2015 Annual Wastewater Treatment Report

Resort Municipality of Whistler
Wastewater Treatment Plant

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Resort Municipality of Whistler

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Resort Municipality of Whistler

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1 Background

1.1 Discharge Monitoring Frequency

Monitoring samples are collected at the WWTP and analyzed daily, bi-weekly, weekly, monthly, and semi-annually. Samples monitored at each given frequency are outlined below.

Daily
- Total Suspended Solids (TSS)
- Orthophosphate (PO_4-P)

Bi-Weekly
- Chemical Oxygen Demand (COD)
- Fecal Coliforms (from May 15 – September 15)

Weekly
- Five Day Carbonaceous Biochemical Oxygen Demand (cBOD5)
- Total Phosphorous (TP)
- Total Kjeldahl Nitrogen (TKN)
- Nitrate + Nitrite (N+N)

Monthly
- Total Metals

Semi-Annually
- Fish Bioassay 96 hour LT50 (Rainbow Trout)

1.2 Permit Excursions

The WWTP tracks and monitors the number of permit excursions that occur during the year (Fig. 1). In 2015, the WWTP had zero permit excursions.

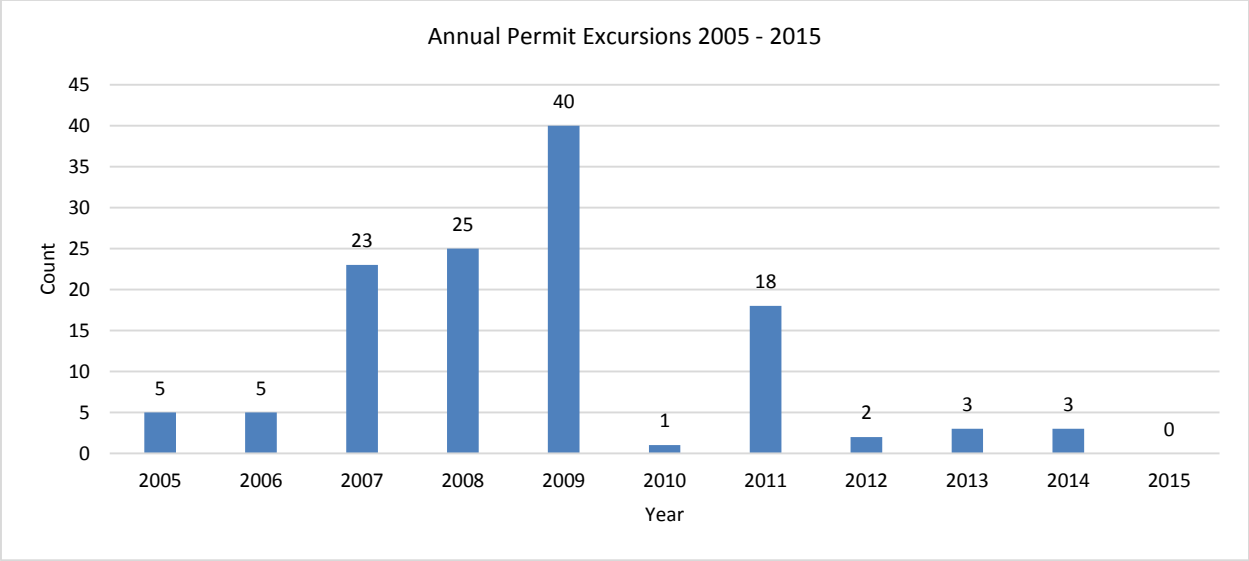


Figure 1. Number of permit excursions occurring by year since 2005.

1.3 General Permit Requirements

Table 1. List of General Permit Requirements.

General Requirement	Quantity
Volume of effluent that bypassed the WWTP*	0
Number of emergency shutdowns during the year	0
Number of trucks turned away due to hazardous waste	0
Number of achievements to report regarding source control and water conservation programs	0

**The raw sewage bypass line was removed in 2010*

1.4 Outfall Inspection

The final effluent outfall was inspected by Cascade Environmental Resource Group in 2010.

1.5 Website

Monitoring data is posted on a quarterly basis to The Resort Municipality of Whistler's website at http://www.whistler.ca/wastewater-treatment-plant

1.6 Facility Staffing

The Resort Municipality of Whistler Waste Water Treatment Plan facility staff qualifications meet and/or exceed 2015 EOCP requirements (Table 2).

Staff qualifications met permit requirements in 2015

Table 2. Facility staff certification list.

Name	Position	Certification
Michael Day, P. Eng.	Utilities Manager	APEGBC Professional Engineer
Trish Browning	Supervisor	Environmental Engineering Technologist EOCP Level I Municipal Wastewater Treatment
Doug Brereton	Operator 4	EOCP Level IV Municipal Wastewater Treatment
Elizabeth Toole	Operator 3	EOCP Level III Municipal Wastewater Treatment
Hamish (Ty) Macfayden	Operator 3	EOCP Level III Municipal Wastewater Treatment
Wendy Linton	Operator 2	EOCP Level II Municipal Wastewater Treatment
Francois Gaudet	Operator 1	EOCP Level I Municipal Wastewater Treatment
Kristy Koehle	Operator In Training	EOCP OIT Municipal Wastewater Treatment
Neil Kearns	Lab Technician	EOCP Level II Municipal Wastewater Treatment
Bruce Eckersley	Millwright	Red Seal Certified Millwright

2 Discharge Discussion and Analysis

2.1 Discharge Volume

In 2015, as in previous years, the effluent discharge volume from the WWTP was substantially below the maximum allowable discharge volume for the dry season of 16,000 m3/day. The WWTP was also substantially below the 25,000 m3/day maximum allowable discharge volume for the wet season (Fig. 2). There was one event on February 7, 2015

where the final effluent flow meter registered 25, 019 m^3/day, but it was determined that the 19 m^3/day was within the flow meters accuracy limitations.

The average discharge volume was 9,350 m^3/day during the dry season, and 10,706 m^3/day during the wet season.

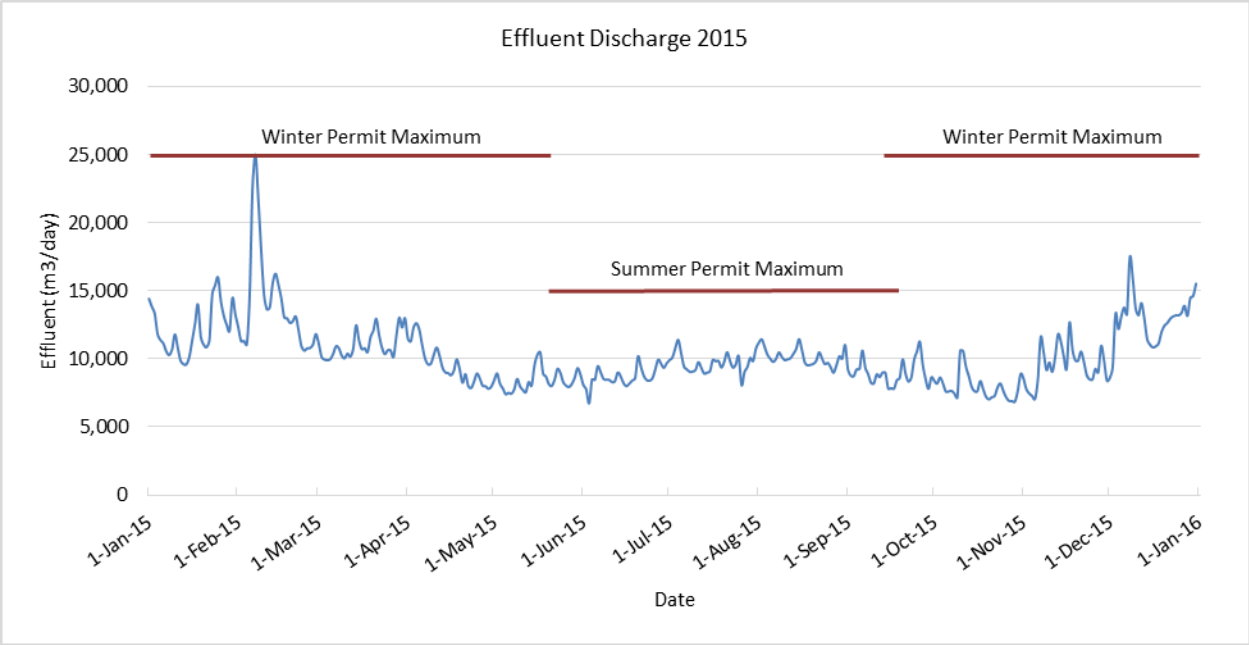


Figure 2. Whistler Waste Water Treatment Facility daily effluent discharge volume (mg/L) 2015.

Table 3. Maximum daily discharge (m3) wet and dry values by year 2003-2015.

Year	Max Discharge Dry	Max Discharge Wet	Month Max Discharge Dry	Month Max Discharge Wet
2003	10,160	14,681	August	January
2004	12,238	13,720	August	December
2005	11,402	17,174	July	January
2006	13,742	19,731	July	December
2007	13,991	24,247	August	March
2008	12,891	17,568	August	December
2009	11,623	17,859	June	April
2010	12,891	22,855	August	January
2011	12,153	19,472	July	January
2012	13,397	20,575	June	January
2013	12,525	19,351	June	March
2014	11,646	25,070	August	December
2015	11,447	25,019	August	February

2.2 Orthophosphate as Phosphorous PO4-P

As per the Operational Certificate, the WWTP performs PO4-P analysis on the final effluent daily, and reports at least five samples per week (Fig. 3 & Fig. 4).

