



2009 Annual Report

Batawa Wastewater Treatment Plant



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**PUBLIC WORKS &
ENVIRONMENTAL SERVICES**

**2009 Annual Report
Batawa Wastewater Treatment Plant
Summary Overview**

1. Summary Overview

The Batawa WWTP, MOE Identifier Number: 110000668, is located at 1378 Trenton/Frankford Rd. in Batawa, ON. Until March, 2009 the plant was operating under Certificate of Approval (C of A) number 3-0786-80-006. On March 10, 2009 a new C of A number 7781-7NYSL9 was issued to include the current upgrades taking place throughout 2009. The Batawa WWTP is rated as a Class 2 facility. It is described as a conventional activated sludge treatment plant. Anaerobic digestion is used at this facility, liquid chlorine was used for effluent disinfection until November 2009 when the plant was upgraded to use UV irradiation treatment for disinfection. The receiving water body is the Trent River. The plant has a rated capacity of 540 m³/d, and when the plant is upgraded, (or upon *Substantial Completion of the Proposed Works*), will have a rated capacity of 783 m³/d. The Batawa Wastewater Treatment plant services a population of approximately 300 people.

As per C of A number 7781-7NYSL9, Condition 10 ss. 6(a-i), an annual report shall be prepared within 90 days following the end of the calendar year detailing the following:

- a. *A summary of 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;*
- b. *A description of any operating problems encountered and corrective actions taken;*
- c. *A summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;*
- d. *A summary of any effluent quality assurance or control measures undertaken in the reporting period;*
- e. *A summary of the calibration and maintenance carried out on all effluent monitoring equipment; and*
- f. *a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.*
- g. *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;*
- h. *a summary of any complaints received during the reporting period and any steps taken to address the complaints;*
- i. *a summary of all By-pass, spill or abnormal discharge events.*

This Condition, or annual reporting requirement is included to provide a performance record for future references, and to provide a compliance record for all the terms and conditions outlined in the Certificate, so that the Ministry can work with the Owner in resolving any problems in a timely manner.



2. Summary of all monitoring data and a comparison to the effluent limits and objectives outlined in Conditions 6 and 7 of the C of A:

Effluent Quality – Final Effluent Monitoring Program and Regulatory Compliance Parameters										
Month	BOD5	CBOD5	Total Suspended Solids	Total Phosphorus	Total Ammonia Nitrogen	E. Coli	pH MIN	pH MAX	Temp	Unionized Ammonia
		Objective: 15.0 mg/L	Objective: 15.0 mg/L	Objective: 0.3 mg/L	Objective: 2.4 mg/L (May-Sept) 4.4 mg/L (Oct-Apr)	Objective: 100 cfu/100 mL	Objective: 6.5	Objective: 8.5		
		Limit: 25.0 mg/L	Limit: 25.0 mg/L	Limit: 0.35 mg/L	Limit: 3.6 mg/L (May-Sept) 7.7 mg/L (Oct-Apr)	Limit: 200 cfu/100 mL	Limit: 6.0	Limit: 9.5		Objective: 20 ug/L
January	2	21	0.45	1.18	52	7.44	8.19	6	15.34	
February	7	25	0.47	0.3	15869	7.5	7.95	4	1.08	
March	7	16	0.34	1.5	873	7.39	8.01	5	5.85	
April	6	23	0.3	4.04	2610	7.71	8.09	8	64.64	
May	4	15	0.28	0.3	14	7.7	7.9	11	6	
June	3	12	0.28	0.1	15	7.65	8.23	15	2.7	
July	2	9	0.17	0.13	2	7.35	8.21	18	1.43	
August	3	9	0.15	0.1	4	7.47	7.7	19	1.2	
September	3	14	0.26	0.12	32	7.41	7.81	17	3.72	
October		11	0.26	3.4	16	7.79	8.08	13	78.2	
November		14	0.27	4.7	3350	7.87	7.99	11	94	
December	13	31	0.47	1.91	21050	7.76	8.11	8	30.56	

* Acute Lethality to Rainbow Trout and Daphnia Magna testing was not performed throughout 2009. This testing was first done in February 2010 with a zero (0) % Mortality Rate result.



Effluent Quality – Monthly Average Waste Loadings				
Month	CBOD/BOD <i>Limit: 19.6 kg/d</i>	Total Suspended Solids <i>Limit: 19.6 kg/d</i>	Total Phosphorus <i>Limit: 0.27 kg/d</i>	Total Ammonia Nitrogen <i>Limit: 2.8 (May 1 - Sep 30) 6.0 (Oct 1 – Apr 30)</i>
January	1.92	20.16	0.43	1.13
February	10.68	38.15	0.72	0.46
March	8.61	19.68	0.42	1.85
April	6.52	25.00	0.33	4.39
May	2.88	10.82	0.20	0.22
June	1.29	5.15	0.12	0.04
July	0.36	1.62	0.03	0.02
August	0.81	2.43	0.04	0.03
September	0.75	3.50	0.07	0.03
October	0.75	3.77	0.09	1.17
November	1.37	7.55	0.15	2.53
December	0.08	16.40	0.25	1.01

Influent Quality – Influent Monitoring Program Results					
Month	BOD (mg/L)	CBOD (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)
January	133		226	3.17	21.8
February	75		87	2.32	19.3
March	51		72	1.29	9.4
April	37		69	1.05	9.3
May	61		81	1.43	14.3
June	88		181	2.34	17
July	95		173	2.43	18.6
August	108		208	2.97	21.3
September	109		109	2.29	16.8
October		61	92	1.81	16.7
November	47		65	1.38	12.3
December	44		55	1.16	11.6



Effluent Quantity – Plant Flow Summary			
<i>Existing Works Approved Rated Capacity: 540 m³/d</i>			
<i>Proposed Works Rated Capacity: 783 m³/d</i>			
Month	Average Daily Flow (m ³ /d)	Max Daily Flow (m ³ /d)	Total Monthly Flow (m ³ /month)
January	960	1,868	29,771
February	1,526	3,613	42,721
March	1,230	5,187	38,300
April	1,087	2,171	32,602
May	721	1,155	22,352
June	429	831	12,875
July	180	539	8,136
August	270	349	8,374
September	250	494	7,509
October	343	755	10,634
November	539	777	16,172
December	529	731	16,384

