Executive Summary

The Guelph Wastewater Treatment Plant (WWTP) provides treatment of domestic, commercial, institutional and industrial wastewater collected from the City of Guelph and the neighbouring community of the Township of Guelph/Eramosa. The facility, located at 530 Wellington Street West, provides tertiary treatment with disinfected effluent being discharged to the Speed River.

This report documents the performance of the sewage works as specified in Certificate of Approval 5388-7TXJ6T.

The WWTP provides preliminary screening and grit removal, primary treatment by sedimentation, secondary treatment by conventional and extended aeration activated sludge and two stage tertiary treatments utilizing rotating biological contactors (RBC) followed by sand filtration. Disinfection of the final effluent is a requirement and is accomplished by the addition of sodium hypochlorite followed by the addition of sodium bisulphite for de-chlorination prior to discharge to the receiving stream.

Process loading to the facility in 2011 was within typical values and the sludge accountability for the facility closed at 3% .The average total daily wastewater flow for this reporting period was 49.894 ML/day. The maximum total daily flow was 89.140 ML on May 19th 2011.

Overall, the WWTP performed satisfactorily during the reporting period. A summary of effluent quality data is included as Table 3.1 of this report. The data indicates that the facility recorded annual removal efficiencies of $cBOD_5$ – 98.7%, TSS – 99.1%, TP – 97.2%, TKN 95.3% and NH_3 – 97.7%.

Solids generated during treatment were primarily stabilized by anaerobic digestion and subsequently mechanically dewatered. During the reporting period a total of 4452 dry tonnes of dewatered biosolids were generated. Of this total 783 dry tonnes were beneficially land applied or recycled into a primary digester.

The facility has no provision for primary treatment or raw sewage bypass directly to the Speed River. The facility does have provision for secondary treatment, tertiary (RBC's and or sand filtration) bypass or partial tertiary treatment bypass. All flow through the facility received at a minimum, complete secondary treatment and was chlorinated. There were two (2) bypasses in 2011. Please see section 5.0 for details.

A plant flow diagram of the facilities process operations is presented as Appendix A of this report

Introduction

A key component of a Comprehensive Performance Evaluation (CPE) is to perform a process loading assessment. This evaluation examines the measured flow and mass loading for the population and compares it to typical per capita contributions.
As seen by the table below the City of Guelph WWTP was overall very typical in terms of process loading for 2011.

Process Loading Evaluation
Population : 134,894 (includes Rockwood)

Parameter	Actual	Typical
Per Capita Flows and Loads		
Per Capita Wastewater Flow	372 L/d per person	350-500 L/d per person
Per Capita BOD_5 Loading	72g/d per person	80 g/d per person
Per Capita TSS Loading	84 g/d per person	90 g/d per person
Per Capita TKN Loading	12.7 g/d per person	13 g/d per person
Ratios		
Flows: Peak Day/Annual Average	1.5	2.5-4.0
Raw: TSS/BOD_5	1.2	0.8-1.2
Raw: TKN/BOD_5	0.18	0.1-0.2

Another important part of the CPE is to conduct a Sludge Accountability on the process. Sludge accountability compares measured sludge production from the data collected and compares it to projected sludge production results. This comparison, which has a best practice acceptable range of plus/minus 15%, is valuable in measuring the reliability of the data being collected to properly represent the facility performance. Contributing factors to successful sludge accountability include accurate sampling and a knowledgeable facility staff to take care of the day to day process requirements. Please refer to section 7.0 for more detail on the volume of samples that staff collect and analyze.

For 2011 the City of Guelph sludge accountability resulted in a 3% accuracy which is well within the acceptable variability and therefore validates the reliability of the data collection and analysis.

Sludge Accountability Summary **2011**

Reported Sludge	kg/d	**Projected Sludge**	kg/d
Intentional Wasting	13568	Primary Sludge Production	6786
Unintentional Wasting	99.8	Biological Sludge Production	3524
Side Stream	(2240)	Chemical Sludge Production	807
Total	11,428 kg/d		11,117 kg/d

Sludge Accountability **3%**

Dewatered Cake production is 12,220 kg/d

Note: plus/minus 15% is best practice

Appendix E demonstrates the calculations that were made to obtain the above results.

1.0 Wastewater Flow

A Parshall flume complete with secondary instrumentation is provided immediately downstream of the facilities chlorine contact chamber. The effluent flow rate through the flume is continuously measured, integrated and totalized on a daily basis in the facilities Supervisory Control and Data Acquisition system. This daily data is manipulated electronically in spreadsheet software to calculate and report the average total daily flow and maximum total daily flow for each month. Flow data for the 2011 reporting period is included as Table 1.1 of this report as well as represented in chart 1.0. A comparison of total flow per month between 2010 and 2011 can be seen in chart 1.2

The average total daily flow for the year 2011 is 49,894 ML/d. A maximum total daily flow of 89,559ML was recorded on May 19th 2011.

