



**Ontario Clean Water Agency**  
**Agence Ontarienne Des Eaux**

Ontario Clean Water Agency  
5 Industrial Dr.  
Chesterville ON  
K0C 1H0  
Phone: 613-448-3098  
Fax: 613-448-1616

March 27, 2017

Ministry of the Environment & Climate Change  
Kingston Office  
1259 Gardiners Rd.  
Kingston, Ontario  
K7M 8S5

**Attention:** Lyn Garrah, Water Supervisor

Dear Ms. Garrah,

**SUBJECT: Morrisburg Wastewater Treatment Plant - 2016 Annual Report**

Please find enclosed the 2016 Annual Performance Report for the Morrisburg Wastewater Treatment Plant. This report was completed in accordance with Section 12(6) of Amended Certificate of Approval No. 2147-734L2K. This report was prepared by the Ontario Clean Water Agency on behalf of the Municipality of South Dundas, based on the information provided. The report covers the period from January 1, 2016 to December 31, 2016.

Should you require any further information, please do not hesitate to contact our office.

Yours truly,

A handwritten signature in black ink, appearing to read "Dawn Crump".

Dawn Crump  
Process and Compliance Technician  
Ontario Clean Water Agency  
Seaway Valley Hub

c.c. Shannon Geraghty, C.A.O./Treasurer, Municipality of South Dundas  
Chris Bazinet, Director of Public Works, Municipality of South Dundas  
Denis Villeneuve, Chief Operator/ORO, Municipality of South Dundas

## Morrisburg Wastewater Treatment Plant 2016 Annual Performance Report

The Morrisburg WWTP is a Class II wastewater treatment system owned and operated by the Municipality of South Dundas. Raw sewage is conveyed from the collection system to the plant pumping station which is equipped with four submersible pumps. From the pumping station, wastewater passes through the inlet works, including fine screens with a screw compactor, and a grit removal and disposal system. Aluminum Sulphate is added to assist in phosphorous removal. The wastewater then moves through either of two parallel Sequential Batch Reactors (SBR) equipped with individual aeration systems, mixers, decanters and sludge removal pumps. Effluent decanted from the SBRs is treated by UV disinfection and subsequently passes through an outfall pipe to the St. Lawrence River.

The Morrisburg WWTP can receive septage. Septage can be transferred to the influent fine screens from the onsite holding tank by two dry-pit pumps.

Sludge removed from the SBRs is transferred to a 140 m<sup>3</sup> storage tank. From the tank, the sludge enters a gravity belt thickener. The thickened sludge is then pumped to an Autothermal Thermophilic Aerobic Digestion (ATAD) system for stabilization. The digested sludge is subsequently pumped to a 1480 m<sup>3</sup> biosolids storage tank. From the storage tank, biosolids are hauled off site to be utilized as soil conditioner.

The following report addresses the requirements outlined in Condition 12 (6) of Amended Certificate of Approval #2147-734L2K issued on August 28, 2007.

***10(6) The Owner shall prepare and submit to the District Manager, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:***

***(a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the Works;***

The total volume of effluent discharged in 2016 was approximately 728,663 m<sup>3</sup>. The average rate of effluent discharge was approximately 2,023 m<sup>3</sup>/day. The calculated percent removal of CBOD<sub>5</sub>, TP, SS and NH<sub>3</sub> in the final effluent described in the following paragraphs was determined using data from weekly effluent samples and monthly raw sewage composite sample results for the reporting period.

The allowable monthly average concentration for CBOD<sub>5</sub> in the effluent as stated in Condition 7 is 25 mg/L. Average concentrations were well below the limits specified. For 2016, the average CBOD<sub>5</sub> in the effluent was < 3.0 mg/L which equates to > 96 % removal of CBOD<sub>5</sub> from the raw sewage.

The allowable monthly average concentration for Suspended Solids (SS) as stated in Condition 7 is 25mg/L. Average concentrations and loadings were well below the limits specified. In 2016, the average concentration of SS in the effluent was approximately 3.8 mg/L which equates to 97 % removal of SS from the raw influent.

The monthly average concentration limit of Total Phosphorus (TP) as stated in Condition 7 is 1.0 mg/L. Average concentrations and loadings were below the limits specified. The average monthly concentration

for TP during this reporting period was 0.24 mg/L. This represents a 92.9% removal of TP from the raw influent.

Condition 7 stipulates that the *E. coli* monthly geometric mean density must not exceed 200 organisms/100 mL of effluent. During 2016, the average monthly geometric mean was < 3.1 CFU/ 100 mL which did not exceed the monthly limit.

Condition 7 also requires the effluent too be non-acutely lethal to Rainbow Trout and Daphnia Magna, with grab samples being collected on a quarterly basis. None of the samples collected in 2016 were found to be acutely lethal.

The pH of the effluent remained within the range of 6.0 – 9.5 specified in Table 2.

A summary of laboratory results can be found in the 2016 PARs, attached in Appendix A.

***(b) a description of any operating problems encountered and corrective actions taken;***

- Blower failed. Removed by Aerzen. New blower installed. Pipes on ATAD system were rebuilt by Eastern Welding to prevent process liquid from flowing back into the blowers.
- Block heater on generator failed. Repaired by GenRep.
- Alum pump failed. Sent to Watson Marlow for repair.
- Chassis malfunctioned in UV Bank 'A'. Replaced by Calgon Carbon.
- Backflow preventer on blower feed system failed. Claude Bourck repaired backflow preventer.
- Low level Float on WAS holding tank failed. ISI replaced float.
- Communications tower fell onto the WWTP. Selectra replaced damaged lid on ATAD #1.
- Damaged conduit on biosolids storage tanks replaced.
- Motor for make-up air unit malfunctioned. Replaced by Hewitt's.

