

**ARNPRIOR  
WATER POLLUTION CONTROL CENTER  
SUMMARY REPORT  
2018**

PREPARED BY  
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## **PRELIMINARY TREATMENT**

### **Screen Units**

There are two screening units, the automatic mechanical screen and the standby manual screen. Both screens have openings of 13 mm between bars and are enclosed with an odour enclosure where the air is discharged to the exterior atmosphere through a carbon filter.

The screenings are then transferred onto a conveyer that empties into a container for disposal at the Arnprior landfill.

### **Grit Removal**

Grit removal is achieved by a pair of rectangular aerated spiral roll 90 m<sup>3</sup> tanks. Each tank has a grit screw conveyer which pushes settled grit into the grit hoppers. Grit is then pumped into a grit dewatering classifier unit where dense grit particles are separated from light organic solids.

## **PRIMARY TREATMENT**

### **Primary Sedimentation**

There are four rectangular primary clarifiers at the WPCC: two with a surface overflow area of 142 m<sup>2</sup> and two with an overflow area of 154 m<sup>2</sup>. All units are equipped with chain and flight sludge collection and manual scum removal.

Raw sludge is pumped from the primary clarifiers to Anaerobic Digesters using plunger type positive displacement pumps.

## **SECONDARY TREATMENT**

### **Activated Sludge Treatment**

The activated sludge treatment process includes two rectangular aeration tank and three separate rectangular secondary clarifiers, each made up of two units in parallel. The aeration tank volumes are 1,303 m<sup>3</sup> each, and are equipped with four inlet gates and one outlet slide plate for isolation.

The secondary clarifiers have a surface area of 310 m<sup>2</sup> each. They are equipped with longitudinal and cross chain and flight collector mechanisms, which collect the activated sludge into a sump where it is returned to the aeration tank.

### **Phosphorous Removal**

The phosphorous control system consists of two 12,100 Litre indoor ferric chloride chemical storage tanks and two chemical feed pumps complete with calibration cylinders. The ferric chloride is added to either the aeration tank or preliminary discharge depending on operational requirements.

### **Chlorination System**

Disinfection of the plant discharge is done through the addition of Sodium Hypochlorite (NaOCl). The NaOCl is stored in a pair of 12,100 Litre tanks, and a bank of three variable speed metering pumps are used to deliver the chlorine to the chlorine contact chamber.

### **De-chlorination System**

The chlorinated water must be de-chlorinated before discharge into the Ottawa River. This is achieved through the addition of sodium bisulfate. The sodium bisulfate system is made up of one 1,336 Litre storage tank and a pair of feed pumps.

### **Sludge Dewatering**

A Centrifuge capable of processing 7 Litres of sludge per second is used for dewatering anaerobically digested sludge. The sludge from this unit is loaded onto a dump truck and delivered to the Arnprior landfill.

### **Auxiliary Power**

The Arnprior WPC is equipped with a 400 Kw diesel generator and automatic transfer switch. This generator will automatically start when a power outage occurs, and can supply power to run the entire plant.

### **Plant Performance Summary (4.3- a)**

The following table indicates the effluent criteria for the Arnprior pollution control plant, criteria is based on an annual average although the new Certificate of Approval for the upgraded plant will be based on a monthly average. The effluent results for 2018 were within these parameters.

Parameter	Effluent Criteria	
	Effluent Limit	Effluent Loading
CBOD <sub>5</sub> (mg/L) *	25	243 kg/day
Suspended Solids (mg/L) *	25	243 kg/day
Total Phosphorus (mg/L) *	1.0	9.7 kg/day

Total Ammonia as Nitrogen (mg/L)	Non-Acutely Lethal to Rainbow Trout and Daphnia Magna	n/a
E.coli CFU/100 mL	200	n/a
Total Residual Chlorine (mg/L)	0.10	n/a
pH	6.0 to 9.5	n/a

\*NOTE: Monthly average concentrations.

