

**MUNICIPALITY OF WEST ELGIN**  
**RODNEY WASTEWATER TREATMENT PLANT**

**2017 ANNUAL REPORT**  
**January 1 to December 31, 2017**

**Environmental Compliance Approval # 3-0871-88-949**

Prepared by:



**Ontario Clean Water Agency**  
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## **Section 1: Overview**

The wastewater treatment plant was operated under Environmental Compliance Approval 3-0871-88-949 dated April 12, 1994 with amendments September 24, 1998.

### **Collection System**

The collection system contains gravity sewers that lead to the Main Pumping Station located on Furnival Road. It contains a wet well with two submersible pumps that pump to the treatment plant. Backup power is supplied by an onsite generator.

### **Plant Description**

The Rodney Wastewater Treatment Plant is an extended aeration facility which consists of: extended aeration, settling, UV disinfection (seasonal), phosphorus removal, and filtration. The extended aeration process is designed to remove carbonaceous and nitrogenous organic compounds (BOD). Aluminum Sulphate is used for phosphorus removal. After the clarifier the effluent is filtered and seasonally disinfected using ultraviolet light, then discharged to Sixteen Mile Creek. Sludge is directed to the lagoon for storage and settling. Decant liquid off the lagoon is returned to the influent of the plant.

### **Process Details**

- Wastewater is directed into the sewage lift station from the Village of Rodney by gravity. Wastewater is pumped from the sewage lift station located near the junction of Furnival Road and King Street by force main into a reinforced concrete splitter chamber, provided with a mechanical rake bar screen.
- The secondary treatment system consists of two aeration basins, one reinforced concrete clarifier tank and two return activated sludge pumps.
- The phosphorous removal system consists of one 30,000 L fiber reinforced tank with spills containment equipped with 2 diaphragm type metering pumps (1 duty and 1 standby).
- Three mechanical aerators in each aeration tank provide oxygen at a low pressure in the aeration tanks.
- The tertiary treatment system consists of four (4) continuous back wash 2 metre deep bed, granular single media sand filtration units housed in the filter building. Hydrogen peroxide is introduced for filter cleaning when necessary.
- The disinfection system consists of a ultra-violet (UV) unit through which the effluent is discharged seasonally.
- A concrete V-notch weir flow measuring chamber is installed between the clarifier and the filter building.
- Operations are controlled by a programmable logic controller (PLC). A data logging computer system with local monitoring capability is used to monitor, trend, and record select process parameters.
- Laboratory space is also located at the WWTP to allow for basic laboratory analyses to be conducted by the plant operator.
- Process control is monitored by SCADA at the West Lorne Wastewater Treatment Facility.

## **Section 2: Monitoring Data**

### **Sample Collection and Testing**

All samples are collected and tested as per the requirements of the Environmental Compliance Approval.

Raw sewage is sampled bi-weekly and tested for BOD<sub>5</sub>, total suspended solids, total phosphorus, and total Kjeldahl nitrogen. The raw samples are collected as 24 hour composite samples.

Final effluent is sampled bi-weekly and tested for BOD<sub>5</sub>, total suspended solids, total phosphorus, free ammonia nitrogen, total Kjeldahl nitrogen, nitrite, nitrate, pH and alkalinity. Samples are collected using an automatic composite sampler and collected over a twenty-four hour period. Grab samples for dissolved oxygen and temperature are collected bi-weekly. A grab sample for E. coli is sampled bi-weekly during the disinfection period from April 15 to October 15.

In-house tests are conducted on a weekly basis on the final effluent, raw influent and the mixed liquor suspended solids at the plant to check plant performance and to make any operational changes required.