Table 1.1
City of Guelph Wastewater Treatment Plant
Wastewater Flow Data, Year 2011

2011	Average Total Daily Flow ML	Maximum Total Daily Flow ML
January	41.643	44.202
February	43.035	59.882
March	58.951	85.337
April	56.743	67.961
May	62.922	89.559
June	56.262	82.055
July	45.472	50.271
August	42.260	47.525
September	43.888	47.407
October	47.040	66.881
November	47.217	71.935
December	53.294	63.962
Annual Average	49.894	x
Winter Average	48.828	x
Summer Average	50.655	x

The Summer period is April 1 to October 31.
The Winter period is November 1 to March 31

Chart 1.1

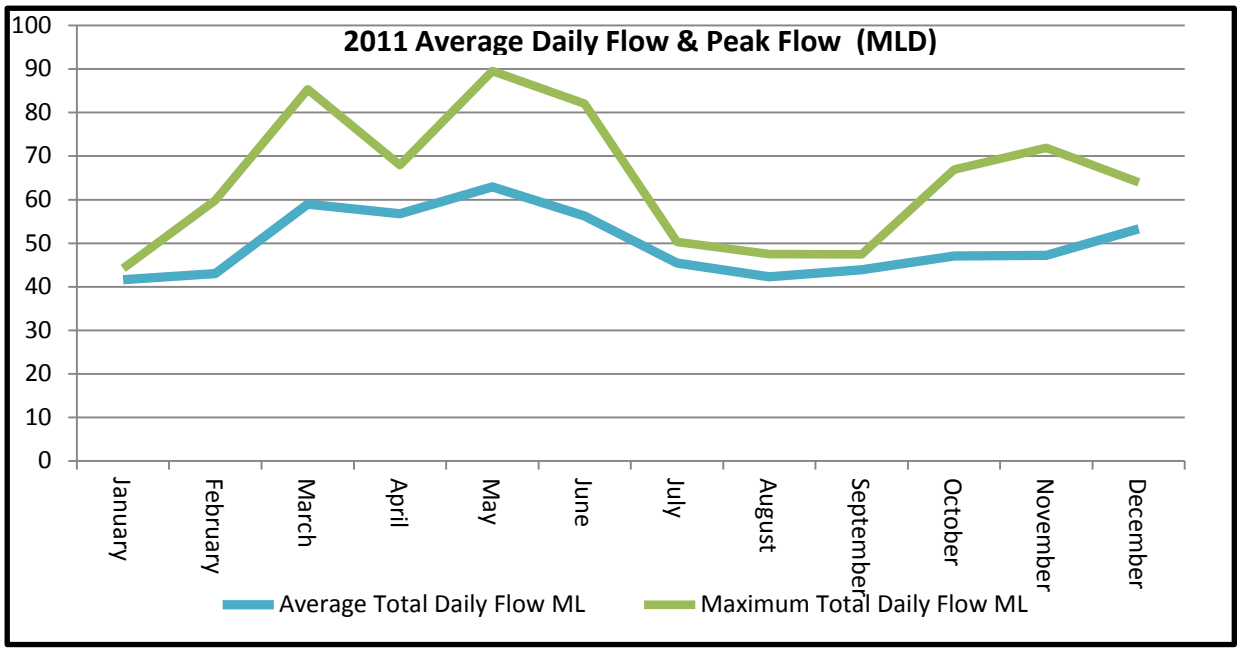
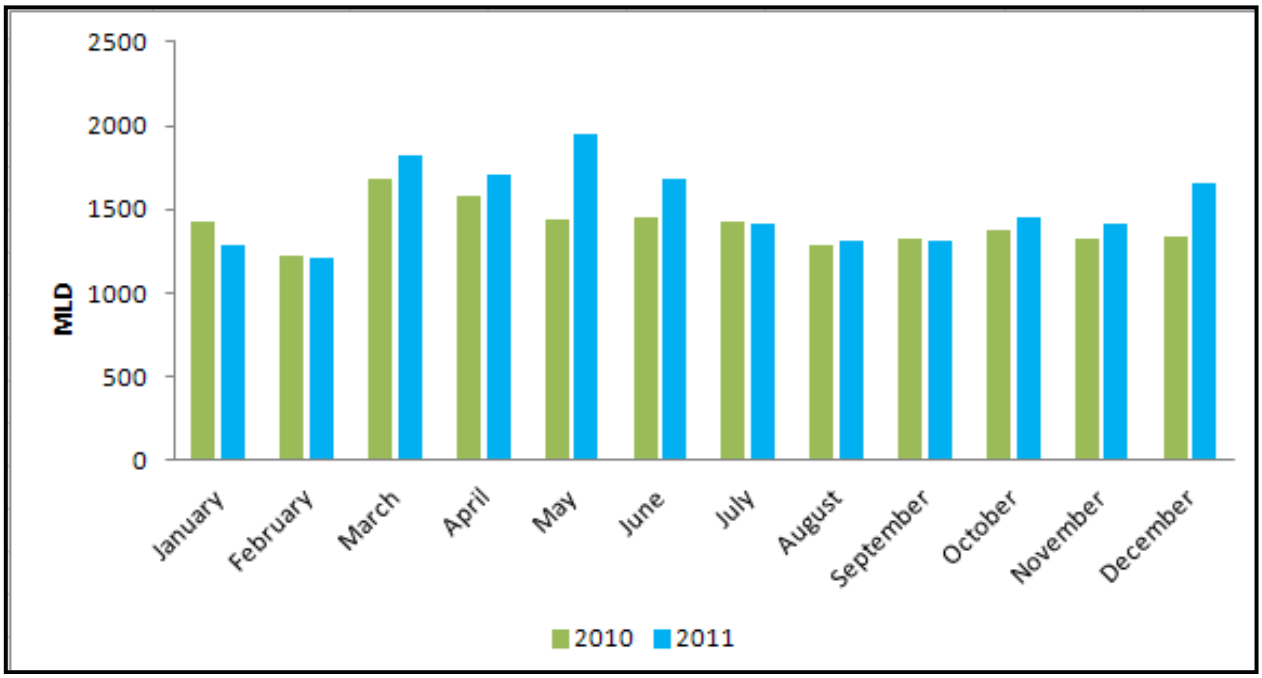


Chart 1.2 illustrates the total monthly flow comparison between 2010 and 2011; to which the facility saw an 8.1% rise is total flow.

