0.07	0.09	0.19	0.11	0.23	0.33	0.14	0.22	0.24	--	--	0.22
Nitrate (N)	mg/L	0.05	--	13000	0.49	--	--	0.42	0.27	--	0.55	--	--	0.22	--	0.14	0.21	0.14	--	--	0.19	0.11	--	0.33	--	--	0.24	--	--	0.22
Nitrite (N)	mg/L	0.01	--	60	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	--	<0.05	<0.05	<0.01	--	--	<0.01	<0.01	--	<0.01	--	--	<0.05	--	--	<0.05
Nitrogen (Ammonia Nitrogen)	mg/L	0.03	--	19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.06	--	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	--	--	0.03
Total Organic Carbon	mg/L	0.5	--	--	6.5	3.6	4.7	0.7	3.3	6.7	4.6	5	8.3	5.7	--	5.3	4.2	3.6	2.6	4.5	3.2	3.4	3.6	4	6	5.6	5.9	--	--	4.4
Orthophosphate (as P)	mg/L	0.01	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	--	<0.01
pH (units)	pH	N/A	5.0-9.0	6.5-9	**6.36**	6.75	6.79	6.63	7.04	6.58	6.54	6.83	6.67	6.6	--	6.8	6.71	6.50	6.81	6.82	6.66	7.02	6.83	**6.37**	6.60	6.60	6.6	--	--	6.68
Total Calcium (Ca)	mg/L	0.1	--	--	4.5	6.9	6.4	8.37	9.02	5.90	6.02	4.99	4.64	6.0	--	6.0	6.8	6.1	7.1	6.1	7.17	7.69	7.96	5.30	4.76	5.04	6.1	--	--	6.7
Total Magnesium (Mg)	mg/L	0.1	--	--	0.6	1.1	1.0	1.25	1.22	0.82	0.98	0.89	0.85	1.0	--	1.1	1.0	1.1	1.1	1.1	1.25	1.17	1.20	0.93	0.86	0.90	1.0	--	--	1.0
Total Phosphorus (1M depth)	mg/L	0.006	--	--	<0.02	<0.02	0.002	0.018	0.002	<0.002	0.014	0.011	0.03	0.019	--	0.03	<0.02	<0.02	<0.02	0.002	0.010	0.002	<0.002	0.009	0.009	0.007	0.025	--	--	<0.02
Total Potassium (K)	**mg/L**	0.1	--	--	0.9	0.9	0.9	1.160	1.060	1.340	1.230	0.771	1.430	0.8	--	1.0	0.8	0.9	1.0	0.9	0.984	0.900	1.020	0.861	0.801	0.968	0.8	--	--	0.8
Total Sodium (Na)	mg/L	0.1	--	--	25	38	34	35.2	40.2	18.4	26.8	22.8	13.7	33.6	--	29.8	35.3	35	40	34	31.1	35.1	30.8	25.7	21.3	20.9	34.6	--	--	37.5
Reactive Silica (SiO2)	mg/L	0.5	--	--	4.5	2.6	2.8	3.8	3.4	5.9	3.7	2.6	5.4	2.9	--	3.2	2.8	2.6	2.5	2.3	2.6	2.3	3.3	2.9	2.5	3	2.8	--	--	2.7
Total Suspended Solids	mg/L	5	--	--	<2	3	9	7	<2	<1	1	<2	5	9	--	6	<5	2	3	<1	15	<2	11	<1	8	<1	<5	--	--	<5
Dissolved Sulphate (SO4)	mg/L	2	--	--	13	11	11	13	12	12	12	10	12	7	--	10	8	11	11	11	10	10	10	9	10	9	7	--	--	9
Turbidity (NTU)	NTU	0.1	50	--	0.4	0.5	0.6	8.2	0.9	0.5	0.6	1	1.2	0.7	--	1	0.7	0.8	0.7	0.6	1.0	0.8	0.4	0.4	3.4	0.5	0.7	--	--	1
Conductivity (uS/cm)	µS/cm	1	--	--	170	250	230	260	250	130	180	170	100	214	--	179	227	240	250	230	230	230	230	170	170	150	213	--	--	254
Calculated Parameters																														
Anion Sum	meq/L	N/A	--	--	1.51	2.18	1.99	2.34	2.15	1.09	1.62	1.56	0.92	2.11	--	1.49	1.79	2.11	2.17	1.99	2.07	2.01	1.77	1.46	1.58	1.30	2.13	--	--	1.98
Ricarb. Alkalinity (calc. as CaCO3)	mg/L	5	--	--	6	7	7	7	9	5	6	7	7	20	--	<5	<5	5	7	7	6	8	7	<1	8	7	21	--	--	<5
Calculated TDS	mg/L	1	--	--	93	129	118	137	134	75	100	90	63	117	--	95	110	123	131	117	120	120	110	91	89	79	119	--	--	119
Carb. Alkalinity (calc. as CaCO3)	mg/L	10	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	--	<10	<10	< 1	<1	<1	<1	<1	<1	<1	<1	<1	<10	--	--	<10
Cation Sum	meq/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	1.94	2.23	1.88	1.88	2.03	1.86	1.48	1.28	1.27	1.94	--	--	2.09
Hardness (CaCO3)	mg/L	N/A	--	--	14	22	20	26	28	18	19	16	15	19.1	--	19.5	21.1	20	22	20	23	24	25	17	15	16	19.3	--	--	20.8
Ion Balance (% Difference)	%	N/A	--	--	3.78	1.63	2.58	5.17	4.02	4.80	1.25	7.22	1.60	5.5	--	9.0	5.5	4.20	1.36	2.84	4.81	0.50	2.48	0.68	10.50	1.17	4.8	--	--	2.8
Langelier Index (@ 20C)	N/A	N/A	--	--	-3.57	-2.90	-2.94	-2.96	-2.43	-3.25	-3.27	-2.94	-3.13	-2.98	--	-3.31	-3.35	-3.33	-2.83	-2.93	-3.06	-2.95	-2.80	NC	-3.18	-3.17	-2.89	--	--	-3.39
Langelier Index (@ 4C)	N/A	N/A	--	--	-3.82	-3.15	-3.19	-3.21	-2.68	-3.50	-3.53	-3.19	-3.38	-3.23	--	-3.63	-3.67	-3.59	-3.08	-3.18	-3.31	-2.80	-3.05	NC	-3.43	-3.42	-3.21	--	--	-3.71
Saturation pH (@ 20C)	N/A	N/A	--	--	9.93	9.65	9.73	9.59	9.47	9.83	9.81	9.77	9.80	9.51	--	10.10	10.1	9.83	9.64	9.75	9.72	9.57	9.63	NC	9.78	9.77	9.49	--	--	10.1
Saturation pH (@ 4C)	N/A	N/A	--	--	10.20	9.90	9.98	9.84	9.72	10.10	10.10	10.00	10.10	9.83	--	10.40	10.4	10.10	9.89	10.00	9.97	9.82	9.88	NC	10.00	10.00	9.81	--	--	10.4
Metals (ICP-MS)																														
Total Aluminum (Al)	µg/L	5	--	5-100	**260**	--	--	**66.5**	45.9	--	**223**	--	--	**177**	--	**306**	**141**	**130**	--	--	**1020**	55.8	--	**202**	--	--	**189**	--	--	**131**