Orthophosphate concentrations in the final effluent were consistently lower than allowable permit requirements in 2015

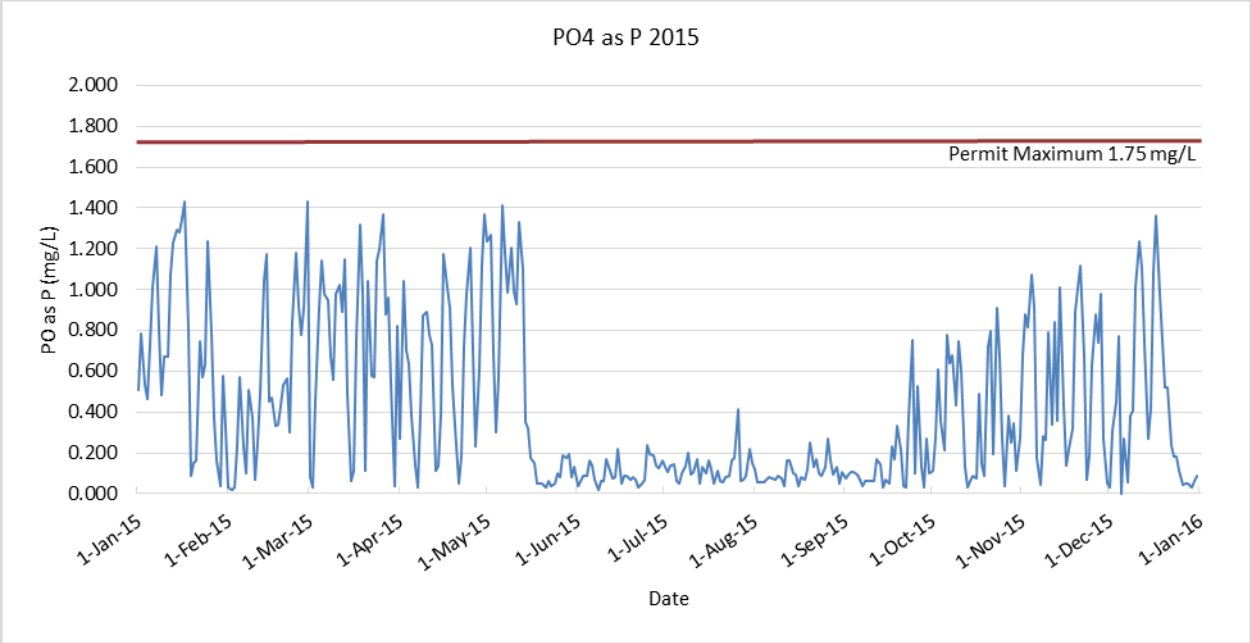


Figure 3.Whistler Waste Water Treatment Facility daily orthophosphate discharge concentrations (mg/L) 2015.

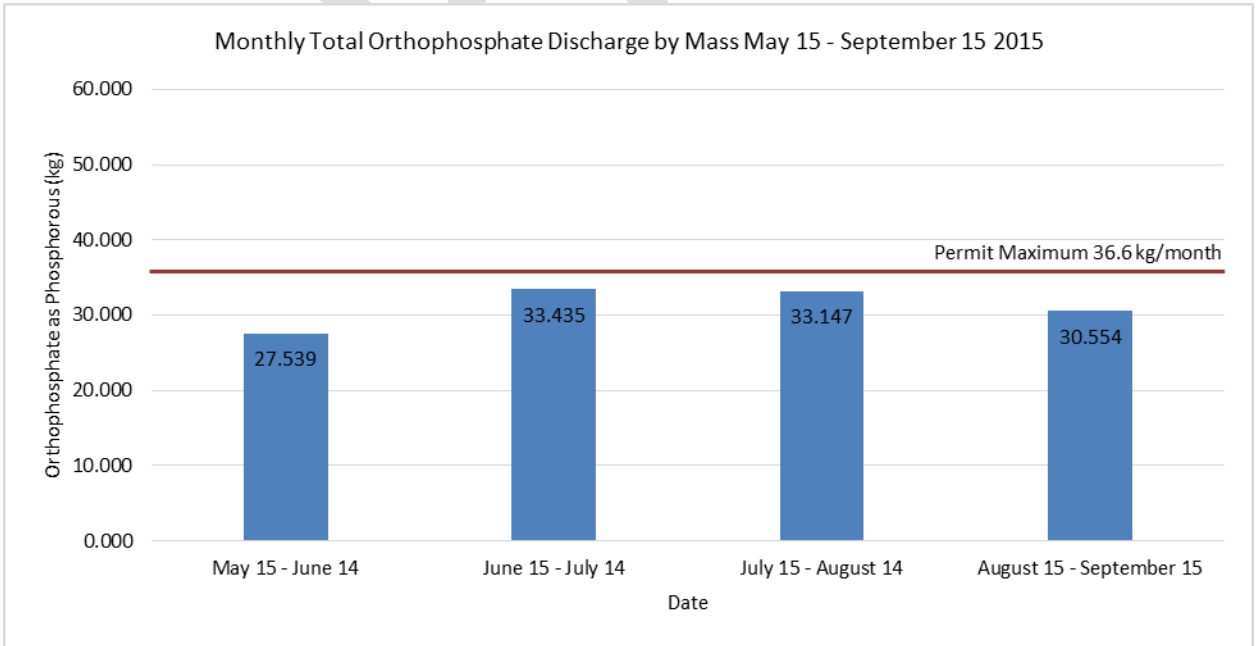


Figure 4. Whistler Waste Water Treatment Facility total orthophosphate discharge (kg) by month May 15 – Sept 15 2015.

2.3 Total Phosphorous

As per the Operational Certificate, the WWTP submits weekly final effluent samples to a certified laboratory for total phosphorous analysis (Fig. 5).

Total Phosphorus testing and reporting frequency met the permit requirements in 2015

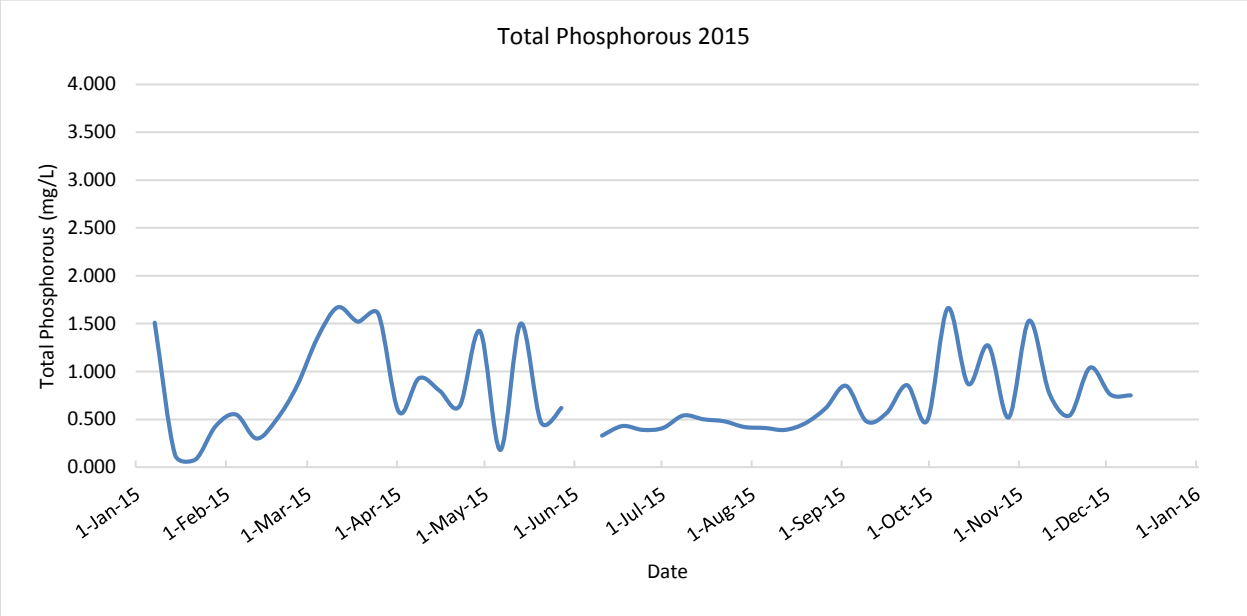


Figure 5. Whistler Waste Water Treatment Facility weekly total phosphorous in effluent (mg/L) 2015.

2.4 Total Suspended Solids

Total Suspended solids concentrations were within permit in 2015 (Fig. 6).

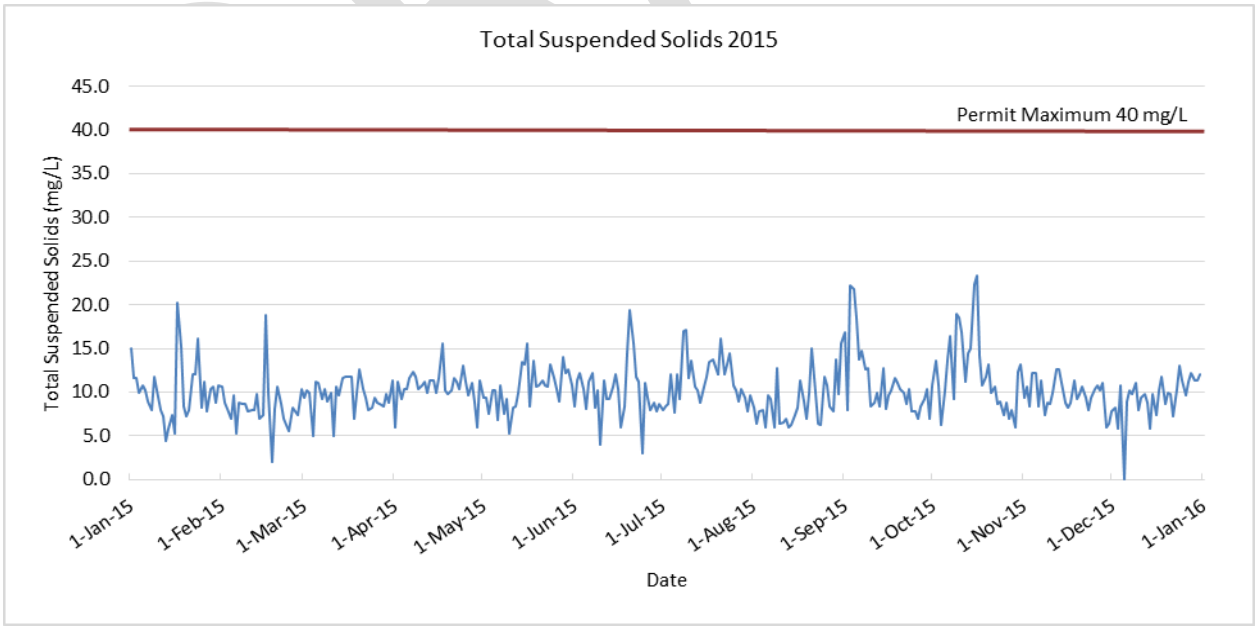


Figure 6. Whistler Waste Water Facility daily total suspended solids (mg/L) 2015.