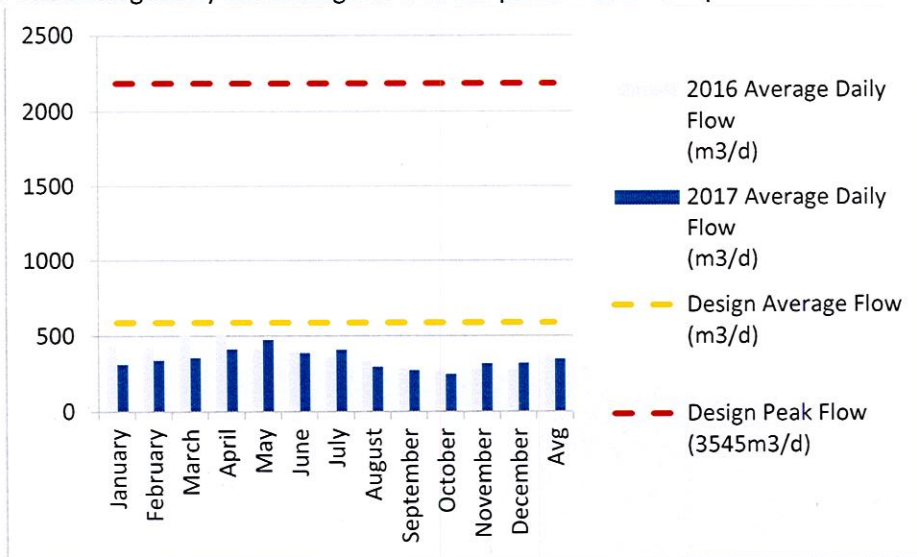
In 2017, all chemical and microbiological sample analyses were conducted by SGS Lakefield Research. Temperature, pH and dissolved oxygen were conducted by staff at the treatment plant.

The receiving stream temperature is performed at Sixteen Mile Creek.

### **Flows**

Detailed monthly flow information is summarized in Appendix A. The total flow treated in 2017 was 127,060m<sup>3</sup>, which corresponds to a 7.7% decrease from 2016 raw flows. The annual average daily flow for the reporting period was 348.1m<sup>3</sup>/day, or 59% of the plant's rated design capacity of 590m<sup>3</sup>/day (refer to Chart 1).

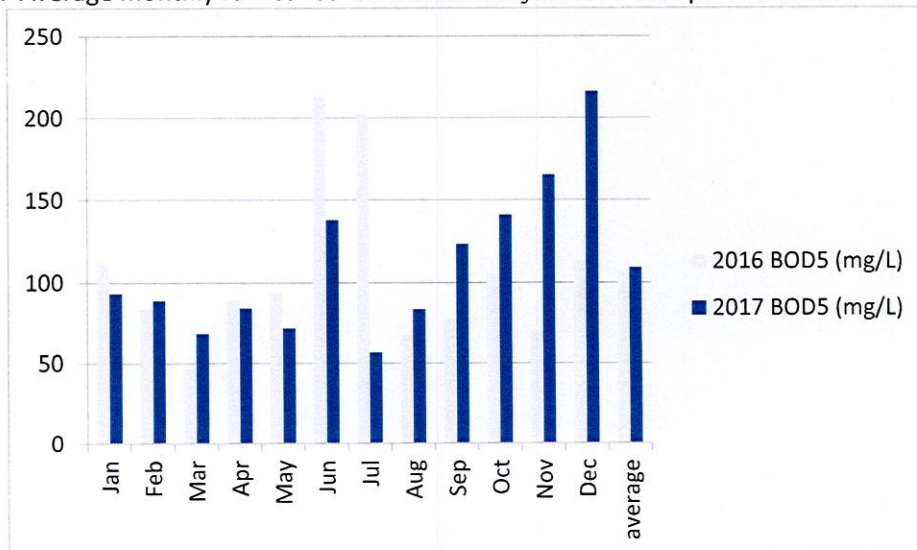
Chart 1. The average daily raw sewage flow to the plant in 2017 compared to 2016.



### Raw Sewage Quality

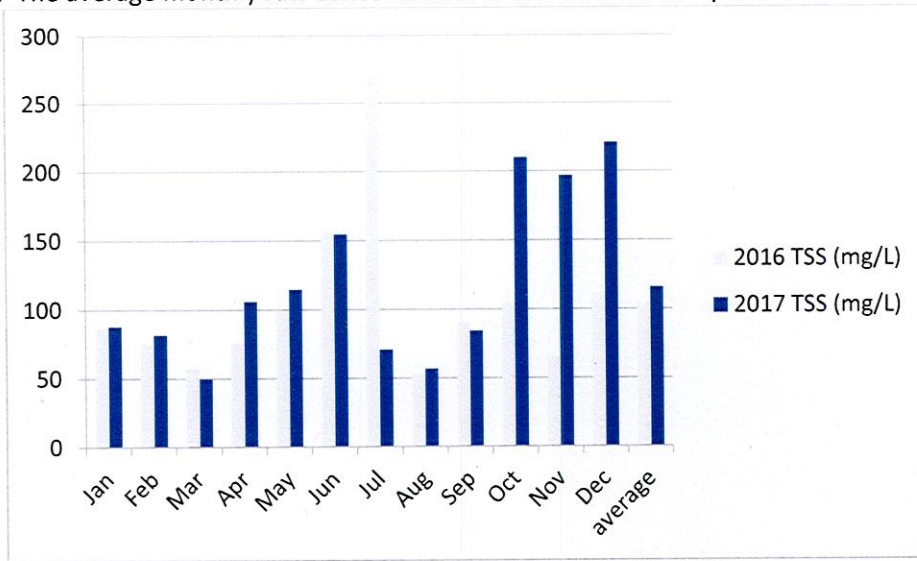
The annual average raw sewage BOD<sub>5</sub> concentration to the plant was 109.3mg/L with a maximum concentration of 321mg/L. The average BOD<sub>5</sub> loading to the plant was 38.1kg/d for 2017. The annual average concentration of BOD<sub>5</sub> has increased 6.5% from 2016, refer to Chart 2.

