



**2014 WASTEWATER POLLUTION CONTROL
PLANT ANNUAL REPORT**

Environmental Certificate of Approval No 3560-8A8LEY
Sewage Works No. 110000953

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1.0 INTRODUCTION

The Municipality of Brighton is pleased to present its Annual Performance Report for wastewater treatment for the period of January 1 to December 31, 2014. Brighton's Water Pollution Control Plant (WPCP) services a population of approximately 6,900 people, as well as Presqu'île Provincial Park. The WPCP is classified as a Class 1 treatment facility that operates under Environmental Compliance Approval (ECA) Number 3560-8A8LEY, issued by the Ontario Ministry of the Environment and Climate Change (MOECC). This report is presented in accordance with Section 10.6 of the ECA.

The WPCP is located at 100 County Road 64. Wastewater collected from the serviced area of the Municipality passes through four treatment components at the WPCP, in the order listed below:

- 1) A 0.7 hectare aerated lagoon (Lagoon #1) with two mechanical surface aerators,
- 2) A chemical mixing chamber where alum 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 natural wetland that borders Presqu'île Bay, which is located off the northeast shore of Lake Ontario.

2.0 WASTEWATER FLOWS

The ECA stipulates that the rated flow capacity of the WPCP is an average of 4,600 m³/day. The average flow for 2014 was 3,431 m³/day, which represents seventy-five percent (75%) of the rated flow capacity. The highest total monthly flow and the highest average daily flow both occurred in April. The lowest total monthly flow and the lowest average daily flow both occurred in September. The maximum daily flow for the year was 12,190 m³ on April 9th. The lowest daily flow was 1,730 m³ on February 7th.

Table I – Monthly Wastewater Flows to WPCP

Month	Total Flow (m³)	Avg. Flow (m³/day)	Percent of the rated capacity (%)
January	96,607	3,116	68%
February	78,958	2,820	61%
March	110,482	3,564	77%
April	192,679	6,423	140%
May	149,944	4,837	105%
June	127,287	4,243	92%
July	87,105	2,810	61%
August	77,784	2,509	55%
September	70,771	2,359	51%
October	89,055	2,873	62%
November	84,396	2,813	61%
December	87,099	2,810	61%
Annual	1,252,167	3,431	75%

2.1 Flow Interpretation

The variations in the flow of wastewater received at the WPCP are caused by infiltration and inflow to the collection system, as a result of local precipitation events, fluctuations in ground water elevations and snow melt.

3.0 WASTEWATER EFFLUENT QUALITY

Section 7 of the ECA lists monthly average limits for the levels of four parameters in the effluent from the waste stabilization pond. The parameters are: five day carbonaceous biochemical oxygen demand (CBOD₅), total suspended solids (TSS), total phosphorus (TP), and ammonia plus ammonium nitrogen (ammonia). Section 9 of the ECA outlines the frequency that the parameters must be tested and lists an additional four parameters that must be tested: nitrate nitrogen, nitrite nitrogen, pH and temperature. In 2014, the effluent quality met the limits for the parameters tested, with the exception of ammonia levels in January and February and from June to December inclusive (Table II). There was also a total phosphorus exceedance in January.

Table II – Monthly Average Waste Stabilization Pond Effluent Quality

Parameter	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	Ammonia (mg/L)
Effluent Limit (mg/L)	30	40	1.0	(May-Oct 14 Nov-Apr 17)
January	11	32	1.39	20.7
February	9	28	0.77	20.0
March	9	20	0.82	15.1
April	7	16	0.42	7.54
May	10	27	0.81	8.4
June	6	10	0.71	14.2
July	7	15	0.74	20.8
August	4	14	0.65	21.2
September	7	30	0.94	18.2
October	5	22	0.74	20.3
November	2	5	0.44	21.9
December	3	6	0.52	20.3

Section 7 of the ECA also lists effluent loading limits for CBOD5, TSS, TP and Ammonia. The effluent from the waste stabilization pond met the effluent loading limits for all required parameters except for ammonia in July, August and October (Table III).

Table III – Monthly Average Waste Stabilization Pond Effluent Load

	CBOD5 (kg/d)	TSS (kg/d)	TP (kg/d)	Ammonia (kg/d)
Loading Limit	138	184	4.6	May-Oct 64.4 Nov-Apr 78.2
January	33	98	4.32	76.7
February	25	79	2.16	74.2
March	31	71	2.91	55.9
April	44	101	2.71	28
May	47	131	3.91	27.5
June	27	40	2.99	46.4
July	19	43	2.07	68.2
August	10	35	1.62	69.4
September	17	72	2.22	59.4
October	14	62	2.13	66.4
November	6	14	1.24	TBD
December	8	17	1.46	TBD

TBD: to be determined- the results from the 2015 March/April sampling are required for the calculation and they were not completed at the time of writing the report.

4.0 CONSTRUCTED WETLAND EFFLUENT QUALITY

Section 6 of the ECA lists monthly average objectives for the levels of five parameters in the constructed wetland effluent. It is the same four parameters that are listed for the waste stabilization pond, with the addition of Escherichia coliform bacteria (E. coli). Sampling for E. coli is monthly, whereas the other samples are collected weekly. Section 6.2 requires that the pH be maintained between 6.0 - 9.5 and the monthly average pH is shown in Table IV below. Section 9 of the ECA outlines the frequency that the parameters must be tested and lists an additional three parameters that must be monitored: nitrate nitrogen, nitrite nitrogen and temperature. In 2014, the effluent quality met the limits for the parameters tested, with the exceptions of ammonia and E. Coli. There were ammonia exceedances in January and February and from June to December, and there were E. coli exceedances in January, February, March, June, July and October (Table IV).

Table IV – Monthly Average Constructed Wetland Effluent Quality

Parameter	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	Ammonia (mg/L)	E. Coli (cfu/ 100 mL)	pH
Effluent Objective (mg/L)	15	15	0.8	(May-Oct 10 Nov-Apr 15)	200	6.0- 9.5
January	7	25	0.77	20.1	400	7.7
February	7	22	0.59	20.5	1320	7.4
March	7	15	0.33	14.6	1120	7.6
April	3	5	0.18	7.12	<20	7.8
May	3	15	0.23	6.21	22	8.0
June	3	5	0.43	10.8	460	8.0
July	5	10	0.24	16.5	292	7.9
August	3	5	0.50	18.5	104	8.0
September	3	5	0.45	16.7	36	7.8
October	2	9	0.48	18.8	1100	7.8
November	2	5	0.35	20.8	60	8.0
December	2	4	0.32	19.9	40	7.8

5.0 OVERVIEW OF SUCCESS AND ADEQUACY OF WORKS

The quality of the wastewater entering the WPCP was compared with the quality of the wastewater before it enters Presqu'île Bay. By comparing the levels of the parameters at the two locations, the ability of the WPCP to treat the parameters can be evaluated. The percent removal is calculated by comparing the level of the parameter in the effluent entering the WPCP with the level of the parameter in the effluent at the final discharge point. An analysis of the percent removal of the required parameters shows the WPCP is successfully treating the effluent for three of the four parameters (Table

V). The annual average percent removal for CBOD5, TSS, and TP was ninety-one (91) or greater. It is noted there was a total phosphorus exceedance in January. However, it was caused by inadequate dosing of alum and the system is capable of successfully removing phosphorus, when operating properly.

The WPCP is not successfully treating ammonia. The annual average removal of ammonia was forty-three percent (43%). The inadequate ammonia removal is shown by the nine (9) months with exceedances of the monthly average ammonia level in the effluent and also by the three (3) monthly loading exceedances. The ammonia removal increases as the air and water temperatures increase in the spring, but the ammonia removal is not consistent from June to December. A decrease in ammonia removal is expected as the air and water temperatures cool in the fall.

The ammonia removal result is contrary to the expectations of two consultants and the MOE that removal of biosolids from the lagoon would improve ammonia levels in the effluent. In 2013, approximately 19,000 cubic metres of biosolids were removed from both lagoons. Therefore, another factor is influencing the ability of the WPCP to remove ammonia. This topic is explored further in Section 5.0 of the attached report entitled "Twelve Month Performance Evaluation of a Bio-dome Pilot Study at Brighton's Water Pollution Control Plant."

Table V – Overall Efficiency of WPCP Sewage Works System

Date	CBOD5 (%)	TSS (%)	TP (%)	Ammonia (%)
January	88	79	80	23
February	90	84	87	49
March	91	92	94	56
April	88	92	92	62
May	91	86	96	78
June	95	95	93	56
July	81	84	94	22
August	97	96	88	45
September	94	97	91	53
October	97	92	85	11
November	99	98	95	50
December	95	97	91	10
Average	92	91	91	43

On April 16, 2014, the Municipality of Brighton was charged on the following five (5) counts under section 107 (3) of the Ontario Water Resources Act.

- Count 1: May 1 - Oct 31, 2012 – fail to comply re exceeding monthly average concentration limit of 14 mg/L ammonia + ammonium nitrogen;
- Count 2: Nov 1 – Dec 31 2012 – fail to comply re exceeding monthly average concentration limit of 17 mg/L ammonia + ammonium nitrogen;
- Count 3: May 1 – Sep 30, 2013 – fail to comply re exceeding monthly average concentration limit of 14 mg/L ammonia + ammonium nitrogen;
- Count 4: May 1 – June 30, 2012 – contravene ECA by exceeding effluent loading limit of 64.4 kg/day for ammonia + ammonium nitrogen;
- Count 5: Nov 7, 2012 – contravene ECA s. 10.3 by failing to report exceedances of effluent loading limit for ammonia + ammonium nitrogen.

6.0 OPERATING PROBLEMS AND CORRECTIVE ACTIONS

Table VI – Summary of Operating Problems and Corrective Actions

DATE	PROBLEM	CORRECTIVE ACTION
February 4, 2014	Old main breaker removed	Replaced with new main breaker and added amp meter
February 14, 2014	Aerator 2 seized	Removed for service, re-installed April 25
April 14, 2014	Flow recorder malfunctioned	Installed new flow recorder (LUT) April 18
May 7, 2014	Old baffles in disrepair, water short-circuiting, removed fall 2013	New baffles installed
July 14, 2014	Flash mixer motor burnt out, bearing gone	Repaired flash mixer installed Oct 28
August 19, 2014	Existing screen inadequate at channel before flash mixer	Installed new screen
November 19, 2014	Cable of middle baffle severed on west side during brushing	Cable repaired December 5th

7.0 SUMMARY OF MAINTENANCE

Table VII – Summary of Maintenance

DATE	NAME OF EQUIPMENT MAINTAINED	ACTION
Bi-Weekly	pH meter/DO meter	Calibration
Bi-weekly	Lagoon and Constructed Wetland	Cut grass around perimeter
Quarterly	Flash mixer/ Aerators	grease/check oil
Quarterly	Aerators	Remove debris
Semi-annually	Constructed Wetland	Trapping of Muskrats
Semi-annually	Constructed wetland	Water levels lowered/raised
Annually	OCM, LUT, Magmeter	Calibration
Annually	Lagoon	Remove brush
Annually	Alum Pump 1&2/ annual flush	Flushed and clean, install new diaphragm kit

8.0 EFFLUENT QUALITY ASSURANCE AND CONTROL MEASURES

There is no physical means to by-pass the waste stabilization pond. Licensed wastewater operators check the WPCP daily and perform weekly perimeter scans. Wastewater exiting the aeration pond passes through an alum dosing chamber that operates twenty-four (24) hours a day, seven (7) days a week. The dosing system is inspected daily by a wastewater operator. All wastewater samples are collected by a licensed wastewater operator, following the applicable MOE guidelines. All collected wastewater samples are sent to an accredited laboratory for analysis. Upon receipt of the sampling results, they are reviewed by the wastewater overall responsible operator and any adjustments to the treatment system are performed, as necessary.

9.0 SUMMARY OF CALIBRATION AND MAINTENANCE ON MONITORING EQUIPMENT

Table VIII – Dates of Equipment Calibration

DATE OF CALIBRATION Or Maintenance	EQUIPMENT CALIBRATED/Maint.	COMPANY PERFORMING CALIBRRATION/Maint.
May 2014	Flow monitors/ Mag Meters	MeasureMax
December 2014	DO meter/ DR2800/pH meters	Hach
Bi-weekly	pH/DO meters	In-house

10.0 EFFORTS AND RESULTS TO MEET EFFLUENT OBJECTIVES

See Section 8.0 regarding total phosphorus control.

Table IX – Efforts and Results to meet Effluent Objectives

DATE	EFFORT	RESULT
May 7	Installed new baffles	Still have ammonia exceedances
2013/2014	Pilot aeration project for Bio-domes by Wastewater Compliance Systems Inc.	The operational efficiency of the bio-dome was successful during the months of April, May and June. However, the bio-dome did not perform well during July, August and September. A combination of the laboratory results and a physical inspection of the bio-dome interior indicate a chemical passed through the tank in July, and again in August and September, that was strong enough to reduce the population of bacteria inside the bio-dome. The data suggests a problem with the bacteria population may have started as early as the end of May. Therefore, a chemical in the water at the WPCP negatively impacted the bacteria sometime between July 8 th and 15 th , 2014. It can be inferred that a similar impact occurred during the following months. As a result of the study, it was decided the Bio-dome technology was not suitable for ammonia removal at Brighton's WPCP.
July	Infiltration and Inflow Study	Forty-three (43) deficiencies were repaired along approximately twelve (12) kilometres of sanitary sewer main. Preliminary results suggest a positive impact on the flows at the WPCP, as the beginning of the year has shown the lowest flows in three years. Also, monitoring of flow rates in the collection system will allow the municipality to focus further investigation in 2015.
August	Switching from aluminum	A ferric chloride supplier performed

	<p>sulphate to ferric chloride</p>	<p>on-site tests of wastewater collected from the WPCP. The supplier provided estimated costs, showing a savings, for the Municipality to switch from alum to ferric chloride. The supplier is recommending a twelve month trial to evaluate the performance of the product and the associated costs. Initiating the trial has been put on hold, pending approval from the third party awarded Request for Proposal C-2015-01 for management of the WPCP.</p>
<p>December</p>	<p>Council passed Resolution 2014-662 on December 15th to implement a Sewer Use By-law.</p>	<p>Council passed the Sewer Use By-law on February 9th, 2015. Schedule A of the by-law has been distributed to commercial and industrial businesses in Brighton and staff have started sampling wastewater from the collection system at strategic locations.</p>

11.0 BIOSOLIDS MANAGEMENT

No biosolids were removed from the lagoons in 2014.

12.0 SUMMARY OF COMPLAINTS

Three odour complaints were received by the Municipality on September 8th, 10th and 15th. The caller was concerned the odour was originating at the WPCP. In all three instances, it could not be verified that the source of the odour was the WPCP.

When an odour complaint is received, the Municipality performs the following investigation:

1. Record date and time complaint received.
2. Record date, time, location of odour detected by person with complaint.
3. Record wind direction and temperature.
4. Record personal detection of odour from WPCP at time of call.
5. Consult with applicable municipal staff regarding recent detectable odours from the WPCP.
6. As soon as practicable, visit the site where the odour was detected and record any detectable odours.

13.0 SUMMARY OF BY-PASSES, SPILLS AND ABNORMAL DISCHARGES

There were no by-passes, spills or abnormal discharges during this reporting period.