MUNICIPALITY OF
BRIGHTON

2022 WASTEWATER POLLUTION CONTROL PLANT AND LIFTSTATION ANNUAL REPORT

Environmental Compliance Approval
3644-BWXRNN (WPCP)
A-500-1122249878 (Lift Station – Collection System)
April 3, 2023

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1.0 INTRODUCTION

The Municipality of Brighton is pleased to present its Annual Performance Report for the Brighton Water Pollution Control Plant (WPCP) governed by ECA 3644-BWXRNN issued on January 15, 2021, and the Harbour Street Sewage Pumping Station governed by ECA number A-500-1122249878 issued on August 25, 2021, for the operating period of January 1 to December 31, 2022.

Brighton's Water Pollution Control Plant (WPCP) services a population of approximately 7,000, as well as Presqu'ile Provincial Park. The Wastewater Collection System (WWCS) is designated as Class II subsystem; the Water Pollution Control Plant (WPCP) is designated as Class I subsystem.

This report has been prepared in accordance with Condition 11(4) of the WPCP ECA, and Condition 8(3) of the Harbour Street Sewage Pumping Station. Each of the ECA's includes Limited Operational Flexibility (LOF) provisions to allow expedited changes to the treatment operation, subject to final MECP approvals and conditions.

The WPCP is located at 100 County Road 64, and the Harbour Street Sewage Pumping Station is located at 7 Harbour Street. Wastewater collected from the serviced area of the Municipality passes through the Sewage Pumping Station, with Forcemain delivering raw sewage to the Lagoon system. A second gravity feed also discharges to the Brighton WPCP. The Lagoon system is comprised of four treatment components in the order listed below:

1) A 0.7-hectare aerated cell (Lagoon #1) with two mechanical surface aerators (15hp), and five aspirating aerators (three 10hp, and two 25hp).
2) A chemical mixing chamber where ferric chloride is added.
3) A 5.44-hectare waste stabilization pond (Lagoon #2) with three baffles.
4) A two-celled constructed wetland having a total surface area of 6.2 hectares.

The effluent from the constructed wetland is discharged continuously into a provincially significant natural wetland that borders Presqu'ile Bay, which is located off the northeast shore of Lake Ontario.

2.0 WASTEWATER FLOWS AND RAW SEWAGE QUALITY

The WPCP has a Rated Capacity of 4,600 m^3/day. For purposes of monitoring and reporting Raw Influent flows, the Aeration Pond Effluent flow meter is referenced in Table I below. The Annual Average Daily Flow is calculated at 2,814 m^3/day, accounting for an average 61% of the Rated Capacity. Throughout the Reporting Period, the highest daily flow recorded was in December at 8,395 m^3/day. The lowest daily flow occurred in February at 1661 m^3/day.

Table I summarizes the Aeration Pond Effluent flows in 2022.

It should be noted that in 2022 levels in Lake Ontario were lower than in previous years. This reduced infiltration into the sanitary sewer system and thus reduced average sewage flows below the approximate 10-year annual average of approximately 3,200 m^3/day.

Table I
Monthly Wastewater Flows to WPCP in 2022

Month	Total Flow (m^3)	Average Daily Flow (m^3/day)	Percent of the rated capacity (%)
January	78,068	2,518	55%
February	95,225	3,401	74%
March	130,371	4,206	91%
April	109,090	4,206	91%
May	93,136	3,004	65%
June	79,343	2,645	57%
July	70,250	2,266	49%
August	67,477	1,727	38%
September	63,597	2,120	46%
October	61,200	1,974	43%
November	65,552	2,185	48%
December	108,881	3,512	76%
Annual	**1,022,191**	**2,814**	**61%**

2.1 Flow Interpretation

The variations in the flow of wastewater received at the WPCP are likely caused by infiltration and inflow (possible sump pumps and rain events) to the collection system, because of local precipitation events, fluctuations in groundwater elevations and snowmelt. It should be noted that the Flow Meter situated at the Harbour Street Sewage Pump Station is out of order for the Reporting Period; again, flow values identified above are from the Aeration Pond Effluent. This meter would also capture gravity influent flows.

Sewer repair work, and CCTV work, was completed by various companies which has reduced infiltration in limited locations. From 2019 to 2021 inspections of sanitary works in new subdivisions was completed before assumption or as part of the inspection of new building structures. These inspections and CCTV work have had a positive impact on the sanitary system. Due to lower rain and lake levels conditions in 2022, average sewage flows have been significantly lower than previous years. There are surges in flows when rain events happen, this suggests that sump pumps are attached to the sanitary system. When road reconstruction happens, it is suggested that storm lines be upgraded to handle sump pumps on that street. This would reduce flows to the sanitary system and increase reserved capacity. Further work will be carried out in the next year or two that will have theentire system reviewed along with sewer repairs that should further reduce infiltration sources.

2.2 Raw Sewage Quality

As per the ECA, raw sewage samples are to be collected and analyzed for select parameters normally once per month. However, for 2022, raw sewage samples were collected weekly as part of an intensive study of the WPCP to better assess ammonia treatment.

Table II as follows summarizes raw wastewater quality for 2022. Weekly raw sewage samples provides better data for managing operation of the aerated cell. Results for all samples collected within a month were averaged to determine raw sewage quality values provided in **Table II**.

Raw sewage samples are collected just upstream of the WCPC in the sanitary sewer collection system. Samples of the pumped sewage from the Harbour Street sewage pumping station (SPS) are collected at the outlet manhole of the SPS force main on the lagoon property. Separate samples of the gravity drainage portion of the sanitary sewer system are collected at the same manhole between pumps cycles of the SPS. The pumped sewage sample and the gravity sewage samples are analyzed separately and then the results averaged to provide weekly raw sewage quality values.