Chart 1.2



2.0 Raw Influent Wastewater Quality

Considerable effort is undertaken in monitoring the characteristics of WWTP influent, effluent and intermediate process streams to provide the necessary data for process optimization by plant staff and meet Certificate of Approval monitoring and reporting requirements. Twenty-four hour flow proportional composite samples are routinely collected and analyzed. The raw influent wastewater data analyzed by the Guelph WWTP and CAEAL certified outside laboratories is combined and a monthly summary is presented in Table 2.1.

Table 2.1
City of Guelph Wastewater Treatment Plant
Raw Influent Wastewater Quality Data, Year 2011

2011	pH	[1]$cBOD_5$ (mg/L)	TSS (mg/L)	P_{Tot} (mg/L)	TKN (mg/L)	NH_3-N (mg/L)
January	7.7	214	238	5.71	42.7	25.1
February	7.7	250	242	5.38	45.2	26.3
March	7.7	146	196	4.39	33.6	19.5
April	7.6	130	179	3.99	28.3	16.8
May	7.6	117	196	3.48	23.8	12.9
June	7.6	128	335	3.64	27.0	14.5
July	7.6	150	201	4.31	32.8	17.8
August	7.7	168	236	4.82	33.5	19.8
September	7.7	173	262	5.41	38.0	23.2
October	7.6	180	244	5.16	34.6	22.5
November	7.7	168	278	5.14	37.7	23.7
December	7.7	210	246	4.70	31.7	19.1
Annual Average	7.7	170	238	4.7	34.1	20.1
Winter Average	7.7	198	240	5.1	38.2	22.7
Summer Average	7.6	149	236	4.4	31.1	18.2

3.0 Final Effluent Quality

Primary sedimentation and secondary activated sludge treatment is provided by four separate treatment trains namely Plants 1, 2, 3 and 4. Plants 1, 2, and 3 incorporate conventional activated sludge with the secondary effluent from each of these three plants directed to a common pump well. The combined secondary effluent is lifted by vertical turbine pumps to the rotating biological contactors (RBC) influent distribution channel and evenly split to each of the four RBC trains. Each of the four RBC trains consists of eight shafts in series. The process objective of the RBC's is to provide additional biological treatment for the oxidation of ammonia. Effluent from the RBC trains is discharged to a common sand filter influent channel and distributed to the sand filters for additional suspended solids capture. The Plant 4 treatment train incorporates extended aeration activated sludge and is capable of complete nitrification. As such plant 4 secondary effluent can be directed to a separate pump well which discharges to the common sand filter influent channel for distribution to the sand filters for additional suspended solids capture. Plant 4 secondary effluent can also be directed through the RBC's as plants 1, 2 and 3.

The final treated effluent passes through a Parshall flume and is measured by an ultrasonic transmitter. Both the transmitter and remote recorder are calibrated yearly to ensure accuracy of total flows. (See appendix C) A Plant Flow Diagram is included as Appendix A. Design data for the treatment units are listed in Appendix B.

Effluent quality requirements as specified in the Certificate of Approval differ for summer and winter conditions, as noted below.

An automatic sampling system collects a series of flow paced aliquots from the chlorine contact chamber and combines them in a container within a refrigerated compartment to produce a 24-hour flow proportional composite sample of the treated WWTP effluent. This composite sample is then analyzed in the Guelph WWTP laboratory on-site. Routinely, samples are submitted to an independent Standards Council of Canada (SCC) accredited laboratory for analysis and WWTP laboratory QA/QC. The combined results from the Guelph WWTP and independent laboratory are tabulated in Table 3.1. This table provides a monthly summary of final effluent quality data.

Residual chlorine and sodium bisulphite are constantly monitored in the chlorine contact chamber in keeping with the year round requirement for disinfection. Both sodium hypochlorite and sodium bisulphite application and control is provided by ORP instrumentation. The objective of 200 E. Coli CFU/100mL of sample was met. Performance data is presented in Table 3.1.

As mandated by Environment Canada, the facility has optimized the disinfection/de-chlorination system to reduce the total residual chlorine to the speed river to 0.02mg/L. In addition to independent SCC accredited laboratory analyses, the City of Guelph has continued to develop the quality assurance measures initiated in 1998 at the Guelph WWTP analytical laboratory. This includes continued development and support of a quality management system for laboratory operations designed to meet the requirements of the ISO/IEC 17025 Standard needed for laboratory accreditation.

The goal is to complete the quality management system by the end of 2012, and to apply for ISO/IEC 17025 accreditation in 2013. Some of the initiatives that have been put in place as a result of this goal are the following:

- All test methods have been or are in the process of being validated to prove method performance on site and prove any modifications to test methods are technically valid.