Total Antimony (Sb)	µg/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2
Total Arsenic (As)	µg/L	2	--	5	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2
Total Barium (Ba)	**µg/L**	5	--	--	**23**	--	--	**35.3**	**24.4**	--	**26.6**	--	--	**22**	--	**19**	**20**	**16**	--	--	**23.0**	**12.2**	--	23	--	--	**22**	--	--	**22**
Total Beryllium (Be)	µg/L	2	--	--	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	<2	<2	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<2	--	--	<2
Total Bismuth (Bi)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2
Total Boron (B)	µg/L	5	--	1900	8	--	--	11.3	8.6	--	<50	--	--	6	--	9	6	5	--	--	8.2	8.8	--	<50	--	--	6	--	--	6
Total Cadmium (Cd)	µg/L	0.017	--	0.017	<0.3	--	--	**0.032**	<0.017	--	<0.017	--	--	<0.017	--	**0.066**	**0.021**	<0.3	--	--	**0.027**	<0.017	--	**0.028**	--	--	**0.023**	--	--	**0.029**
Total Chromium (Cr)	µg/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	<1	<1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	--	<1
Total Cobalt (Co)	µg/L	1	--	--	<1	--	--	0.96	<0.40	--	<0.40	--	--	<1	--	2	<1	<1	--	--	0.65	<0.40	--	<0.40	--	--	<1	--	--	<1
Total Copper (Cu)	µg/L	2	--	2.0-4.0	<2	--	--	2.0	<2.0	<2.0	4.0	<2.0	2.3	<2	--	<2	<2	<2	--	--	3.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	--	--	<2
Total Iron (Fe)	µg/L	50	--	300	140	--	--	**817**	89	161	141	**315**	**528**	137	--	**742**	130	100	--	--	**1090**	151	76	143	**699**	181	178	--	--	181
Total Lead (Pb)	µg/L	0.5	--	1.0-7.0	<0.5	--	--	1.73	<0.50	--	<0.50	--	--	<0.5	--	0.9	<0.5	<0.5	--	--	2.39	<0.50	--	<0.50	--	--	<0.5	--	--	<0.5
Total Manganese (Mn)	µg/L	2	--	--	17	--	--	142	68.9	41.3	34.4	128	62.4	48	--	214	33	58	--	--	159	81.0	28.0	33.8	88.6	30.6	22	--	--	87
Total Molybdenum (Mo)	µg/L	2	--	73	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2
Total Nickel (Ni)	µg/L	2	--	25-150	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	2	<2	2	--	--	2.2	<2.0	--	<2.0	--	--	<2	--	--	<2
Total Selenium (Se)	µg/L	1	--	1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	<1	<1	<2	--	--	<1.0	<1.0	--	<1.0	--	--	<1	--	--	<1
Total Silver (Ag)	µg/L	0.1	--	0.1	<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	<0.1	<0.1	<0.5	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	--	<0.1
Total Strontium (Sr)	µg/L	5	--	--	18	--	--	36.3	37.1	--	25	--	--	26	--	30	31	30	--	--	34.7	32.8	--	25.7	--	--	27	--	--	31
Total Thallium (Tl)	µg/L	0.1	--	0.8	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	<0.1	--	--	<0.1
Total Tin (Sn)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2
Total Titanium (Ti)	µg/L	2	--	--	<2	--	--	7.8	<2.0	--	3.9	--	--	<2	--	4	<2	<2	--	--	21.3	<2.0	--	3.6	--	--	<2	--	--	<2
Total Uranium (U)	µg/L	0.1	--	15	<0.1	--	--	<0.10	<0.10	--	<0.10	--	--	0.1	--	<0.1	<0.1	<0.1	--	--	0.10	<0.10	--	<0.10	--	--	0.1	--	--	<0.1
Total Vanadium (V)	µg/L	2	--	--	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	<2	<2	<2	--	--	<2.0	<2.0	--	<2.0	--	--	<2	--	--	<2
Total Zinc (Zn)	µg/L	5	--	30	8	--	--	10.0	5.4	5.7	6.3	6.2	5.4	<5	--	13	8	12	--	--	18.3	<5.0	5.8	6.6	7.5	10	8	--	--	11
MICROBIOLOGICAL																														
Total Coliform	MPN/100mL	1	--	--	200	73	--	> 250	>250	>250	85	>250	--	411	--	2420	866	49	40	--	>250	46	97	64	>230	--	261	--	--	1410
E. coli	**MPN/100mL**	**1**	**400**	**--**	**33**	**45**	**--**	**19**	**> 250**	**2**	**2**	**34**	**<100**	**2**	**--**	**20**	**12**	**10**	**31**	**--**	**69**	**<1**	**6**	**17**	**>250**	**<100**	**1**	**--**	**--**	**12**
Fecal Coliform	MPN/ml	--	100	--	--	--	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	12	--	--	--	--	--	--	--	--	--
Chlorophyll A - Acidification method	µg/L	0.30	--	--	0.62	2.31	0.57	0.82	1.12	0.07	2.85	0.86	0.15	1.03	--	0.69	1.17	1.15	1.36	0.59	3.50	1.54	0.53	0.55	2.48	1.33	0.76	--	--	1.18
Chlorophyll A - Welschmeyer method	µg/L	0.30	--	--	0.64	2.21	0.64	0.74	1.04	0.06	2.75	0.76	0.15	1.10	--	0.91	1.37	1.22	1.33	0.66	3.39	1.51	0.42	0.51	2.26	1.13	0.76	--	--	1.34
Total Kjeldahl Nitrogen as N	mg/L	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	--	--	--	--	--	--	--	--	<0.4	--	--	--