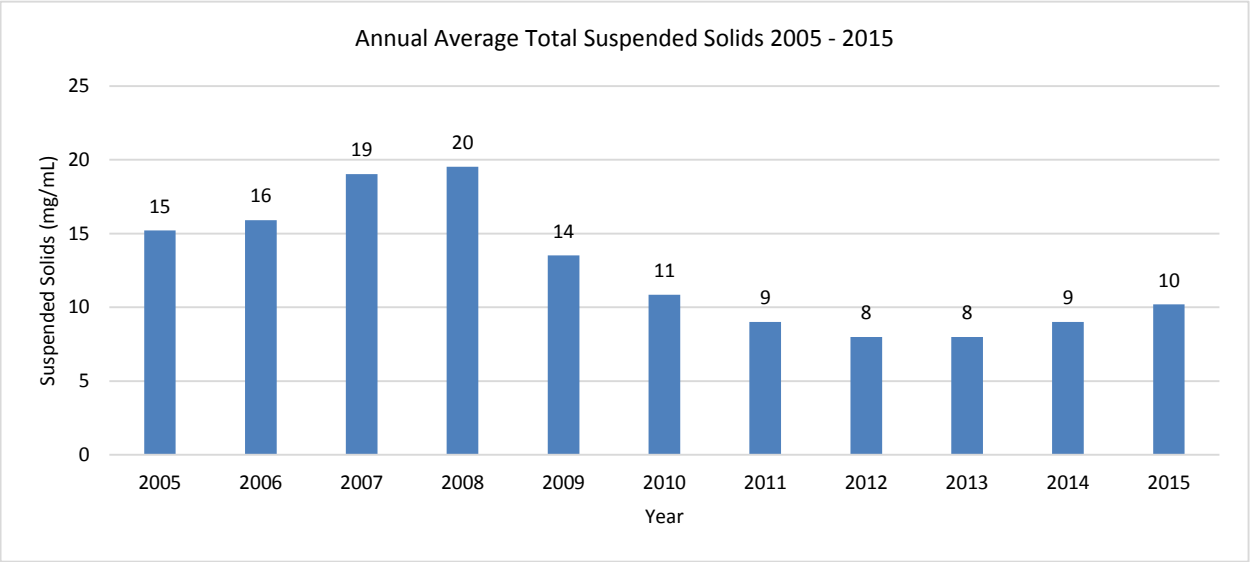


Figure 7. Whistler Waste Water Facility annual average suspended solids (mg/L) 2005 - 2015.

2.5 Carbonaceous Biochemical Oxygen Demand

Carbonaceous biochemical oxygen demand testing requirements outlined in the operational certificate were met in 2015.

Concentrations of carbonaceous biochemical oxygen demand were in accordance with permit requirements in 2015

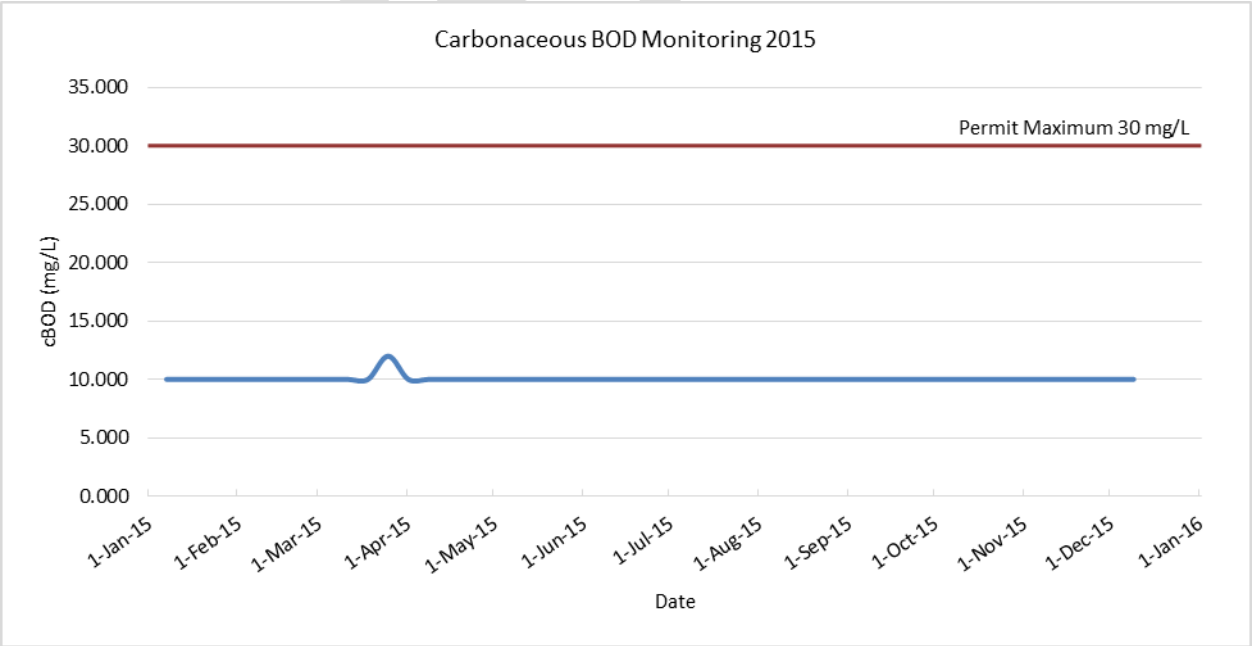


Figure 8. Whistler Waste Water Treatment Facility weekly carbonaceous BOD (mg/L) 2015.

2.6 Effluent Disinfection

As per the Operational Certificate, the WWTP disinfected the effluent with UV from May 15 to October 15. Bi-weekly final effluent samples were submitted to a certified laboratory for fecal coliform analysis throughout the disinfection period in order to verify the effectiveness of the UV disinfection. There were some inconsistent fecal coliform results in July, August, and October 2015. These results were traced back to cross contamination during sampling and contaminated sample tubes; the results are not thought to be a result of the effectiveness of the UV disinfection. (Fig. 9). Note: results determined to be less than detection limit are shown on the graph as the laboratory detection limit of 2.0 cfu/ 100 mL.

Effluent was disinfected in accordance with permit requirements in 2015

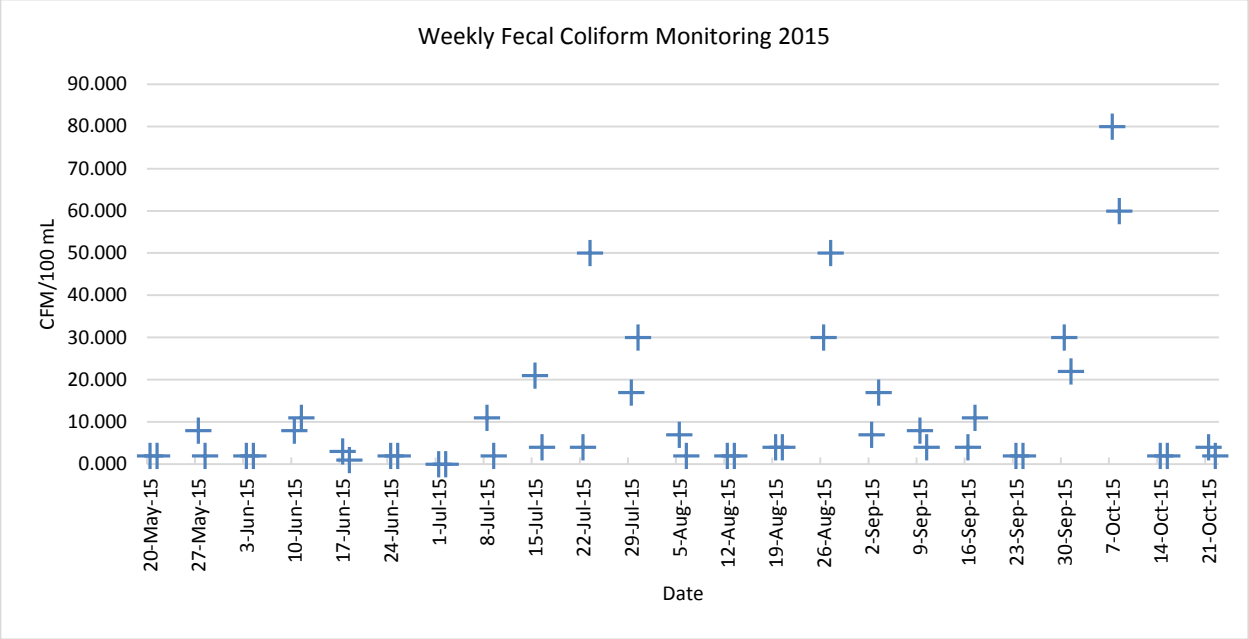


Figure 9. Whistler Waste water Treatment Facility weekly fecal coliform (CFM/mL) 2015.