Chart 2. Average monthly raw concentration of BOD<sub>5</sub> for 2017 compared to 2016.



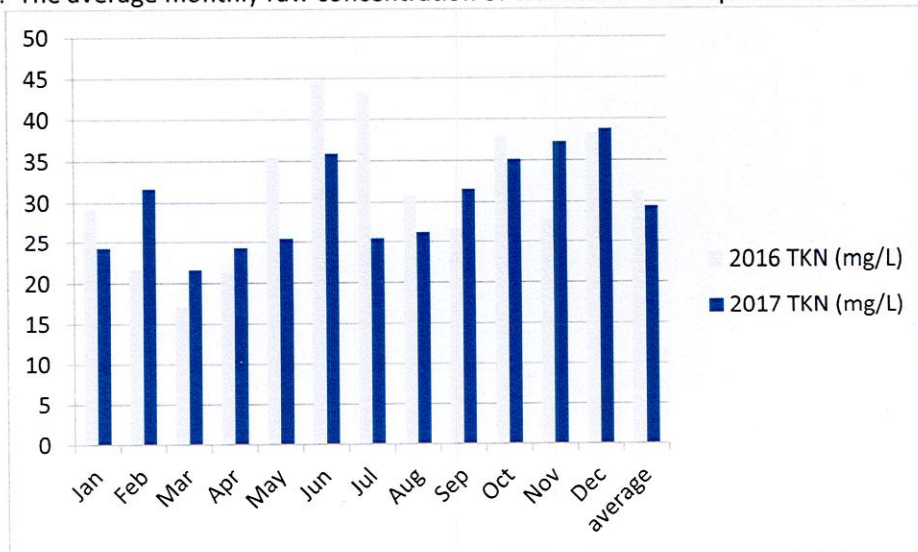
The annual average raw sewage suspended solids (TSS) concentration to the plant was 116mg/L, with a maximum of 332mg/L. This corresponds to an average TSS loading to the plant of 40.4kg/day. The average concentration of TSS has increased 15% from 2016, refer to Chart 3.

Chart 3. The average monthly raw concentration of TSS for 2017 compared to 2016.



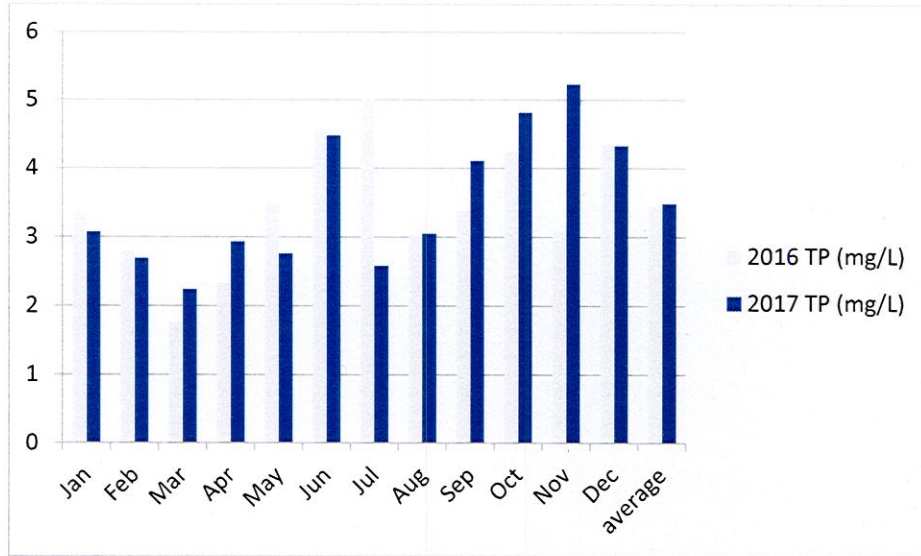
The annual average raw sewage Total Kjeldahl Nitrogen (TKN) concentration to the plant was 29.5mg/L, with a maximum of 43.8mg/L. This corresponds to an average TKN loading to the plant of 10.3kg/day. The average concentration of TKN has decreased 3.9% from 2016, refer to Chart 4.