TABLE II
Monthly Raw Sewage Quality In 2022

2022	CBOD5 (mg/L)	TSS (mg/L)	Total Phosphorus (mg/L)	TKN (mg/L)	Ammonia Nitrogen (mg/L)
January	94.0	118.8	4.94	46.6	27.4
February	160.6	206.0	5.06	47.0	38.7
March	111.5	108.1	2.72	34.0	27.5
April	157.0	153.0	3.29	31.4	27.3
May	189.9	158.3	4.25	44.7	36.8
June	193.0	199.3	4.37	44.4	37.6
July	219.3	212.4	4.37	46.4	41.1
August	178.7	204.0	4.45	43.7	40.2
September	156.3	171.8	4.30	40.1	36.8
October	159.3	183.3	4.39	48.8	39.6
November	159.3	146.9	4.39	41.8	36.3
December	217.2	244.3	4.25	42.1	35.7
Average	166.3	175.5	4.23	42.57	35.4

3.0 WASTEWATER EFFLUENT QUALITY

Schedule C of the ECA identifies Final Effluent Compliance Limits for sample location downstream of the Stabilization Lagoon and upstream of the Constructed wetland. Effluent design objectives are identified in Schedule B.

Schedule D of the ECA identifies Monitoring parameters for both Influent and Final Effluent monitoring. Table III below outlines Final Effluent flows throughout the Reporting Period. The facility operated at 58% of the Rated Capacity throughout the Reporting Period, with an Annual Average Daily Flow of 2,571 m^3/day.

Table III
Monthly Final Effluent Flows to Constructed Wetland in 2022

Month	Total Flow (m^3)	Avg. Flow (m^3/day)	Peak Monthly Flow (m^3/day)	Percent of the rated capacity (%)
January	72,698	2,345	3,566	51
February	93,225	3,329	6,649	72
March	114,301	4,082	7,437	89
April	102,368	3,412	4,411	74
May	75,970	2,713	3,978	59
June	68,188	2,273	3,687	49
July	63,424	2,046	3,786	44
August	46,822	1,510	2,939	32
September	61,307	2,044	3,216	44
October	76,552	2,469	4,058	54
November	61,617	2,054	2,601	45
December	110,463	3,563	8,659	77
Annual	**836,472**	**2,571**		**58%**

Table IV summarizes effluent quality for the Stabilization Lagoon. Effluent Objectives and Limits are also captured in the table. For CBOD5 and TSS, compliance is based on an Annual Average Effluent Concentration, all other parameters have a Monthly Average Effluent Concentration Limit. In 2022, the effluent quality did not meet the Objectives for Total Suspended Solids (TSS) in February, March, and April. The facility did not meet Effluent Tan Limits January, February, May June and July. As mentioned in previous Performance Reports, the facility is not able to consistently facilitate the nitrification process. Best efforts were made to modify operating strategies for nitrification to occur, however during cold water temperatures in the winter, and ammonia bleed-out from sludge deposits in the Stabilization Lagoon, Objectives and Limits were not achieved.

Table IV
Monthly Average Waste Stabilization Pond Effluent Quality – 2022

Parameter	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)	TKN	E-coli (mg/L)	Temp	pH	Nitrate (mg/L)	Nitrite (mg/L)
Effluent Objectives (mg/L)	15.0	15.0	0.8	May 1-Oct 31: 10.0 Nov 1-Apr 30: 15.0	No objective	200 cfu/100mL		6.5-9.0	No objective	No objective
Effluent Limit (mg/L)	30	40	1.0	May-Oct 31:14.0 Nov 1-Apr 30: 17.0	No Limit	No Limit	No Limit	6.0-9.5	No Limit	No Limit
January	4.3	11.3	0.31	*18.4*	22.6	1500	5.8	7.7	0.20	0.60
February	*18.8*	*31.8*	0.60	*21.3*	23.5	3480	7.2	6.7	0.07	0.33
March	*17.6*	*24.8*	0.31	11.3	12.9	2600	6.5	7.5	0.12	0.62
April	9.8	*22.3*	0.22	14.4	15.3	920	10.3	7.4	0.13	0.42
May	11.4	14.6	0.21	*15.5*	16.8	2300	17.9	7.5	0.14	0.14
June	3.0	7.3	0.18	*20.2*	20.8	74	21.4	7.4	0.20	0.34
July	8.0	5.8	0.24	*16.5*	18.2	80	24.0	7.4	0.67	0.29
August	4.4	3.8	0.19	9.3	10.2	12	24.3	7.4	0.39	0.50
September	2.8	4.5	0.21	8.5	9.1	60	19.3	7.6	0.49	0.24
October	3.0	4.0	0.28	7.2	10.6	14	13.6	7.5	0.52	1.27
November	3.2	4.8	0.25	7.4	8.4	22	7.5	7.6	0.49	1.17
December	6.0	8.5	0.30	13.4	14.2	1280	2.4	7.7	0.20	1.21
Average	**7.7**	**11.9**	**0.28**	**13.6**	**15.2**	**1029**	**13.3**	**7.4**	**0.30**	**0.59**

Table V provides Stabilization Pond effluent loading results. For CBOD5 and TSS, compliance is based on an Annual Average Daily Effluent Loading, all other parameters have a Monthly Average Loading Limit. The effluent from the Lagoon met the effluent loading limits for all required parameters. **Table V** also estimates sludge generation rates in the waste stabilization pond.