2.7 Effluent Toxicity

The two LC50 toxicity tests performed as required by the operating permit resulted in 100% of rainbow trout fry surviving in raw (100% concentration) effluent for 96 hours.

Both Toxicity test outcomes complied with permit requirements in 2015

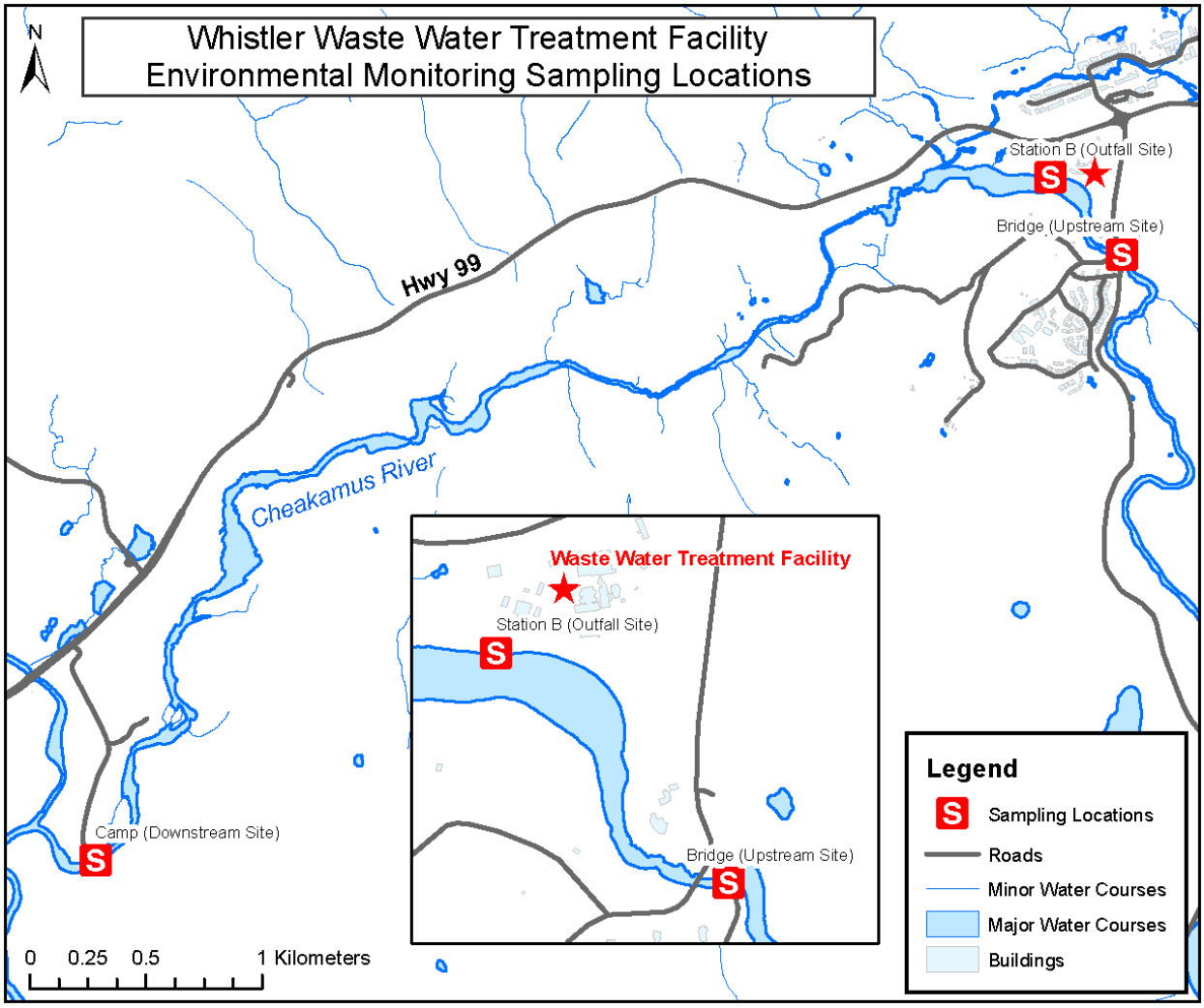
3 Receiving Environment Monitoring

The receiving environment for the final effluent of the WWTP is routinely sampled once per month by WWTP staff, and the samples are submitted to a certified laboratory. This provides an accurate representation of conditions in the receiving environment throughout the year. The plant operating permit requires the RMOW monitor two sampling stations, with samples taken three times per year. As has happened in the past few years, the RMOW maintained a more stringent monitoring program in 2015, sampling in three locations every month of the year except

for November. The results presented below that were determined to be less than detection limit are shown on the graphs at laboratory detection limit.

Receiving Environment testing and reporting met permit requirements in 2015

The monitored parameters pH, turbidity, conductivity, PO_4-P, NO_2 + NO_3, total ammonia (NH_3), and total metals concentrations are compared at three sampling locations (Upstream, Outfall, Downstream)(Map. 1). The upstream sampling location (Bridge) is located approximately 100 meters above the outfall (Station B) and the downstream sampling *location (Camp) is located approximately 4 kilometers downstream of the outfall.*



Map 1. Whistler Waste Water Treatment Facility environmental monitoring sampling locations.

3.1 pH in Receiving Environment

The WWTP had very little impact on the pH in the receiving environment. The average pH in 2015 at all sampling locations was 7.37, which is quite close to the previous year's average of 7.51.

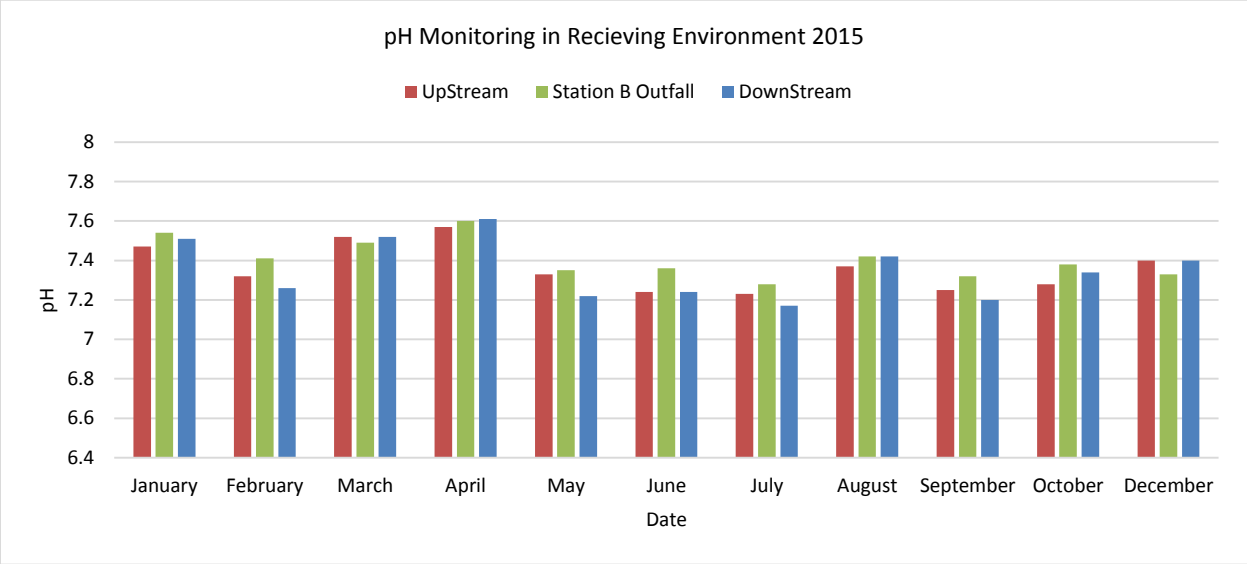


Figure 10. Whistler Waste Water Treatment Facility pH monitoring in receiving environment 2015.

3.2 Conductivity Receiving Environment

The WWTP did seem to cause an increase in conductance in the receiving environment. As in 2014, the increase was more pronounced during the winter months associated with lower river flows. The WWTP had a smaller influence on conductance during the summer months. In each month, the observed increase in conductance had begun to dissipate before the downstream sampling location.

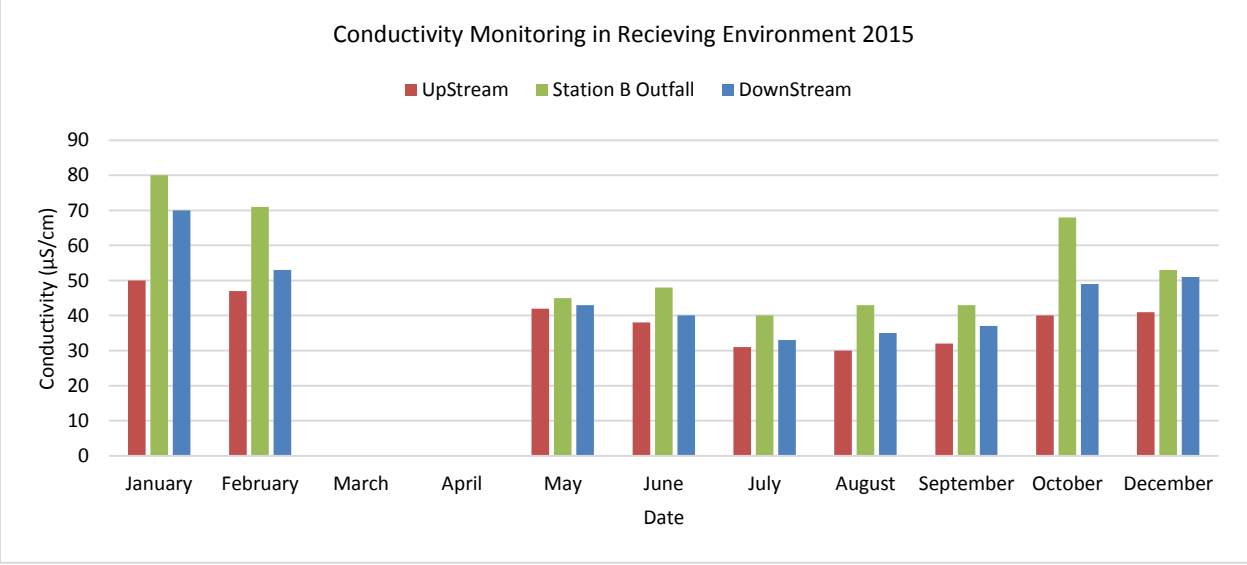


Figure 11. Whistler Waste Water Treatment Facility conductivity monitoring (µS/cm) in receiving environment 2015.