Notes:

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

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

CCME FWAL = Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guideline for the protection of the environment and ecological receptors (last updated 2011)

Health Canada Guideline for Recreational Water Quality = Health Canada Guidelines for Canadian Recreational Water Quality - Draft (September, 2009)

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

Bold = Parameter concentration exceeds CCME FWAL Guideline - Previous Result.

SNC·LAVALIN

ATTACHMENT 1

Field Reports

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Off Kearney Lake Road

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	10:20
Sample Depth (m):	1.0
pH:	6.32
Dissolved Oxygen (mg/L):	9.76
Secchi Depth (m):	2.50
Water Temperature (degrees Celsius):	13.2
Conductivity (µs/cm):	243

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Collins Road, through wooded area

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	9:10
Sample Depth (m):	1.0
pH:	5.75
Dissolved Oxygen (mg/L):	9.37
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	10.1
Conductivity (µs/cm):	77.9

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Via walking path off Kearney Lake Road

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	9:50
Sample Depth (m):	1.0
pH:	5.86
Dissolved Oxygen (mg/L):	10.20
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	11.7
Conductivity (µs/cm):	207.3

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Via walking path off Kearney Lake Road

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	9:41
Sample Depth (m):	1.0
pH:	5.72
Dissolved Oxygen (mg/L):	10.09
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	11.7
Conductivity (µs/cm):	207.1

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Along Kearney Lake Road

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	10:03
Sample Depth (m):	1.0
pH:	6.20
Dissolved Oxygen (mg/L):	9.67
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	13.3
Conductivity (µs/cm):	219.5

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Via Lakeshore Drive in Kingswood Subdivision

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	08:40
Sample Depth (m):	1.0
pH:	5.19
Dissolved Oxygen (mg/L):	8.77
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	7.7
Conductivity (µs/cm):	123.6

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Sunny with Clouds
Air Temperature:	15°C
Cloud Cover:	Partial
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Off Highway 102

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	14:15
Sample Depth (m):	1.0
pH:	6.19
Dissolved Oxygen (mg/L):	7.55
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	11.7
Conductivity (µs/cm):	226

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Off Highway 102

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	10:40
Sample Depth (m):	1.0
pH:	6.01
Dissolved Oxygen (mg/L):	6.30
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	11.5
Conductivity (µs/cm):	288

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Overcast
Air Temperature:	10°C
Cloud Cover:	Yes
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Via French Mast Lane in Moirs Mill Subdivision

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	10:51
Sample Depth (m):	1.0
pH:	6.39
Dissolved Oxygen (mg/L):	9.98
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	11.6
Conductivity (µs/cm):	215.1

Additional Comments / Notes

FIELD REPORT – MAY 2013

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

Site Conditions

Weather:	Sunny with Clouds
Air Temperature:	12°C
Cloud Cover:	Partial
Wildlife Sightings:	N/A
Site Accessibility: Accessible	Via Lake Dr., off Hammonds Plains Rd.