Chart 4. The average monthly raw concentration of TKN for 2017 compared to 2016.



The annual average raw sewage Total Phosphorus (TP) concentration to the plant was 3.49mg/L, with a maximum of 5.80mg/L. This corresponds to an average TP loading to the plant of 1.21kg/day. The average concentration of TP has increased 3.5% from 2016, refer to Chart 5.

Chart 5. The average monthly raw concentration of TP for 2017 compared to 2016.



**Effluent Limits**

Detailed analytical data is attached to this report as Appendix A. The following table provides a summary of the monthly average concentration and loading ranges compared to the limits set in the Environmental Compliance Approval.

## Summary and Comparison of Compliance Data

Table 1. Monthly average concentration and loading ranges for 2017.

Parameter	Monthly Average Effluent Limit (mg/L)	Monthly Average Effluent Result Ranges (mg/L)	Monthly Average Loading Limit (kg/d)	Monthly Average Loading Result Ranges (kg/d)
BOD <sub>5</sub>	10(a)	<2 – <2	6.9	0.5 – 1.5
	15(b)	<2 – 4.5		
Suspended Solids	10(a)	<2 – 2.5	6.9	0.5 – 1.6
	15(b)	2.5 – 5.0		
Total Phosphorus	0.5(a)	0.06 - 0.13	0.4	0.02 - 0.05
	1.0(b)	0.08 – 0.16		
Total (Ammonia + Ammonium) Nitrogen	3.0(a)	<0.1 – 0.15	2.2	0.03 – 0.06
	5.0(b)	<0.1 – 0.55		
E. coli	200	<2 – 2		
Unionized Ammonia*	0.1	0 – 0.012		

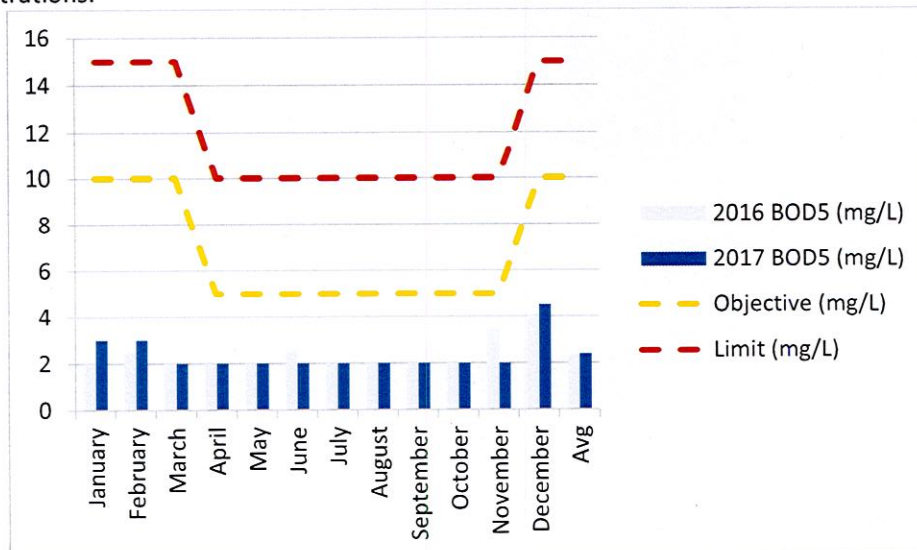
NOTE: (a) limit applies during the non-freezing period  
 (b) limit applies during the freezing period  
 \*single sample results

### Discussion on Monitoring Data as Compared to the Effluent Limits

There were no non-compliances with Environmental Compliance Approval limits.