* Total Yearly Flow: 245,830 m³

* 2009 Average Daily Flow: 674 m³/d

* Maximum Monthly Average Daily Flow throughout reporting period: 5,187 m³/d

Summary of all By-pass, Spill, or Abnormal Discharge Events throughout inspection period									
Date of Occurrence	Description	CBOD	TSS	TP	TAN	pH	Samples collected		
									E.Coli
February 12, 2009	Bypass – due to a period of rainfall and snow melt, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final treated effluent. Bypass received disinfection. The bypass lasted for a period of 34 hours with a volume of 331 m ³ .	22 6	52 22	0.75 0.50	0.8 0.1	7.65 7.94			94,000 NT
February 27, 2009	Bypass – due to a period of rainfall and snow melt, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final treated effluent. Bypass received disinfection. The bypass lasted for a period of 21 hours with a volume of 1 m ³ .	3	14	0.29	0.8	7.61			1,060
March 11, 2009	Bypass – due to a period of heavy rain, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final filtered effluent. Bypass received disinfection. The bypass lasted for a period of 17 hours with a volume of 3 m ³ .	<4	19	0.38	0.3	7.90			340
April 3, 2009	Bypass – due to a period of heavy rain, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final filtered effluent. Bypass received disinfection. The bypass lasted for a total of 113.5 hours with a volume of 720 m ³ .	17	44	0.54	4.4	7.71			8,700
September 25, 2009	C of A Exceedance – For the month of April, the plant exceeded the monthly Geometric Mean Density of E. Coli limit of 200 cfu/100 mL. This was due to higher than normal influent flows during the month of April which caused an effluent degradation. No other reportable limits were exceeded.	April Monthly Average E. Coli concentration: 1,086 cfu/100 mL							
October 15, 2009	Discontinuation of Final Effluent Chlorination commencing in November – Aecom Engineering sent correspondence to MOE requesting the temporary disconnection of final effluent chlorination between November 2009 and January 2010 for the installation of the UV contact chamber and UV disinfection unit. MOE approved this on October 30, 2009 with the conditions that any effluent parameters not met, be reported to their office, and the effluent would be disinfected during any bypass events								

November 26, 2009	Bypass – partial primary bypass occurred due to a line blockage between the aeration tank and the primary clarifier which caused the level to increase in the primary clarifier and start bypassing to the final effluent outfall. Samples were not collected of this bypass as the duration was very short before the operator had corrected the problem. This bypass lasted for approx. 45 minutes with a total of 3 m ³ bypassed.	Bypass samples not collected due to short duration of occurrence
December 2, 2009	C of A Exceedance – For the month of November, the Batawa WWTP exceeded the monthly Geometric Mean density of E. Coli limit of 200 cfu/100 mL. All other C of A effluent limits were met during the month	Monthly Average Concentration of E. Coli during the month of November: 3, 350 cfu/100 mL
December 3, 2009	Bypass – due to a period of heavy rain, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final treated effluent. Bypass received disinfection. The bypass lasted for a period of 33 hours and 38 min. with a volume of 255 m ³ .	19 48 0.68 0.9 7.76 11,5000
December 9, 2009	Bypass – due to a period of heavy rain, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final treated effluent. Bypass received disinfection. The bypass lasted for a period of 15 hours with a volume of 3 m ³ .	24 38 0.48 2.6 8.02 12,400
December 26, 2009	Bypass – due to a period of heavy rain, the plant bypassed secondary treated effluent to the final outfall where it was blended with the final treated effluent. Bypass received disinfection. The bypass lasted for a period of 47.5 hours with a volume of 162 m ³ .	<2 58 0.56 3.6 8.01 2
January 14, 2009	C of A Exceedance – For the month of December 2009 the plant did not meet C of A effluent limit requirements for Total Suspended Solids, Total Phosphorus (which is not actually reportable until substantial completion of the proposed works), and the monthly Geometric Mean density of E. Coli. These exceedances due to three separate bypass events during the month of December.	Month of December Average Concentrations: TSS = 31 mg/L; Limit of 25.0 mg/L TP = 0.47 mg/L; Limit of 0.35 mg/L (not reportable under Condition 7 ss.4 of C of A until upgrades at plant are substantially completed) E. Coli = 21, 050 cfu/100 mL

2. Interpretation of all monitoring data and a comparison to the effluent limits and objectives outlined in Conditions 6 and 7 of the C of A:

Carbonaceous Biological Oxygen Demand / Biological Oxygen Demand (CBOD₅ / BOD₅)

For the months of January and February 2009, the Batawa Wastewater Treatment plant was operating under C of A number 3-0786-80-006. On March 10, 2009 a new C of A number 7781-7NYSL9 was issued for the plant which required the Final Effluent to be sampled and tested for CBOD₅ on a weekly basis. As a result of this new C of A, the City started requesting CBOD₅ analysis weekly in September 2009, with BOD₅ analysis on the Final Effluent being completed weekly between January and September 2009. The City's monthly average BOD₅/CBOD₅ concentrations remained below the Effluent Limit of 25.0 mg/L, and the Effluent Concentration Objective of 15.0 mg/L throughout the inspection period. The average plant BOD Removal Efficiency of 92.0% shows the plant is capable of processing the municipal Influent BOD concentrations, (see Figure 1a. for details). In February, March, and April of 2009 there were bypass events each month which could have contributed to higher than normal waste loadings, (as depicted in Figure 1c.) as the average monthly flow would have been higher. However, the effluent average waste loadings remained below the effluent average waste loading limit of 19.6 kg/d throughout the entire reporting period. Additionally, the C of A does not state an objective for the average waste loading monthly.