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	13:40
Sample Depth (m):	1.0
pH:	6.49
Dissolved Oxygen (mg/L):	9.26
Secchi Depth (m):	3.20
Water Temperature (degrees Celsius):	14.8
Conductivity (µs/cm):	234

Additional Comments / Notes

FIELD REPORT – MAY 2013

Project:	Water Quality Monitoring - Bedford West	**Sub-Area(s):** 9
Client:	Halifax Regional Municipality	
Site: Larry Uteck Blvd.		**Site ID: LU**
Watercourse: Pond		**Location:** Larry Uteck off-ramp
Monitoring Well ☐Pumping Well ☒ Surface Water ☐Spring/Seep ☐Discharge Pipe ☐Other:		
GPS Coordinates:	20T 4949816E, 445042N (UTM, NAD83)	
SLE Field Personnel:	Allain Thebeau/ Ghislain Pitre	

Site Conditions

Weather:	Sunny with Clouds
Air Temperature:	12°C
Cloud Cover:	Partial
Wildlife Sightings:	N/A
Site Accessibility: Accessible	From Larry Uteck Blvd. off-ramp, Halifax-bound

Field Parameter Data

	Remarks
Date (d.m.y):	15 May 2013
Time (hh:mm):	14:30
Sample Depth (m):	1.0
pH:	6.39
Dissolved Oxygen (mg/L):	10.15
Secchi Depth (m):	N/A
Water Temperature (degrees Celsius):	13.9
Conductivity (µs/cm):	670

Additional Comments / Notes

ATTACHMENT 2

Site Photographs

Photo 1: KL1, Kearney Lake sample location

Photo 2: KL2, Kearney Lake sample location

Photo 3: KL3, Kearney Lake sample location

Photo 4: KL4, Kearney Lake sample location

Photo 5: KL5, Kearney Lake sample location

Photo 6: LSD, Lake Shore Drive sample location

Photo 7: Hwy102-1 sample location

Photo 8: Hwy102-2 sample location

Photo 9: PML1, Paper Mill Lake sample location

Photo 10: PML2, Paper Mill Lake sample location

Photo 11: LU, Larry Uteck off-ramp sample location

ATTACHMENT 3

Laboratory Certificates of Analysis

AGAT Laboratories

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

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

ATTENTION TO: **Derek Heath**

PROJECT NO: **510192-0001**

AGAT WORK ORDER: **13X715770**

WATER ANALYSIS REVIEWED BY: **Jason Coughtrey, Inorganics Supervisor**

DATE REPORTED: **May 24, 2013**

PAGES (INCLUDING COVER): **11**

VERSION*: **1**

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

*NOTES

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

AGAT Laboratories
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Dartmouth, Nova Scotia
CANADA B3B 1M2
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

CLIENT NAME: SNC-LAVALIN

ATTENTION TO: Derek Heath

SNC Lavalin Bedford West Package

DATE RECEIVED: 2013-05-15

DATE REPORTED: 2013-05-24

		SAMPLE DESCRIPTION:		KL-1	KL-2	KL-3	KL-4	KL-5	LSD	HWY-102-1	HWY-102-2
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350825	4350836	4350843	4350870	4350882	4350890	4350908	4350919
Total Suspended Solids	mg/L		5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorophyll A - Acidification Method	ug/L		0.50	1.22	0.62	1.44	1.34	1.44	<0.50	1.27	2.41
Chlorophyll A - Welschmeyer Method	ug/L		0.50	1.40	0.72	1.62	1.48	1.59	<0.50	1.45	3.02
E. Coli (MPN)	MPN/100 mL		1	48	12	8	6	6	10	4	111
Total Coliforms (MPN)	MPN/100 mL		1	1200	>2420	345	548	461	1990	1550	2420

		SAMPLE DESCRIPTION:		PML-1	PML-2	LU
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350929	4350936	4350947
Total Suspended Solids	mg/L		5	<5	<5	<5
Chlorophyll A - Acidification Method	ug/L		0.50	1.17	1.18	1.54
Chlorophyll A - Welschmeyer Method	ug/L		0.50	1.37	1.34	1.77
E. Coli (MPN)	MPN/100 mL		1	12	12	3
Total Coliforms (MPN)	MPN/100 mL		1	866	1410	866

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

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Certified By:

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

CLIENT NAME: SNC-LAVALIN

ATTENTION TO: Derek Heath

Standard Water Analysis + Metals (Total)