Table V
Monthly Average Waste Stabilization Pond Effluent Load – 2022

	CBOD5 (kg/d)	TSS (kg/d)	TP (kg/d)	TAN (kg/d)	Sludge Generated Approximately**
ECA Limit	138 kg/d	184 kg/d	4.6 kg/d	May-Oct 64.4 kg/d Nov-Apr 78.2 kg/d	(m^3/month) Based on Sludge Yield of 2.8 l/ m^3
January	10.7	28.3	0.9	46.4	218.6
February	63.8	108.0	2.0	72.4	266.6
March	74.0	104.3	1.3	47.4	365.5
April	35.5	80.9	0.8	52.3	305.5
May	34.3	43.9	0.6	46.6	260.8
June	7.9	19.2	0.5	54.3	222.2
July	18.1	43.6	0.5	37.4	196.7
August	9.6	8.3	0.4	20.2	188.9
September	5.8	9.5	0.4	18.0	178.1
October	5.9	7.9	0.6	14.2	171.4
November	7.0	10.5	0.5	16.2	183.5
December	21.1	29.9	1.0	47.1	304.9
Average	**24.5**	**23.4**	**0.8**	**39.3**	**238.5**

**Sludge generated is based on an estimated sludge yield of 2.8 l of sludge per cubic meter of wastewater treated. Sludge yield at 2.8 l/m^3 based on 5% total solids in sludge blanket on bottom of stabilization lagoon. The ECA does not limit sludge production rates.

4.0 OVERVIEW OF SUCCESS AND ADEQUACY OF WORKS

For the most part, the WPCP is successfully treating the effluent for all effluent parameters apart from TAN. As per **Table IV**, there were exceedances of TAN for five months in 2022.

For E-coli, there is no active disinfection in the treatment process and the influence of wildlife contributes to higher E-coli values.

Table VI summarizes overall treatment efficiency of the lagoon system, based on effluent quality from the wetland portion of the treatment works compared to the raw sewage quality.

Table VI
Overall Efficiency of WPCP Sewage Works System - 2022

Date	CBOD5 (%)	TSS (%)	TP (%)	Ammonia Nitrogen (%)
January	96.8	94.1	95.0	41.3
February	92.2	92.2	89.9	49.3
March	92.8	94.0	90.4	54.6
April	93.2	96.9	97.1	58.1
May	97.1	92.3	90.8	69.0
June	98.3	96.6	90.2	61.6
July	98.4	97.3	89.0	70.9
August	97.6	97.5	88.8	81.7
September	97.8	97.2	91.9	82.9
October	97.3	95.8	97.2	87.0
November	97.9	97.8	97.8	88.7
December	97.7	98.6	96.4	67.0
Average	**96.4**	**95.9**	**92.9**	**67.7**

5.0 OPERATING ISSUES AND CORRECTIVE ACTIONS

Table VII summarizes mechanical problems and corrective actions in 2022.

Table VII
Summary of Operating Issues and Corrective Actions

LOCATION	ISSUE	CORRECTIVE ACTION
Lagoon	Ammonia	Lagoon Dredging 2022
Lagoon	Radar unit for Chemical Tank	Read out reset by Franklin
Ferric pump head replacement	Lagoon	Replace pump head cartridge x 3, normal wear.
Liftstation	Liftstation debris (twice yearly maintenance)	Quinte Sewer clean wetwell
Aerated cell	Debris on aerators	cleaned aerators maintenance
Loyalist Drive	Lateral cleaning twice a year	3 homes on one service
Lagoon, Wetland, Park	Calibrations and Inspection	Yearly
Liftstation	Second Forced main from Liftstation to Lagoon	Upgrade to Liftstation 2022
Liftstation	Onsite Inspection JL Richards	Pump upgrade
WPCP	Hoist Inspection	3 at Liftstation (one for Park)
Liftstation	Pump replacement	Upgrade to Liftstation

6.0 SUMMARY OF MAINTENANCE

Table VIII summarizes normal maintenance completed at the lagoon system and sewage pumping stations.

Table VIII
Summary of Maintenance

DATE	NAME OF EQUIPMENT MAINTAINED	ACTION
Weekly	pH meter / DO	Calibration (in-house)
Yearly	Jar Testing for Ferric Dosing	Garrett Speck, FanChem/PVS Benson
Quarterly	Flash mixer/ Aerators/Pumps	Grease/check oil
Yearly	Sludge Depth Measured	Sludge judge
Quarterly maintenance	Watson Marlow QDos	replace heads when required (usual 3 to 4 months)
Spring (yearly)	Siemens Magmeter, LUT400	Calibration
Equipment Calibration	Flow monitoring devises at Lagoon, liftstation, Wetlands and Presqu'ile Park	Calibration
Liftstation	Liftstation debris (quarterly maintenance)	Quinte Sewer clean wetwell
Spring (yearly)	wetland levels	Water levels lowered
Spring, summer, and fall (yearly)	Aerators	Repairs or Removed debris
Summer (yearly)	Constructed wetland	Water levels Lowered
Weekly	Berm	Repair/Maintenance
November (yearly)	wetland levels	Water levels raised

7.0 EFFLUENT QUALITY ASSURANCE AND CONTROL

Wastewater exiting the aeration pond passes through a chemical dosing chamber (also called the Cell). Ferric Chloride is the coagulant used to remove phosphorus and help with flocculation of solids. It also aids in the settling of other substances and odour control. The dosing system operates twenty-four (24) hours a day, seven (7) days a weekand is measured to dose exact amount of ferric chloride for optimal performance. The system is checked and logged daily by a wastewater operator.

Raw sewage and effluent samples are collected by a trained wastewater operator, following the applicable MECP guidelines. All collected wastewater samples are sent weekly to an accredited laboratory for analysis. The results of the raw sewage and effluent sampling results are analyzed weekly by Brighton staff. A result showing non-compliance with the required wastewater limit or objective, as stated in the ECA, is reported to the MECP in accordance with the ECA.