The annual average effluent BOD<sub>5</sub> for 2017 was 2.4mg/L, which is a 1.7% increase from 2016 (refer to Chart 6). The annual loading of BOD<sub>5</sub> at the plant in 2017 was 0.8kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

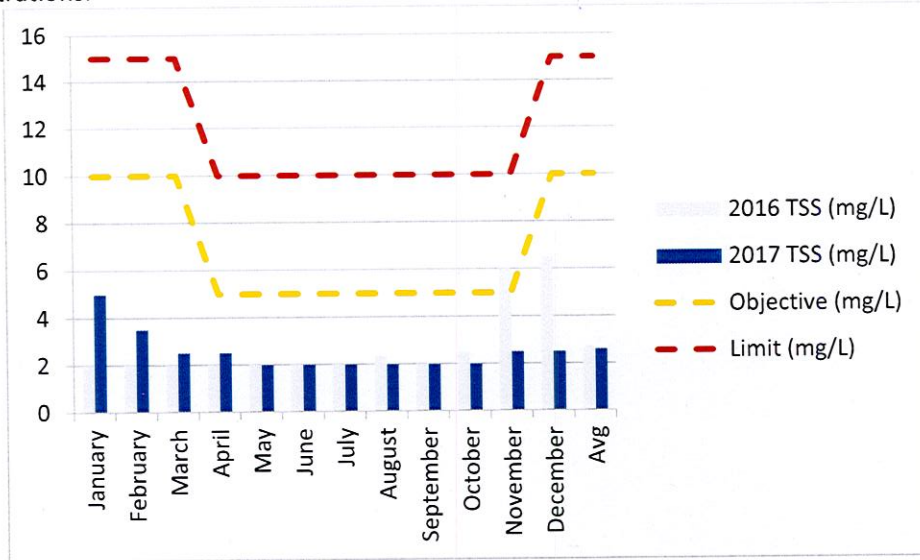
Chart 6. The effluent monthly average concentration of BOD<sub>5</sub> in 2017 compared to 2016 concentrations.





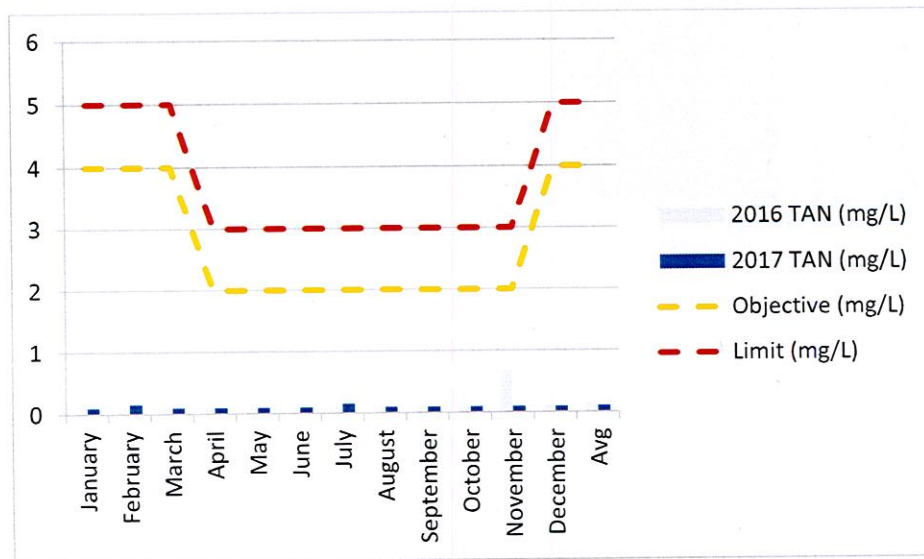
The annual average effluent Total Suspended Solids (TSS) for 2017 was 2.6mg/L, which is a decrease from 2016 by 4.2% (refer to Chart 7). The annual loading of TSS at the plant in 2017 was 0.9kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 7. The effluent monthly average concentration of TSS in 2017 compared to 2016 concentrations.