DATE RECEIVED: 2013-05-15

DATE REPORTED: 2013-05-24

		SAMPLE DESCRIPTION:		KL-1	KL-2	KL-3	KL-4	KL-5	LSD	HWY-102-1	HWY-102-2
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350825	4350836	4350843	4350870	4350882	4350890	4350908	4350919
pH				6.78	6.37	6.68	6.69	6.71	6.94	6.86	6.61
Reactive Silica as SiO2	mg/L		0.5	2.5	2.8	2.9	3.0	2.7	2.6	3.1	1.6
Chloride	mg/L		1	66	19	54	54	58	39	53	71
Fluoride	mg/L		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sulphate	mg/L		2	11	4	7	7	8	6	12	10
Alkalinity	mg/L		5	<5	<5	<5	<5	<5	8	9	6
True Color	TCU		5	11	37	19	17	10	10	9	11
Turbidity	NTU		0.1	1.6	1.9	0.7	0.7	0.7	1.1	0.5	1.5
Electrical Conductivity	umho/cm		1	259	83	219	218	232	168	243	295
Nitrate + Nitrite as N	mg/L		0.05	0.18	0.12	0.21	0.20	0.21	0.18	0.51	0.17
Nitrate as N	mg/L		0.05	0.18	0.12	0.21	0.20	0.21	0.18	0.51	0.17
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	4.4	7.5	4.3	4.2	4.0	4.7	5.1	6.1
Ortho-Phosphate as P	mg/L		0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Total Sodium	mg/L		0.1	35.8	8.9	35.1	31.6	33.6	21.9	30.8	39.0
Total Potassium	mg/L		0.1	0.8	0.5	0.8	0.8	0.8	1.2	1.3	1.3
Total Calcium	mg/L		0.1	7.5	2.7	7.0	6.8	7.1	6.4	11.1	7.6
Total Magnesium	mg/L		0.1	1.1	0.7	1.0	1.0	1.0	1.2	1.4	1.2
Total Phosphorous	mg/L		0.02	<0.02	<0.02	0.03	0.02	0.03	0.04	<0.02	0.02
Bicarb. Alkalinity (as CaCO3)	mg/L		5	<5	<5	<5	<5	<5	8	9	6
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	<10	<10	<10	<10
Hydroxide	mg/L		5	<5	<5	<5	<5	<5	<5	<5	<5
Calculated TDS	mg/L		1	124	37	106	103	110	82	117	135
Hardness	mg/L			23.3	9.6	21.6	21.1	21.8	20.9	33.5	23.9
Langelier Index (@20C)	NA			-3.24	-4.05	-3.37	-3.37	-3.33	-2.93	-2.73	-3.33
Langelier Index (@ 4C)	NA			-3.56	-4.37	-3.69	-3.69	-3.65	-3.25	-3.05	-3.65
Saturation pH (@ 20C)	NA			10.0	10.4	10.0	10.1	10.0	9.87	9.59	9.94
Saturation pH (@ 4C)	NA			10.3	10.7	10.4	10.4	10.4	10.2	9.91	10.3
Anion Sum	me/L			2.10	0.63	1.68	1.68	1.82	1.40	1.96	2.34
Cation sum	me/L			2.08	0.63	2.00	1.84	1.94	1.43	2.06	2.24

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Certified By:

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

Certificate of Analysis

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

CLIENT NAME: SNC-LAVALIN

ATTENTION TO: Derek Heath

Standard Water Analysis + Metals (Total)

DATE RECEIVED: 2013-05-15

DATE REPORTED: 2013-05-24

		SAMPLE DESCRIPTION:		KL-1	KL-2	KL-3	KL-4	KL-5	LSD	HWY-102-1	HWY-102-2
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350825	4350836	4350843	4350870	4350882	4350890	4350908	4350919
% Difference/ Ion Balance (NS)	%			0.7	0.3	8.6	4.5	3.2	1.0	2.4	2.3
Total Aluminum	ug/L		5	191	256	140	141	136	131	86	130
Total Antimony	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Arsenic	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Barium	ug/L		5	12	8	19	18	19	12	57	44
Total Beryllium	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Bismuth	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron	ug/L		5	6	6	7	7	7	10	10	9
Total Cadmium	ug/L		0.017	0.020	<0.017	0.028	0.027	0.024	<0.017	<0.017	0.019
Total Chromium	ug/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Total Cobalt	ug/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Total Copper	ug/L		2	<2	<2	<2	9	<2	<2	<2	<2
Total Iron	ug/L		50	207	269	131	213	111	236	111	383
Total Lead	ug/L		0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	0.6
Total Manganese	ug/L		2	73	24	37	34	35	71	23	83
Total Molybdenum	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Nickel	ug/L		2	2	<2	<2	<2	<2	<2	<2	<2
Total Selenium	ug/L		1	<1	<1	<1	<1	<1	<1	<1	<1
Total Silver	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L		5	37	12	33	32	31	24	52	39
Total Thallium	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2	<2	5	<2	<2	<2	<2
Total Titanium	ug/L		2	4	4	<2	<2	<2	<2	<2	4
Total Uranium	ug/L		0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Total Vanadium	ug/L		2	<2	<2	<2	<2	<2	<2	<2	<2
Total Zinc	ug/L		5	11	<5	10	21	11	6	<5	12

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Certificate of Analysis

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

CLIENT NAME: SNC-LAVALIN

ATTENTION TO: Derek Heath

Standard Water Analysis + Metals (Total)

DATE RECEIVED: 2013-05-15

DATE REPORTED: 2013-05-24

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: PML-1 SAMPLE TYPE: Water DATE SAMPLED: 5/15/2013 4350929	PML-2 Water 5/15/2013 4350936	LU Water 5/15/2013 4350947
pH				6.71	6.68	6.92
Reactive Silica as SiO2	mg/L		0.5	2.8	2.7	5.1
Chloride	mg/L		1	57	63	190
Fluoride	mg/L		0.1	0.1	0.1	0.1
Sulphate	mg/L		2	8	9	26
Alkalinity	mg/L		5	<5	<5	6
True Color	TCU		5	8	18	7
Turbidity	NTU		0.1	0.7	1	1.8
Electrical Conductivity	umho/cm		1	227	254	732
Nitrate + Nitrite as N	mg/L		0.05	0.21	0.22	1.11
Nitrate as N	mg/L		0.05	0.21	0.22	1.11
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	0.03	<0.03
Total Organic Carbon	mg/L		0.5	4.2	4.4	3.1
Ortho-Phosphate as P	mg/L		0.01	<0.01	<0.01	<0.01
Total Sodium	mg/L		0.1	35.3	37.5	95.1
Total Potassium	mg/L		0.1	0.8	0.8	2.6
Total Calcium	mg/L		0.1	6.8	6.7	22.0
Total Magnesium	mg/L		0.1	1.0	1.0	2.8
Total Phosphorous	mg/L		0.02	<0.02	<0.02	<0.02
Bicarb. Alkalinity (as CaCO3)	mg/L		5	<5	<5	6
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10
Hydroxide	mg/L		5	<5	<5	<5
Calculated TDS	mg/L		1	110	119	347
Hardness	mg/L			21.1	20.8	66.5
Langelier Index (@20C)	NA			-3.35	-3.39	-2.60
Langelier Index (@ 4C)	NA			-3.67	-3.71	-2.92
Saturation pH (@ 20C)	NA			10.1	10.1	9.52
Saturation pH (@ 4C)	NA			10.4	10.4	9.84
Anion Sum	me/L			1.79	1.98	6.10
Cation sum	me/L			2.00	2.09	5.55