- A quality control program has been instituted for all test methods that have undergone validation. Typical QC samples introduced in a batch of 20 samples includes as appropriate: a method blank, a quality control standard, a calibration check standard, and a sample duplicate. Matrix spike samples are also analyzed to monitor sample matrix interferences. Control limits for QC samples are statistically determined. When control limits are exceeded, corrective action is taken and either the analysis is repeated or the data is qualified.

- Participation in an external proficiency testing regime provided by the Canadian Association for Laboratory Accreditation (CALA).

- Internal training program to ensure laboratory analysts are adequately trained when performing a test method and have proven proficient at the test methods they perform

- A Continual improvement program has been started to provide a systematic method of identifying and addressing issues that would bring about change and eventually impede the consistent production of valid test results.

- Annual ISO/IEC 17025 calibration of key measurement instruments has been implemented for lab balances, pipettes, and thermometers. A daily monitoring program ensures verification of calibration for these instruments.

- A formal document control and records management program has been started to ensure changes to documents are authorized and controlled and laboratory records are managed to ensure integrity.

Table 3.1
City of Guelph Wastewater Treatment Plant
Final Effluent Quality Data, Year 2011

2011	pH	Temp	[1]cBOD$_5$		BOD5		TSS		P_{Tot}		TKN	Total Ammonium Nitrogen		NO_3-N	NO_2-N	[5]E. Coli	TCR	SBR
			Concentration	Loading	Concentration	Loading	Concentration	Loading	Concentration	Loading		Concentration	Loading					
		^{0}C	(mg/L)	(kg/d)	(mg/L)	(kg/d)	(mg/L)	(kg/d)	(mg/L)	(kg/d)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(CFU/100 mL)	(mg/L)	(mg/L)
Jan	7.8	13.4	2.2	91	2.2	91	2	91.1	0.11	4.7	1.75	0.57	23.8	32.3	0.29	10	0	1.47
Feb	7.8	12.7	2.2	88	2.7	109.1	2	97.8	0.11	4.7	1.96	0.85	37.1	33.37	0.24	25	0	1.88
March	7.7	12.1	2	116.5	2.3	129.1	2	120.4	0.12	6.9	2.99	1.83	111.9	26.68	0.39	13	0	1.69
Apr	7.8	13.1	2	115.4	2.8	167	2	113.9	0.12	6.6	1.37	0.38	21.8	28.87	0.22	37	0	2.71
May	7.9	14.5	2.7	180.3	3	204.6	2	143.9	0.12	7.4	1.93	0.49	36.3	24.91	0.28	16	0	1.72
June	8.0	17.2	2.2	123.9	2.2	123.9	2	118.5	0.11	6.5	1.26	0.11	6.1	25.68	0.21	16	0	1.72
July	8.1	19	2	91	2.3	108.8	2	93.1	0.14	6.4	1.32	0.13	6	28.36	0.21	32	0	2.24
Aug	8.1	20.8	2	84.3	2.3	99.4	2	83.8	0.17	7.3	1.17	0.08	3.3	28.03	0.18	65	0	2.04
Sept	7.9	21	2	89.2	2	89.2	2	90	0.16	7.2	1.6	0.28	12.7	30.09	0.06	15	0	1.67
Oct	7.9	18.7	2	91.6	2	91.6	2	106.1	0.15	7.1	1.1	0.17	8.1	29.13	0.12	47	0	0.95
Nov	7.9	17.3	2.4	121.1	2.6	127.3	2	93.2	0.13	6.2	1.03	0.21	12.1	30.02	0.1	38	0	1.27
Dec	8.0	14.8	2	117.3	4.2	251.5	2	112.1	0.13	6.9	1.66	0.47	26.6	25.22	0.24	45	0	0.93
Annual Average	7.9	16.2	2.1	109.1	2.4	126.4	2.0	105.3	0.1	6.5	1.6	0.5	25.5	28.6	0.2	29.92	0.00	1.69
Winter Average	7.8	14.1	2.2	106.8	2.8	141.6	2.0	102.9	0.1	5.9	1.9	0.8	42.3	29.5	0.3	26.20	0.00	1.45
Summer Average	8.0	17.8	2.1	110.8	2.4	126.4	2.0	107.0	0.1	6.9	1.4	0.2	13.5	27.9	0.2	32.57	0.00	1.86
Notes:	1	All cBOD$_5$ and BOD5 analysis conducted by independent CAEAL accredited laboratory only.																
	2	SBR, sodium bisulphite residual																
	3	All analyses based on 24-hour flow paced composite samples.																
	4	The Summer period is April 1 to October 31. The Winter period is November 1 to March 31.																
	5	Escherichia Coli values are calculated geometric means.																
	6	n/a = not applicable – Nr = Not Recorded																
	7	As per the certificate of approval, total chlorine residual is equal to or less than 0.02mg/L																

4.0 Solids Handling and Disposal

The raw sludge produced at the WWTP is thickened in the primary clarifiers and pumped to the anaerobic digestion system which consists of four primary digesters and one secondary digester. The waste activated sludge from all Plants are thickened in a rotary drum thickener and then sent to one of the primary digesters.

Following stabilization by anaerobic digestion, biosolids are directed from the secondary digester to the dewatering facility. The dewatering facility consists of four belt filter presses and associated auxiliary equipment.