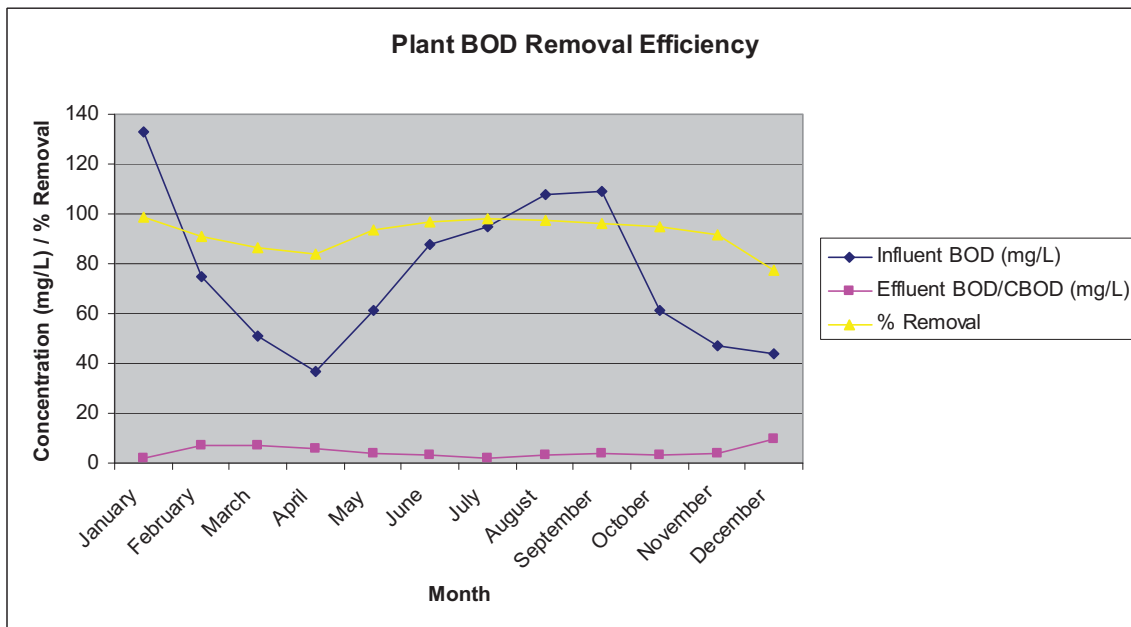


Figure 1a. Monthly average BOD Removal Efficiency

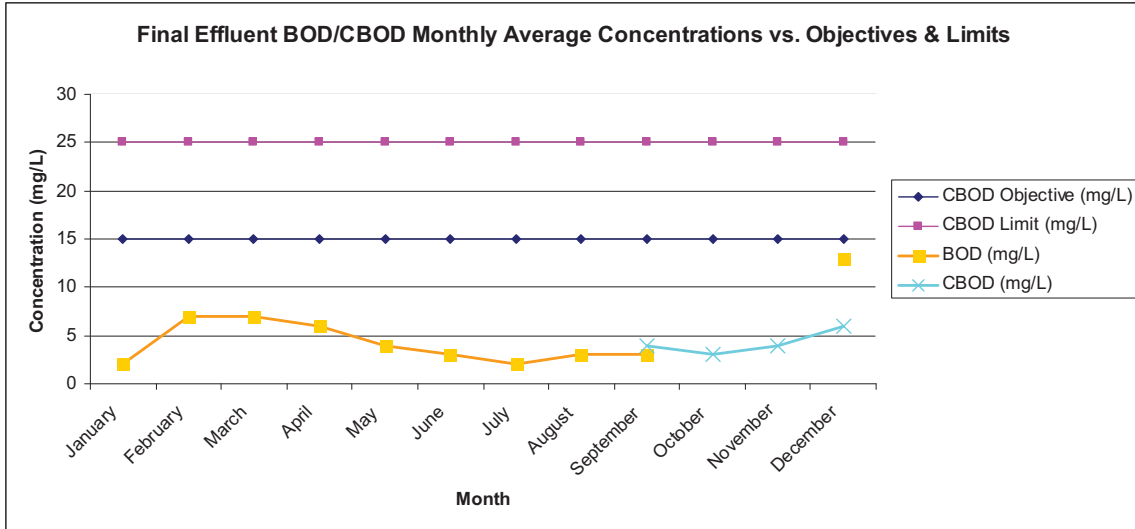


Figure 1b. Final Effluent BOD/CBOD Monthly average Concentration vs. Effluent Objectives & Limits

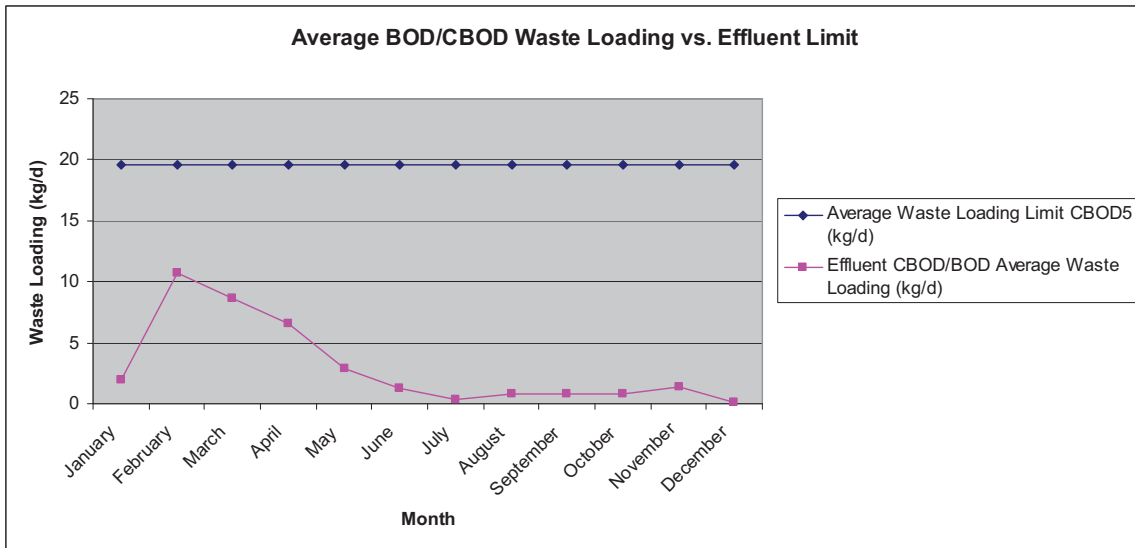


Figure 1c. Final Effluent BOD/CBOD Monthly average Waste Loadings vs. Effluent Limit

Total Suspended Solids

The raw sewage Total Suspended Solids concentrations vary widely at this facility depending on flow conditions. In December the average Final Effluent Suspended Solids was out of compliance as there were three separate bypass events during the month where the sample results were quite high. These high Total Suspended Solids concentrations are due to the flows being higher than the rated capacity of the existing plant. Once proposed works are complete, this should help alleviate the high monthly average suspended solids levels in the Final Effluent. The plant had an average Suspended Solids removal efficiency of 80.8%.