3.3 Turbidity in Receiving Environment

The WWTP effluent had a negligible effect on the turbidity of the receiving environment in 2015. In each month, all three sampling locations were within 1.0 NTU of each other.

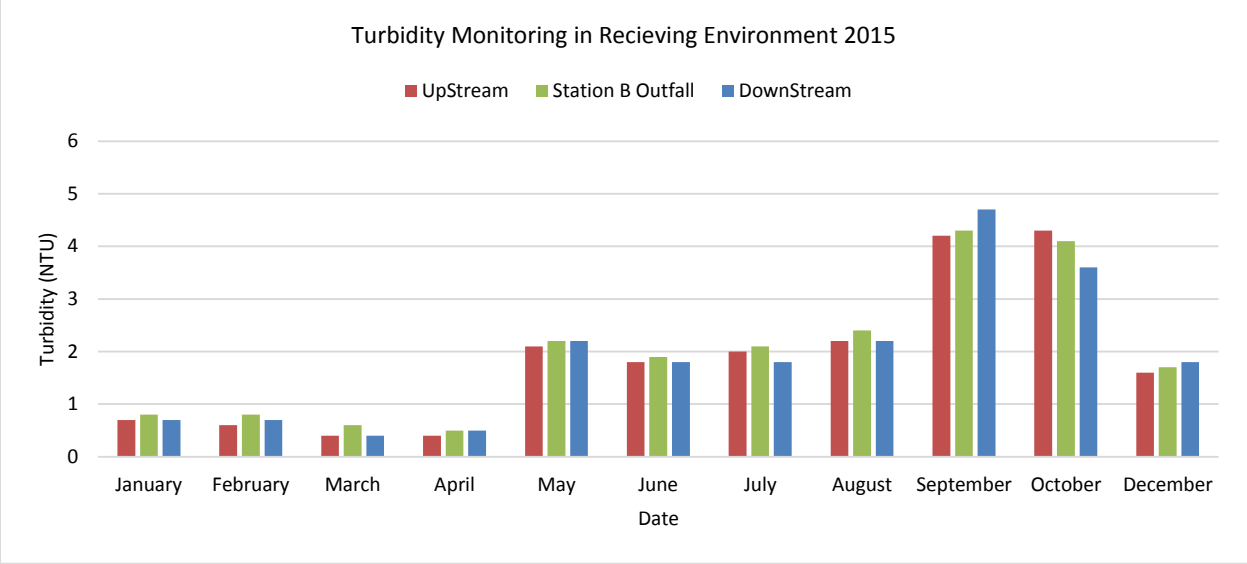


Figure 12. Whistler Waste Water Treatment Facility turbidity monitoring (NTU) in receiving environment 2015.

3.4 Orthophosphate (PO4-P) in Receiving Environment

All PO4-P values in the receiving environment in 2015 were below the laboratory detection limit of 0.01 mg/L, at all three sampling locations.

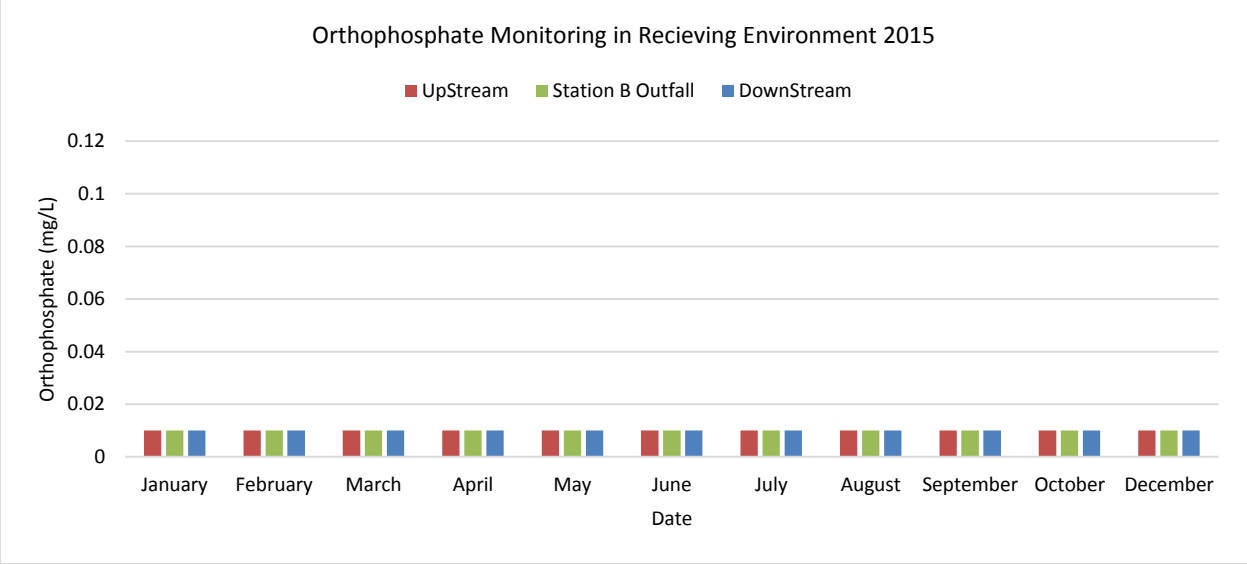


Figure 13. Whistler Waste Water Treatment Facility orthophosphate monitoring (mg/L) in receiving environment 2015.

3.5 Ammonia (NH3) in Receiving Environment

The NH_3 levels at the Station B Outfall sampling location were only slightly higher than the receiving environment background levels in May, June, and July of 2015. Remarkably, the downstream sampling location had significantly higher ammonia levels than both the upstream and outfall locations in June, July, August, September and December; however all results were below 0.15 mg/L.

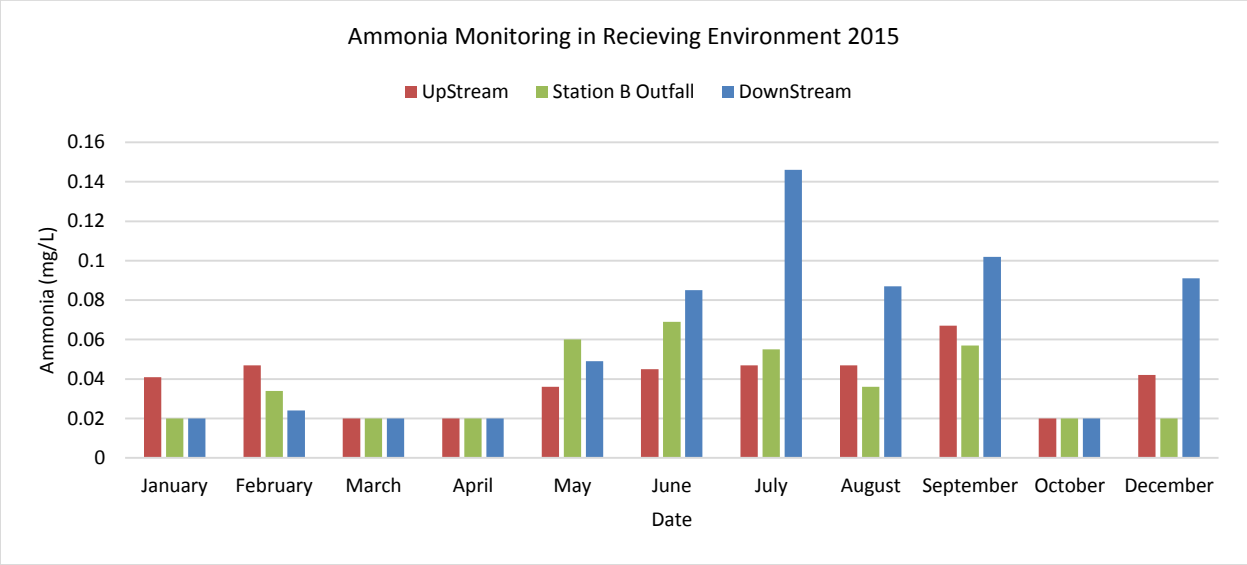


Figure 14. Whistler Waste Water Treatment Facility ammonia monitoring (mg/L) in receiving environment 2015.

3.6 Nitrate + Nitrite (N+N) in Receiving Environment

In 2015, there were elevated levels of nitrate and nitrite at the outfall sampling location in every month. These spikes did show significant dissipation at the downstream Camp sampling location, almost back to background levels. During the summer sampling events, the effects on the receiving environment were reduced. This was consistent with last year's monitoring.