A simplified solids flow diagram of the WWTP is presented in Appendix A.

A summary of solids production, handling and disposal is presented in Table 4.1. The results of routine laboratory analysis of the dewatered biosolids are presented in Table 4.2. The results of routine E. coli analysis of the dewatered biosolids are presented in Table 4.3. In reference to Table 4.3 only biosolids that received the Lystek treatment were land applied.

The Rotary Drum Thickener (to thicken Waste Activated Sludge) is automated to run 24hrs/day, provided sufficient waste activated sludge is available. The unit used a combination of cationic and anionic polymers at a ratio of approximately 1.5:1 to assist in thickening the waste activated sludge to 4.38% solids. Table 4.4 will reveal in more detail the monthly totals.

During the reporting period 4452 dry tonnes of dewatered biosolids were generated. Of this total 626 dry tonnes of Lystek processed dewatered biosolids was diverted from landfill and was beneficially land applied. An additional 157 dry tonnes of Lystek product was recycled into a primary digester to support a special study at the facility. Application of a Class A equivalent biosolids material (US EPA 503, CFR Part 40) to registered site numbers 6016-03, 5004-03, 5037-03, 6007-03, and 6033-03 occurred through the haulage and application services provided by Terratec Environmental Incorporated. The quality of the Lystek material can be found in Table 4.2.

The compost infrastructure was utilized as required to load trucks with dewatered biosolids cake to support the landfill aspect of the biosolids program.

In 2011 the biosolids program completely eliminated the practice of bulking (wood amendment plus dewatered cake) for all of the dewatered biosolids that needed to be sent to landfill. The elimination of this practice due to optimized total solids cake production is not only cost effective but is also environmentally friendly by occupying less space in a landfill.

Table 4.1
City of Guelph Wastewater Treatment Plant
Solids Handling and Disposal, Year 2011

Month	Average Digested Solids Total Solids (%)	Digested Solids Pumped to Dewatering (m^3/month)	Average Dewatered Cake Total Solids (%)	Cake Production (wet tonne)	Cake Production (dry tonne)	Average Lystek Total Solids (%)	Lystek to Land Application (m3/month)	Cake Equivalent (dry tonne)	Cake to Lystek (wet tonne)	Cake & Bulking to Landfill (wet tonne)	Cake to Landfill (wet tonne)	Combined to Landfill (wet tonne)
Jan	2.05	17535.28	22.40	1696.42	380.00	14.60	-	-	-	-	1158.58	1158.58
Feb	1.93	17345.73	21.30	1657.72	353.09	13.90	-	-	-	-	939.71	939.71
Mar	2.30	17408.11	22.00	1931.22	424.87	15.10	-	-	-	-	1051.36	1051.36
Apr	2.80	19675.36	22.20	2637.35	585.49	15.00	-	-	-	-	1189.86	1189.86
May	2.17	17772.62	22.10	1846.87	408.16	15.50	426.05	66.04	298.81	-	917.88	917.88
Jun	1.84	17500.09	22.60	1516.50	342.73	15.50	1060.56	164.39	727.38	-	522.94	522.94
Jul	1.93	16310.99	23.30	1427.74	332.66	15.70	807.23	126.74	543.93	-	387.93	387.93
Aug	1.68	14773.57	24.00	1095.48	262.92	14.40	914.57	131.70	548.74	-	519.85	519.85
Sep	1.85	15175.34	21.90	1355.92	296.95	14.60	799.34	116.70	532.89	-	606.56	606.56
Oct	2.23	14908.15	24.30	1451.02	352.60	13.80	493.21	68.06	280.09	-	702.35	702.35
Nov	2.20	15674.40	22.50	1623.82	365.36	15.10	722.27	109.06	484.72	-	1030.89	1030.89
Dec	2.03	16153.59	21.10	1643.56	346.79	-	-	-	-	-	1214.57	1214.57
Totals		200,233.22		19,883.63	4,451.62		5,223.23	782.69	3,416.57	0.00	10,242.48	10,242.48
Average	2.08		22.48		12.20	14.85						

	Lystek to Land Application			Lystek to Digester		Total Lystek Disposal	
	%Solids	m3 applied	Dry Tonnes	m3	Dry Tonnes	m3	Dry Tonnes
Jan	14.60	0.00	0.00	179.0	26.1	179.02	26.14
Feb	13.90	0.00	0.00	289.9	40.3	289.88	40.29
Mar	15.10	0.00	0.00	426.9	64.5	426.90	64.46
Apr	15.00	0.00	0.00	171.4	25.7	171.40	25.71
May	15.50	426.05	66.04	0.0	0.0	426.05	66.04
Jun	15.50	1060.56	164.39	0.0	0.0	1060.56	164.39
Jul	15.70	807.23	126.74	0.0	0.0	807.23	126.74
Aug	14.40	914.57	131.70	0.0	0.0	914.57	131.70
Sep	14.60	799.34	116.70	0.0	0.0	799.34	116.70
Oct	13.80	493.21	68.06	0.0	0.0	493.21	68.06
Nov	15.10	722.27	109.06	0.0	0.0	722.27	109.06
Dec	0.00	0.00	0.00	0.0	0.0	0.00	0.00
Totals		5223.2	782.7	1,067.2	156.6	6290.43	939.29