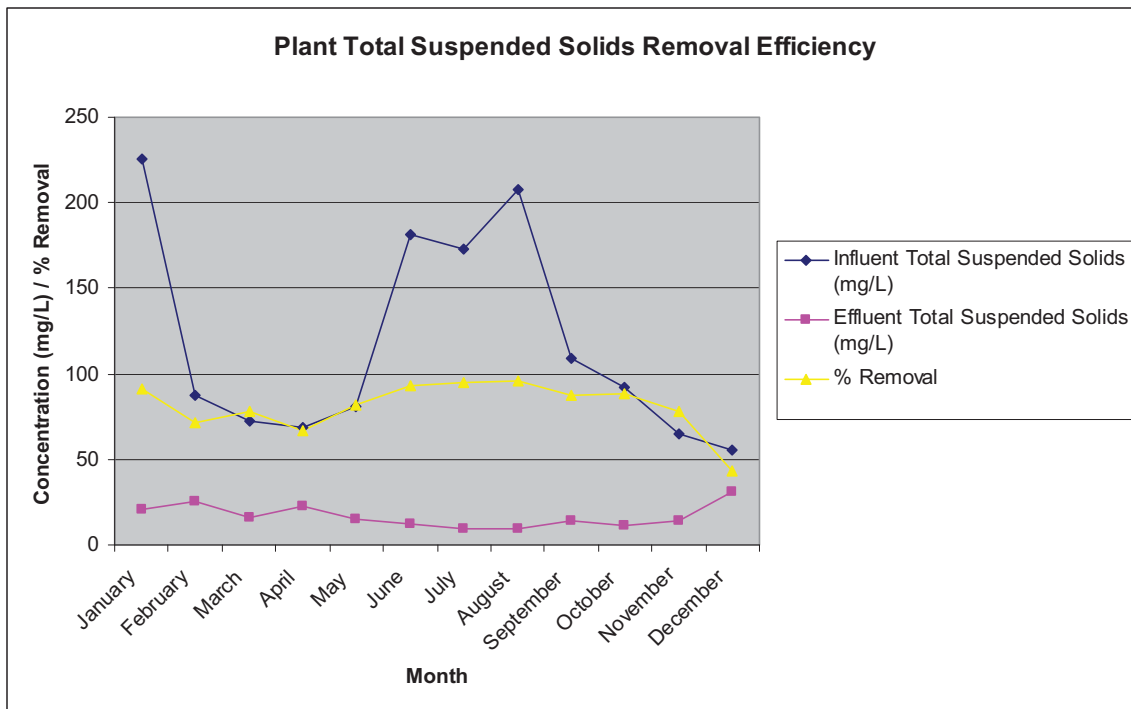


Figure 2a. Monthly Average Total Suspended Solids Removal Efficiency

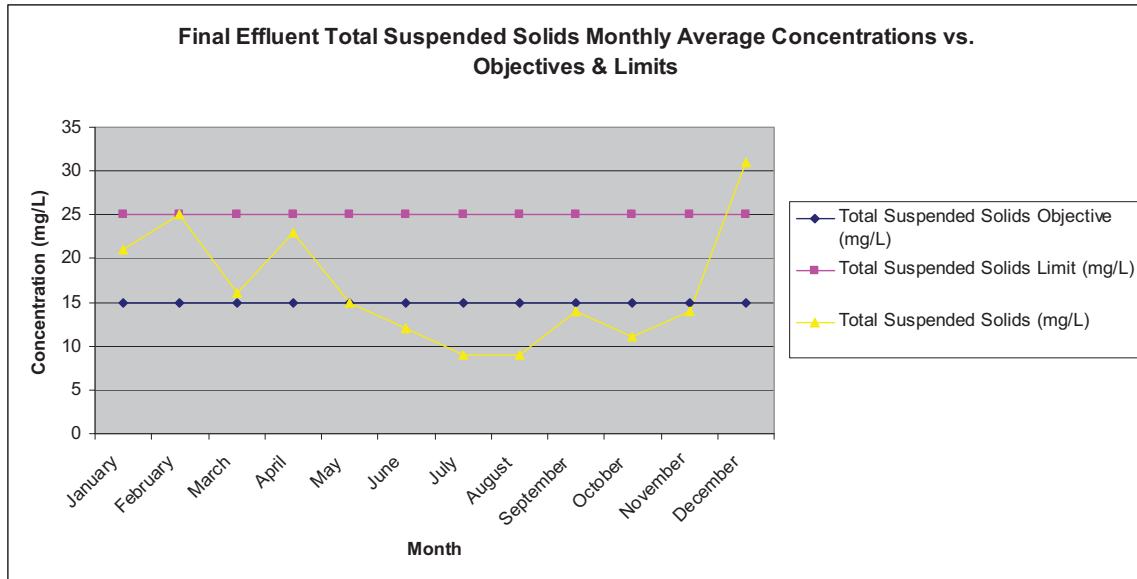


Figure 2b. Final Effluent Monthly Average Total Suspended Solids Concentrations vs. Objectives & Limits

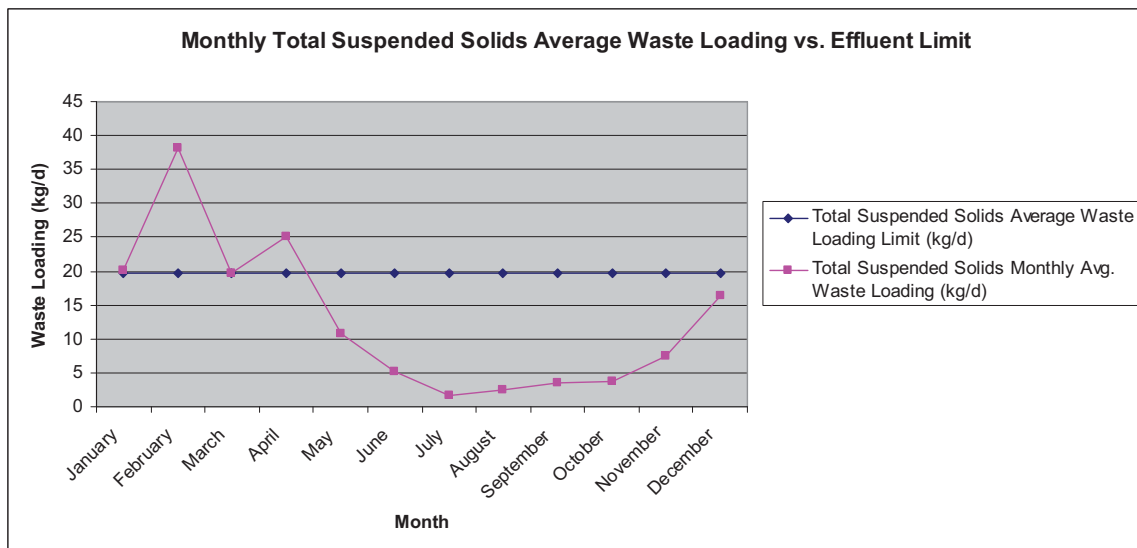


figure 2c. Final Effluent Monthly average Waste Loadings vs. Effluent Limit

Total Phosphorus

Throughout the inspection period, the average Total Phosphorus removal efficiency was 81.8%. C of A number 7781-7NYSL9 does not have a regulatory requirement for the owner to make a report in respect of Total Phosphorus exceedances until the Substantial Completion of the Proposed Works. However, the City is still striving to meet the Effluent Objectives and Limits of Total Phosphorus at all times. During the months of January, February, March, and December, the plant was not able to meet the effluent objective of 0.3 mg/L or the effluent limit of 0.35 mg/L due in most part to the higher than normal influent flows, and the amount of bypasses during each month. During the months of January, February, March, and April, the Average Waste Loading for Total Phosphorus was above the effluent limit of 0.27 kg/d due to the higher than normal influent flows and the effluent lab results obtained from the bypasses which occurred during February, March, and April. Once upgrades are complete at the plant, the City expects these results will remain within allowable limits.