8.0 SUMMARY OF CALIBRATION AND MAINTENANCE ON MONITORING EQUIPMENT

Table IX – Equipment Calibration

DATE OF CALIBRATION Or Maintenance	**EQUIPMENT CALIBRATED/Maint.**	**COMPANY PERFORMING CALIBRRATION/Maint.**
Yearly	Flow monitors/ Mag Meters	Franklin/Siemens
Yearly	*DO meter/ DO Probes/ DR3900	Hach Technician
Weekly	*DO probe/pH meters	In-house

*DO stands for Dissolved Oxygen

8.1 Calibration reports for flow metering equipment as follows:

HACH SERVICE PLUS CERTIFIED PROGRAMS

Certificate of Instrument Performance
Certificat de Conformité

Company Name / Nom de la Compagnie : MUNICIPALITY OF BRIGHTON
Account Number / No. de compte : 40170999
Certification Number / Numéro du Certificat : WO-00475546

Part Number / No. de pièce : HQ30D	HQ30d FLEXI PORTABLE METER
Serial Number / No. de série : 131100096249	
External Reference / Référence externe : DO	

Hach Sales & Service Canada Ltd. certifies that your instrument has been serviced, calibrated, verified with standards and now meets new product specifications.

Hach Sales & Service Canada Ltd. atteste que votre instrument a été entretenu, calibré et vérifié selon les normes en vigueur. Ses spécifications actuelles sont équivalentes à celles d'un produit neuf.

Certified by / Certifié par :
Sanjeev Khanna

Certification Date / Date de certification :
10/22/2019

HACH SERVICE PLUS CERTIFIED PROGRAMS

Certificate of Instrument Performance
Certificat de Conformité

Company Name / Nom de la Compagnie : MUNICIPALITY OF BRIGHTON
Account Number / No. de compte : 40170999
Certification Number / Numéro du Certificat : WO-00475546

Part Number / No. de pièce : LPV440.99.00012	db aa DR3900 SPECTROPHOTOMETER WITH RFID
Serial Number / No. de série : 1834843	
External Reference / Référence externe :	

Hach Sales & Service Canada Ltd. certifies that your instrument has been serviced, calibrated, verified with standards and now meets new product specifications.

Hach Sales & Service Canada Ltd. atteste que votre instrument a été entretenu, calibré et vérifié selon les normes en vigueur. Ses spécifications actuelles sont équivalentes à celles d'un produit neuf.

Certified by / Certifié par :
Sanjeev Khanna

Certification Date / Date de certification :
10/22/2019

HACH SERVICE PLUS CERTIFIED PROGRAMS

Certificate of Instrument Performance
Certificat de Conformité

Company Name / Nom de la Compagnie : MUNICIPALITY OF BRIGHTON
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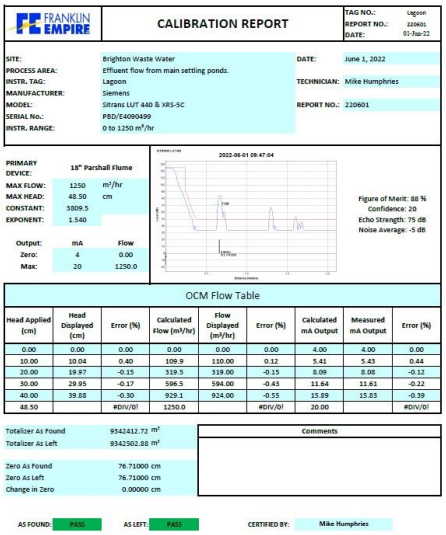
Certified by / Certifié par :
Sanjeev Khanna

Certification Date / Date de certification :
10/22/2019



FRANKLIN EMPIRE

CALIBRATION REPORT

TAG NO.: Lagoon
REPORT NO.: 220601
DATE: 01-Jun-22

SITE:	Brighton Waste Water	DATE:	June 1, 2022
PROCESS AREA:	Effluent flow from main settling ponds.		
INSTR. TAG:	Lagoon	TECHNICIAN:	Mike Humphries
MANUFACTURER:	Siemens		
MODEL:	Sitrans LUT 440 & XRS-5C	REPORT NO.:	220601
SERIAL No.:	PBD/E4090499		
INSTR. RANGE:	0 to 1250 m^3/hr		

PRIMARY DEVICE:	18" Parshall Flume	
MAX FLOW:	1250	m^3/hr
MAX HEAD:	48.50	cm
CONSTANT:	3809.5	
EXPONENT:	1.540	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	1250.0

2022-06-01 09:47:04

Figure of Merit: 88 %
Confidence: 20
Echo Strength: 75 dB
Noise Average: -5 dB

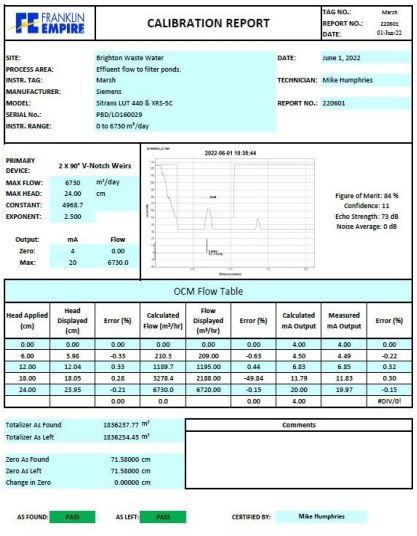
OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m^3/hr)	Flow Displayed (m^3/hr)	Error (%)	Calculated mA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	0.00
10.00	10.04	0.40	109.9	110.00	0.12	5.41	5.43	0.44
20.00	19.97	-0.15	519.5	519.00	-0.15	8.09	8.08	-0.12
30.00	29.95	-0.17	596.5	594.00	-0.43	11.64	11.61	-0.22
40.00	39.88	-0.30	929.1	924.00	-0.55	15.89	15.83	-0.39
48.50		#DIV/0!	1250.0		#DIV/0!	20.00		#DIV/0!