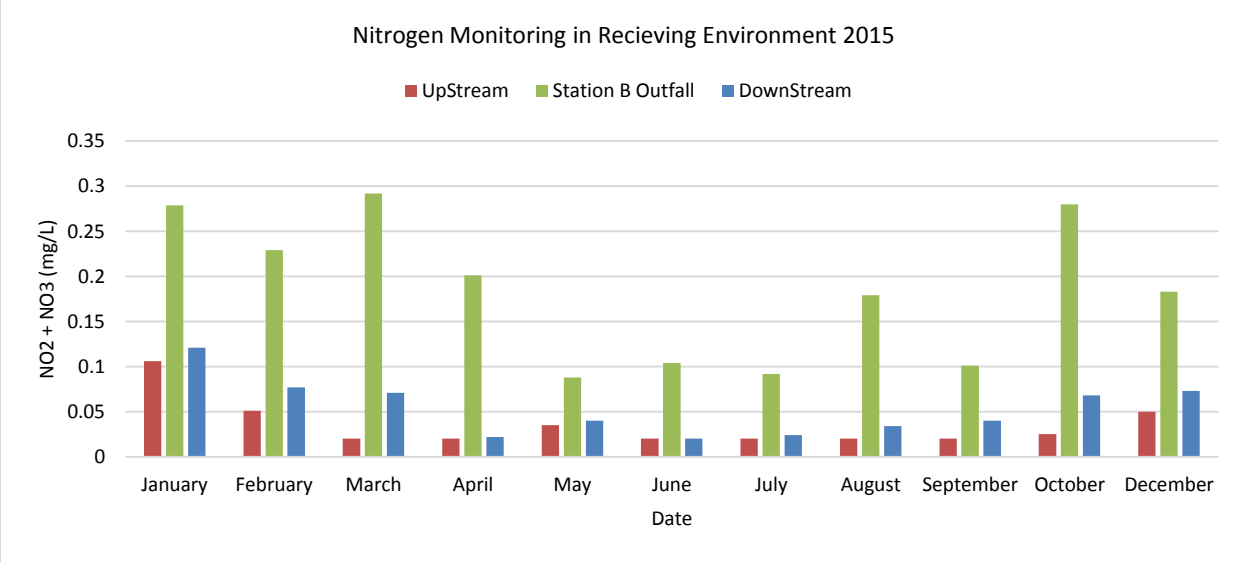


Figure 15. Whistler Waste Water Treatment Facility nitrogen monitoring (mg/L) in receiving environment 2015.

4 Conclusion

In the opinion of RMOW staff, this report fulfills the reporting requirements for the Operational Certificate ME-01452. If you have any questions, please contact either Trish Browning at 604-935-8386, or Michael Day at 604-935-8315.

5 Appendix A – Waste Water Treatment Facility Data Table

Date	Effluent Q (m3/day)	TSS (mg/L)	CBOD5 (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Jan-15	14,418	15.0		0.510	7.4		
2-Jan-15	13,837	11.6		0.782	10.8		
3-Jan-15	13,322	11.6		0.531	7.1		
4-Jan-15	11,827	10.0		0.466	5.5		
5-Jan-15	11,381	10.8		0.730	8.3		
6-Jan-15	11,132	10.2		1.010	11.2		
7-Jan-15	10,558	9.0	<10	1.210	12.8	1.510	
8-Jan-15	10,284	8.0		0.801	8.2		
9-Jan-15	10,667	11.8		0.482	5.1		
10-Jan-15	11,798	10.2		0.674	8.0		
11-Jan-15	10,818	8.0		0.670	7.2		
12-Jan-15	9,855	7.2		1.070	10.5		
13-Jan-15	9,612	4.4		1.230	11.8		
14-Jan-15	9,601	5.8	<10	1.290	12.4	0.130	
15-Jan-15	10,137	7.4		1.280	13.0		
16-Jan-15	11,335	5.2		1.352	15.3		
17-Jan-15	12,534	20.2		1.433	18.0		
18-Jan-15	14,008	15.2		0.800	11.2		
19-Jan-15	11,648	8.4		0.090	1.0		
20-Jan-15	11,054	7.2		0.150	1.7		
21-Jan-15	10,851	8.0	<10	0.160	1.7	0.080	
22-Jan-15	11,349	12.0		0.749	8.5		
23-Jan-15	14,745	12.0		0.570	8.4		
24-Jan-15	15,395	16.2		0.632	9.7		
25-Jan-15	15,981	8.2		1.238	19.8		
26-Jan-15	14,236	11.2		0.782	11.1		
27-Jan-15	13,177	7.8		0.370	4.9		
28-Jan-15	12,516	10.4	<10	0.160	2.0	0.430	
29-Jan-15	12,048	10.6		0.040	0.5		
30-Jan-15	14,479	8.8		0.577	8.3		
31-Jan-15	13,279	10.8		0.319	4.2		