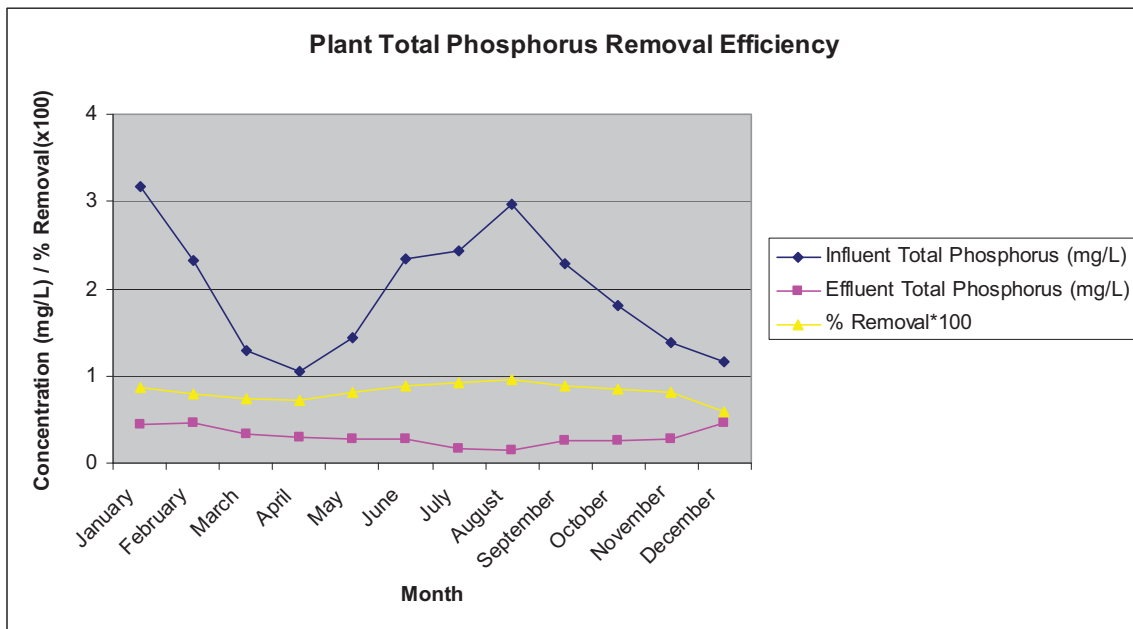


Figure 3a. Monthly Average Total Phosphorus Removal Efficiency

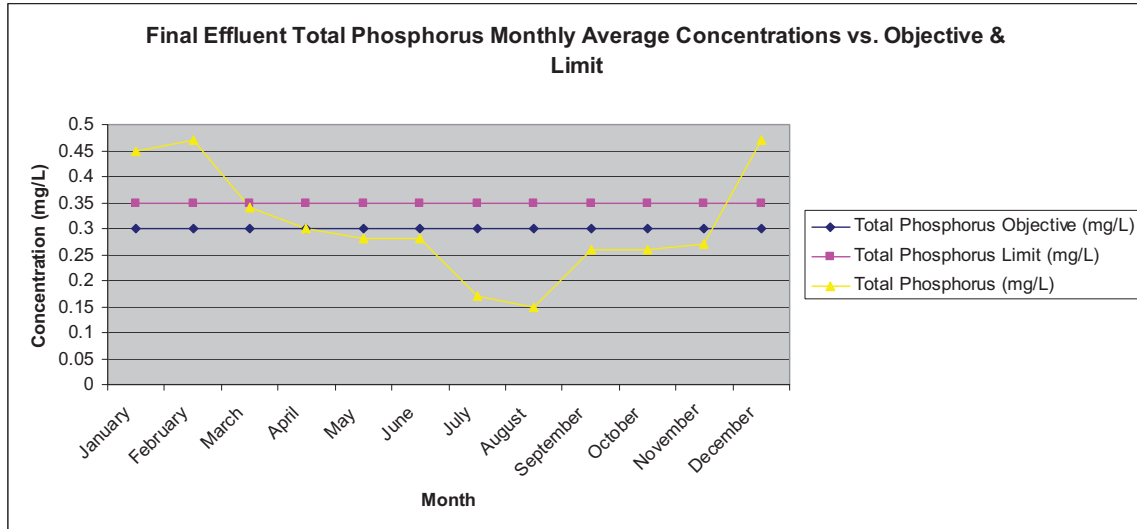


Figure 3b. Final Effluent Total Phosphorus Monthly Average Concentrations vs. Objective & Limit

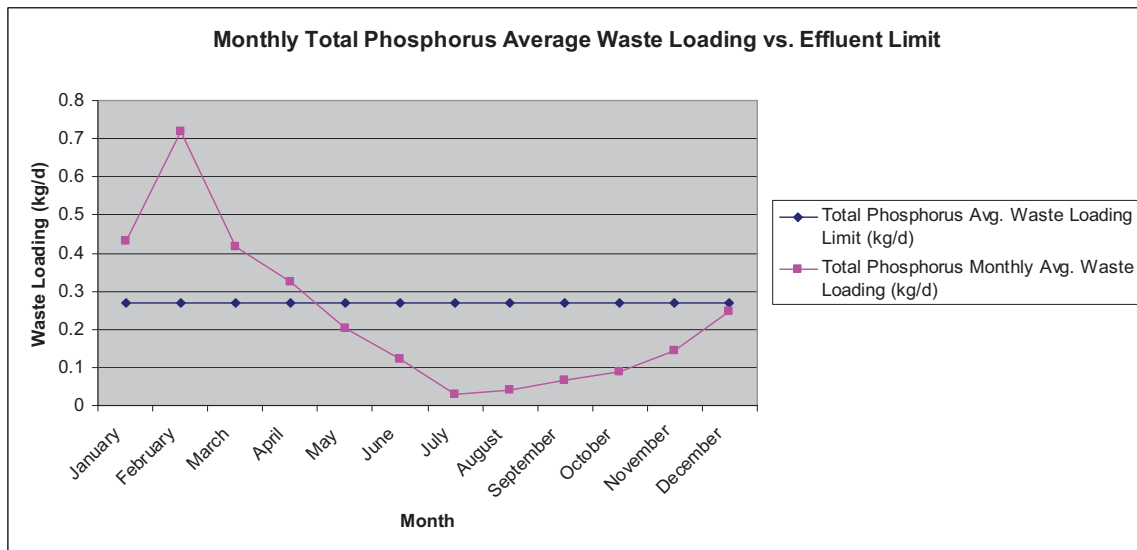


Figure 3c. Final Effluent Total Phosphorus Monthly Average Waste Loadings vs. Effluent Limit

Total Ammonia Nitrogen

Throughout the inspection period, the average Total Ammonia Nitrogen removal efficiency was 87.8%. C of A number 7781-7NYSL9 does not have a regulatory requirement for the owner to make a report in respect of Total Ammonia Nitrogen exceedances until the Substantial Completion of the Proposed Works. However, the City is still striving to meet the Effluent Objectives and Limits at all times. The plant remained within the stipulated effluent limits and objectives throughout the entire inspection period, with the exception of the month of November, the plant did not meet the effluent objective of 4.4 mg/L. Once upgrades are complete at the plant, it is expected that the plant will continue to remain within compliance limits.