Totalizer As Found	9342412.72	m^3
Totalizer As Left	9342502.88	m^3
Zero As Found	76.71000	cm
Zero As Left	76.71000	cm
Change in Zero	0.00000	cm

Comments

AS FOUND: PASS AS LEFT: PASS CERTIFIED BY: Mike Humphries



FRANKLIN EMPIRE

CALIBRATION REPORT

TAG NO.: Marsh
REPORT NO.: 220601
DATE: 01-Jun-22

SITE:	Brighton Waste Water	DATE:	June 1, 2022
PROCESS AREA:	Effluent flow to filter ponds.		
INSTR. TAG:	Marsh	TECHNICIAN:	Mike Humphries
MANUFACTURER:	Siemens		
MODEL:	Sitrans LUT 440 & XRS-5C	REPORT NO.:	220601
SERIAL No.:	PBD/LO160029		
INSTR. RANGE:	0 to 6750 m^3/day		

PRIMARY DEVICE:	2 X 90° V-Notch Weirs	
MAX FLOW:	6730	m^3/day
MAX HEAD:	24.00	cm
CONSTANT:	4968.7	
EXPONENT:	2.500	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	6730.0

2022-06-01 10:35:44

Figure of Merit: 84 %
Confidence: 11
Echo Strength: 73 dB
Noise Average: 0 dB

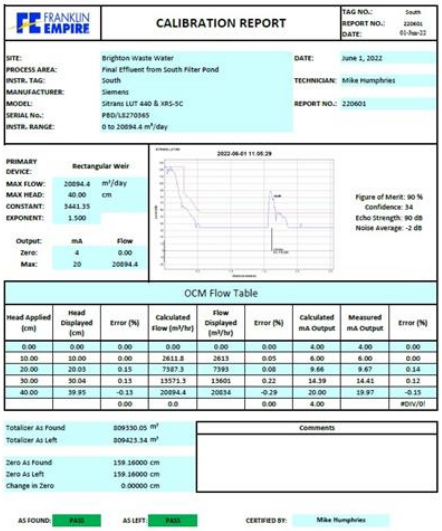
OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m^3/hr)	Flow Displayed (m^3/hr)	Error (%)	Calculated mA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	0.00
6.00	5.98	-0.33	210.5	209.00	-0.63	4.50	4.49	-0.22
12.00	12.04	0.33	1189.7	1195.00	0.44	6.83	6.85	0.32
18.00	18.05	0.28	3278.4	2188.00	-49.84	11.79	11.83	0.30
24.00	23.95	-0.21	6750.0	6720.00	-0.15	20.00	19.97	-0.15
		0.00	0.0		0.00	4.00		#DIV/0!

Totalizer As Found	1836237.77	m^3
Totalizer As Left	1836254.45	m^3
Zero As Found	71.58000	cm
Zero As Left	71.58000	cm
Change in Zero	0.00000	cm

Comments

AS FOUND: PASS AS LEFT: PASS CERTIFIED BY: Mike Humphries



FRANKLIN EMPIRE

CALIBRATION REPORT

TAG NO.: South
REPORT NO.: 220601
DATE: 01-Jun-22

SITE:	Brighton Waste Water	DATE:	June 1, 2022
PROCESS AREA:	Final Effluent from South Filter Pond		
INSTR. TAG:	South	TECHNICIAN:	Mike Humphries
MANUFACTURER:	Siemens		
MODEL:	Sitrans LUT 440 & XRS-5C	REPORT NO.:	220601
SERIAL No.:	PBD/LE270365		
INSTR. RANGE:	0 to 20894.4 m^3/day		

PRIMARY DEVICE:	Rectangular Weir	
MAX FLOW:	20894.4	m^3/day
MAX HEAD:	40.00	cm
CONSTANT:	3441.35	
EXPONENT:	1.500	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	20894.4

2022-06-01 11:05:29

Figure of Merit: 90 %
Confidence: 34
Echo Strength: 90 dB
Noise Average: -2 dB

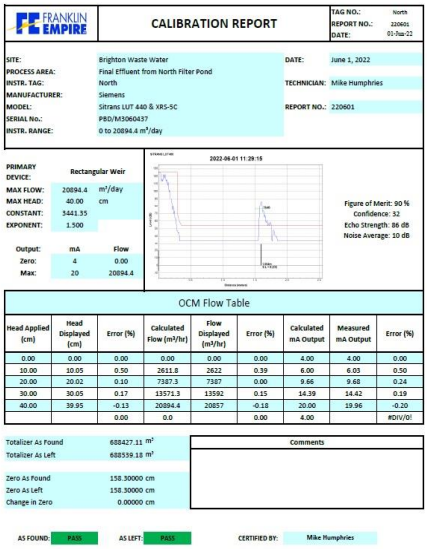
OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m^3/hr)	Flow Displayed (m^3/hr)	Error (%)	Calculated mA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	0.00
10.00	10.00	0.00	2611.8	2613	0.05	6.00	6.00	0.00
20.00	20.03	0.15	7387.3	7393	0.08	9.66	9.67	0.14
30.00	30.04	0.13	13571.3	13601	0.22	14.39	14.41	0.12
40.00	39.95	-0.13	20894.4	20834	-0.29	20.00	19.97	-0.15
		0.00	0.0		0.00	4.00		#DIV/0!

Totalizer As Found	809330.05	m^3
Totalizer As Left	809423.34	m^3
Zero As Found	159.16000	cm
Zero As Left	159.16000	cm
Change in Zero	0.00000	cm

Comments

AS FOUND: PASS AS LEFT: PASS CERTIFIED BY: Mike Humphries



FRANKLIN EMPIRE

CALIBRATION REPORT

TAG NO.: North
REPORT NO.: 220601
DATE: 01-Jun-22

SITE:	Brighton Waste Water	DATE:	June 1, 2022
PROCESS AREA:	Final Effluent from North Filter Pond		
INSTR. TAG:	North	TECHNICIAN:	Mike Humphries
MANUFACTURER:	Siemens		
MODEL:	Sitrans LUT 440 & XRS-5C	REPORT NO.:	220601
SERIAL No.:	PBD/M3060437		
INSTR. RANGE:	0 to 20894.4 m^3/day		

PRIMARY DEVICE:	Rectangular Weir	
MAX FLOW:	20894.4	m^3/day
MAX HEAD:	40.00	cm
CONSTANT:	3441.35	
EXPONENT:	1.500	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	20894.4

2022-06-01 11:29:15

Figure of Merit: 90 %
Confidence: 32
Echo Strength: 86 dB
Noise Average: 10 dB

OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m^3/hr)	Flow Displayed (m^3/hr)	Error (%)	Calculated mA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	0.00
10.00	10.05	0.50	2611.8	2622	0.39	6.00	6.03	0.50
20.00	20.02	0.10	7387.3	7387	0.00	9.66	9.68	0.24
30.00	30.05	0.17	13571.3	13592	0.15	14.39	14.42	0.19
40.00	39.95	-0.13	20894.4	20857	-0.18	20.00	19.96	-0.20
		0.00	0.0		0.00	4.00		#DIV/0!