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Certificate of Analysis

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

CLIENT NAME: SNC-LAVALIN

ATTENTION TO: Derek Heath

Standard Water Analysis + Metals (Total)

DATE RECEIVED: 2013-05-15

DATE REPORTED: 2013-05-24

		SAMPLE DESCRIPTION:		PML-1	PML-2	LU
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350929	4350936	4350947
% Difference/ Ion Balance (NS)	%			5.5	2.8	4.7
Total Aluminum	ug/L		5	141	131	107
Total Antimony	ug/L		2	<2	<2	<2
Total Arsenic	ug/L		2	<2	<2	<2
Total Barium	ug/L		5	20	22	133
Total Beryllium	ug/L		2	<2	<2	<2
Total Bismuth	ug/L		2	<2	<2	<2
Total Boron	ug/L		5	6	6	10
Total Cadmium	ug/L		0.017	0.021	0.039	0.300
Total Chromium	ug/L		1	<1	<1	<1
Total Cobalt	ug/L		1	<1	<1	<1
Total Copper	ug/L		2	<2	<2	2
Total Iron	ug/L		50	130	181	194
Total Lead	ug/L		0.5	<0.5	<0.5	<0.5
Total Manganese	ug/L		2	33	87	87
Total Molybdenum	ug/L		2	<2	<2	<2
Total Nickel	ug/L		2	<2	<2	<2
Total Selenium	ug/L		1	<1	<1	<1
Total Silver	ug/L		0.1	<0.1	<0.1	<0.1
Total Strontium	ug/L		5	31	31	93
Total Thallium	ug/L		0.1	<0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2	<2
Total Titanium	ug/L		2	<2	<2	3
Total Uranium	ug/L		0.1	<0.1	<0.1	<0.1
Total Vanadium	ug/L		2	<2	<2	<2
Total Zinc	ug/L		5	8	11	57

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

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Certificate of Analysis

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

CLIENT NAME: SNC-LAVALIN

ATTENTION TO: Derek Heath

TP (Water)

DATE RECEIVED: 2013-05-15

DATE REPORTED: 2013-05-24

		SAMPLE DESCRIPTION:		KL-1	KL-2	KL-3	KL-4	KL-5	LSD	HWY-102-1	HWY-102-2
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350825	4350836	4350843	4350870	4350882	4350890	4350908	4350919
Total Phosphorus	mg/L		0.002	0.007	0.010	0.006	0.006	0.005	0.007	0.006	0.014

		SAMPLE DESCRIPTION:		PML-1	PML-2	LU
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		5/15/2013	5/15/2013	5/15/2013
Parameter	Unit	G / S	RDL	4350929	4350936	4350947
Total Phosphorus	mg/L		0.002	0.005	0.006	0.006