Date	Effluent Q (m3/day)	TSS (mg/L)	CBOD5 (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Feb-15	12,353	10.6		0.030	0.3		
2-Feb-15	11,308	8.8		0.020	0.2		
3-Feb-15	11,317	8.1		0.030	0.3		
4-Feb-15	11,050	7.0	<10	0.230	2.5	0.550	
5-Feb-15	14,558	9.6		0.570	8.3		
6-Feb-15	22,464	5.2		0.230	5.2		
7-Feb-15	25,019	8.8		0.101	2.5		
8-Feb-15	21,801	8.6		0.505	11.0		
9-Feb-15	18,062	8.6		0.371	6.7		
10-Feb-15	14,716	7.8		0.068	1.0		
11-Feb-15	13,637	8.0	<10	0.248	3.4	0.300	
12-Feb-15	13,788	8.0		0.498	6.9		
13-Feb-15	15,552	9.8		1.042	16.2		
14-Feb-15	16,259	7.0		1.173	19.1		
15-Feb-15	15,437	7.4		0.450	6.9		
16-Feb-15	14,442	18.8		0.470	6.8		
17-Feb-15	13,058	10.0		0.330	4.3		
18-Feb-15	12,980	2.0	<10	0.340	4.4	0.500	
19-Feb-15	12,642	8.1		0.430	5.4		
20-Feb-15	12,770	10.6		0.534	6.8		
21-Feb-15	13,120	8.6		0.567	7.4		
22-Feb-15	12,113	7.0		0.300	3.6		
23-Feb-15	10,928	6.2		0.840	9.2		
24-Feb-15	10,608	5.6		1.180	12.5		
25-Feb-15	10,772	8.2	<10	0.920	9.9	0.850	
26-Feb-15	10,800	7.8		0.780	8.4		
27-Feb-15	11,042	7.4		0.912	10.1		
28-Feb-15	11,818	10.4		1.433	16.9		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Mar-15	11,140	9.4		0.080	0.9		
2-Mar-15	10,152	10.2		0.030	0.3		
3-Mar-15	9,949	10.0		0.450	4.5		
4-Mar-15	9,909	5.0	<10	0.910	9.0	1.350	
5-Mar-15	9,972	11.2		1.140	11.4		
6-Mar-15	10,354	11.0		0.977	10.1		
7-Mar-15	10,924	9.2		0.945	10.3		
8-Mar-15	10,786	10.4		0.670	7.2		
9-Mar-15	10,241	9.0		0.560	5.7		
10-Mar-15	10,036	10.0		0.980	9.8		
11-Mar-15	10,387	5.0	<10	1.020	10.6	1.670	
12-Mar-15	10,164	10.6		0.890	9.0		
13-Mar-15	10,724	9.6		1.150	12.3		
14-Mar-15	12,461	11.6		0.489	6.1		
15-Mar-15	11,381	11.8		0.060	0.7		
16-Mar-15	10,710	11.8		0.110	1.2		
17-Mar-15	10,783	11.8		0.752	8.1		
18-Mar-15	10,502	7.0	<10	1.320	13.9	1.520	
19-Mar-15	11,583	10.0		0.977	11.3		
20-Mar-15	12,074	12.6		0.111	1.3		
21-Mar-15	12,943	10.4		1.042	13.5		
22-Mar-15	11,750	9.4		0.580	6.8		
23-Mar-15	10,823	8.0		0.570	6.2		
24-Mar-15	10,353	8.2		1.140	11.8		
25-Mar-15	10,635	9.4	12.000	1.200	12.8	1.600	
26-Mar-15	10,617	8.8		1.370	14.5		
27-Mar-15	10,154	8.6		0.880	8.9		
28-Mar-15	11,715	8.4		0.960	11.2		
29-Mar-15	13,032	9.8		0.540	7.0		
30-Mar-15	12,309	8.8		0.040	0.5		
31-Mar-15	12,990	11.4		0.820	10.7		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Apr-15	11,495	6.0	<10	0.270	3.1	0.580	
2-Apr-15	11,282	11.2		1.042	11.8		
3-Apr-15	12,310	9.2		0.700	8.6		
4-Apr-15	12,619	10.4		0.635	8.0		
5-Apr-15	12,124	10.4		0.380	4.6		
6-Apr-15	10,990	11.6		0.140	1.5		
7-Apr-15	10,004	12.4		0.030	0.3		
8-Apr-15	9,592	11.8	<10	0.390	3.7	0.930	
9-Apr-15	9,641	10.4		0.870	8.4		
10-Apr-15	10,291	10.8		0.890	9.2		
11-Apr-15	10,837	11.2		0.775	8.4		
12-Apr-15	10,230	10.0		0.730	7.5		
13-Apr-15	9,379	11.4		0.110	1.0		
14-Apr-15	9,010	11.4		0.140	1.3		
15-Apr-15	8,956	10.0	<10	0.390	3.5	0.801	
16-Apr-15	8,791	11.6		1.173	10.3		
17-Apr-15	9,139	15.6		1.010	9.2		
18-Apr-15	9,961	10.2		0.912	9.1		
19-Apr-15	9,261	9.8		0.530	4.9		
20-Apr-15	8,247	10.2		0.330	2.7		
21-Apr-15	8,874	11.6		0.050	0.4		
22-Apr-15	7,997	11.2	<10	0.190	1.5	0.640	
23-Apr-15	7,853	10.4		0.720	5.7		
24-Apr-15	8,320	13.0		0.977	8.1		
25-Apr-15	8,926	11.2		1.205	10.8		
26-Apr-15	8,562	9.6		0.700	6.0		
27-Apr-15	8,025	11.0		0.230	1.8		
28-Apr-15	7,986	8.8		0.610	4.9		
29-Apr-15	7,800	6.0	<10	1.120	8.7	1.420	
30-Apr-15	7,962	11.4		1.368	10.9		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-May-15	8,431	9.4		1.238	10.4		
2-May-15	8,921	9.4		1.270	11.3		
3-May-15	8,178	7.6		0.690	5.6		
4-May-15	7,829	10.2		0.300	2.3		
5-May-15	7,401	10.2		0.570	4.2		
6-May-15	7,506	6.8	<10	1.410	10.6	0.180	
7-May-15	7,435	10.8		1.180	8.8		
8-May-15	7,771	7.5		0.984	7.6		
9-May-15	8,527	9.2		1.205	10.3		
10-May-15	7,982	5.2		0.990	7.9		
11-May-15	7,713	8.2		0.930	7.2		
12-May-15	7,551	8.4		1.330	10.0		
13-May-15	8,299	10.0	<10	1.100	9.1	1.500	
14-May-15	8,034	13.4		0.352	2.8		
15-May-15	9,506	13.2		0.319	3.0		
16-May-15	10,283	15.6		0.173	1.8		
17-May-15	10,489	8.4		0.150	1.6		
18-May-15	8,927	13.6		0.050	0.4		
19-May-15	8,697	10.6		0.050	0.4		
20-May-15	8,142	10.8	<10	0.050	0.4	0.470	<2
21-May-15	8,016	11.4		0.030	0.2		<2
22-May-15	8,466	10.8		0.060	0.5		
23-May-15	9,262	10.6		0.040	0.4		
24-May-15	8,986	13.2		0.050	0.4		
25-May-15	8,302	11.6		0.100	0.8		
26-May-15	8,038	10.4		0.080	0.6		
27-May-15	7,929	9.0	<10	0.190	1.5	0.619	8.000
28-May-15	8,155	14.0		0.173	1.4		2.000
29-May-15	8,612	12.2		0.195	1.7		
30-May-15	9,319	12.6		0.081	0.8		
31-May-15	8,840	10.8		0.130	1.1		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Jun-15	8,078	8.4		0.040	0.323		
2-Jun-15	7,749	11.4		0.060	0.465		
3-Jun-15	6,721	12.2	<10	0.090	0.605		2.000
4-Jun-15	8,485	10.4		0.090	0.764		2.000
5-Jun-15	8,459	8.1		0.160	1.350		
6-Jun-15	9,461	11.2		0.137	1.294		
7-Jun-15	9,025	12.2		0.070	0.632		
8-Jun-15	8,532	8.2		0.020	0.171		
9-Jun-15	8,476	10.2		0.060	0.509		
10-Jun-15	8,456	4.0	<10	0.060	0.507	0.330	8.000
11-Jun-15	8,295	11.4		0.166	1.378		11.000
12-Jun-15	8,363	9.2		0.114	0.953		
13-Jun-15	8,999	9.2		0.075	0.674		
14-Jun-15	8,697	10.6		0.080	0.696		
15-Jun-15	8,209	12.0		0.220	1.806		
16-Jun-15	7,999	10.4		0.050	0.400		
17-Jun-15	8,180	6.0	<10	0.090	0.736	0.430	3.000
18-Jun-15	8,409	8.4		0.090	0.757		1.000
19-Jun-15	8,583	14.4		0.068	0.587		
20-Jun-15	10,189	19.4		0.081	0.830		
21-Jun-15	9,430	15.6		0.070	0.660		
22-Jun-15	8,763	11.8		0.030	0.263		
23-Jun-15	8,445	11.2		0.050	0.422		
24-Jun-15	8,401	3.0	<10	0.070	0.588	0.390	2.000
25-Jun-15	8,572	11.0		0.240	2.057		2.000
26-Jun-15	9,228	9.4		0.197	1.818		
27-Jun-15	9,937	8.0		0.187	1.858		
28-Jun-15	9,660	8.8		0.140	1.352		
29-Jun-15	9,349	7.8		0.123	1.150		
30-Jun-15	9,679	8.6		0.163	1.576		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Jul-15	9,918	8.0	<10	0.130	1.292	0.410	n/s
2-Jul-15	10,110	8.4		0.109	1.103		n/s
3-Jul-15	10,798	8.6		0.135	1.460		
4-Jul-15	11,395	12.0		0.143	1.633		
5-Jul-15	10,415	7.7		0.060	0.625		
6-Jul-15	9,441	12.0		0.050	0.472		
7-Jul-15	9,227	9.2		0.100	0.923		
8-Jul-15	9,048	17.0	<10	0.140	1.267	0.540	11.000
9-Jul-15	9,071	17.2		0.202	1.832		<2
10-Jul-15	9,186	11.6		0.091	0.838		
11-Jul-15	9,759	13.6		0.104	1.017		
12-Jul-15	9,340	10.6		0.170	1.588		
13-Jul-15	8,922	10.2		0.050	0.446		
14-Jul-15	8,991	8.8		0.130	1.169		
15-Jul-15	9,094	10.6	<10	0.100	0.909	0.500	21.000
16-Jul-15	9,917	11.8		0.160	1.587		4.000
17-Jul-15	9,820	13.4		0.120	1.178		
18-Jul-15	9,853	13.8		0.052	0.513		
19-Jul-15	9,369	12.9		0.110	1.031		
20-Jul-15	9,796	12.0		0.060	0.588		
21-Jul-15	10,490	16.2		0.055	0.581		
22-Jul-15	9,847	12.0	<10	0.081	0.802	0.480	4.000
23-Jul-15	9,354	13.2		0.088	0.823		50.000
24-Jul-15	9,597	14.4		0.163	1.563		
25-Jul-15	10,194	10.8		0.176	1.793		
26-Jul-15	8,061	10.2		0.414	3.334		
27-Jul-15	9,027	9.0		0.065	0.588		
28-Jul-15	9,387	10.4		0.068	0.642		
29-Jul-15	10,072	9.4	<10	0.085	0.853	0.420	17.000
30-Jul-15	9,846	7.8		0.221	2.181		30.000
31-Jul-15	10,759	9.6		0.153	1.647		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Aug-15	11,187	8.2		0.116	1.3		
2-Aug-15	11,434	6.4		0.055	0.6		
3-Aug-15	10,903	7.8		0.059	0.6		
4-Aug-15	10,313	8.0		0.055	0.6		
5-Aug-15	10,012	6.0	<10	0.068	0.7	0.410	7.000
6-Aug-15	9,782	9.6		0.078	0.8		2.000
7-Aug-15	10,007	9.2		0.075	0.7		
8-Aug-15	10,479	6.0		0.068	0.7		
9-Aug-15	10,147	12.8		0.085	0.9		
10-Aug-15	9,908	6.4		0.072	0.7		
11-Aug-15	9,963	6.6		0.040	0.4		
12-Aug-15	10,048	7.0	<10	0.160	1.6	0.390	<2
13-Aug-15	10,365	6.0		0.160	1.7		<2
14-Aug-15	10,741	6.2		0.100	1.1		
15-Aug-15	11,447	7.4		0.094	1.1		
16-Aug-15	10,633	8.2		0.040	0.4		
17-Aug-15	9,723	11.4		0.080	0.8		
18-Aug-15	9,521	9.0		0.070	0.7		
19-Aug-15	9,568	7.0	<10	0.120	1.1	0.460	4.000
20-Aug-15	9,641	10.0		0.251	2.4		4.000
21-Aug-15	9,872	15.0		0.134	1.3		
22-Aug-15	10,484	10.0		0.169	1.8		
23-Aug-15	10,026	6.4		0.100	1.0		
24-Aug-15	9,611	6.2		0.090	0.9		
25-Aug-15	9,711	11.8		0.130	1.3		
26-Aug-15	9,372	10.8	<10	0.270	2.5	0.617	30.000
27-Aug-15	8,983	8.4		0.160	1.4		50.000
28-Aug-15	9,534	7.8		0.093	0.9		
29-Aug-15	10,192	13.8		0.134	1.4		
30-Aug-15	10,021	9.8		0.052	0.5		
31-Aug-15	11,016	15.6		0.104	1.1		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Sep-15	9,182	16.8		0.075	0.7		
2-Sep-15	8,763	8.0	<10	0.091	0.8	0.850	7.000
3-Sep-15	8,736	22.2		0.104	0.9		17.000
4-Sep-15	9,228	21.8		0.107	1.0		
5-Sep-15	9,278	18.4		0.091	0.8		
6-Sep-15	10,611	13.8		0.070	0.7		
7-Sep-15	9,361	14.8		0.040	0.4		
8-Sep-15	8,892	12.6		0.060	0.5		
9-Sep-15	8,251	12.8	<10	0.060	0.5	0.480	8.000
10-Sep-15	8,204	8.4		0.062	0.5		4.000
11-Sep-15	8,866	8.8		0.062	0.5		
12-Sep-15	8,665	10.0		0.169	1.5		
13-Sep-15	8,986	8.4		0.143	1.3		
14-Sep-15	8,968	12.8		0.030	0.3		
15-Sep-15	7,816	8.1		0.070	0.5		
16-Sep-15	7,849	9.6	<10	0.050	0.4	0.567	4.000
17-Sep-15	7,812	10.2		0.231	1.8		11.000
18-Sep-15	8,434	11.6		0.169	1.4		
19-Sep-15	8,616	11.0		0.332	2.9		
20-Sep-15	9,958	10.4		0.210	2.1		
21-Sep-15	8,920	10.0		0.040	0.4		
22-Sep-15	8,331	8.6		0.030	0.2		
23-Sep-15	8,622	10.4	<10	0.371	3.2	0.857	<2
24-Sep-15	9,950	7.8		0.750	7.5		<2
25-Sep-15	10,550	7.8		0.100	1.1		
26-Sep-15	11,252	7.0		0.524	5.9		
27-Sep-15	9,591	8.4		0.130	1.2		
28-Sep-15	8,503	9.2		0.030	0.3		
29-Sep-15	7,800	10.4		0.270	2.1		
30-Sep-15	8,646	7.0	<10	0.100	0.9	0.490	30.000