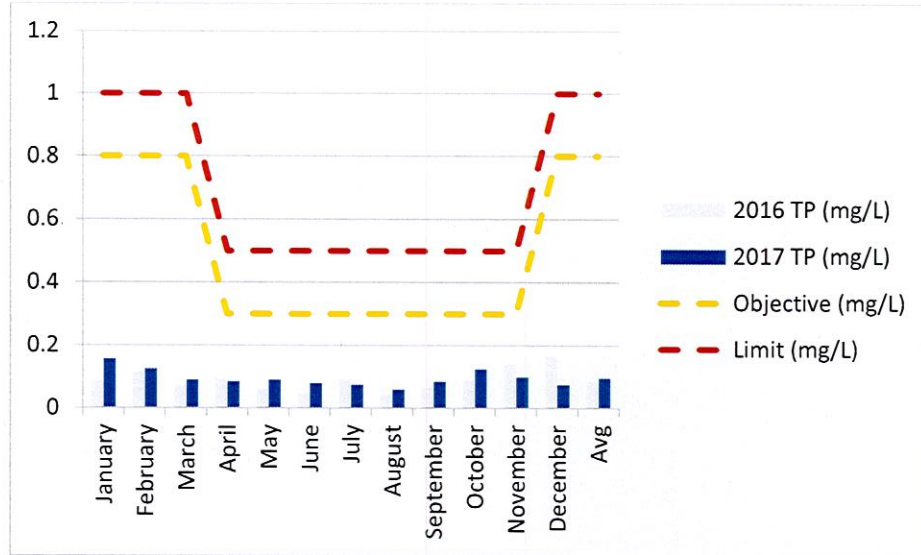
The annual average effluent Total Ammonia + Ammonium Nitrogen (TAN) for 2017 was 0.11mg/L, which is a 26% decrease from 2016 (refer to Chart 8). The annual loading of TAN at the plant in 2017 was 0.04kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 8. The effluent monthly average concentration of TAN in 2017 compared to 2016 concentrations.



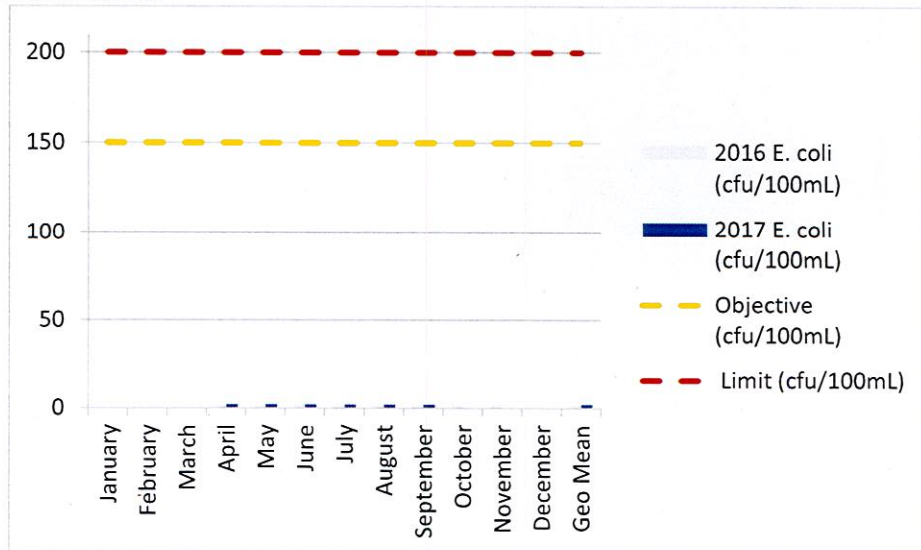
The annual average effluent Total Phosphorus (TP) for 2017 was 0.10mg/L, which is a 12.8% increase from 2016 (refer to Chart 9). The annual loading of TP at the plant in 2017 was 0.03kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 9. The effluent monthly average concentration of TP in 2017 compared to 2016 concentrations.



The annual geometric mean effluent E. coli for 2017 was 2cfu/100mL, which is a 3% increase from 2016 (refer to Chart 10). Refer to Table 1 for a list of monthly geometric mean effluent limits.

Chart 10. The effluent monthly geometric mean concentration of E. coli in 2017 compared to 2016 concentrations.



### **Section 3: Operating Problems and Corrective Actions**

Ongoing SCADA issues with communications and overall use of system. This has been placed on the capital list created by OCWA to be replaced.

Cold temperatures can affect the treatment of the sewage. The mechanical surface aerators in the aeration tanks lowers the temperature of the contents further. Usually, adjustments to the mixed liquor suspended solids at the plant is enough to remain in compliance during these cold periods, however in extreme winters this is not enough. A replacement of the mechanical aerators is proposed in 2017. Not only should this improve treatment but will be more energy efficient.

The collection system on Third Street has required frequent monitoring due to backing up of sewage in the area. This area is inspected and flushed routinely.