Lystek Land Application Report			
Site C of A Number	Total Area Applied	Application Rate	Total Volume Applied
	acres	m3/acre	m3
6016-03	32.25	21.44	690.05
5004-03	96.81	20.89	2022.36
5037-03	72.46	20.49	1484.63
6007-03	27.44	22.18	608.62
6033-03	18.83	23.13	417.57
-	-	-	-
Totals	247.79		5223.23
Terratec Environmental			
System C of A Number: 4560-4QDFY9			

Total Volume to Landfill	0.00
Landfill Site	**Wet Tonnes**
Green Lane	
38593 3rd Line	
St Thomas Ontario	
N5P 3T2	
C of A # A051601	

Total Volume to Landfill	3,579.35
Landfill Site	**Wet Tonnes**
Republic Waste Location	
Allied Waste Niagara Fall Landfill, LLC	
5600 Niagara Falls Boulevard	
Niagara Falls, New York	
14304	
DEC Permit # 9-2911-00119/00005	
Facility/Program # 32811	

Total Volume to Landfill	6,663.13
Landfill Site	**Wet Tonnes**
Ridge Landfill	
BFI Canada Inc.	
20262 Erieau Road	
P.O. Box 1871	
Blenheim, Ontario	
N0P 1A0	
C of A # A021601	

Table 4.2
City of Guelph Wastewater Treatment Plant
Biosolids Metal Analysis, Year 2011

	Total Solids (mg/L)		Total Volatile Solids (%)		pH (Units)		C:N Ratio		TKN (ug/g)		NH3 + NH4 as N (Total Ammonium Nitrogen) (ug/g)		NO3- + NO2- as N (Nitrate + Nitrite as Nitrogen) (ug/g)	
	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek
Jan	20.5	14.6	59.7	55.7	7.5	8.3	6.3	7.2	44250	36950	8605	14550	4.5	44.5
Feb	18.2	13.9	60.5	55.4	7.4	8.6	5.3	6.0	51950	41300	9235	13566	4.5	21.0
Mar	21.8	15.1	58.1	54.7	7.4	8.3	5.7	7.1	48650	34750	8675	14475	3.0	11.8
Apr	21.0	15.0	58.9	55.2	7.4	8.4	5.2	6.4	51900	37800	8685	14800	3.0	14.0
May	21.6	15.5	60.3	54.9	7.9	8.7	5.2	6.9	52250	36600	7450	18000	3.0	10.7
Jun	22.7	15.5	59.2	54.5	7.3	8.5	5.4	6.2	48733	39250	8833	14775	3.0	58.5
Jul	21.8	15.7	59.7	53.2	7.5	8.9	5.5	5.8	47700	39225	8090	13975	3.0	10.0
Aug	21.2	14.4	59.2	53.2	7.5	9.2	5.2	5.3	50467	44075	9507	12265	3.0	9.5
Sep	19.3	14.6	59.1	54.3	7.4	8.6	4.5	5.3	53650	44800	8395	16525	2.6	13.0
Oct	21.2	13.8	58.5	53.8	7.4	8.5	4.9	5.0	52300	45633	10900	11113	20.0	57.0
Nov	21.3	15.1	61.8	55.2	7.4	8.3	4.6	6.6	61167	36900	9393	18800	11.5	3.0
Dec	20.0	-	61.3	-	7.3	-	5.1	-	57650	-	10420	-	3.0	-

	Organic N (mg/kg)		Total P (Total Phosperous) (ug/g)		Total K (Potassium) (ug/g)		Cd (mg/kg) (Cadmium)		Cr (mg/kg) (Chromium)		Co (mg/kg) (Cobalt)		Cu (mg/kg) (Copper)	
	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek
Jan	36,000	22,500	33000	29500	1450	53500	1.3	1.2	97.5	88.0	7.5	7.3	805	725
Feb	42,500	27,666	32000	29333	1500	53333	1.2	1.0	84.0	77.7	6.5	6.2	770	690
Mar	39,500	20,000	32500	30500	1850	51500	1.4	1.2	87.0	80.8	6.8	7.4	760	693
Apr	43,500	23,000	31000	28500	1850	49000	1.5	1.3	97.5	84.5	6.7	6.0	770	680
May	45,000	18,700	29500	27333	1400	45666	1.5	1.4	101.0	80.3	7.8	8.0	725	667
Jun	40,000	24,500	27333	27000	1167	47750	1.4	1.5	74.3	71.8	8.5	8.3	703	645
Jul	39,500	25,250	14140	24700	700	39250	2.6	1.4	58.0	89.0	6.9	8.6	465	663
Aug	41,000	31,750	27667	24000	733	40000	1.4	1.3	86.0	75.5	8.7	8.7	763	690
Sep	45,500	28,250	28500	27000	750	40500	1.8	2.0	66.0	68.5	8.4	8.5	730	695
Oct	41,000	34,333	31000	24666	800	39666	2.3	2.1	94.0	111.0	7.9	8.0	740	663
Nov	51,667	18,000	29333	29000	833	42000	1.6	1.6	88.3	86.0	8.2	7.5	717	690
Dec	47,000	-	32000	-	750	-	1.4	-	65.5	-	6.8	-	650	-

	Pb (mg/kg) (Lead)		Mo (mg/kg) (Molybdenum)		Ni (mg/kg) (Nickel)		Zn (mg/kg) (Zinc)		Hg (mg/kg) (Mercury)		As (mg/kg) (Aresenic)		Se (mg/kg) Selenium	
	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek
Jan	35.5	36.0	8.8	9.4	30.5	30.5	1050.0	920.0	0.8	0.8	3.0	3.0	2.5	2.2
Feb	31.5	27.0	7.7	9.0	28.5	26.0	1100.0	946.7	0.7	0.6	3.0	2.3	2.2	1.9
Mar	34.0	31.0	7.3	8.6	27.5	27.8	1100.0	990.0	0.7	1.1	3.0	3.0	3.1	2.6
Apr	42.0	32.0	7.4	7.5	28.0	24.5	1250.0	1100.0	0.7	0.8	3.0	3.0	2.8	2.6
May	40.0	35.0	6.7	8.4	32.0	26.7	1100.0	1053.3	0.6	0.7	3.0	3.0	2.9	2.8
Jun	39.0	36.0	7.3	8.8	27.3	26.3	1133.3	1042.5	1.0	1.0	3.7	4.0	3.4	3.0
Jul	177.0	34.0	5.7	9.7	26.5	27.5	1200.0	1095.0	0.4	0.8	5.5	3.3	2.0	2.9
Aug	30.7	29.0	9.3	10.2	28.7	27.3	1133.3	1025.0	0.8	0.6	3.0	3.0	3.2	2.8
Sep	27.5	25.0	10.8	10.3	27.0	26.8	1100.0	1040.0	0.7	0.7	3.5	2.8	3.0	2.7
Oct	25.0	24.0	9.7	10.7	29.0	26.0	1100.0	1056.7	0.5	0.7	3.0	3.0	2.7	2.7
Nov	27.7	23.0	9.3	10.0	28.3	28.0	1133.3	1100.0	0.7	0.7	2.9	-	2.8	2.6
Dec	25.5	-	7.6	-	25.5	-	1050.0	-	1.7	-	3.0	-	3.6	-

Table 4.3
City of Guelph Wastewater Treatment Plant
Dewatered Biosolids Analysis, Year 2011

E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean
Date	CFU/gm dry weight)		Date	CFU/gm dry weight)		Date	CFU/gm dry weight)		Date	CFU/gm dry weight)		Date	CFU/gm dry weight)	
3-Jan-11	9100	8639	11-Mar-11	15000	20515	16-May-11	2100	10278	19-Aug-11	43000	13307	31-Oct-11	7800	19595
7-Jan-11	120000	17706	14-Mar-11	28000	18649	20-May-11	24000	10626	22-Aug-11	8600	17038	4-Nov-11	53000	22591
10-Jan-11	9200	13790	18-Mar-11	10000	17818	6-Jun-11	22000	10509	26-Aug-11	30000	27691	7-Nov-11	38000	23966
14-Jan-11	30000	23431	21-Mar-11	9400	14096	10-Jun-11	21000	12353	2-Sep-11	50000	27291	11-Nov-11	55000	30488
17-Jan-11	3000	17754	25-Mar-11	24000	15853	13-Jun-11	2900	13391	9-Sep-11	60000	29661	14-Nov-11	9800	32278
21-Jan-11	120000	17754	28-Mar-11	280000	28192	17-Jun-11	7100	9876	12-Sep-11	130000	58485	18-Nov-11	50000	31812
24-Jan-11	6300	16151	1-Apr-11	7400	26148	20-Jun-11	2700	5845	16-Sep-11	36000	61213	21-Nov-11	7900	21481
28-Jan-11	29000	16014	4-Apr-11	940	14704	24-Jun-11	67000	7812	19-Sep-11	7000	37443	25-Nov-11	46000	20542
31-Jan-11	42000	30977	8-Apr-11	41000	16810	27-Jun-11	29000	13892	26-Sep-11	6900	21805	28-Nov-11	7900	19465
4-Feb-11	26000	21134	11-Apr-11	7400	6778	4-Jul-11	4000	12036	30-Sep-11	48000	16997	2-Dec-11	75000	21541
7-Feb-11	6900	21621	15-Apr-11	4600	6018	8-Jul-11	9000	16263	3-Oct-11	3000	9132	5-Dec-11	10000	22849
11-Feb-11	28000	21432	18-Apr-11	17000	12411	11-Jul-11	42000	14471	7-Oct-11	5500	8598	9-Dec-11	300000	36513
14-Feb-11	9000	14582	29-Apr-11	13000	9313	14-Jul-11	11000	11356	14-Oct-11	25000	11862	12-Dec-11	29000	50541
18-Feb-11	7000	10504	2-May-11	5200	8527	18-Jul-11	8200	13589	17-Oct-11	18000	9283	16-Dec-11	55000	46770
1-Mar-11	41000	16399	6-May-11	21000	12464	22-Jul-11	3200	10493	21-Oct-11	30000	16507	19-Dec-11	13000	49941
4-Mar-11	12000	13269	9-May-11	23000	13442	25-Jul-11	4300	5935	24-Oct-11	30000	25227	23-Dec-11	6600	19234
7-Mar-11	24000	16956	13-May-11	11000	12892	5-Aug-11	53000	8794	28-Oct-11	21000	24151	30-Dec-11	29000	19234

E.coli Lystek		4 Sample Geomean	E.coli Lystek		4 Sample Geomean	E.coli Lystek		4 Sample Geomean	E.coli Lystek		4 Sample Geomean	E.coli Lystek		4 Sample Geomean
Date	CFU/gm dry weight)	CFU/gm dry weight)	Date	CFU/gm dry weight)	CFU/gm dry weight)	Date	CFU/gm dry weight)	CFU/gm dry weight)	Date	CFU/gm dry weight)	CFU/gm dry weight)	Date	CFU/gm dry weight)	CFU/gm dry weight)
5-Jan-11	10	10	13-Apr-11	10	10	21-Jul-11	10	10	4-Oct-11	10	10			
12-Jan-11	10	10	18-May-11	10	10	26-Jul-11	10	10	11-Oct-11	10	10			
2-Feb-11	10	10	25-May-11	10	10	3-Aug-11	10	10	18-Oct-11	10	10			
15-Feb-11	10	10	31-May-11	10	10	10-Aug-11	10	10	9-Nov-11	10	10			
22-Feb-11	10	10	7-Jun-11	10	10	17-Aug-11	10	10						
2-Mar-11	10	10	14-Jun-11	10	10	30-Aug-11	10	10						
8-Mar-11	10	10	22-Jun-11	10	10	6-Sep-11	10	10						
15-Mar-11	10	10	28-Jun-11	10	10	13-Sep-11	10	10						
22-Mar-11	10	10	5-Jul-11	10	10	20-Sep-11	10	10						
6-Apr-11	10	10	13-Jul-11	10	10	27-Sep-11	10	10						

Table 4.4
City of Guelph Wastewater Treatment Plant
Thickened Waste Activated Sludge Report (TWAS) Year 2011

2011	Volume to TWAS	Volume from TWAS	Reduction	Solids
	m^3	m^3	%	% D.S.
Jan	5,331	2,070	61	4.11
Feb	4,493	789	82	3.89
Mar	11,542	2,208	81	3.38
Apr	10,392	2,060	80	4.22
May	7,621	1,030	86	4.35
Jun	9,144	1,805	80	4.86
Jul	12,475	2,063	83	4.70
Aug	10,547	1,794	83	4.80
Sep	15,849	2,492	84	4.37
Oct	11,675	2,481	79	5.00
Nov	9,423	2,100	78	4.95
Dec	7,843	2,315	70	3.98
Totals	116,335	23,207	79.1	4.38

5.0 Unusual Events/Process Upsets

The facility has no provision for primary treatment or raw sewage bypass directly to the Speed River but does have provision for secondary treatment, tertiary (RBC's and or sand filtration) bypass or partial tertiary treatment bypass. There were no incidents of secondary treatment bypass.
There were a total of two (2) bypasses in 2011. There was one, emergency tertiary bypass and one, emergency partial tertiary bypass.
Both events are listed in Table 6.1 and were reported to the MOE SAC Office as well as notification made to downstream stakeholders as per standard operating protocol.

Table 5.1
City of Guelph Wastewater Treatment Plant
Bypass Summary 2011

Date	Occurrence Number	Duration hrs/min	m3	cBOD5 mg/L	TSS mg/L	TP mg/L	NH3-N mg/L	Chlorinated
September 18th 2011	0880-8LTRLV	52mins	1500	4.0	430 **	1.40	0.16	yes
November 29th 2011	4555-8-P3TZF	3.5hrs	768	3.0	2.0	0.17	1.20	yes

**The TSS for the plants in service that would have been represented in this sample were 3mg/L, 9mg/L and 10mg/L. It is therefore suspected that the sample submitted for TSS analysis was compromised.

6.0 WWTP Maintenance Upgrades / Modifications

The following is a summary of Capital Projects, upgrades and major maintenance conducted during the reporting period.

TABLE 6.1
City of Guelph Wastewater Treatment Plant
Capital Project Summary, Year 2011

Project	Status
• SCADA upgrade at the plant	Ongoing
• Administration & Laboratory HVAC upgrade	Ongoing
• New Septage receiving station ,EPO Garage, Truck Unloading area	Complete
• New Dechlorination Storage facility	Complete
• Digester 1 cleaning and gas proofing and repairs	Complete
• Digester 5 roof resealed	Complete
• Process Operation Centre Detailed design	Ongoing
• Biosolids Storage Facility Pre design	Complete

TABLE 6.2
City of Guelph Wastewater Treatment Plant
Maintenance Project Summary, Year 2011

Project	Status
• Laboratory Information Management Sys.	Ongoing
• Laboratory Accreditation	Ongoing
• Facility Information Management Sys.	Ongoing
• Implementation of a pump replacement program for facility	Ongoing
• Digester mixer and rebuild program	Ongoing
• Installation of Safety rope wire on all plants	Ongoing
• Rebuild and replace mixers on digesters	Ongoing
• Low lift pump replacement	Pump #2 Replaced
• Fabrication and Installation of Safety guards plant wide	Ongoing
• Install step feed gate electric actuators –plant wide	Completed
• All ferric pumps converted to peristaltic dosing type	Completed
• New sand in East and West filters. Filter nozzles inspected/replaced. • Under drains flushed as well	Completed
• Chlorine building new stairs and work platforms	Completed
• Refurbish Plant 1 primary scum troughs and replace Plant 1 final scum troughs	Completed
• Facility Data/Information Management Sys	Target completion 2012