***(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing part of the Works;***

Please see the Maintenance Summary attached in Appendix B.

***(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;***

Effluent samples are collected on a weekly basis. All samples are analyzed by a laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA). Accreditation ensures that the laboratory has acceptable laboratory protocols and test methods in place. It also requires the laboratory to provide evidence and assurances of the proficiency of the analysts performing the test methods.

***(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment***

The reports verifying required annual calibrations and verifications can be found attached in Appendix C.

***(f) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6;***

Condition 6.1 & 6.2 - During the reporting period all monthly average concentrations of CBOD<sub>5</sub>, TSS, TP and TAN were below the effluent objectives. The *E. coli* monthly geometric means were also below the stated objective.

Condition 6.3 (a) - Effluent pH remained within the 6.0 - 9.5 range specified in the Certificate of Approval.

Condition 6.3 (b) - The monthly average day flows remained below the 4,608 m<sup>3</sup>/day design capacity. In addition, the daily maximum rated capacity of 18,500 m<sup>3</sup>/day was not exceeded in 2016.

Condition 6.3 (c) - Effluent was essentially free of floating or settleable solids and did not contain substances that would cause a film, sheen, foam or discoloration to the receiving stream.

***(g) a tabulation of the quantity of septage added to the Works for co-treatment during the reporting period;***

No septage was received in 2016.

***(h) a summary of chemical characterization data for samples of septage collected in accordance with Table 4 in Condition 11 during the reporting period;***

None to report.

***(i) a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;***

In 2016, a total of 1000 m<sup>3</sup> of liquid biosolids was utilized as soil conditioner. The sludge was land applied in September (NASM Plan #20439). It is anticipated that approximately the same volume of sludge will be generated in 2017.

***(j) a tabulation of the quantity of groundwater pumped from the WWTP building foundation drainage system to the storm sewer system;***

Please see a tabulation of the quantity of groundwater pumped from the WWTP drainage system to the storm sewer in the WWTP PAR, attached in Appendix A.

***(h) a summary of any complaints received during the reporting period and any steps taken to address the complaints;***

There were no reported complaints received in relation to the Morrisburg WWTP and its operation during the reporting period.

*(i) a summary of all By-pass, spill or abnormal discharge events;*

None to report.

*(j) any other information the District Manager requires from time to time.*

No requests for additional information have been made.

**APPENDIX A:**  
OPERATIONAL DATA

**ONTARIO CLEAN WATER AGENCY**  
**MORRISBURG WASTEWATER TREATMENT PLANT PERFORMANCE ASSESSMENT REPORT**

MUNICIPALITY: SOUTH DUNDAS  
 PROJECT: MORRISBURG WWTP  
 WORKS NUM.: 120000168  
 DESCRIPTION: TWO SEQUENTIAL BATCH REACTORS AND AEROBIC SLUDGE DIGESTION

YEAR: 2016  
 WATER COURSE: ST. LAWRENCE  
 DESIGN CAPACITY: 4,608 m<sup>3</sup>/d

MONTH	RAW			RAW				SEPTAGE	GROUNDWATER	SLUDGE
	Total Flow m <sup>3</sup>	Avg Day Flow m <sup>3</sup>	Max Day Flow m <sup>3</sup> /d	Raw BOD (mg/L)	Raw SS (mg/L)	Raw PHOS. (mg/L)	Raw TKN (mg/L)	Volume Received m <sup>3</sup>	Volume Pumped to Storm Sewer m <sup>3</sup>	Liquid Sludge Hauled m <sup>3</sup>
JAN	62,755	2,024	4,566	121	110	1.84	11.9	0	820	0
FEB	79,609	2,745	5,354	66	60	1.21	6.8	0	820	0
MAR	115,963	3,741	8,773	11	13	1.48	8.0	0	820	0
APR	76,579	2,836	5,843	33	48	1.47	13.9	0	820	0
MAY	41,026	1,323	1,588	51	112	2.85	19.1	0	687	0
JUN	42,000	1,400	2,514	102	42	3.63	32.9	0	416	0
JUL	40,769	1,315	1,868	102	160	3.66	17.1	0	416	0
AUG	37,473	1,292	1,890	86	180	3.17	19.6	0	446	0
SEPT	35,190	1,173	1,545	290	356	8.07	46.6	0	495	1000
OCT	57,581	1,857	6,124	43	500	7.55	58.2	0	714	0
NOV	57,578	1,919	3,100	76	112	3.93	33.1	0	802	0
DEC	82,140	2,650	5,947	90	174	1.79	7.7	0	1121	0
TOTAL	728,663							0		1000
AVG		2,023		89	156	3.39	22.9		8,378	
MAX			8,773							
CRITERIA		<b>4,608</b>	<b>18,500</b>					<b>8.0</b>		
COMPLIANCE		<b>YES</b>	<b>YES</b>							