Totalizer As Found	688427.11	m^3
Totalizer As Left	688539.18	m^3
Zero As Found	158.30000	cm
Zero As Left	158.30000	cm
Change in Zero	0.00000	cm

Comments

AS FOUND: PASS AS LEFT: PASS CERTIFIED BY: Mike Humphries

SIEMENS MAGFLO® Verification Certificate

Customer:

Name	Brighton, Town of
Address	35 Alice Street
	Brighton, ON
	K0K 1H0
Phone	613-475-3453
Email	

MAGFLO® Identification:

TAG No./Name	0
Sensor Code No.	7ME652
Sensor Serial No.	122202H091
Transmitter Code No.	7ME691
Transmitter Serial No.	401730N041
Location	Presqu'ile

Results:

Verification file name or No.		Presqu'ile
Transmitter		Passed
Sensor	Insulation	Passed
	Magnetic Circuit	Passed

Velocity	Current Output			Frequency Output		
Theoretical	Theoretical	Actual	Deviation	Theoretical	Actual	Deviation
0.5m/s	4.800mA	4.804mA	0.56%	0.500kHz	0.501kHz	0.26%
1.0m/s	5.600mA	5.605mA	0.30%	1.000kHz	1.002kHz	0.18%
3.0m/s	8.800mA	8.803mA	0.06%	3.000kHz	3.002kHz	0.07%
	Current Output 4-20mA			Frequency Output 0-10kHz		

Transmitter Settings:

Basic	Qmax.	2000.00 l/min
	Flow Direction	Positive
	Low flow Cut-off	3.00%
	Empty Pipe	ON
Output	Current Output	OFF
	Time Constant	N/A
	Relay Output	Error Level
	Digital Output	Pulse
	Frequency Range	N/A
	Time Constant	N/A
	Volume/pulse	0.99999953 US G/p
	Pulse width	0.066 sec.
	Pulse polarity	Positiv
Totalizer 1 value before test		90724.2578125 m³
Totalizer 1 value after test		90724.2890625 m³
Totalizer 2 value before test		2.34394646 m³
Totalizer 2 value after test		2.34394684 m³
Operating time in days		2836

Sensor Details:

Size	DN 150 6 IN
Cal. Factor	15.664'264
Correction Factor	1.0
Excitation Freq.	7.5Hz

Verificator Details (083F5060)

Serial No.	000811N218
Device No.	91739
Software Version	1.40
PC-Software Version	5.00
Cal. date	2018.09.20
ReCal. date	2019.09.20

Comments

These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters.
Verification is traceable to National and International Standards.

Date and signature

2019.04.01 Mike Humphries

FRANKLIN EMPIRE

FIELD SERVICES REPORT

REPORT OF: Mike Humphries
DATE OF SERVICE: June 01, 2022
CUSTOMER / ADDRESS:
Town of Brighton
67 Sharpe Road
Brighton, Ontario K0K 1H0

CONTACT: Adam Walraven
EMAIL: awalraven@brighton.ca

PURPOSE FOR SERVICE:
Check operation of Multiranger Plus in lift / pumping station.

SYSTEM CONFIGURATION:
Milltronics Multiranger Plus
Milltronics Transducer

APPLICATION:
Ultra Sonics monitoring level of wet well.
Level readings are used for pump control.

OBSERVATIONS / CHANGES MADE:
Echo confidence is high (53db) and readings appear to be correct.
Monitored pump cycle and all worked well.

CONCLUSIONS / RECOMMENDATIONS:
Multiranger Plus is functioning as expected.

9.0 EFFORTS AND RESULTS TO MEET EFFLUENT OBJECTIVES

In May of 2015, Brighton retained the engineering and wastewater operations firm of GSS Engineering Consultants Ltd. (GSS) to assist with operation of the lagoon system.

With the assistance of GSS, the Municipality of Brighton has implemented several interim efforts under the LOF process of the ECA to improve performance of the lagoon treatment system.

Since 2015, five aerators have been added to the aerated cell. Total aeration power now provided is 110 HP (approx. 83 kW). Of the five new aerators, three of the new aerators (10 hp each) were added to the aerated cell in late June 2020.

While total energy "density" available in the aerated cell is relatively low (3.3 W/m^3 based on total volume of 18,000 m^3), all seven (7) aerators, when running together, have proven to be fairly successful in suspending a significant number of solids in the aerated cell (Note the MECP recommendation for full suspension of solids is 15-25 W/m^3). However, one of the issues that we run into is a washout of biomass when flows are higher than normal, a biomass can take from 5 to 6 weeks to establish in a perfect environment, so when a washout occurs this system takes time to re-establish.

For several years, on/off aerator operation combined with manual "**decanting**" of the surface layer of effluent from the aerated cell when the aerators were off has been practiced. This would assumedly retain solids within the aerated cell and allow VSS to build to levels that would support nitrification. This year the same could not be said, with low solids in July to late November ammonia removal proceeded to decline at an unusual rate that we did not expect with low solids.