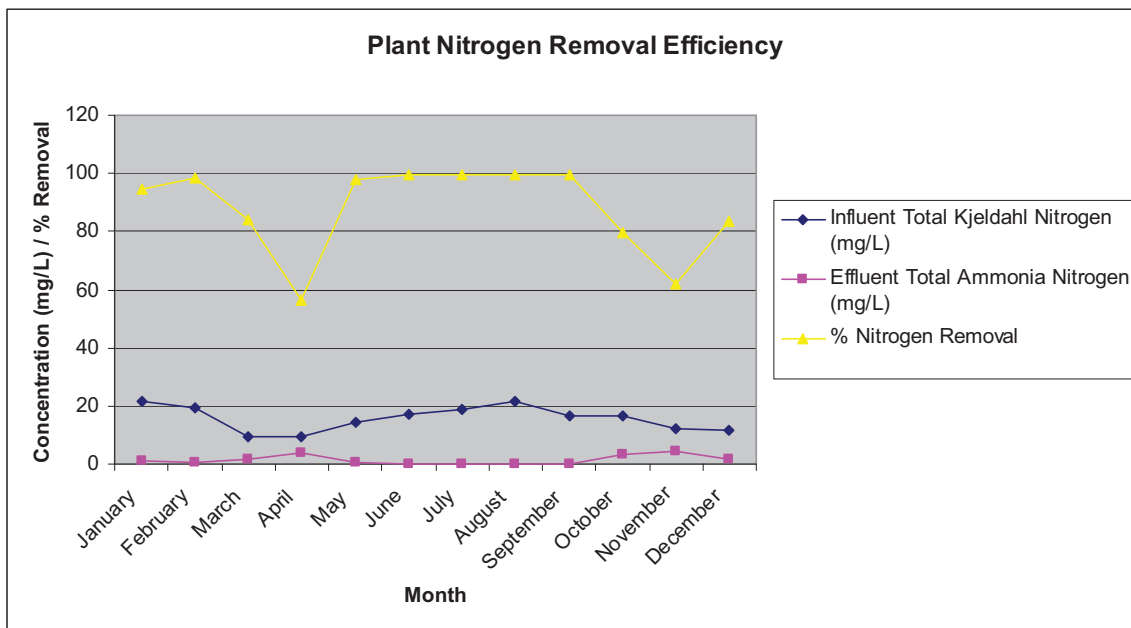


Figure 4a. Plant Monthly Average Nitrogen Removal Efficiency

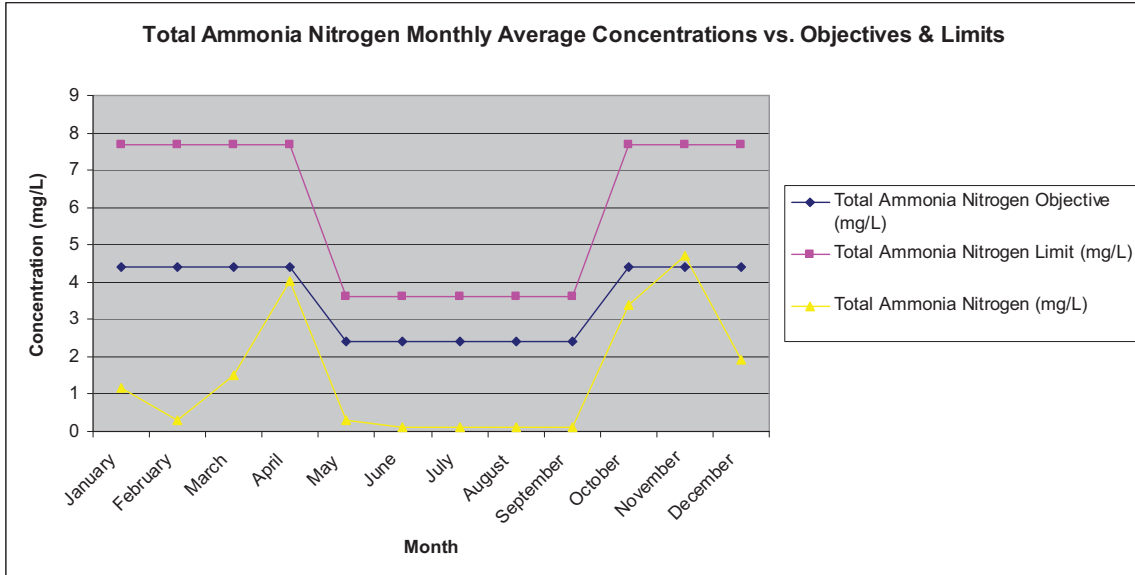


Figure 4b. Final Effluent Total Ammonia Nitrogen Monthly Average Concentrations vs. C of A Effluent Objective and Limit

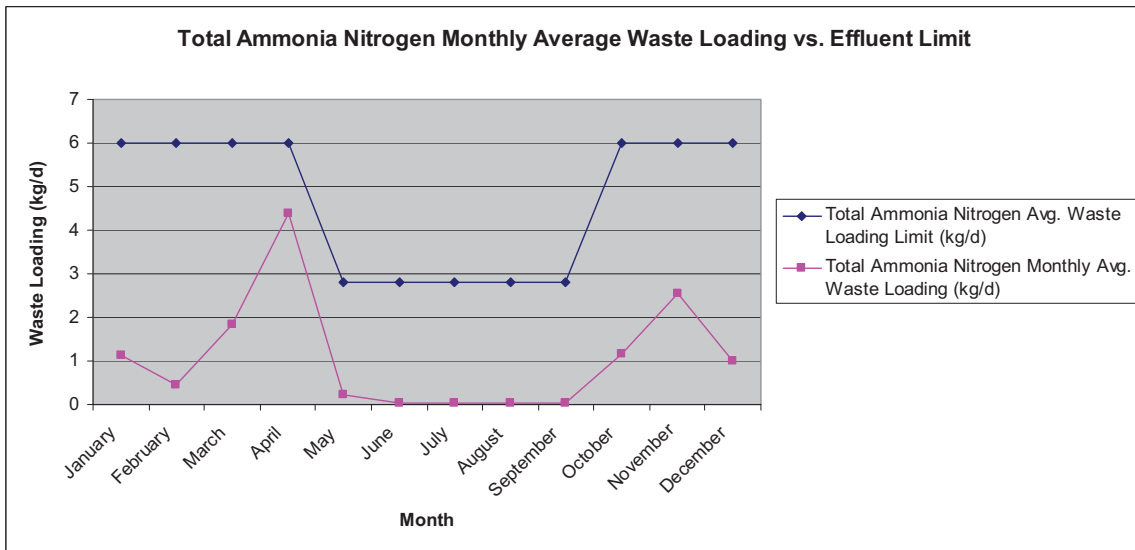


Figure 4c. Final Effluent Total Ammonia Nitrogen Monthly Average Waste Loading vs. C of A Effluent Limit

pH

The pH of the Effluent remained within C of A objectives and limits throughout the entire inspection period.