### **Section 4: Maintenance**

Regular scheduled monthly preventative maintenance is assigned and monitored using the Workplace Management System (WMS) program. The following is a summary of maintenance performed other than WMS work orders:

- Repaired aeration mixers 1, 4 and 6
- Replaced battery for generator
- Repaired effluent pump
- Replaced bar screen motor

### **Section 5: Effluent Quality Assurance**

Effluent quality assurance is evaluated by monitoring parameters and changes throughout the plant processes. The operators monitor the aeration tank by performing weekly tests on the mixed liquor. These tests include dissolved oxygen, pH, temperature, settling tests, Mixed Liquor Suspended Solids (MLSS), and Mixed Liquor Volatile Suspended Solids (MLVSS). As well, monitoring of the alum dosages, wasting volumes and Return Activated Sludge Suspended Solids is completed. Data collected from these tests provide information to the operator to make the appropriate adjustments in the treatment process and take corrective actions before the plant reaches its effluent limits.

### **Section 6: Calibration and Maintenance**

Annual maintenance on the generator was completed by Albert's Generator Services. Flowmetrix Technical Services Inc. performed the annual calibration on the flow meter in April. In house meters for pH and dissolved oxygen are calibrated by OCWA operators as per manufacturer's instructions.

## **Section 7: Effluent Quality**

### **Effluent Objectives**

The following table shows the monthly average effluent concentrations ranges and loadings to the effluent objectives outlined in the Environmental Compliance Approval.

Table 3. Monthly average effluent concentration and loadings compared to objectives.

Parameter	Average Monthly Effluent Objective (mg/L)	Average Monthly Effluent Result Ranges (mg/L)	Average Monthly Loading Objectives (kg/day)	Average Monthly Loading Result Ranges (kg/day)
BOD <sub>5</sub>	5(a)	<2 – <2	3.9	0.5 – 1.5
	10(b)	<2 – 4.5		
Suspended Solids	5(a)	<2 – 2.5	3.9	0.5 – 1.6
	10(b)	2.5 – 5.0		
Total Phosphorus	0.3(a)	0.06 – 0.13	0.28	0.02 – 0.05
	0.8(b)	0.08 – 0.16		
Total (Ammonia + Ammonium) Nitrogen	2.0(a)	<0.1 – 0.15	1.57	0.03 – 0.06
	4.0(b)	<0.1 – 0.55		
E. coli	150	<2 – 2		
Dissolved Oxygen	5 (minimum)	5.75 – 9.29		

### **Discussion of Effluent Objectives**

The Rodney WWTP met all the monthly averaging loading objectives and monthly average concentration objectives in 2017 set out in the Environmental Compliance Approval.

The annual average flow for 2017 was 348.1m<sup>3</sup>/d, which is below the design flow of 590m<sup>3</sup>/d. The design average daily flow for the plant was not exceeded in 2017 compared to 18 exceedances in 2016. The hydraulic peak flow of 2,190m<sup>3</sup>/day for the plant was not exceeded 2017.

## **Section 8: Biosolids**

The lagoon is used for sludge digestion and storage as per the Environmental Compliance Approval. The waste activated sludge (WAS) process transfers to the lagoon. The sludge is allowed to settle at the bottom of the lagoon and the liquid is pumped back to the head of the plant for treatment. There is sludge build up at the discharge pipe from the plant to the lagoon. In 2017, the amount of WAS transferred to the lagoon was approximately 4,600m<sup>3</sup>. It is anticipated that a similar amount will be transferred in 2018 (4,500m<sup>3</sup>).

## **Section 9: Community Complaints**

There was no community complaints received in 2017.

## **Section 10: Bypasses, Spills, and Abnormal Discharges**

There were no by-pass events for the Rodney WWTP during 2017.

The Rodney Wastewater Treatment Plant can direct raw sewage from the pump station to the lagoon when there is a power failure of long duration or is there is high flow to the plant. Flow was not temporarily diverted to the lagoon in 2017. The pump station has back up power; however, the treatment plant does not have any back up power.

## **Section 11: Alterations, Extensions or Replacement of the Works**

There were no major alterations, extension or replacements of works in 2017. It has been recommended for capital upgrades to the aeration system, SCADA system, generator, filters and alum system in 2018.

## **Section 12: Summary**

Overall the Rodney Wastewater Treatment Plant provided effective treatment in 2017, with no non-compliances and no objective exceedances. Capital improvements to the system will ensure continued success in the operation of the plant and to improve the effluent quality.

**APPENDIX A**

**Analytical Data**