A Notice of Modification (Notification Number 7) for trial decanting, combined with on/off aeration, was submitted to MECP in August 2017. A renewal of the decanting process was again requested in 2019 (Notification Number 8). Notification Number 8 is included in **Appendix A.**

Notification Number 8 was subsequently approved by the MECP under the LOF conditions of the current ECA. Decanting was completed in 2018 (and then again in 2019, 2020, 2021, 2022) by the following manual decanting method:

Decanting Method

Based on preliminary evaluations, the simplest method to achieve manual decanting was to:

- Manually turn off all aerators at approximately 7 am.
- Wait one half to one hour to allow settling of solids in the aerated cell.
- Manually lift the first 6-inch stop log to release the first "batch" of clear decant.
- After approximately 1 additional hour, manually remove the 2nd stop log to release a second batch of clear decant.
- Overall, such draining of decant lowered water levels in the aeration cell by approximately 12 inches (300 mm).
- At approximately 2 pm, reinstall both stop logs and then turn on all aerators. The aerated cell would slowly refill.
- Allow aerators to run from 2 pm to approximately 7 am. Then repeat the decant process for daily decanting.

The operators completed regular measurement of dissolved oxygen in the aerated cell. Generally, the 4 hour decant period depending on dissolved oxygen (8 am to 12 pm) resulted in falling dissolved oxygen levels in the aerated cell, but oxygen levels do not normally fall below 1 mg/l. Once the aerators were restarted, there was sometimes a temporary, further sag in oxygen levels before oxygen levels rebounded to above 3 mg/l.

The surface area of the aerated cell is approximately 6,000 m^2. Therefore, the volume contained in the top 0.3 m of the cell is approximately 1,800 m^3. Therefore, given a fill time of 17 hours (2 pm to 7 am), the stop logs would not normally start overflowing before 7 am of the next day if incoming sewage flows were less than 106 m^3/hour (or 2,500 m^3/day).

Normally, once the aerated cell was decanted for 4 hours or shorter, the remaining storage depth of approximately 12 inches (300 mm) was sufficient to store the incoming sewage flow until the next morning, without overtopping the stop logs. At some point we go 24/7 aeration due to DO levels.

Results – Retention of VSS and Removal of Ammonia

Decanting was completed on a sporadic basis during the early months of 2022 but generally full-time aeration (and normal overflow of the aeration cell to the lagoon) was practiced during the summer of 2022.

Other Results

Other than TAN, decanting beginning in January 2022 appeared to improve, or at least maintain, the high quality of effluent being discharged from the downstream Stabilization Lagoon. Values of CBOD, TSS and TP were often at very low levels consistent with tertiary treatment.

Summary

The decanting process, combined with on/off operation of the aerators, appears capable of building relatively high levels of VSS (but not as necessary as we originally thought) in the aeration cell. The addition of 3 aerators in June 2020 demonstrated that this additional mixing energy was sufficient to suspend high levels of VSS (greater than 400 mg/l) in the aeration cell.

These higher levels of VSS were coinciding with very good ammonia removal rates but in 2022 even with low levels of VSS the system still responded. However, the ability of the extra mixing energy to maintain high levels of VSS appeared to diminish in late fall (December) when water temperatures in the aerated cell declined below 10 C. Added aeration also tends to lower the temperature of the aeration pond quicker than it use to. Lower levels of VSS in December were not coinciding with lower levels of ammonia removal. It is recommended that continued experimentation with various combinations of on/off aerator operation (either manually or by timers) coupled with decanting, be continued during 2023.

At this time, it is our assumption that the reason the 110 hp total, combined aerator energy did not keep VSS levels above 400 mg/l in the late fall due to the increased viscosity of water under cold conditions. Therefore, additional aerators for late fall and winter use could provide the additional mixing energy required to keep enough VSS in suspension to achieve a VSS concentration of at least 400 mg/l and preferably higher (500 to 600 mg/l).

However, additional aerators would likely increase the rate of heat loss from the aerated cell and therefore drive down effluent temperatures, a variable speed drive would be of assistance if a new aeration unit is chosen, if not it would result in higher viscosity water (which would reduce its mixing potential). Use of submerged mixers, that do not entrain cold air from the aerators, could be used successfully to increase VSS levels under cold conditions without as much increased heat loss.

10.0 TOTAL AMMONIUM NITROGEN

Removal of TAN nitrogen has been a long-standing issue for the Brighton WPCP. LOF provisions under previously issued Notices were undertaken largely to improve removal of ammonia nitrogen in the lagoon system.

In 2018, efforts to improve TAN removal focused on operation of the aerators on timers in conjunction with manual decanting of the aerated cell. These measures were intended to build levels of VSS and increase sludge age in the aerated cell to promote development of nitrifying bacteria. In 2022 we continued with decanting and fine tuning of the aeration pond. More critically, the additional 30 horsepower provided by the three additional aerators in June 2020 proved very successful in achieving higher concentrations of VSS but in 2022 also showed the system could also work with low VSS.

In August of 2022 sludge removal was undertaken (GFL) to help with the removal of uptake of TAN from the sludge buildup of the last 4 years, GFL removed, and land applied 580.4 dry metric tonnes, 288 tanker truck loads with an average of 4.63% solids, at a cost of approximately $500K. Total volume of liquid sludge removed was approximately 14,152 cubic meters.

The Class EA process to upgrade the lagoon system with a targeted ammonia removal system was completed in 2018 however in 2022 an additional EA has begun geared towards a more conventional plant. The amended ECA was issued on December 11, 2019 and then again in January of 2021 to support possible construction of the new MBBR. Council decided against the MBBR due to the cost. In 2021, GSS Engineering proposed the construction of a new aeration system, secondary clarifier with upstream screening, sludge return capability and final sludge management. R.V. Anderson was selected to conduct a peer review of the proposed design, and identified a number of constraints associated with the proposed design, more particularly as it pertains to facilitation of the nitrification process. The peer review report was provided to the MECP in the Fall of 2021 for review. A meeting with MECP took place early in 2022 to discuss the conceptual design, and peer review report. MECP has advised that a Class EA amendment would be required in order to evaluate the conceptual design as a preferred solution.