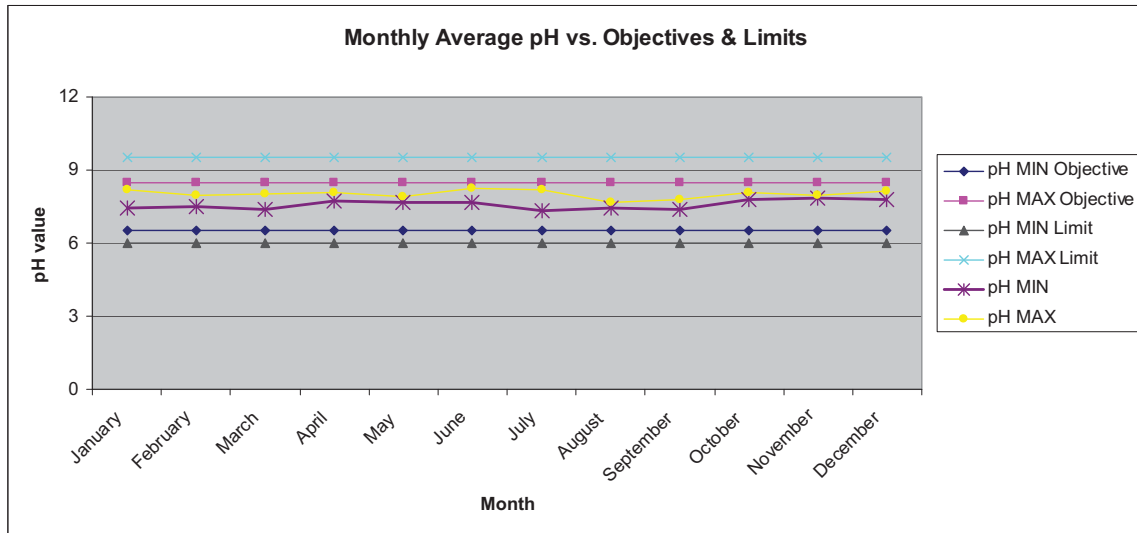


Figure 5: Monthly average pH measurements vs. C of A Effluent Objective & Limits

E. Coli

Throughout the inspection period, the Batawa Wastewater Treatment plant had difficulty meeting the effluent limit of 200 cfu/100 mL and the effluent Objective of 100 cfu/100 mL during any month in which the plant experienced a bypass event. This includes the months of February, March, April, November, and December. This is due in part to the existing small contact chamber not being able to disinfect the effluent properly during high flow situations, and the fact that the Final Effluent sample point is not representative of any additional contact time before the effluent is discharged to the Trent River. In November the City was granted permission to discontinue chlorination until the new UV chamber, and UV disinfection system could be installed, conditional that during any bypass events the Final Effluent would be chlorinated. The City was able to meet this requirement. Since the UV has been online (operational January 2010) effluent E. Coli levels have been substantially reduced.

Effluent Flows

During the months of November, and December, plant daily flows had to be estimated for the last seven (7) days in November, and the first sixteen (16) days of December due to the installation/construction of the new intake structure, and the installation of the new plant flow meter. However, the new flow meter was not calibrated correctly, therefore readings for the first 16 days of December were inaccurate. Flows were estimated for these days based off remaining daily monthly flow measurements. Until substantial completion of the proposed works is completed, the plant will have difficulty remaining below the existing works Rated Capacity of 540 m³/d during months in which there is a spring run-off, and months where there are heavy rainfalls resulting in bypass events. The City is hopeful that with the addition of plant capacity the City will be able to remain below the Proposed Works rated capacity of 783 m³/d, and the peak flow rate of 2, 879 m³/d. During the months of January, February, March, April, and May the plant did not remain below the rated capacity of 540 m³/d due in most part to heavy rainfall events and snow melts.

The last five (5) years of historical annual average daily plant flows are depicted in Figure 6 c. The last 3-year average annual daily flow of 536 m³/d shows the plant is operating at 99% of its approved capacity, while the last 5-year average annual daily flow of 493 m³/d shows the plant was operating at 91% of the plants approved capacity.

Please see the Effluent Quantity table for further details on monthly flows throughout the year.