COMMENTS: GROUNDWATER VOLUMES PUMPED FOR JANUARY TO APRIL ESTIMATED BASED ON FIVE MONTH AVERAGE

## 2016 - MORRISBURG WWTP EFFLUENT SAMPLING MONTHLY AVERAGES

MONTH	DATE	CBOD (mg/L)	SS (mg/L)	TP (mg/L)	TAN (mg/L)	E. Coli (CFU/100ml)
January	7-Jan-16	< 3	3	0.14	< 0.01	34
	14-Jan-16	< 3	3	0.12	< 0.01	2
	21-Jan-16	< 3	< 3	0.18	< 0.01	2
	28-Jan-16	< 3	3	0.25	< 0.01	2
	<b>Monthly Average</b>	3	3	0.17	0.01	4
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
February	04-Feb-16	< 3	3	0.2	< 0.01	14
	11-Feb-16	< 3	< 3	0.21	0.02	2
	18-Feb-16	< 3	3	0.31	< 0.01	6
	25-Feb-16	3	8	0.24	0.02	36
	<b>Monthly Average</b>	3.0	4.3	0.24	0.02	9
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
March	03-Mar-16	< 3	6	0.22	< 0.01	4
	10-Mar-16	< 3	10	0.28	< 0.01	16
	17-Mar-16	< 3	3	0.11	< 0.01	2
	22-Mar-16	< 3	6	0.12	0.03	2
	31-Mar-16	< 3	< 3	0.11	0.04	2
	<b>Monthly Average</b>	3	5.6	0.17	0.02	3
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
April	07-Apr-16	< 3	4	0.16	0.02	4
	14-Apr-16	< 3	3	0.15	0.03	2
	20-Apr-16	< 3	4	0.19	0.06	20
	28-Apr-16	< 3	4	0.25	0.06	6
	<b>Monthly Average</b>	3	3.75	0.19	0.04	6
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
May	05-May-16	< 3	< 3	0.29	0.02	2
	12-May-16	< 3	3	0.13	0.04	2
	19-May-16	< 3	< 3	0.27	0.07	2
	26-May-16	< 3	3	0.2	0.06	2
	<b>Monthly Average</b>	3	3	0.22	0.05	2
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
June	02-Jun-16	< 3	< 3	0.16	0.05	2
	09-Jun-16	< 3	< 3	0.16	0.03	2
	16-Jun-16	< 3	3	0.24	0.15	2
	23-Jun-16	< 3	< 3	0.21	0.12	2
	30-Jun-16	3	3	0.12	0.05	4
	<b>Monthly Average</b>	3.00	3.00	0.18	0.08	2
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
July	07-Jul-16	< 3	< 3	0.14	0.11	2
	14-Jul-16	< 3	3	0.16	0.09	2
	21-Jul-16	< 3	< 3	0.37	0.09	2
	28-Jul-16	< 3	< 3	0.25	0.10	2
	<b>Monthly Average</b>	3	3	0.23	0.10	2
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
August	04-Aug-16	< 3	3	0.25	0.18	6
	11-Aug-16	< 3	3	0.38	0.09	4
	18-Aug-16	< 3	4	0.14	0.05	4
	25-Aug-16	< 3	3	0.18	0.03	2
	<b>Monthly Average</b>	3	3.25	0.24	0.09	4
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
September	01-Sep-16	< 3	< 3	0.2	0.09	2
	08-Sep-16	< 3	< 3	0.2	0.04	2
	15-Sep-16	< 3	< 3	0.17	0.01	2
	22-Sep-16	< 3	4	0.16	0.05	6
	29-Sep-16	< 3	< 3	0.21	< 0.01	2
	<b>Monthly Average</b>	3	3.2	0.19	0.04	2
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
October	06-Oct-16	< 3	3	0.17	0.17	2
	13-Oct-16	< 3	< 3	0.23	0.03	2
	20-Oct-16	< 3	4	0.21	0.08	2
	27-Oct-16	< 3	< 3	0.13	0.02	2
	<b>Monthly Average</b>	3	3.3	0.19	0.08	2
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
November	03-Nov-16	< 3	7	0.3	0.1	6
	10-Nov-16	< 3	9	0.55	0.09	2
	17-Nov-16	< 3	4	0.42	0.08	2
	24-Nov-16	3	5	0.58	0.03	2
	<b>Monthly Average</b>	3	6.25	0.46	0.08	3
	<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
December	01-Dec-16	< 3	4	0.14	0.05	2
	08-Dec-16	< 3	3	0.17	< 0.01	4
	15-Dec-16	< 3	4	0.13	0.03	2
	22-Dec-16	< 3	4	0.25	0.04	-
	28-Dec-16	< 3	3	0.11	0.05	2
	<b>Monthly Average</b>	3.0	3.6	0.16	0.04	2
<b>Compliant?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>	