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

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Quality Assurance

CLIENT NAME: SNC-LAVALIN

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

ATTENTION TO: Derek Heath

Water Analysis

RPT Date: May 24, 2013			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
SNC Lavalin Bedford West Package															
Total Suspended Solids	1	4365405	<5	<5	0.0%	< 5	97%	80%	120%		120%	120%	96%	80%	120%
E. Coli (MPN)	1	4350929	17	12	34.5%	< 1		0%	0%		0%	0%		0%	0%
Total Coliforms (MPN)	1	4350929	727	866	17.5%	< 1		0%	0%		0%	0%		0%	0%
Standard Water Analysis + Metals (Total)															
pH	4350825	4350825	6.78	6.78	0.0%	<	99%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	1	4350947	5.1	5.2	1.9%	< 0.5	101%	80%	120%		80%	120%	102%	80%	120%
Alkalinity	4350825	4350825	<5	<5	0.0%	< 5	92%	80%	120%	NA	80%	120%	NA	80%	120%
True Color	1	4352712	<5	<5	0.0%	< 5	95%	80%	120%		80%	120%		80%	120%
Turbidity	1	4350890	1.2	1.1	8.7%	< 0.1	91%	80%	120%		80%	120%		80%	120%
Electrical Conductivity	4350825	4350825	259	262	1.2%	< 1	97%	80%	120%	NA	80%	120%	NA	80%	120%
Ammonia as N	1	4350947	<0.05	<0.05	0.0%	< 0.03	114%	80%	120%		80%	120%	109%	80%	120%
Total Organic Carbon	1	4352964	1.1	1.2	8.7%	< 0.5	94%	80%	120%		80%	120%	103%	80%	120%
Ortho-Phosphate as P	1	4350947	<0.01	<0.01	0.0%	< 0.01	100%	80%	120%		80%	120%	108%	80%	120%
Total Sodium	5202013	4356970	12.8	11.6	9.8%	< 0.1	98%	80%	120%	88%	80%	120%	104%	70%	130%
Total Potassium	5202013	4356970	4.9	4.7	4.2%	< 0.1	109%	80%	120%	98%	80%	120%	70%	70%	130%
Total Calcium	5202013	4356970	27.4	24.6	10.8%	< 0.1	108%	80%	120%	101%	80%	120%	100%	70%	130%
Total Magnesium	5202013	4356970	2.0	1.8	10.5%	< 0.1	98%	80%	120%	101%	80%	120%	87%	80%	120%
Total Phosphorous	5202013	4356970	0.05	0.05	0.0%	< 0.02	105%	80%	120%	85%	80%	120%	80%	70%	130%
Bicarb. Alkalinity (as CaCO3)	4350825	4350825	<5	<5	0.0%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	4350825	4350825	<10	<10	0.0%	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	4350825	4350825	<5	<5	0.0%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Total Aluminum	5202013	4356970	451	450	0.2%	< 5	112%	80%	120%	105%	80%	120%	119%	70%	130%
Total Antimony	5202013	4356970	< 2	< 2	0.0%	< 2	98%	80%	120%	103%	80%	120%	104%	70%	130%
Total Arsenic	5202013	4356970	9	8	11.8%	< 2	98%	80%	120%	95%	80%	120%	105%	70%	130%
Total Barium	5202013	4356970	27	24	11.8%	< 5	99%	80%	120%	101%	80%	120%	101%	70%	130%
Total Beryllium	5202013	4356970	< 2	< 2	0.0%	< 2	100%	80%	120%	85%	80%	120%	97%	70%	130%
Total Bismuth	5202013	4356970	< 2	< 2	0.0%	< 2	104%	80%	120%	99%	80%	120%	109%	70%	130%
Total Boron	5202013	4356970	13	13	0.0%	< 5	99%	80%	120%	106%	80%	120%	97%	70%	130%
Total Cadmium	5202013	4356970	0.043	0.039	9.8%	< 0.017	100%	80%	120%	99%	80%	120%	100%	70%	130%
Total Chromium	5202013	4356970	3	3	0.0%	< 1	117%	80%	120%	102%	80%	120%	99%	70%	130%
Total Cobalt	5202013	4356970	2	2	0.0%	< 1	117%	80%	120%	109%	80%	120%	97%	70%	130%
Total Copper	5202013	4356970	28	26	7.4%	< 2	112%	80%	120%	113%	80%	120%	87%	70%	130%
Total Iron	5202013	4356970	4310	3660	16.3%	< 50	119%	80%	120%	111%	80%	120%	113%	70%	130%
Total Lead	5202013	4356970	23.6	22.7	3.9%	< 0.5	102%	80%	120%	100%	80%	120%	116%	70%	130%
Total Manganese	5202013	4356970	196	168	15.4%	< 2	114%	80%	120%	116%	80%	120%	102%	70%	130%
Total Molybdenum	5202013	4356970	4	4	0.0%	< 2	103%	80%	120%	100%	80%	120%	103%	70%	130%
Total Nickel	5202013	4356970	4	4	0.0%	< 2	119%	80%	120%	103%	80%	120%	96%	70%	130%
Total Selenium	5202013	4356970	1	1	0.0%	< 1	98%	80%	120%	94%	80%	120%	97%	70%	130%

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Quality Assurance

CLIENT NAME: SNC-LAVALIN

AGAT WORK ORDER: 13X715770

PROJECT NO: 510192-0001

ATTENTION TO: Derek Heath

Water Analysis (Continued)

RPT Date: May 24, 2013			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Silver	5202013	4356970	< 0.1	< 0.1	0.0%	< 0.1	99%	80%	120%	100%	80%	120%	98%	70%	130%
Total Strontium	5202013	4356970	212	190	10.9%	< 5	100%	80%	120%	98%	80%	120%	99%	70%	130%
Total Thallium	5202013	4356970	< 0.1	< 0.1	0.0%	< 0.1	103%	80%	120%	100%	80%	120%	104%	70%	130%
Total Tin	5202013	4356970	< 2	< 2	0.0%	< 2	99%	80%	120%	102%	80%	120%	101%	70%	130%
Total Titanium	5202013	4356970	20	20	0.0%	< 2	113%	80%	120%	104%	80%	120%	125%	70%	130%
Total Uranium	5202013	4356970	1.6	1.6	0.0%	< 0.1	102%	80%	120%	102%	80%	120%	116%	70%	130%
Total Vanadium	5202013	4356970	< 2	< 2	0.0%	< 2	119%	80%	120%	100%	80%	120%	91%	70%	130%
Total Zinc	5202013	4356970	41	38	7.6%	< 5	116%	80%	120%	118%	80%	120%	92%	70%	130%
Standard Water Analysis + Metals (Total)															
Turbidity	1	4350554	1.6	1.6	0.0%	< 0.1	91%	80%	120%		80%	120%		80%	120%
TP (Water)															
Total Phosphorus	1	4350825	0.007	0.007	0.0%	< 0.002	97%	90%	110%	98%	90%	110%	96%	80%	120%