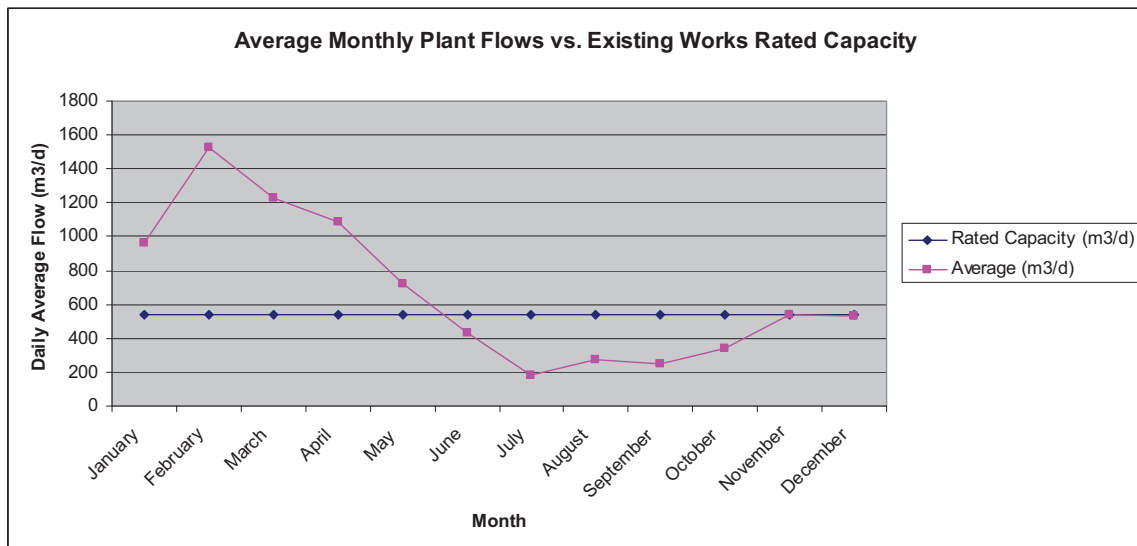


Figure 6a. Average Monthly Plant Flows vs. Existing Works Rated Capacity

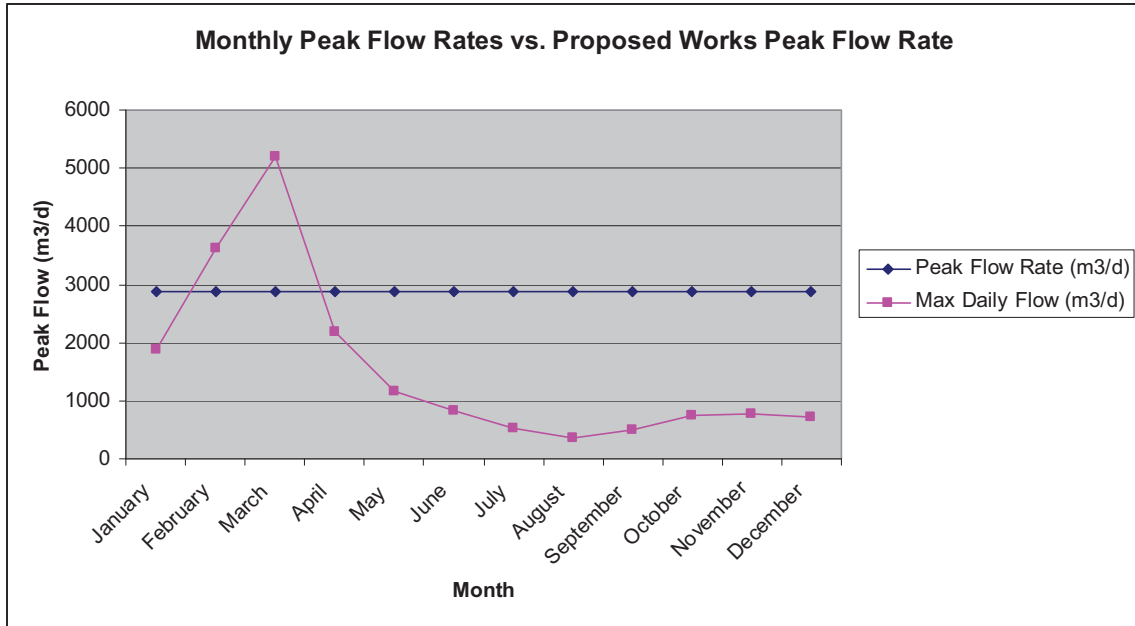


Figure 6b. Monthly Peak Flow Rates vs. Proposed Works Peak Flow Rate capacity

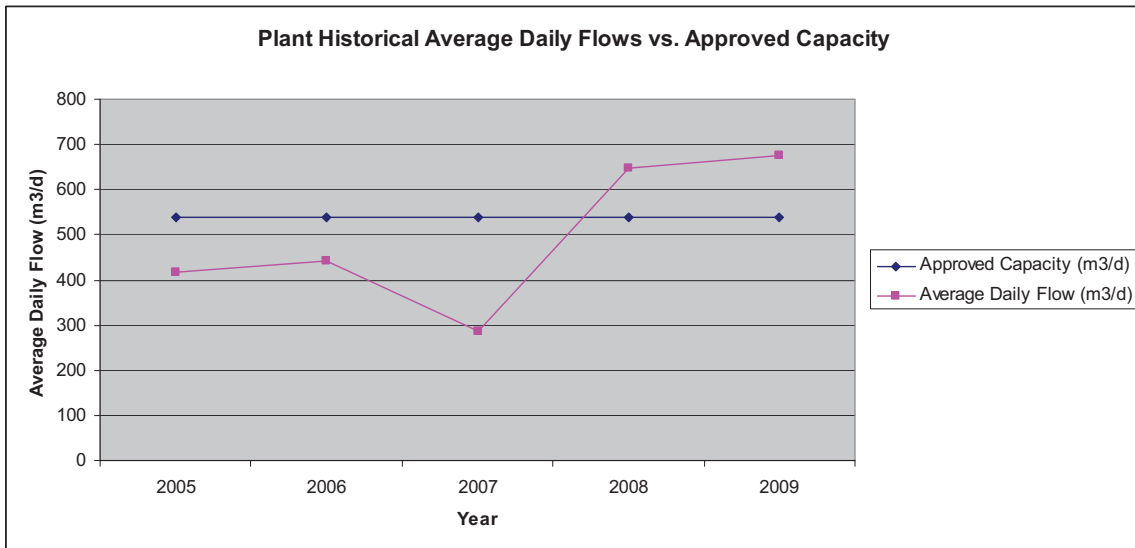


Figure 6c. Plant Historical Average Daily Flows vs. Approved Capacity

3. Description of any operating problems encountered and corrective actions taken:

Please refer to the 'Summary of all By-pass, Spill, or abnormal discharge events throughout inspection period' table for details.

4. Summary of any maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works:

Batawa Wastewater Treatment Plant Upgrades to December 2009

- ✚ New Grit Channel construction
- ✚ New Comminutor at the end of the main grit channel
- ✚ New Motor Control Centre (MCC) panel
- ✚ New Alum pumping system
- ✚ UV contact chamber construction, and new UV disinfection system installation
- ✚ Sludge pump piston repair
- ✚ A computerized maintenance management system will be implemented in 2010
- ✚ Alarm upgrades
- ✚ A new primary clarifier, aeration tank, secondary clarifier, aerobic digesters, aeration blowers, rotary lobe sludge pumps, lab and SCADA control system will be completed in 2010

5. Summary of any effluent quality assurance or control measures undertaken during the reporting period:

Influent and Effluent analyses for BOD, Total Suspended Solids, Total Phosphorus, Total Ammonia Nitrogen, E. Coli, and pH are performed by an accredited laboratory, SGS Lakefield Research Ltd, and the results obtained are used for compliance purposes. In-house analyses are also completed by trained operators, however, *with the exception of Total Chlorine analyses*, these results are not used to determine compliance as there are no quality assurance/control measures in place. These results are used for process management purposes only.



6. 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:

<u>2009 Sludge Production</u>	Biosolids Volume (m³)	Treatment Method	Disposal Site
September 29- October 1,21,29 & November 2	288 m ³	Dewatered in Trenton WWTP	Frankford Landfill
February	Approx. 130	Dewatered in Frankford WWTP	Frankford Landfill
July	Approx. 130	Dewatered in Trenton WWTP	Frankford Landfill
April	Approx. 130	Dewatered in Trenton WWTP	Frankford Landfill

A total of approximately **678 m³** of Biosolids was produced in 2009. The City anticipates a total of **750 m³** of Biosolids will be generated in 2010. Liquid Biosolid land application will be the preferred method of disposal in the future.

7. Summary of complaints received during the reporting period, and any steps taken to address the complaints:

The City did not receive any complaints during this reporting period.

8. Overview of the success and adequacy of the Works:

The operators of the Batawa Wastewater Treatment Plant have been able to operate the plant to a level satisfactory to the City of Quinte West. During a plant upgrade/expansion there are always many obstacles to overcome operationally, and staff have been able to adapt to the many changes taking place at the plant while remaining within compliance during normal operating conditions. Once upgrades are complete at this plant, the City expects the effluent produced by this facility will meet and exceed regulatory requirements.