## 2016 - MORRISBURG WWTP EFFLUENT UN-IONIZED AMMONIA

Sample Date	Sample Temperature ° C	Sample Temp. Kelvin	Dissociation Constant pK <sub>a</sub>	Effluent Sample pH on-site	Fraction of Un-ionized Ammonia	Total Ammonia (mg/L) (NH <sub>3</sub> + NH <sub>4</sub> as N)	Un-ionized Ammonia (mg/L)
7-Jan-16	12.3	285.45	9.65	7.32	0.0046	< 0.01	0.0000
14-Jan-16	11.3	284.45	9.69	7.38	0.0049	< 0.01	0.0000
21-Jan-16	11.2	284.35	9.69	7.35	0.0045	< 0.01	0.0000
28-Jan-16	10.7	283.85	9.71	7.32	0.0041	< 0.01	0.0000
04-Feb-16	9.1	282.25	9.76	7.40	0.0043	< 0.01	0.0000
11-Feb-16	9.8	282.95	9.74	7.27	0.0034	0.02	0.0001
18-Feb-16	9.8	282.95	9.74	7.37	0.0043	< 0.01	0.0000
25-Feb-16	7.1	280.25	9.83	7.34	0.0032	0.02	0.0001
03-Mar-16	8.6	281.75	9.78	7.39	0.0041	< 0.01	0.0000
10-Mar-16	7.0	280.15	9.83	7.33	0.0031	< 0.01	0.0000
17-Mar-16	7.9	281.05	9.80	7.32	0.0033	< 0.01	0.0000
22-Mar-16	8.4	281.55	9.79	7.35	0.0036	0.03	0.0001
31-Mar-16	8.5	281.65	9.78	7.29	0.0032	0.04	0.0001
07-Apr-16	9.0	282.15	9.77	7.31	0.0035	0.02	0.0001
14-Apr-16	8.9	282.05	9.77	7.31	0.0035	0.03	0.0001
21-Apr-16	9.8	282.95	9.74	7.25	0.0032	0.06	0.0002
28-Apr-16	10.6	283.75	9.71	7.20	0.0031	0.06	0.0002
05-May-16	11.3	284.45	9.69	7.24	0.0036	0.02	0.0001
12-May-16	11.8	284.95	9.67	7.22	0.0035	0.04	0.0001
19-May-16	12.4	285.55	9.65	7.05	0.0025	0.07	0.0002
26-May-16	13.3	286.45	9.62	7.15	0.0034	0.06	0.0002
02-Jun-16	14.0	287.15	9.60	7.24	0.0044	0.05	0.0002
09-Jun-16	14.9	288.05	9.57	7.43	0.0072	0.03	0.0002
16-Jun-16	15.6	288.75	9.54	7.63	0.0120	0.15	0.0018
23-Jun-16	16.2	289.35	9.52	6.20	0.0005	0.12	0.0001
30-Jun-16	16.5	289.65	9.52	7.30	0.0061	0.05	0.0003
07-Jul-16	18.0	291.15	9.47	7.35	0.0076	0.11	0.0008
14-Jul-16	20.2	293.35	9.40	7.39	0.0098	0.09	0.0009
21-Jul-16	20.3	293.45	9.39	7.42	0.0105	0.09	0.0009
28-Jul-16	21.8	294.95	9.35	7.45	0.0126	0.10	0.0013
04-Aug-16	21.3	294.45	9.36	7.34	0.0094	0.18	0.0017
11-Aug-16	22.1	295.25	9.34	7.43	0.0123	0.09	0.0011
18-Aug-16	21.6	294.75	9.35	7.43	0.0118	0.05	0.0006
25-Aug-16	23.0	296.15	9.31	7.52	0.0160	0.03	0.0005
01-Sep-16	21.3	294.45	9.36	7.55	0.0152	0.09	0.0014
08-Sep-16	21.9	295.05	9.34	7.54	0.0155	0.04	0.0006
15-Sep-16	21.6	294.75	9.35	7.43	0.0118	0.01	0.0001
22-Sep-16	22.2	295.35	9.33	7.49	0.0141	0.05	0.0007
29-Sep-16	20.8	293.95	9.38	7.47	0.0122	< 0.01	0.0001
06-Oct-16	20.6	293.75	9.38	7.55	0.0145	0.17	0.0025
13-Oct-16	21.3	294.45	9.36	7.63	0.0182	0.03	0.0005
20-Oct-16	20.0	293.15	9.40	7.64	0.0170	0.08	0.0014
27-Oct-16	18.0	291.15	9.47	7.73	0.0180	0.02	0.0004
04-Nov-16	18.5	291.65	9.45	7.73	0.0187	0.1	0.0019
10-Nov-16	18.9	292.05	9.44	7.81	0.0230	0.09	0.0021
17-Nov-16	18.2	291.35	9.46	7.81	0.0219	0.08	0.0018
24-Nov-16	17.7	290.85	9.48	7.70	0.0165	0.03	0.0005
01-Dec-16	16.5	289.65	9.52	7.82	0.0198	0.05	0.0010
08-Dec-16	15.9	289.05	9.53	7.84	0.0198	< 0.01	0.0002
15-Dec-16	15.4	288.55	9.55	7.94	0.0239	0.03	0.0007
22-Dec-16	15.6	288.75	9.54	7.89	0.0217	0.04	0.0009
28-Dec-16	13.4	286.55	9.62	7.86	0.0172	0.05	0.0009

$f = 1/(10^{(pK_a - pH)} + 1)$ , where  $f$  is the decimal fraction of un-ionized ammonia (NH<sub>3</sub>).

$pK_a = 0.09018 + 2729.92/T$ , where  $pK_a$  is the dissociation constant of ammonia at a given temperature.

$T = (K + \text{degrees C} + 273.16)$ , where  $T$  is the ambient water temperature in Kelvin.