10.1 Total Phosphorus

As per **Table III**, there was no exceedance in 2022 of the TP limits of 1.0 mg/l for the lagoon.

10.2 CBOD and Suspended Solids

Levels of CBOD and suspended solids remained below the compliance limits for all months in 2022 and achieved compliance with the Annual Average Effluent Concentrations and Loadings. In February, March and April, the facility did not meet the effluent Objectives established for Total Suspended Solids but was able to meet them forall other parameters.

11.0 BIOSOLIDS MANAGEMENT

As follows is an estimate of sludge generated in the lagoon system in 2022, and the volume of sludge removed from the treatment works.

As per previous sections, a significant volume of sludge (14,152 cubic meters) was removed from the stabilization lagoon between August and September of 2022 and land applied. Despite significant volumes of sludge being removed in 2022, sludge will continue to build up in the stabilization lagoon over time. Based on total sewage flows, the following section provides an estimate of the total amount of sludge generated and deposited in the stabilization lagoon in 2022.

The volume of sludge generated, and stored in the lagoon (stabilization pond) is estimated as follows:

- Total sewage flow in 2022 – 1,022,191m3

- Assume starting sludge yield of 3.5 l/m^3 (as per Table 16-1 of Design Guidelines for Sewage Works – MOE, 2008)

- Above sludge yield is for conventional activated sludge plants with anaerobic treatment and with phosphorus removal. Sludge yield in Table 16-1 is based on average solids content of 4%.

- Some consolidation of sludge will occur over time in stabilization lagoon. Assume sludge thickening from 4% to 5% will occur. Therefore, sludge yield will be slightly less, or 0.8 X 3.5 l/m^3 = 2.8 l/m^3.

- Therefore, total sludge production in 2022 is estimated to be 2,862m^3 .

Net sludge generated in 2022 is summarized as follows:

Total Sewage Flow in 2022	Sludge Yield	Total Sludge Generated	Average Sludge Depth in Lagoon	Sludge Removed	Net Sludge Added to Lagoon in 2022
1,022,191m^3	2.8 l/m^3	2,862m^3	0.058 m	0 m^3	2,862m^3 *

Note – average sludge depth in lagoon above is extra sludge depth produced in lagoon in current year and based on approximate lagoon area of 54,400 m^2.

As above (*), new sludge deposited in lagoon in 2022 was approximately 2,862m^3.

12.0 SUMMARY OF COMPLAINTS

The Municipality received no complaints in 2022.

13.0 SUMMARY OF BY-PASSES, SPILLS AND ABNORMAL DISCHARGES

There was no sewage spill in 2022

14.0 SUMMARY OF SEWER WORK COMPLETED

Between 2015 and 2021, the Municipality completed CCTV and maintenance of the sanitary sewer system. This work included flushing and CCTV inspection and progressed to include repairs of sewers and manholes to reduce infiltration.
In the last nine (9) years, the Municipality has spent over $850,000 on the collection system infrastructure.
Reducing infiltration to the system reduced potential overloading's on the Lagoon and the receiving environment, this reduces run time of pumping equipment and reduced energy usage for pumping sewage. One of the main issues is sump pumps that are illegally tied into the sanitary system which causes a surge to the pumping station and the lagoon, treating clear water is costly and takes up reserved capacity of the sanitary system.

The Municipality plans to invest further funding for sewer repairs in attempts to remove more inflow and infiltration to the sanitary system. This year will see the final 8 kms of flushing and CCTV work.

15.0 RAINBOW TROUT TOXICITY TESTING

Brighton has submitted quarterly samples of final effluent from the Lagoon to a toxicity laboratory in Guelph, Ontario (Aquatox Testing and Consulting Ltd.) for LC 50 testing using young rainbow trout.

All tests completed in 2022 have passed toxicity testing. Sampling and testing have been done in accordance with Environment Canada requirements.
Prepared by:

APPENDIX A

NOTICE OF MODIFICATIONS SUBMITTED TO MECP UNDER LOF PROCESS – 2018

Ontario

Ministry of the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL SYSTEMS) OR DISTRICT MANAGER (FOR INDUSTRIAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility
(Insert the ECA's owner, number and issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Owner	ECA number	Issuance Date (mm/dd/yy)	Notice number
Municipality of Brighton	3081-9XQNZK	07/07/15	8

Part 2 – Description of the modifications as part of the Limited Operational Flexibility
(Attach a detailed description of the sewage works)

Previously, Brighton installed timers on the existing four aerators in the aerated cell of the sewage treatment works. On/off cycling of the aerators was attempted to retain biological solids in the aerated cell, to increase sludge age and promote formation and retention of nitrifiying bacteria. This notice seeks to augment aeration timers by allowing removal of existing stop logs (two, 6" tall stop logs) in the morning to "decant" clarified water from the aerated cell when the aerators are off. Once the boards are reinstalled later in the same day, all aerators would be returned to operation.

Description shall include:
1. A detail description above of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. An assessment of the anticipated environmental effects
3. Updated versions of, or amendments to, all relevant technical documents required by this ECA that are affected by the modifications as applicable, e.g. site plan, design brief, drawings, emergency and spill prevention plan, etc.

Part 3 – Declaration by Professional Engineer
I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Has been designed in accordance with the Limited Operational Flexibility as described in the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name (Print)	PEO License Number
Jeff Graham, P. Eng.	90222860
Signature	**Date (mm/dd/yy)**
	06/21/2018

Name of Employer
GSS Engineering Consultants Ltd.

Part 4 – Declaration by Owner
I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. This modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name of Owner Representative (Print)	Owner representative's title (Print)
Mr. Keith Lee	Wastewater Supervisor
Owner Representative's Signature	**Date (mm/dd/yy)**
	06/21/2018

EAB Form August 20, 2013

Prepared by: Adam Walraven Wastewater OIC

_____

Municipality of Brighton
Report done on available data provided.
AW