COMPLIANCE DATA 2018							
MONTH	SUSPENDED SOLIDS		PHOSPHOROUS		B.O.D / CBOD		E.COLI Geo-Mean
	Influent. mg/L	Effluent. mg/L	Influent. mg/L	Effluent. mg/L	Influent. mg/L	Effluent. mg/L	
JAN.	201.20	6.46	4.90	0.18	194.80	3.00	10.6
FEB.	182.60	8.84	4.12	0.32	123.00	5.25	3.9
MAR.	640.17	5.26	4.38	0.17	309.75	3.00	2.8
APR.	339.00	1.90	3.44	0.13	205.50	4.75	9.8
MAY	286.60	3.60	3.23	0.14	151.80	3.00	17.6
JUN.	245.20	3.86	0.36	0.36	185.50	3.25	6.7
JUL.	309.89	5.56	3.19	0.26	167.60	4.20	228.3
AUG.	1,612.80	5.50	11.86	0.30	609.25	3.50	18.0
SEPT.	658.00	3.82	10.55	0.33	384.50	4.00	10.4
OCT.	939.00	6.17	6.15	0.35	13.40	6.00	48.4
NOV.	435.33	5.62	7.38	0.23	586.50	5.75	12.4
DEC.	321.80	3.40	3.26	0.16	134.75	3.25	2.6
AVG	514.30	5.00	5.23	0.24	255.53	4.08	31.0
MAX	1,612.80	8.84	11.86	0.36	609.25	6.00	228.3
MIN	182.60	1.90	0.36	0.13	13.40	3.00	2.6

### Monitoring Data Interpretation (4.3 b & c)

**The Total Suspended Solids (TSS)** in the raw and effluent wastewater is usually measured 3 times per week from a composite sample. The effluent reporting criteria is 25 mg/l and the plant target is 15 mg/l. The average monthly effluent TSS in 2018 was 5.00 mg/l and the monthly maximum average result was 8.84 mg/l in February. The TSS removal efficiency at the WPCC was 99% in 2018. Non-compliance with respect to plant effluent loading of Suspended Solids is 243 kg/d. The WPCC had an average daily effluent loading of 27 kg/d in 2018.

**The Total Phosphorous (TP)** in the raw and effluent wastewater is sampled and tested each week from composite samples. The reporting criteria is 1.0 mg/l and the plant target is 0.5 mg/l.

The average monthly TP levels in 2018 was 0.24 mg/l with a monthly high average of 0.36 mg/l in June. The Total Phosphorous non-compliance loading rate is 9.7 kg/d and in 2018 the average daily TP loading rate was 1.36 kg/d.

**Five day Biological Oxygen Demand (CBOD<sub>5</sub>)** is sampled once per week from a composite sample. The effluent reporting criteria is 25 mg/l and the plant target is 15 mg/l. The average monthly CBOD<sub>5</sub> in 2018 was 4.08 mg/l with a monthly average high of 6.00 mg/l in October. The CBOD<sub>5</sub> removal efficiency at the WPCC was 98 %. The CBOD<sub>5</sub> non-compliance loading rate is 243 kg/d, and in 2018 the plant averaged an effluent loading rate of 24 kg/d.

**Total Kjeldahl Nitrogen (TKN)** is the sum of organic nitrogen, ammonia (NH<sub>3</sub>), and ammonium (NH<sub>4</sub><sup>+</sup>) in the chemical analysis of soil, water, or wastewater (e.g. sewage treatment plant effluent). To calculate Total Nitrogen (TN), the concentrations of nitrate-N and nitrite-N are determined and added to TKN. There is no effluent limit criteria for TKN, The average monthly TKN levels in 2018 was 8.92 mg/l with a monthly high of 14.95 mg/l in February.

**Chloride** is common in human diet and passes through unchanged through the digestive system. It can also be increased by industrial processes. There are no effluent limit criteria for Chloride, the average monthly chloride level was 198 mg/l with a monthly high of 352.25 mg/l in April.

**Conductivity** is a measure of the ability of water to carry an electric current. If the wastewater has too many molecules of organic compounds it cannot conduct a current as well. There are no effluent limit criteria for Conductivity, the average monthly Conductivity in 2018 was 1,101 µmho/cm with a monthly high of 1,777 µmho/cm in April.

**Ammonia** is present naturally in wastewater, the effluent target for Ammonia is 10 mg/l. The toxicity limit for Ammonia is tested using a lethality test with Rainbow Trout and Daphnia Magna. The average monthly Ammonia concentration was 5.16 mg/l, the monthly high was 11.29 mg/l in February. All toxicity samples taken in 2018 passed.