## 2016 - MORRISBURG WWTP LOADING CALCULATIONS

MONTH	Total Effluent Flow (m <sup>3</sup> )		BOD	SS	TP	NH <sub>3</sub>
January	62,755	Monthly Average (mg/L)	3.0	3	0.1725	0.01
		Loading (kg/d)	6.07	6.07	0.35	0.02
		Compliant?	YES	YES	YES	YES
February	79,609	Monthly Average (mg/L)	3	4.25	0.24	0.015
		Loading (kg/d)	7.70	10.91	0.62	0.04
		Compliant?	YES	YES	YES	YES
March	115,963	Monthly Average (mg/L)	3.0	5.6	0.17	0.02
		Loading (kg/d)	11.22	20.95	0.63	0.07
		Compliant?	YES	YES	YES	YES
April	76,579	Monthly Average (mg/L)	3.0	3.75	0.19	0.04
		Loading (kg/d)	7.41	9.26	0.46	0.10
		Compliant?	YES	YES	YES	YES
May	41,026	Monthly Average (mg/L)	3.0	3	0.22	0.0475
		Loading (kg/d)	3.97	3.97	0.29	0.06
		Compliant?	YES	YES	YES	YES
June	42,000	Monthly Average (mg/L)	3.0	3	0.18	0.08
		Loading (kg/d)	4.06	4.06	0.24	0.11
		Compliant?	YES	YES	YES	YES
July	40,769	Monthly Average (mg/L)	3.0	3.0	0.23	0.10
		Loading (kg/d)	3.95	3.95	0.30	0.13
		Compliant?	YES	YES	YES	YES
August	37,473	Monthly Average (mg/L)	3.0	3.3	0.24	0.09
		Loading (kg/d)	3.63	3.93	0.29	0.11
		Compliant?	YES	YES	YES	YES
September	35,190	Monthly Average (mg/L)	3.0	3.2	0.19	0.04
		Loading (kg/d)	3.41	3.63	0.21	0.05
		Compliant?	YES	YES	YES	YES
October	57,581	Monthly Average (mg/L)	3	4.0	0.42	0.08
		Loading (kg/d)	5.57	7.43	0.78	0.15
		Compliant?	YES	YES	YES	YES
November	57,578	Monthly Average (mg/L)	3	6.3	0.46	0.08
		Loading (kg/d)	5.57	11.61	0.86	0.14
		Compliant?	YES	YES	YES	YES
December	82,140	Monthly Average (mg/L)	3.0	3.6	0.16	0.04
		Loading (kg/d)	7.95	9.54	0.42	0.10
		Compliant?	YES	YES	YES	YES

## **2016 - MORRISBURG WWTP AEROBIC BIOSOLIDS RESULTS**

<b>SLUDGE RESULTS</b>		<b>07-Jan-16</b>	<b>04-Feb-16</b>	<b>03-Mar-16</b>	<b>07-Apr-16</b>	<b>05-May-16</b>	<b>02-Jun-16</b>	<b>07-Jul-16</b>	<b>04-Aug-16</b>	<b>01-Sep-16</b>	<b>06-Oct-16</b>	<b>03-Nov-16</b>	<b>01-Dec-16</b>
Ammonia	mg/L	926	855	906	887	902	810	1010	1340	1010	1130	1170	1110
Nitrate	mg/L	0.3	< 0.1	1.3	1.1	< 3	3.5	< 1	3.8	3.5	4.3	4.8	3
Ammonia + Nitrate	mg/L	926	855	907	888	905	814	1011	1344	1014	1134	1175	1113
Total Phosphorus	mg/L	1140	904	1200	1060	1310	857	853	1100	1160	1300	1230	1210
Total Solids	mg/L	29700	28400	29900	30600	28200	20400	21000	26500	25800	29500	27400	27500
Aluminum	mg/L	1320	1180	984	897	1170	760	810	876	1140	1510	1590	1500
Arsenic	mg/L	0.10	< 0.10	< 0.10	< 0.10	0.10	< 0.10	< 0.1	< 0.1	0.2	< 0.1	0.20	< 0.10
Cadmium	mg/L	< 0.030	< 0.300	< 0.030	< 0.030	< 0.030	< 0.030	< 0.03	< 0.03	< 0.030	< 0.03	< 0.030	< 0.030
Chromium	mg/L	1.08	1.57	0.96	0.95	1.46	1.16	0.87	0.76	1.37	1.45	1.59	1.95
Cobalt	mg/L	0.18	0.12	0.150	0.18	0.20	0.12	0.08	0.08	0.11	0.15	0.16	0.13
Copper	mg/L	39.80	34.10	29.60	33.50	34.50	24.80	28.1	29.8	35	49.3	47.90	45.80
Lead	mg/L	0.70	0.50	0.60	0.60	0.80	0.60	0.5	0.6	0.8	0.8	0.70	0.70
Mercury	mg/L	0.03	0.03	0.03	0.03	0.04	0.03	0.034	0.052	0.064	0.108	0.14	0.13
Molybdenum	mg/L	0.19	0.26	0.23	0.25	0.29	0.26	0.25	0.25	0.27	0.4	0.30	0.32
Nickel	mg/L	2.46	2.20	2.04	2.24	2.72	1.80	2.53	2.58	2.98	2.22	2.00	2.04
Selenium	mg/L	0.10	0.10	0.10	< 0.10	0.10	< 0.10	0.1	0.1	0.1	0.1	0.20	0.20
Zinc	mg/L	12.4	10.70	10.50	11.70	14.30	9.60	10.9	12.5	14.4	14.8	13.9	13.40

**2016 - MORRISBURG WWTP MONTHLY AEROBIC BIOSOLIDS CONCENTRATION RATIO**

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Ammonia	926	855	906	887	902	810	1010	1340	1010	1130	1170	1110
Nitrate	0	0.1	1.3	1.1	3.0	3.5	1.0	3.8	3.5	4.3	4.8	3.0
Ammonia + Nitrate	926	855.1	907.30	888.1	905.0	813.5	1011	1343.8	1013.5	1134	1175	1113
Total Phosphorus	1140	904	1200.00	1060	1310.0	857.0	853	1100	1160	1300	1230	1210
Total Solids	29700	28400	29900.00	30600	28200.0	20400.0	21000	26500	25800	29500	27400	27500
Aluminum	1320	1180	984.00	897	1170.0	760.0	810	876	1140	1510	1590	1500
Arsenic	0	0.1	0.10	0.1	0.1	0.1	0.1	0.1	0.2	0.10	0.20	0.10
Cadmium	0	0.3	0.03	0.03	0.0	0.0	0.03	0.03	0.03	0.03	0.03	0.03
Chromium	1	1.57	0.96	0.95	1.5	1.2	0.87	0.76	1.37	1.45	1.59	1.95
Cobalt	0	0.12	0.15	0.18	0.2	0.1	0.08	0.08	0.11	0.15	0.16	0.13
Copper	40	34.1	29.60	33.5	34.5	24.8	28.1	29.8	35	49.30	47.90	45.80
Lead	1	0.5	0.60	0.6	0.8	0.6	0.5	0.6	0.8	0.80	0.70	0.70
Mercury	0	0.027	0.03	0.028	0.0	0.0	0.034	0.052	0.064	0.11	0.14	0.13
Molybdenum	0	0.26	0.23	0.25	0.3	0.3	0.25	0.25	0.27	0.40	0.30	0.32
Nickel	2	2.2	2.04	2.24	2.7	1.8	2.53	2.58	2.98	2.22	2.00	2.04
Selenium	0	0.1	0.10	0.1	0.1	0.1	0.1	0.1	0.1	0.10	0.20	0.20
Zinc	12	10.7	10.50	11.7	14.3	9.6	10.9	12.5	14.4	14.80	13.90	13.40

**2016 - MORRISBURG WWTP MONTHLY AEROBIC BIOSOLIDS CONCENTRATION RATIO**

Metals ratio = mg metals/kg solids

	Metal/Solids Ratio (Sludge)												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Limit
Arsenic	3.37	3.52	3.34	3.27	3.55	4.90	4.76	3.77	7.75	3.39	7.30	3.64	<b>170</b>
Cadmium	1.01	10.56	1.00	0.98	1.06	1.47	1.43	1.13	1.16	1.02	1.09	1.09	<b>34</b>
Chromium	36.36	55.28	32.11	31.05	51.77	56.86	41.43	28.68	53.10	49.15	58.03	70.91	<b>2800</b>
Cobalt	6.06	4.23	5.02	5.88	7.09	5.88	3.81	3.02	4.26	5.08	5.84	4.73	<b>340</b>
Copper	1340.07	1200.70	989.97	1094.77	1223.40	1215.69	1338.10	1124.53	1356.59	1671.19	1748.18	1665.45	<b>1700</b>
Lead	23.57	17.61	20.07	19.61	28.37	29.41	23.81	22.64	31.01	27.12	25.55	25.45	<b>1100</b>
Mercury	0.91	0.95	1.00	0.92	1.24	1.27	1.62	1.96	2.48	3.66	5.22	4.58	<b>11</b>
Molybdenum	6.40	9.15	7.69	8.17	10.28	12.75	11.90	9.43	10.47	13.56	10.95	11.64	<b>94</b>
Nickel	82.83	77.46	68.23	73.20	96.45	88.24	120.48	97.36	115.50	75.25	72.99	74.18	<b>420</b>
Selenium	3.37	3.52	3.34	3.27	3.55	4.90	4.76	3.77	3.88	3.39	7.30	7.27	<b>34</b>
Zinc	417.51	376.76	351.17	382.35	507.09	470.59	519.05	471.70	558.14	501.69	507.30	487.27	<b>4200</b>

<b>Sludge is Acceptable</b>	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
-----------------------------	------	------	------	------	------	------	------	------	------	------	------	-------	------

SOME ANALYSIS RESULTS EXPRESSED AS "<" (LESS THAN);HOWEVER, IN ORDER TO COMPLETE THE CALCULATION, ONLY THE NUMERIC VALUE WAS USED; THEREFORE THE AVG. CONC. IS GREATER THAN ACTUAL.

**APPENDIX B:**  
MAINTENANCE SUMMARY

# **Morrisburg Wastewater Treatment Plant**

## **Maintenance Summary 2016**

January 4/2016

- Charles Vaillancourt from Aerzen was in to remove atad blower that was filled with process liquid

January 26/2016

- Adam from Genrep on site to repair block heater on generator

January 28/2016

- Genrep on site to install an air filter on generator

January 29/2016

- Tim from thermal processing in to troubleshoot issue of process water black flowing into the blowers

February 2/2016

- Alum pump 2 was sent away to Watson Marlow because it was not working properly

February 4/2016

- Atel air in to fix bathroom heater

February 16+17/2016

- Eastern Welding on site to disassemble and reassemble the atad piping for the blowers to remove any process liquid inside.

February 23/2016

- Calgon carbon representative on site to remove and replace chassis that was malfunctioning in UV bank 1A. He also replaced some ballasts and bulbs.

February 26/16

- NDT in to inspect all lifting devices in the plant

March 1/2016

- Charles Vaillancourt in to install new blower

March 2/2016

- Morrisburg plumbing in to repair boilers.

March 3/2016

- Claude in from back flow preventer to repair the backflow preventer on blower feed system

March 7/2016

- Dave Pheiffer from atel air in to replace various lightbulbs

March 11/2016

- Morrisburg Plumbing in to complete repairs on boilers

March 15/2016

- ISI in to repair T500 low level float that was faulty

March 17/2016

- Selectra on site to have atad 1 damaged lid from communications tower replaced.

April 4/2016

- Genrep on site due to dead batteries on generator. Faulty connection to battery was the cause.

April 18/16

- C. Melbourne in to fix printer communications.

May 17/2016

- Capital Steam in to clean wetwell.

June 1/2016

-Selectra in to replace damaged conduit for long term storage tank floats.

June 2/ 2016

- Tremblay Fire in to do annual inspection on fire alarm systems.

June 20/2016

- Triangle pumps on site to look at diesel transfer system for generator. Also to do yearly inspection.

June 22/2016

- Dave Pheiffer in to install the repaired alum 2 pump that was sent in to Watson Marlow.



June 28/16

- ISI in to look at repaired alum pump as pump would not run in auto. The pump was recalibrated. Also the jet pumps were programmed to continue to run if there was a foam out.

July 11/2016

- Dave from ISI was in to look at the breakers in the SBR cabinet and also looked at aeration valve 424 because it might have weak breaker.

July 12, 2016

- Trevor from ISI in to change settings back on atad system so the both blower and jet pump shut off when atad has a foaming event.

July 13/2016

- Jim Doyle from Enviromark on site to look at greyline level transmitter in influent pumping station. He increased the dampening setting from 10 seconds to 20 seconds to smooth out any short term spikes. The cause of the spikes may be do to power fluctuations.

July 25/2016

- Brad in with Mike from capital controls to look at devices that need an annual calibration.

July 27/2016

- Tim in to calibrate all instruments that need annual calibrations.

August 9/2016

- Dave Pheiffer on site to plan for installing a UPS for the radar and greyline level transmitters at the influent pumping station.
- Third High Farms on site to haul sludge from long term storage tank.

August 10/16

- Third High Farms in to haul sludge from long term storage tank.

August 18/2016

- Dave Pheiffer on site to install a UPS hook up for influent pumping station electrical panelling. It is to target the greyline and radar level transmitters so no interruption will occur during a power fluctuation.

September 20/2016

- OCWA on site to gather information to prepare to take over reporting duties.

September 28/2016

- Capital Steam in to clean well of grease.

October 14/2016

- Genrep on site to do annual load test and inspection on generator.

October 21/2016

- Chad in from ISI to look at issue with the floats in the WAS tank.

October 26/2016

- Dave Pheiffer in to check issue with ballasts tripping on Chassis 3 on back 1A. Discovered that it is actually chassis 4 which is causing chassis 3 to trip.

November 21/2016

- Jeff from Hewitt in to replace packing on degritter and to investigate issue with motor for make up air unit.

November 22/2016

- Jeff from Hewitt is back with new motor for make up air unit. He installed it.
- Dave Pheiffer in to wire motor for make up air unit. He also installed barrier for the floats in the WAS tank.

November 29/2016

- Edgetech in to perform annual inspections on gas sensors.

**APPENDIX C:**

**INSTRUMENT CALIBRATIONS & VERIFICATIONS**

# CapitalControls

Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

830 Industrial Ave. Ottawa, ON K1G-4B8 Ph. 613 248-1999 Fax: 613 248-1997

## **Instrument Calibrations & Verifications**

**3 Morrisburg W.P.C.P**

**Site Reports July, 2016**

# Capital Controls

Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

830 Industrial Ave. Ottawa, ON K1G-4B8 Ph. 613 248-1999 Fax: 613 248-1997

## 3.1 FIT-370. East Influent Channel Flow:

<b>FIELD EQUIPMENT VERIFICATION / CALIBRATION REPORT</b>							DATE: July 27 / 2016	
DESCRIPTION : Raw Sewage Influent.			MODEL: OCF 4.0-A1A1M2C		TAG: FIT-370			
MANUFACTURER : Greyline			Serial # 38588					
Client Name: Township of South Stormont.						Device Output Signal : 4.00 - 20.0 mA		
INSTALLATION INSPECTION								
	DESCRIPTION	FINDINGS				COMMENTS		
		OK	FIXED	N/A	FAULTY			
<b>GENERAL</b>						<i>Calibration by means of Simulating Channel Level</i>		
1	TAGGING			X		<b>Grey Line OCF 4.0 Configuration</b>		
2						Flume Type = Parshall    Size = 12"		
<b>MECHANICAL</b>						Range = 547                      LOE= 60 Sec.		
3	MOUNTING: check for proper fastening, etc.	X				Mode = Flow                      Damping = 10%		
4	ORIENTATION: check for proper angle, etc.)	X				Max. Range = 1.085 m    Min. Range = 0.298 m		
5	POSITION: relative position to other components (ie. for proper flow, blanking distance), etc.	X				Units = m                      Volume = m3 Time =Day                      Echo = 66% to 80%		
6						Range = 42,043 m3/day		
<b>ELECTRICAL</b>						Relay 1 = Off    Relay 2 = Off    Relay 2 = Off		
7		X						
8	WIRE TAGGING: (exists and proper wire type)	X				<b>Actual process = 573.2 m<sup>3</sup>/d @ 4.30 mA</b>		
9	QUALITY OF CONNECTIONS:	X				Head <sub>(Max)</sub> = Max. Range - Min. Range		
10	GROUNDING:	X				Head <sub>(Max)</sub> = (1.085m - 0.298m) =.787.m		
11	SHIELDING: (check if grounded only at PLC end of wire)	X				Q <sub>(Max)</sub> = 42,043 m3/day		
12	CERTIFICATION CSA, ULC:	X						
13								
SET-UP/CALIBRATION								
DIGITAL		ADJUSTMENT USING			VERIFIED USING		SETPOINT / RANGE	
14	SETPOINT ADJUSTMENT	MECHANICAL TYPE				Level Target		
		ELECTRONIC TYPE				Fluke 725 calibrator S/N 8759025 Cal. Report# July 28, 2016		0 – 42043m <sup>3</sup> /d
Configuration Parameters:		<b>Calibration Data Test    Tolerance: 15.00%</b>						
		<i>Input Variable</i>	<i>Transmitter Var.</i>	<i>Cal. Value</i>	<i>% Error</i>	<i>Notes</i>		
	Process Simulated	46.99 cm	19,250 m <sup>3</sup> /d	18,903 m <sup>3</sup> /d	0.825%	(Calibration Jig set to 18.5")		
	Process Displayed	19,250 m <sup>3</sup> /d	11.417 mA	11.325 mA	0.575%	Passed		
NOTES:***Current calculated based on <i>Display Variable</i> 12.856 mA = ((19250/42043)*16)+4 Error (% Full Scale) = ((Measured Output - Calculated Variable) / Full Scale) * 100 = ((11.417mA - 11.325mA) / 16 mA ) *100 = 0.575 % of full scale								
						Checked By: <i>Tim Stewart</i> Cell: 613 325 9213 Email: tim.stewart@capitalcontrols.ca		

# CapitalControls

Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

830 Industrial Ave. Ottawa, ON K1G-4B8 Ph. 613 248-1999 Fax: 613 248-1997

## 3.2 FIT-380. West Influent Channel Flow:

FIELD EQUIPMENT VERIFICATION & CALIBRATION							DATE: July 27 / 2016
DESCRIPTION : Raw Sewage Influent.			MODEL: OCF 4.0-A1A1M2B		TAG: FIT-380		
MANUFACTURER : Greylne			Serial # 38587				
Client Name: Township of South Stormont.					Device Output Signal : 4.00 - 20.0 mA		
INSTALLATION INSPECTION							
	DESCRIPTION	FINDINGS				COMMENTS	
		OK	FIXED	N/A	FAULTY		
<b>GENERAL</b>							
						Calibration by means of Simulating Channel Level	
1	TAGGING			X		Grey Line OCF 4.0 Configuration	
2						Flume Type = Parshall Size = 12"	
<b>MECHANICAL</b>							
3	MOUNTING: check for proper fastening, etc.	X				Range = LOE= 60 Sec. Mode = Flow Damping = 10%	
4	ORIENTATION: check for proper angle, etc.)	X				Max. Range = 1.085 m Min. Range = 0.298 m	
5	POSITION: relative position to other components (ie. for proper flow, blanking distance), etc.	X				Units = m Volume = m3 Time =Day Echo = 62% to 80%	
6						Range = 42,043m3/day	
<b>ELECTRICAL</b>							
7		X				Relay 1 = Off Relay 2 = Off Relay 2 = Off	
8	WIRE TAGGING: (exists and proper wire type)	X				<b>Actual process = 783.4 m<sup>3</sup>/d @ 4.31 mA</b>	
9	QUALITY OF CONNECTIONS:	X				Head <sub>(Max)</sub> = Max. Range - Min. Range	
10	GROUNDING:	X				Head <sub>(Max)</sub> = (1.085m - 0.298m) = 0.787m	
11	SHIELDING: (check if grounded only at PLC end of wire)	X				Q <sub>(Max)</sub> = 42043 m3/day	
12	CERTIFICATION CSA, ULC:	X					
SET-UP/CALIBRATION							
DIGITAL		ADJUSTMENT USING		VERIFIED USING		SETPOINT / RANGE	
14	SETPOINT ADJUSTMENT	MECHANICAL TYPE		Level Target			
		ELECTRONIC TYPE		Fluke 725 calibrator S/N 8759025 Cal. Report# June 28, 2016		0 – 42043 m <sup>3</sup> /d	
Configuration Parameters:			Calibration Data Test Tolerance: 15.00%				
		Input Variable	Transmitter Var.	Cal. Value	% Error	Notes	
	Process Simulated	24.13 cm	7052 m <sup>3</sup> /d	6728 m <sup>3</sup> /d	0.77%	(Calibration Jig set to 9.5")	
	Process Displayed	7052 m <sup>3</sup> /d	6.719 mA	11.19 mA	0.243%	Passed	
NOTES:***Current calculated based on Display Variable 6.68 mA = ((7052/42043)*16)+4				Checked By: <i>Tia Stewart</i>			
Error (% Full Scale) = ((Measured Output - Calculated Variable) / Full Scale) * 100 = ((6.719mA - 6.68 mA) / 16 mA) *100 = 0.243 % of full scale				Cell: 613 325 9213 Email: tim.stewart@capitalcontrols.ca			