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Oct-15	8,392	10.8		0.114	1.0		22.000
2-Oct-15	8,180	13.6		0.277	2.3		
3-Oct-15	8,627	10.8		0.609	5.3		
4-Oct-15	8,202	6.2		0.360	3.0		
5-Oct-15	7,599	10.2		0.210	1.6		
6-Oct-15	7,609	13.8		0.780	5.9		
7-Oct-15	7,646	16.4	<10	0.640	4.9	1.660	80.000
8-Oct-15	7,451	9.2		0.678	5.0		60.000
9-Oct-15	7,159	19.0		0.433	3.1		
10-Oct-15	10,594	18.6		0.749	7.9		
11-Oct-15	10,569	16.8		0.600	6.3		
12-Oct-15	9,424	11.2		0.130	1.2		
13-Oct-15	8,725	14.4		0.030	0.3		
14-Oct-15	7,954	15.0	<10	0.060	0.5	0.870	2.000
15-Oct-15	7,623	22.4		0.085	0.6		<2
16-Oct-15	7,632	23.4		0.075	0.6		
17-Oct-15	8,371	14.2		0.492	4.1		
18-Oct-15	7,777	10.8		0.147	1.1		
19-Oct-15	7,217	11.8		0.085	0.6		
20-Oct-15	7,019	13.2		0.720	5.1		
21-Oct-15	7,185	10.0	<10	0.798	5.7	1.270	4.000
22-Oct-15	7,280	10.6		0.195	1.4		2.000
23-Oct-15	7,898	8.6		0.912	7.2		
24-Oct-15	8,186	9.0		0.671	5.5		
25-Oct-15	7,642	7.4		0.270	2.1		
26-Oct-15	7,167	8.8		0.040	0.3		
27-Oct-15	6,910	7.0		0.380	2.6		
28-Oct-15	6,903	8.0	<10	0.250	1.7	0.520	
29-Oct-15	6,845	6.0		0.342	2.3		
30-Oct-15	7,645	12.4		0.111	0.8		
31-Oct-15	8,889	13.2		0.274	2.4		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Nov-15	8,569	9.4		0.680	5.8		
2-Nov-15	7,785	10.6		0.880	6.9		
3-Nov-15	7,463	8.4		0.814	6.1		
4-Nov-15	7,272	12.2	<10	1.075	7.8	1.530	
5-Nov-15	7,049	12.2		0.912	6.4		
6-Nov-15	8,452	8.4		0.176	1.5		
7-Nov-15	11,608	11.4		0.042	0.5		
8-Nov-15	10,497	7.4		0.280	2.9		
9-Nov-15	9,180	8.8		0.260	2.4		
10-Nov-15	9,733	8.6		0.790	7.7		
11-Nov-15	9,052	10.0	10.000	0.340	3.1	0.770	
12-Nov-15	10,115	12.6		0.840	8.5		
13-Nov-15	11,800	12.6		0.355	4.2		
14-Nov-15	11,268	11.0		1.010	11.4		
15-Nov-15	10,190	8.8		0.430	4.4		
16-Nov-15	9,275	8.2		0.140	1.3		
17-Nov-15	12,669	8.8		0.220	2.8		
18-Nov-15	10,727	11.4	<10	0.322	3.5	0.541	
19-Nov-15	9,905	9.2		0.890	8.8		
20-Nov-15	9,857	9.8		1.010	10.0		
21-Nov-15	10,533	10.6		1.120	11.8		
22-Nov-15	9,798	9.4		0.670	6.6		
23-Nov-15	8,811	8.0		0.070	0.6		
24-Nov-15	8,492	9.4		0.190	1.6		
25-Nov-15	8,501	10.4	<10	0.630	5.4	1.040	
26-Nov-15	9,266	10.8		0.879	8.1		
27-Nov-15	9,008	10.2		0.739	6.7		
28-Nov-15	10,956	11.0		0.977	10.7		
29-Nov-15	9,882	6.0		0.270	2.7		
30-Nov-15	8,399	6.4		0.050	0.4		

Date	Effluent Q (m^3/day)	TSS (mg/L)	$CBOD_5$ (mg/L)	Soluble PO4 as P (mg/L)	PO4 as P (kg/day)	Total P (mg/L)	Fecal Coliform (cfu/100mL)
1-Dec-15	8,597	7.8		0.030	0.3		
2-Dec-15	9,375	8.2	<10	0.310	2.9	0.760	
3-Dec-15	13,310	5.8		0.450	6.0		
4-Dec-15	12,195	10.8		0.772	9.4		
5-Dec-15	13,116	0.0		0.000	0.0		
6-Dec-15	13,770	9.0		0.270	3.7		
7-Dec-15	13,287	10.2		0.059	0.8		
8-Dec-15	17,482	9.8		0.380	6.6		
9-Dec-15	15,923	11.0	<10	0.410	6.5	0.750	
10-Dec-15	13,716	8.0		1.010	13.8		
11-Dec-15	13,203	9.4		1.238	16.3		
12-Dec-15	14,095	9.8		1.107	15.6		
13-Dec-15	12,993	8.8		0.740	9.6		
14-Dec-15	11,461	5.8		0.270	3.1		
15-Dec-15	11,043	9.8		0.420	4.6		
16-Dec-15	10,838	7.4		1.080	11.7		
17-Dec-15	10,923	10.2		1.360	14.9		
18-Dec-15	11,147	11.8		0.977	10.9		
19-Dec-15	11,977	8.6		0.750	9.0		
20-Dec-15	12,436	10.0		0.520	6.5		
21-Dec-15	12,634	9.8		0.520	6.6		
22-Dec-15	12,942	7.2		0.240	3.1		
23-Dec-15	13,117	10.4		0.180	2.4		
24-Dec-15	13,202	13.0		0.180	2.4		
25-Dec-15	13,196	11.3		0.110	1.5		
26-Dec-15	13,392	9.6		0.045	0.6		
27-Dec-15	13,900	11.2		0.050	0.7		
28-Dec-15	13,160	12.2		0.050	0.7		
29-Dec-15	14,467	11.4		0.030	0.4		
30-Dec-15	14,618	11.4		0.060	0.9		
31-Dec-15	15,524	12.0		0.090	1.4		
Total	**3,739,541**				**1,576.12**		

6 Appendix B – Environmental Monitoring Site Data Table

		January	February	March	April	May	June	July	August	September	October	December
Bridge Upstream Sample Site												
Nitrate as N	mg/L	0.106	0.051	0.013	0.016	0.035	<0.010	<0.010	<0.010	<0.010	0.025	0.05
Nitrite as N	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phosphate, Ortho as P	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia as N, Total	mg/L	0.041	0.047	<0.020	<0.020	0.036	0.045	0.047	0.047	0.067	<0.020	0.042
Turbidity	NTU	0.7	0.6	0.4	0.4	2.1	1.8	2	2.2	4.2	4.3	1.6
pH	pH units	7.47	7.32	7.52	7.57	7.33	7.24	7.23	7.37	7.25	7.28	7.4
Conductivity (EC)	uS/cm	50	47			42	38	31	30	32	40	41
Nitrate+Nitrite as N	mg/L	0.106	0.051	<0.020	<0.020	0.035	<0.020	<0.020	<0.020	<0.020	0.025	0.05
Station B Outfall Sample Site												
Nitrate as N	mg/L	0.264	0.215	0.292	0.201	0.088	0.104	0.092	0.179	0.101	0.28	0.183
Nitrite as N	mg/L	0.015	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phosphate, Ortho as P	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia as N, Total	mg/L	<0.020	0.034	<0.020	<0.020	0.06	0.069	0.055	0.036	0.057	<0.020	<0.020
Turbidity	NTU	0.8	0.8	0.6	0.5	2.2	1.9	2.1	2.4	4.3	4.1	1.7
pH	pH units	7.54	7.41	7.49	7.6	7.35	7.36	7.28	7.42	7.32	7.38	7.33
Conductivity (EC)	uS/cm	80	71			45	48	40	43	43	68	53
Nitrate+Nitrite as N	mg/L	0.279	0.229	0.292	0.201	0.088	0.104	0.092	0.179	0.101	0.28	0.183
Camp Downstream Sample Site												
Nitrate as N	mg/L	0.121	0.077	0.071	0.022	0.04	0.012	0.024	0.034	0.04	0.068	0.073
Nitrite as N	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phosphate, Ortho as P	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia as N, Total	mg/L	<0.020	0.024	<0.020	<0.020	0.049	0.085	0.146	0.087	0.102	<0.020	0.091
Turbidity	NTU	0.7	0.7	0.4	0.5	2.2	1.8	1.8	2.2	4.7	3.6	1.8
pH	pH units	7.51	7.26	7.52	7.61	7.22	7.24	7.17	7.42	7.2	7.34	7.4
Conductivity (EC)	uS/cm	70	53			43	40	33	35	37	49	51
Nitrate+Nitrite as N	mg/L	0.121	0.077	0.071	0.022	0.04	<0.020	0.024	0.034	0.04	0.068	0.073