Walkerton Water Pollution Control Plant

#120001489

2018 Summary Report

Prepared by Veolia Water Canada
For the Municipality of Brockton

Contents

Plant Description

The Walkerton Water Pollution Control Plant is a conventional activated sludge process with a rated capacity of 7,560 m3 per day with a peak capacity of 18,160 m3 per day. The collection system comprises of approximately 40 km of gravity sewers flowing to a single pumping facility on site with 3 pumps fitted with variable speed drives. It has screening and grit removal with 3 primary clarifiers, 4 aeration cells and 4 secondary clarifiers. Phosphorus removal is enhanced by the addition of ferric chloride. Chlorine gas is used for disinfection during the period of April 1st to November 30th each year. The facility has two stage anaerobic digestion and additional sludge storage to ensure favorable conditions for land application. A bio-gas/natural gas generator provides stand-by power to the entire facility.

Plant Performance Summary

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Walkerton Wastewater Annual Report 2018

Facility Classification: Class 3 Waste Water Treatment
Total Design Capacity: 7,560 m3/day
Receiving Waters: Saugeen River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Average	Maximum	Limit
Flow																
Influent Total Flow (m3/mth)	157,194	188,833	137,819	184,160	142,419	97,629	87,335	87,264	80,038	85,837	106,468	127,068	1,482,064	123,505	21,111	**18160**
Influent Average Day Flow (m3/d)	5,071	6,744	4,446	6,139	4,594	3,254	2,817	2,815	2,668	2,769	3,549	4,099		4,080	6,744	**7560**
Influent Max Day Flow (m3/d)	10,148	21,111	6,797	9,163	6,746	3,844	3,344	3,685	3,354	3,606	4,581	5,667			21,111	
Biochemical O2 Demand																
Influent Average Raw CBOD (mg/L)	64	77	67	53	41	61	72	80	63	189	70	43		73	276	
Effluent Average CBOD (mg/L)	2	2	2	2	2	2	2	2	2	2	2	2		2	2	**25**
CBOD Loading (kg/d)	8.98	11.54	8.48	11.83	9.10	6.65	6.08	5.55	5.04	5.50	6.95	8.96		7.9		
Percent Removal	96.9	97.4	97.0	96.2	95.2	96.7	97.2	97.5	96.8	98.9	97.2	95.3		96.9	%	
Suspended Solids														69	226	
Influent Average TSS (mg/L)	57	100	64	56	38	77	56	76	46	152	86	22		69	226	
Effluent Average TSS (mg/L)	2	2	2	2	2	2	2	2	3	2	2	3		2	4	**25**
SS Loading (kg/d)	7.93	9.78	8.48	8.10	9.10	6.65	4.66	4.51	6.37	5.50	5.12	9.76		7.2		
Percent Removal	97.1	98.5	96.9	97.3	94.7	97.4	97.3	97.8	94.6	98.7	98.2	88.4		96.4	%	
Phosphorus																
Influent Average TP (mg/L)	2.48	3.20	2.41	1.56	1.59	1.98	3.02	2.49	2.66	2.82	2.42	1.55		2.35	3.20	
Effluent Average TP (mg/L)	0.25	0.24	0.16	0.16	0.22	0.41	0.33	0.27	0.31	0.33	0.28	0.31		0.27	0.47	**1**
Phosphorus Loading (kg/d)	1.08	1.07	0.44	0.96	1.00	1.36	1.03	0.75	0.77	0.91	0.96	1.36		1.0		
Percent Removal	89.9	92.7	93.6	90.1	86.2	79.3	89.1	89.0	88.5	88.3	88.6	80.0		87.9	%	
Nitrogen Series																
Influent Average NH3+NH4 (mg/L)	11.00	15.70	13.40	10.90	12.80	13.80	27.60	24.80	22.50	19.20	17.30	12.60		16.80	27.60	
Effluent Average NH3+NH4 (mg/L)	0.14	0.54	0.07	0.06	0.11	0.07	0.58	0.57	0.06	0.05	0.05	0.04		0.20	1.11	**3**
NH3+NH4 Loading (kg/d)	0.49	2.13	0.27	0.32	0.49	0.21	1.87	1.50	0.14	0.13	0.18	0.16		0.7		
Effluent Average Nitrate (mg/L)	9.80	9.40	11.30	10.47	15.35	14.45	14.57	14.86	22.05	19.65	15.15	13.95		14.10	23.10	
Effluent Average Nitrite (mg/L)	0.13	0.57	0.25	0.02	0.34	0.02	0.10	0.25	0.03	0.02	0.02	0.02		0.15	0.66	
Unionized Ammonia (ug/L)	0.001	0.001	0.000	0.000	0.000	0.000	0.017	0.006	0.000	0.000	0.000	0.000		0.002	0.033	**0.02**
pH																
Influent Average pH	7.10	7.12	7.05	7.35	7.33	7.11	7.45	7.26	7.21	7.25	7.26	7.63		7.24	7.63	
Effluent Average pH	7.47	7.33	7.34	7.35	7.38	7.34	7.85	7.50	7.43	7.52	7.54	7.87		7.49	7.92	
Total Chlorine																
Avg. Chlorine Analyzer Reading (mg/L)			0.29	0.52	0.46	0.53	0.66	0.60	0.45	0.41	0.46	0.43		0.51	1.33	
Disinfection																
E.Coli Geo.Mean per 100mL				86	1	9	1	6	1	1	21			15.8	86	**200**

Metals Summary

VEOLIA WATER

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Facility Classification: Class 3 Waste Water Treatment

Total Design Capacity: 7560 m3/day

Receiving Waters: Saugeen River

Final Effluent	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		PWQO	ODWO
Nickel; Ni (mg/L)															
Min:	0.003	0.005	0.008	0.003	0.004	0.004	0.010	0.005	0.006	0.006	0.007	0.005	**0.003**		
Max:	0.006	0.007	0.009	0.004	0.005	0.005	0.012	0.009	0.007	0.006	0.008	0.005	**0.012**		
Avg:	0.005	0.006	0.009	0.004	0.005	0.005	0.011	0.007	0.007	0.006	0.008	0.005	**0.006**	0.025	
Zinc; Zn (mg/L)															
Min:	0.020	0.020	0.020	0.020	0.020	0.030	0.020	0.020	0.020	0.020	0.020	0.010	**0.010**		
Max:	0.020	0.020	0.020	0.020	0.030	0.030	0.050	0.020	0.020	0.020	0.020	0.030	**0.050**		
Avg:	0.020	0.020	0.020	0.020	0.025	0.030	0.035	0.020	0.020	0.020	0.020	0.020	**0.022**	0.030	5.0
Copper (mg/L)															
Min:	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.005	0.004	**0.002**		
Max:	0.002	0.002	0.003	0.003	0.004	0.003	0.004	0.005	0.004	0.007	0.005	0.004	**0.007**		
Avg:	0.002	0.002	0.003	0.003	0.004	0.003	0.004	0.004	0.004	0.006	0.005	0.004	**0.003**	0.005	1.0
Chromium (mg/L)															
Min:	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	**0.0030**		
Max:	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	**0.0030**		
Avg:	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	**0.0030**	0.001	0.05

Notes:

Limits are taken from the "Provincial Water Quality Objectives" July 1994 and "Ontario Drinking Water Objectives"

- Nickel concentration in the final effluent averaged 24% of the limit stated in the Provincial Water Quality Objectives (PWQO), the processed hauled sludge metals limit within the Nutrient Management Act does not pose a concern presently.
- Copper average concentration in the final effluent was 60% of the limit stated in the Provincial Water Quality Objectives (PWQO) at .003 mg/l. Although objectives are being met, monitoring should be continued.
- Zinc averages 73% of the PWQO with an average of 0.022. Although the average concentration is less than the Objectives, monitoring should be continued.

- Chromium averages were over the PWQO objective. Our annual average exceeded the PWQO of 0.001mg/l by 0.002 mg/l with an average of 0.003 mg/l. It should be noted that the average concentration of Chromium was less than Ontario Drinking Water Objective of 0.05mg/l.

Operating Problems Encountered

- Low loading levels to the plant allow clarifiers and two of the aeration cells to be cycled in and out of operation. This allows for more energy efficiency and improved plant operation.
- The effluent quality from the plant continues to be excellent, but close monitoring of Copper, Zinc and Chromium is ongoing.
- There are significant differences between “dry period” flows and “wet period” flows. This is not unusual for older collection systems.

Major Maintenance

While there were numerous breakdowns of the equipment at the WPCP in 2018 none significantly impacted the effluent quality.
Additional maintenance other than routine maintenance included:

- 2018 Digester Roof Project
- January - Insulators finished the primary digester roof
- February 27th- Installed a new furnace in the dry well
- April- Rebuilt Raw Sludge Pump #1, Removed Raw Sewage Pump #3 to be rebuilt
- September 17th- Sent Blower 1 and Return Activated Sludge pump #1 away to be rebuilt
- October 31st- Effluent pump stopped working. Will need to be replaced
- November 20th- Replaced air tubing and main valve for the grit chamber air lift tubes

QA/QC Measures

All required regulatory and ECA required analyses were performed by E3 Laboratory Services. In addition routine in house laboratory sampling was undertaken to ensure compliance and included, but was not limited to 30 minute suspended solids, mixed liquor suspended solids, final effluent dissolved and total phosphorus, pH, NH3&4, temperature and total chlorine (when chlorinating).

Effluent Monitoring Equipment

The following is a list of the monitoring equipment at the WPCP for the final effluent:

- Hach CL17 – Total Chlorine analyzer.
- Hach DR2800 – Total Phosphorus, Dissolved Phosphorus, Ammonia, and Total Solids
- Hach Sension 1 – pH
- Hach DO Analyzer- Dissolved Oxygen
- Hach Pocket colorimeter – Total Cl2 residual
- Digital Scale MLSS

Calibration and Service of Equipment

- April 5th – Annual inspection of all safety equipment.
- April 30th – Calibration of gas detectors by Hetek
- March 26th – Backflow prevention device inspections by Troy's Plumbing
- June 4th/July 17th - Calibration of flow monitoring equipment by ICS – Influent, Effluent
- November 7th - Calibration of gas detectors by Hetek

Effluent Objectives

Operations staff completed the following testing to ensure Effluent Objectives were met :

1. Ammonia tests are performed to monitor overall plant performance.
2. Dissolved Phosphorus tests were used to indicate the required Ferric Chloride dosage.
3. Total Chlorine was measured to ensure that E Coli. levels were kept below 200 cfu/100ml.
4. pH measurements were taken to ensure levels were between 6.0 and 9.0 and water quality.
5. Dissolved oxygen was measured to ensure that adequate aeration is being carried out.
6. Mixed liquor suspended solids tests are used to determine adequate microbiological populations and to set the sludge wasting rates.

Biosolids Volume

The volume of biosolids hauled in 2018 was approximately 2801 m3. This volume increased from 2017 due to emptying the Primary Digester for the installation of a new roof. On August 10th 1157 m3 of biosolids were hauled to NASM Plan # 23493. On August 13th, 14th, and 15th a total of 1644 m3 of biosolids were hauled to NASM Plan # 23554.
In 2019 it is expected that a similar amount of biosolids will be hauled based on current levels in the Digesters and Holding Tank.

Customer Complaints

No complaints were known to have been received.

By-Passes/Abnormal Discharge Events

There were no by-passes in 2018. However, on February 20th and 21st the daily discharge flow was exceeded by 465 m3 and 1379 m3. The cause for this was excessive snow melt/rain. The exceedance was reported to the MOE inspector and no further action was required. All effluent parameters were at acceptable levels during the high flow events.

Information for the District Manager

No additional information was known to have been requested from the District Manager.

Recommendations

1. An alternative to the coarse bar screen, such as a step screen, should be considered to reduce excess solids into the entry of the wet well of the sewage pumping station. This would also decrease the wear on the sewage pumps as well as the frequency of plugging.
2. The existing chlorine disinfection process should be replaced with Ultra Violet disinfection in time for the 2021 Federal Regulation Deadline
3. Upgrading of the sewage collection system must continue to take place. A decrease in infiltration would decrease costs and risks of operational by-passes during extreme wet periods.
4. Long term plans to replace secondary clarifier floating traveling bridges with chain and flight sludge collection should be considered due to the reliability issues of the floating carriage system.
5. Long term plans to replace the existing comminutor with a second step screen as a stand-by or for higher flows.
6. Investigate concrete failure and steps to repair or prevent further corrosion.
7. Provide lifting devices and beams to maintain pipes, pumps and other heavy equipment.
8. Install a continuous gas monitor in the dry/wet well including an audio/visual alarm inside and outside of the building.
9. Replace aging sludge mixers in sludge holding tank with new energy efficient ones.

Safety Incidents

There were no Safety Incident at the Walkerton Wastewater Treatment Plant in 2018.

Walkerton Sewage Treatment Plant

2018 Annual Report

Appendix 1

Sludge Holding Tank Summary

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Facility Classification: Class 3 Waste Water Treatment
Total Design Capacity: 7,560 m3/day
Receiving Waters: Saugeen River

Sludge Holding Tank

Month	Phosphorus Average (mg/L)	Total Suspended Solids (mg/L)	Ammonia Average (mg/L)	Arsenic Average (mg/L)	Cadium Average (mg/L)	Cobalt Average (mg/L)	Chromium Average (mg/L)	Copper Average (mg/L)	Mercury Average (mg/L)	Molybendium Average (mg/L)	Nickel Average (mg/L)	Lead Average (mg/L)	Selenium Average (mg/L)	Zinc Average (mg/L)
Jan '18														
Feb '18	1,100	32,000	604.0	0.20	0.03	0.47	3.63	29.1	0.10	0.37	3.34	1.9	0.86	37.10
Mar '18														
Apr '18	784	25,000	615.0	0.20	0.02	0.37	3.05	25.7	0.10	0.32	2.62	1.3	0.60	31.70
May '18	782	24,000	518.0	0.20	0.02	0.37	2.96	24.3	0.10	0.35	2.63	1.3	0.57	30.50
Jun '18	716	47,300	545.0	0.20	0.02	0.33	2.56	21.3	0.10	0.28	2.30	1.1	0.64	26.90
Jul '18	520	19,200	588.0	0.20	0.02	0.28	2.07	16.7	0.10	0.24	1.90	0.9	0.58	21.30
Aug '18	518	17,700	607.0	0.20	0.02	0.28	2.03	17.2	0.10	0.24	1.84	0.9	0.31	21.40
Sep '18	2,140	72,000	578.0	0.20	0.05	0.87	6.30	51.8	0.13	0.61	5.69	4.7	0.91	65.00
Oct '18														
Nov '18														
Dec '18														
Average	937.14	33,885.71	579.29	0.20	0.03	0.42	3.23	26.59	0.10	0.34	2.90	1.73	0.64	33.41
Ratio				2896	22528	1365	179	22	5555	1683	200	335	907	17
Min Limit				**100**	**500**	**50**	**6**	**10**	**1500**	**180**	**40**	**15**	**500**	**4**