**Nitrate** is found in small amounts in wastewater but can be formed during the nitrifying process at biological treatment plants, there are no effluent criteria for Nitrate, and the average monthly nitrate concentration in 2018 was 11.04 mg/l with a monthly high of 20.20 mg/l in October.

**Nitrite** is formed during the reduction of ammonia and nitrate, there are no effluent criteria for nitrite, the average monthly nitrite concentration in 2018 was 0.97 mg/l and the monthly high was 4.1 mg/l in July.

**Total Phosphorus** is normally found in wastewater and if discharged to a receiving water can stimulate the growth of plants life in nuisance quantities. The effluent limit for Total Phosphorus is 1.0 mg/l. The average monthly phosphorous concentration in 2018 was 0.24 mg/l with a monthly high of 0.36 mg/l in June.

### Plant Flow Summary (4.3 b & c)

The WPCC has a permit under the Certificate of Approval to discharge an effluent of 9,700 m<sup>3</sup>/d averaged over the year, and a peak hourly flow of 59,200 m<sup>3</sup>/day. The average daily flow in 2018 was 5,335 m<sup>3</sup> per day, or 55% of the C of A permitted flow. There were plant bypasses in July and September, these were due to high rainfall events and were reported to the Ministry of Environment.

A summary of the 2018 plant flow is as follows:

Month	Maximum Daily Flow M <sup>3</sup>	Effluent M <sup>3</sup>	Secondary Bypass M <sup>3</sup>	Plant Bypass M <sup>3</sup>	Average Daily Flow M <sup>3</sup>
January	8,841	141,976	0	0	4,738
February	8,759	146,350	0	0	4,837
March	9,334	187,994	0	0	5,956
April	13,375	171,628	0	0	9,347
May	11,121	179,875	0	0	5,526
June	9,051	168,630	0	0	4,513
July	10,413	152,359	0	58	4,514
August	9,322	144,946	0	0	4,440
September	10,516	139,648	0	1,018	4,573
October	10,516	147,445	0	0	4,632
November	9,019	152,809	0	0	5,200
December	10,029	122,270	0	0	5,740
Avg	10,025	154,661	0	90	5,335
Max	13,375	187,994	0	1,018	9,347
Min	8,759	122,270	0	0	4,440
Total		1,855,930	0	1,076	

### Plant Maintenance (4.3 d)

Plant maintenance scheduled and tracked using a computerized maintenance system. A weekly maintenance schedule is printed out and the maintenance personnel initial the schedule as tasks are completed. If any major repairs are required, the operator fills out a work order detailing work required and parts needed.

A summary of major repairs or maintenance carried out in 2018 is as follows:

- Replaced two valve actuators on Primary Clarifier #1.
- Replaced Chain and Flights in Primary Clarifier #2
- Replaced Chain and some flights in Secondary Clarifier #1
- Installed Heat Trace and insulation on outdoor methane gas lines on Digester #1.
- Replace Media in Odour Control Unit.
- Repaired leaks on Sodium Hypochlorite storage tanks.
- New check valve on Secondary Clarifier scum line.
- Installed new Waste Activated sludge automated valve.
- Rebuilt one Primary Clarifier #3 sludge pump.

### Operational Problems (4.3 e)

There are many, day to day adjustments or repairs that the operators must carry out in addition to the major maintenance listed below.

Major operational problems that occurred in 2018 are as follows:

- The collector chain in secondary clarifier #1 snapped, causing extensive damage to several flights. This was repaired with spare parts that were on hand, and the clarifier was returned to service.
- A problem with a chlorine dosing pipe resulted in an elevated E-Coli result in the plant effluent in July 2018, this was reported to the MOE Spills Action Center. The pipe was immediately repaired and proper chlorine dosing resumed.

### Proposed Alteration (4.3 f)

- There are no proposed plant alterations planned for 2019

### Sludge Processing (4.3 g,h)

Combined primary and secondary waste activated sludge is collected from all four primary settling tanks, and pumped into the anaerobic Digesters. From the Digesters sludge is pumped into holding tanks, it is then conditioned and processed in the centrifuge. Sludge is dewatered to approximately 22% and loaded onto a truck and transferred to the Arnprior landfill and landfilled. There was a total of approximately 145,696 kg dry weight of sludge transported to the Arnprior Landfill. Sludge production in 2019 is expected to be slightly higher than 2018. A summary of the sludge processed is as follows:

<b>SUMMARY OF SLUDGE MANAGEMENT</b>				
<b>FILTER OPERATION</b>				
<b>Month</b>	<b>Sludge To Storage m<sup>3</sup></b>	<b>Sludge To Filter m<sup>3</sup></b>	<b>% Solids Avg.</b>	<b>Dry Solids (kg)</b>
Jan	942	426	3.48	14,825
Feb	1,051	430	3.50	15,036
Mar	986	265	3.53	9,355
Apr	939	370	3.64	13,459
May	407	527	3.49	18,403
Jun	612	480	3.17	15,192
Jul	598	385	3.17	12,192
Aug	620	525	2.52	13,248
Sep	701	430	2.56	11,002
Oct	710	271	3.25	8,815
Nov	1,073	79	3.23	2,554
Dec	1,185	363	3.20	11,616
Avg	819	379	3.23	12,141
Max	1,185	527	3.64	18,403
Min	407	79	2.52	2,554
Total	9,824	4,551	38.73	145,696

## Wastewater Profile

In addition to the above compliance sampling and analysis, the table below outlines the monthly average results of various characteristics of the treated wastewater. These samples are taken with composite samplers and sent to a certified laboratory:

ARNPRIOR EFFLUENT CHARACTERISTICS										
Month	Total Phosphorous mg/l	Ammonia mg/l		TKN mg/l	CBOD <sub>5</sub> mg/l	Nitrate mg/l	Nitrite mg/l	E. Coli Geomean Density 100 org/100mL	Chloride	Total Suspended Solids
	Effluent	Un-ionized Ammonia	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent
Jan	0.18	0.00891	8.02	10.18	3.00	14.02	0.58	4.4	286.00	10.6
Feb	0.32	0.02220	11.29	14.95	5.25	11.08	0.30	13.7	234.50	3.9
Mar	0.17	0.02356	7.13	9.75	3.00	7.75	0.33	8.5	333.75	2.8
Apr	0.13	0.01258	8.70	11.50	4.75	1.38	0.10	3.6	352.25	9.8
May	0.14	0.00442	1.90	3.02	3.00	5.74	0.38	13.4	168.24	17.6
Jun	0.36	0.00157	1.85	3.80	3.25	12.23	0.65	6.3	180.00	6.7
Jul	0.26	0.00432	3.30	12.42	4.20	14.16	4.10	9.1	136.60	228.3
Aug	0.30	0.01181	4.58	6.83	3.50	9.28	1.78	11.9	87.93	18.0
Sep	0.33	0.00524	6.22	8.30	4.00	10.75	1.28	52.7	97.65	10.4
Oct	0.35	0.00000	0.49	13.40	6.00	20.20	1.40	83.7	6.00	48.4
Nov	0.23	0.00727	4.73	7.68	5.75	13.93	0.60	7.7	225.75	12.4
Dec	0.16	0.00635	3.76	5.28	3.25	12.00	0.20	2.4	279.25	2.6
Objective	.75		10.0		15.0			100		
Avg	0.24	0.00902	5.16	8.92	4.08	11.04	0.97	18.1	198.99	31.0
Max	0.36	0.02356	11.29	14.95	6.00	20.20	4.10	83.7	352.25	228.3
Min	0.13	0.00000	0.49	3.02	3.00	1.38	0.10	2.4	6.00	2.6

## Calibration (4.3 i)

All flow meters were calibrated on site by a service contract given to Endress + Hauser Canada Ltd., the manufacturer of the meters. A company representative applied a number of performance checks to the meters and all meters were accurate within  $\pm 1\%$ .

## Conclusion

The Arnprior WPCP met all MOE sewage effluent criteria, except in July when a problem with a Chlorine Injection pipe resulted in high E-Coli results in the plant effluent in 2018. This issue was reported to the MOE Spills Action Center, and the pipe was immediately repaired and proper chlorine dosing resumed. For inquiries regarding this report, please contact Mike Trumble at 623-4231 Ext. 1834.

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