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Method Summary

CLIENT NAME: SNC-LAVALIN **AGAT WORK ORDER: 13X715770**

PROJECT NO: 510192-0001 **ATTENTION TO: Derek Heath**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Suspended Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC
Chlorophyll A - Acidification Method	Subcontracted	Subcontracted	
Chlorophyll A - Welschmeyer Method	Subcontracted	Subcontracted	ICP-MS
E. Coli (MPN)	MIC-121-7000	Based on SM 9223B	INCUBATOR
Total Coliforms (MPN)	MIC-121-7000	Based on SM 9223B	INCUBATOR
pH	INOR-121-6001	SM 4500 H+B	PC-TITRATE
Reactive Silica as SiO2	INORG-121-6028	SM 4110 B	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	IC
Fluoride	INORG-121-6005	SM 4110 B	IC
Sulphate	INORG-121-6005	SM 4110 B	IC
Alkalinity	INORG-121-6001	SM 2320 B	PC-TITRATE
True Color	INORG-121-6014	EPA 110.2	NEPHELOMETER
Turbidity	INORG-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC-TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	IC
Nitrite as N	INORG-121-6005	SM 4110 B	IC
Ammonia as N	INORG-121-6003	SM 4500-NH3 G	COLORIMETER
Total Organic Carbon	INORG-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INORG-121-6005	SM 4110 B	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Potassium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Calcium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Magnesium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorous	MET-121-6104 & MET-121-6105	SM 3125	ICP/MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC-TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS		SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance (NS)	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total 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

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Method Summary

CLIENT NAME: SNC-LAVALIN **AGAT WORK ORDER: 13X715770**

PROJECT NO: 510192-0001 **ATTENTION TO: Derek Heath**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
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
Total Chromium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Cobalt	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Copper	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Iron	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Lead	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Manganese	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Molybdenum	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Nickel	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Selenium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Silver	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Strontium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Thallium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Tin	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Titanium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Uranium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Vanadium	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Zinc	MET121-6104 & MET-121-6105	SM 3125	ICP/MS
Total Phosphorus	INOR-93-1022	SM 4500-P B & E	SPECTROPHOTOMETER

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Chain of Custody Record

Turnaround Time Required (TAT) 13x715710

Regular TAT	5 to 7 working days	☑
Rush TAT	24 to 48 hours	☐
	48 to 72 hours	☐

Date Required: 7°C

Report To

Company: SNC Lavalin
Contact: Derek Heath
Address: 5657 Spring Garden Road, Suite 200
Phone: +1 (902) 492-4544 Fax:
PO#:
AGAT Quotation: 12-761
Client Project Name/#: 510192-0001

Report Information

1. Name: Andrew Paris
   Email: andrew.paris@snclavalin.com
2. Name: Allain Thebeau
   Email: allain.thebeau@snclavalin.com

Report Format

- ☐ Single Sample per page
- ☑ Multiple Samples per page
- ☑ Excel Format Included

Laboratory Use Only

Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature:
AGAT Job Number:
Notes:

Invoice To

Same Yes ☑ / No ☐

Company:
Contact:
Address:
Phone: Fax:
PO#/Credit Card #:

Regulatory Requirements (Check):

- ☐ List Guidelines on Report ☐ Do not List Guidelines on Report
- ☐ PIRI
  - ☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
  - ☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
  - ☐ Gas ☐ Gas ☐ Lube
- ☐ CCME
  - ☐ Industrial ☐ CDWQ ☐ Other
  - ☐ Commercial ☐ NSDFOSP
  - ☐ Res/Park ☐ HRM 101
  - ☐ Agricultural ☐ Storm Water
  - ☐ FWAL ☐ Waste Water
  - ☐ Sediment

Sample Identification	Sample Matrix	Date/Time Sampled	Comments – Site/Sample Info. Sample Containment	Microtox	CCME PHC BTEX/F1-F4	Metals	AB Class II Landfill	Detailed Salinity	Routine Potability	Standard Water + Metals	Low Level Total Phosphorus	TSS & TKN	E.Coli (MPN)	Chlorophyll A	Number of Containers	Preserved (Y/N)	Hazardous (Y/N)	Lab Sample #
KL-1	WATER	10:20	May 15/2013							✓	✓	✓	✓	✓				
KL-2	WATER	9:10								✓	✓	✓	✓	✓				
KL-3	WATER	9:50								✓	✓	✓	✓	✓				
KL-4	WATER	9:41								✓	✓	✓	✓	✓				
KL-5	WATER	10:03								✓	✓	✓	✓	✓				
LSD	WATER	8:40								✓	✓	✓	✓	✓				
HWY-102-1	WATER	14:51								✓	✓	✓	✓	✓				
HWY-102-2	WATER	10:40								✓	✓	✓	✓	✓				
PML-1	WATER	10:50								✓	✓	✓	✓	✓				
PML-2	WATER	13:40								✓	✓	✓	✓	✓				
LU	WATER	14:30								✓	✓	✓	✓	✓				
	WATER									✓	✓	✓	✓	✓				

Samples Relinquished by (print name & sign): original signed	Date May 15/13 15:55	Samples Received by (Print name & sign): original signed	Date Aug 15/13	Special Instructions
Samples Relinquished by (print name & sign): original signed	Date	Samples Received by (Print name & sign): original signed	Date 15:55	
Samples Relinquished by (print name & sign):	Date	Samples Received by (Print name & sign):	Date	

Page ____ of ____
NO: