

NPDES Compliance Summary
Report, Fiscal Years 2019 - 2021
Clinton Wastewater Treatment Plant



Massachusetts Water Resources Authority
Environmental Quality, Water & Wastewater
Report 2022-14

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NPDES COMPLIANCE SUMMARY REPORT
Fiscal Years 2019 - 2021
Clinton Wastewater Treatment Plant

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Executive Summary

The Massachusetts Water Resources Authority (MWRA) assumed formal operational responsibility of the Clinton Wastewater Treatment Plant in 1987 (Acts of 1987, Chapter 307). Major facility upgrades of primary, secondary, and advanced treatment facilities were completed in 1992. The plant provides treatment of wastewater from the town of Clinton and the Lancaster Sewer District using an activated sludge process in combination with advanced nutrient removal. In 2017, MWRA added a Phosphorus Reduction Facility to provide advanced tertiary treatment and reduce phosphorus concentrations. Effluent is chlorinated and dechlorinated before being discharged to the South Branch of the Nashua River, a Class B warm water fishery as defined by Massachusetts Surface Water Quality Standards (314 CMR 4.00).

MWRA currently operates the Clinton Wastewater Treatment Plant (Clinton Plant) under a NPDES permit that became effective on March 1, 2017 and expired on February 28, 2022. The permit was administratively continued and will remain so until a new final permit is issued. The NPDES permit requires MWRA to monitor the Clinton Plant effluent wastewater for specific parameters. These limits are derived from federal regulations, state water quality standards, available dilution in the Nashua River, and watershed-specific concerns. Seasonal permit limits for total phosphorus went into effect on April 1, 2019, following scheduled compliance milestones related to the new Phosphorus Reduction Facility construction and subsequent optimization.

This report summarizes monitoring and compliance data from July 1, 2018 to June 30, 2021 (fiscal years 19 through 21). We examine wastewater influent and effluent quality trends against the limits of MWRA's NPDES permit limits over each fiscal year (FY) and longer historical records. This report also highlights additional NPDES reporting including industrial wastewater, operations and maintenance, and sludge processing.

Permit Compliance

All violations are summarized in Table 1, with further detail for each parameter provided in the following sections. Table 2 lists the limit for each parameter with FY21 monitoring results; FY19-20 in Appendix B.

Table 1. Summary of NPDES Permit Violations, FY19-21

Effluent Characteristics		FY19 Violations	FY20 Violations	FY21 Violations
Flow	12-month Rolling Average:	8	3	0
Biochemical Oxygen Demand (BOD)	Monthly Average:	0	0	0
	Weekly Average:	1	0	0
Total Suspended Solids (TSS)	Monthly Average:	0	0	0
	Weekly Average:	1*	0	0
pH		0	0	0
Dissolved Oxygen (DO)	Daily Average Minimum:	0	0	0
<i>E. coli</i>	Monthly Geometric Mean:	0	0	0
	Daily Geometric Mean:	1	0	0
Total Chlorine Residual (TCR)	Monthly Average:	0	0	0
	Daily Maximum:	2	0	0
Copper	Monthly Average:	0	0	0
	Daily Maximum:	0	0	0
Total Ammonia Nitrogen: June 1st - October 31st	Monthly Average:	0	0	0
	Daily Maximum:	0	0	0
Total Phosphorus: April 1st - October 31st ¹	Monthly Average:	0	0	0
	Daily Maximum:	0	0	0
Acute Toxicity ²	Daily Minimum:	0	0	0
Chronic Toxicity ²	Daily Minimum:	1	0	1

* This violation is of the TSS weekly average loading in lbs/day, not TSS concentration in mg/L.

¹ Seasonal total phosphorus limit of 0.15 mg/L went into effect April 1, 2019.

² Toxicity testing is conducted on a quarterly basis.

Table 2. NPDES Permit Compliance Results, FY21

Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Flow (MGD, million gallons per day)												
<i>Limit</i>	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
Monthly Average	1.72	1.74	1.61	1.67	1.87	3.05	2.98	2.30	2.44	2.40	2.81	2.67
12-Month Rolling Average	2.35	2.34	2.34	2.34	2.34	2.35	2.36	2.36	2.36	2.22	2.21	2.27
Biochemical Oxygen Demand (BOD)												
<i>Concentration Limit (mg/L)</i>	20	20	20	20	20	20	20	20	20	20	20	20
Monthly Average	1.83	1.37	1.75	1.68	1.73	2.47	2.50	2.33	1.23	0.68	0.80	0.92
Weekly Average	1.63	3.25	2.11	1.90	2.20	2.36	4.43	2.56	1.86	0.88	1.52	1.38
<i>Load Limit (lbs/day)</i>	500	500	500	500	500	500	500	500	500	500	500	500
Monthly Average	26	20	24	23	27	64	51	45	25	13	17	19
Weekly Average	25	47	28	28	33	51	135	50	41	16	32	27
<i>Minimum Percent Removal Limit</i>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Percent Removal	99.1%	99.4%	99.2%	99.3%	99.2%	98.2%	98.8%	98.9%	99.4%	99.6%	99.6%	99.4%
Total Suspended Solids (TSS)												
<i>Concentration Limit (mg/L)</i>	20	20	20	20	20	20	20	20	20	20	20	20
Monthly Average	1.20	0.40	0.90	1.10	2.20	5.50	3.80	4.20	2.60	1.70	1.70	1.80
Weekly Average	2.30	0.70	2.10	2.10	3.40	5.90	6.50	4.70	3.50	2.30	2.30	2.30
<i>Load Limit (lbs/day)</i>	500	500	500	500	500	500	500	500	500	500	500	500
Monthly Average	16	6	12	15	34	139	93	82	52	35	39	40
Weekly Average	36	10	28	29	52	139	198	85	76	46	49	51
<i>Minimum Percent Removal Limit</i>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Percent Removal	99.6%	99.9%	99.8%	99.7%	99.3%	96.6%	98.4%	99.1%	99%	99.5%	99.5%	99.4%
pH (SU)												
<i>Limit</i>	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3
Range	7.2-7.7	7.2-7.6	7.2-7.6	7.2-7.6	7.4-7.8	7.1-7.6	7.3-7.6	7.3-7.5	7.2-7.6	7-7.6	7.1-7.7	7-7.6
Dissolved Oxygen (mg/L)												
<i>Limit</i>	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Conc.	7.6	7.9	8.1	8.7	9.3	9.2	10.1	10.5	10.2	9.4	9	8.6
E. coli Bacteria (cfu/100mL)												
<i>Monthly Limit</i>	126	126	126	126	126	126	126	126	126	126	126	126
Monthly Geometric Mean	5	5	5	5	5	6	5	5	5	5	5	6
<i>Daily Limit</i>	409	409	409	409	409	409	409	409	409	409	409	409
Maximum Daily	9	5	7	5	9	16	7	5	7	5	9	13

Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Total Chlorine Residual (µg/L)												
Monthly Limit	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Monthly Average	0.13	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.13	0.0	0.0
Daily Limit	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
Maximum Daily	4.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0
Total Phosphorus												
Concentration Limit	150	150	150	150	1,000	1,000	1,000	1,000	1,000	150	150	150
Monthly Average Conc. (µg/L)	74.5	66.2	74.7	71.7	391.9	201.4	159.3	309.7	112.5	48.7	39.5	48.3
Load Limit	3.8	3.8	3.8	3.8	25.1	25.1	25.1	25.1	25.1	3.8	3.8	3.8
Monthly Average Loading (lbs/day)	1.0	1.0	1.0	1.0	5.9	5.0	3.9	6.0	2.4	1.0	0.9	1.1
Total Ammonia, as N (mg/L)												
Monthly Limit	2	2	2	2	10	10	10	10	10	10	5	2
Monthly Average	0	0	0.01	0	0	0.24	0.1	0	0.02	0	0	0.02
Daily Limit	3	3	3	3	35.2	35.2	35.2	35.2	35.2	-	-	2
Maximum Daily	0	0	0.03	0	0	1.64	0.23	0	0.05	0	0	0.1
Total Recoverable Copper (µg/L)												
Monthly Limit	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
Monthly Average	11.3	11.6	10.95	11.1	9.85	7.31	8.56	8.5	8.42	8.94	8.57	7.66
Daily Limit	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Maximum Daily	11.3	12.1	11.4	11.1	9.85	8.21	8.56	8.5	8.98	8.94	8.57	9
Whole Effluent Toxicity												
Acute Minimum Limit			>100%			>100%			>100%			>100%
Acute Toxicity (LC50)			>100%			>100%			>100%			>100%
Chronic Minimum Limit			62.5%			62.5%			62.5%			62.5%
Chronic Toxicity (NOEC)			<u>25%</u>			100%			100%			100%

Values that are bold and underlined are permit limit violations.

Flow

The Clinton Plant receives flow from the town of Clinton and the Lancaster Sewer District. Figure 1 shows the average daily flow by month for both communities in FY21. Lancaster flow is about 10% of the total flow to the plant.

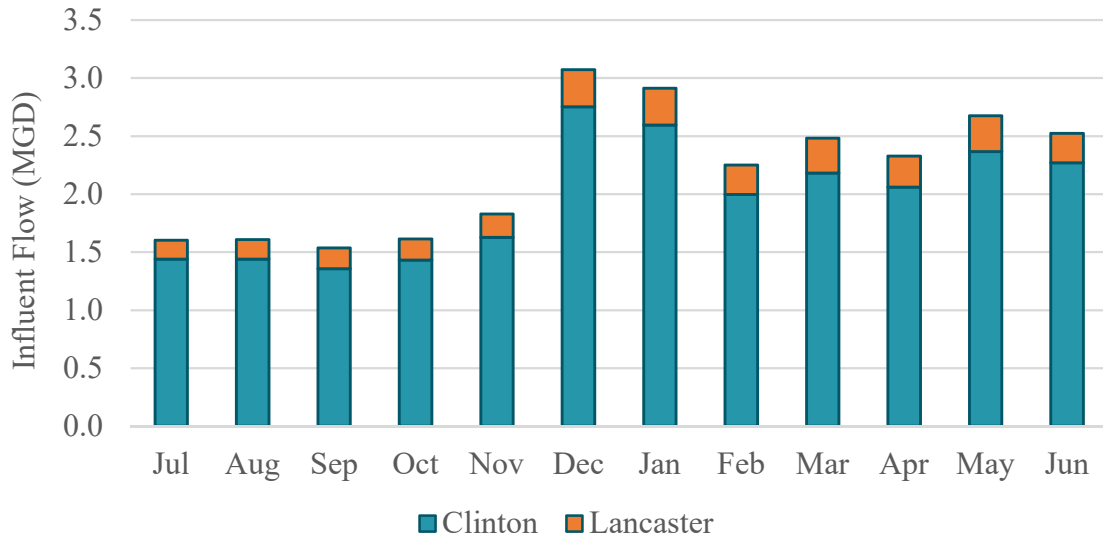


Figure 1. Monthly Average Influent Flow by Town, FY21

Influent flow can be influenced by rainfall, an indirect measure of infiltration and inflow potential to the Clinton and Lancaster collection systems. Figure 2 shows the FY21 monthly influent flow range against monthly rainfall. Plant flows were highest in December 2020.

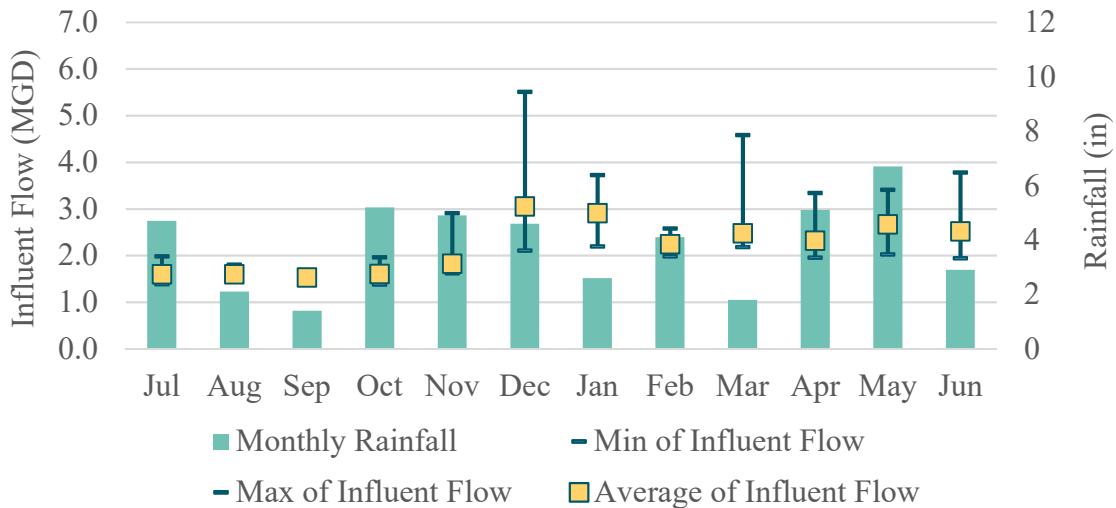


Figure 2. Influent Flow Compared to Precipitation, FY21

Figures 3 and 4 below detail 5-year and 15-year historical plant flows respectively. Figure 3 compares the 12-month rolling average effluent flow against the permit limit of 3.01 million gallons per day (MGD). The daily flow in green shows the variability in plant flow due to rainfall, snowmelt and other factors. As a result of a prolonged period of high flow in FY18 and FY19, the rolling average flow exceeded the permit limit for nearly a year. Figure 4 compares annual average flows with annual rainfall.

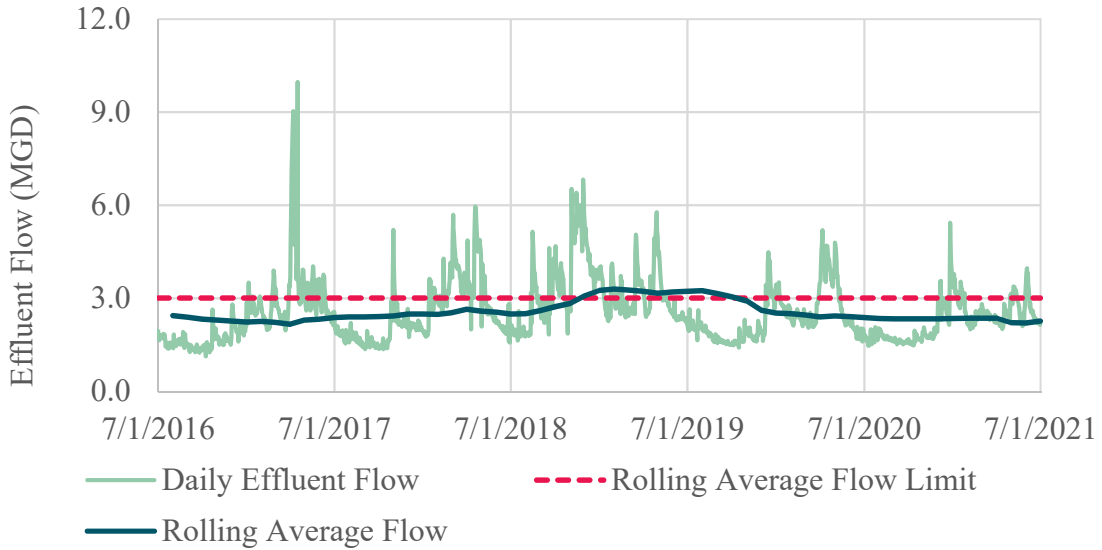


Figure 3. Daily Effluent Flow and 12-month Rolling Average Flow, FY17-FY21

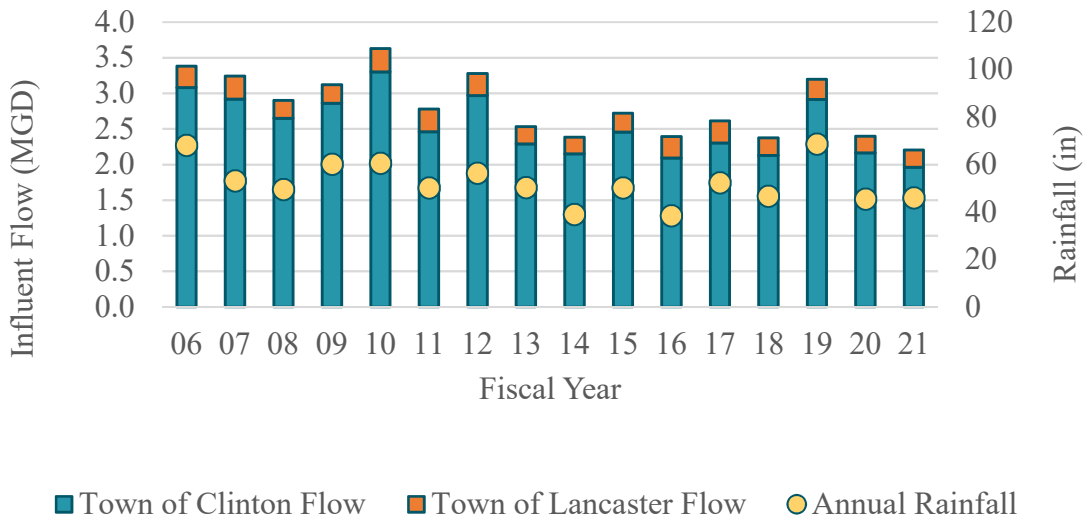


Figure 4. Historical Influent Flow Compared to Precipitation, FY06-FY21

All FY19 and FY20 flow trends are in Appendix C.

Biochemical Oxygen Demand

Wastewater treatment plants measure Biochemical Oxygen Demand (BOD) as an index for the amount of organic material being discharged to the environment. It is measured as the 5-day oxygen consumption by organisms decomposing organic matter. The Clinton Plant, like other wastewater treatment plants, has a benchmark of 85% BOD removal and limit of 20 mg/L in the effluent.

Figure 5 below is a plot of the influent BOD concentration and loading in FY21. Concentrations were highest in late summer, while loadings were higher in the latter half of the fiscal year.

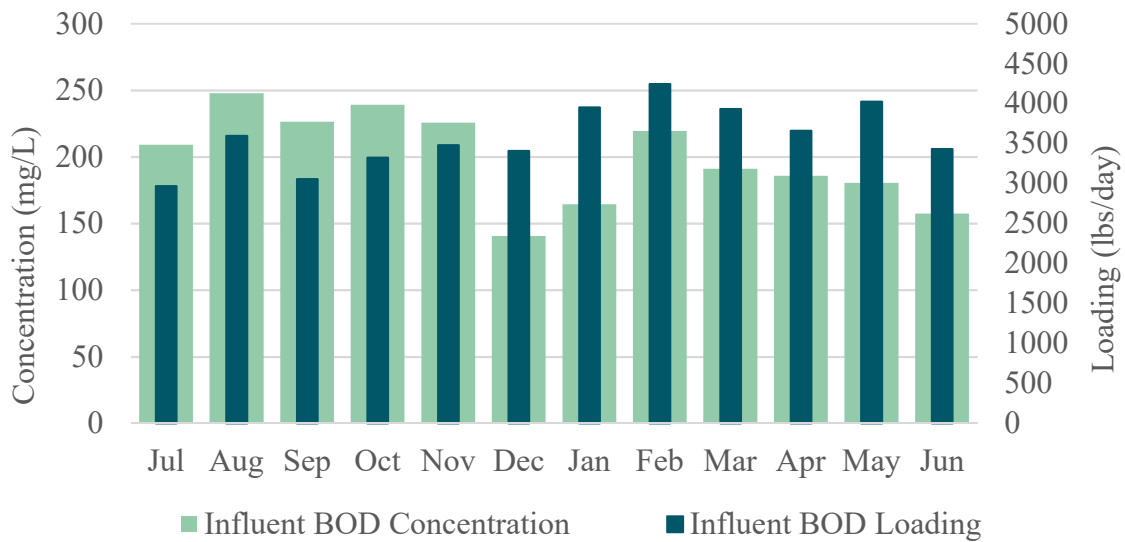


Figure 5. Influent BOD Concentrations and Loadings, FY21

Figure 6 compares BOD monthly average concentration and loading against the permit limits of 20 mg/L and 500 lbs/day respectively. The Clinton Plant effluent was well below permit limits throughout FY21. Figure 7 shows the plant's effectiveness at removing BOD from the influent, with monthly percent removal well above the 85% minimum with an average removal of 99.2%.

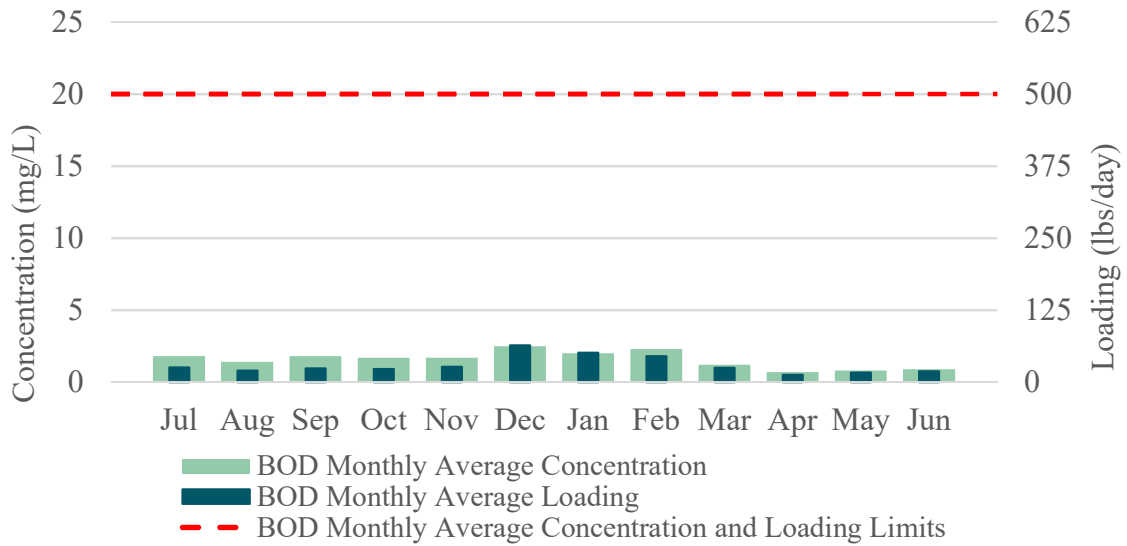


Figure 6. Effluent BOD Concentrations and Loadings, FY21

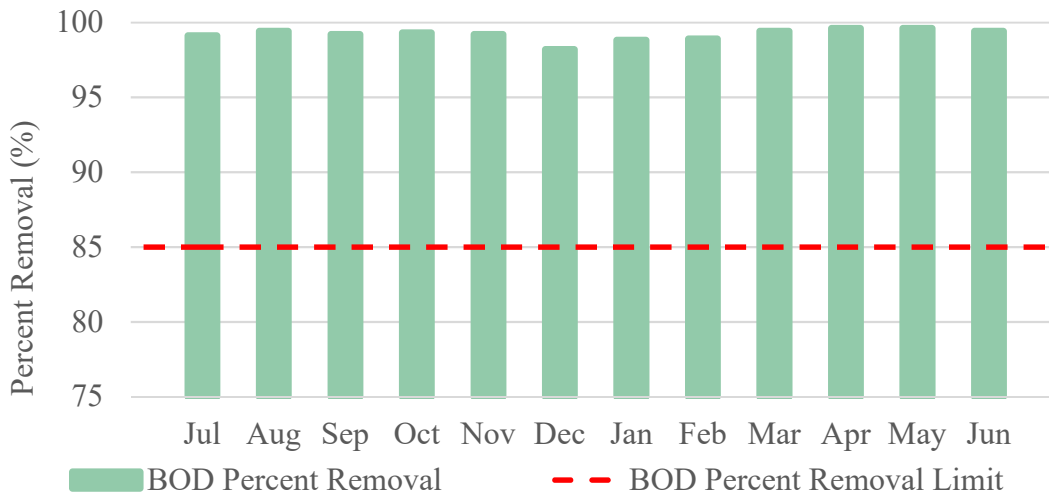


Figure 7. BOD Percent Removal, FY21

Figure 8 below contains individual influent and effluent BOD test results for the last five fiscal years. Effluent BOD concentrations are consistently well below the permit limit despite variable influent concentrations.

All FY19 and FY20 BOD results are in Appendix D. An exceedance of the weekly average limit in June 2019 was the result of a high-BOD slug of industrial wastewater.

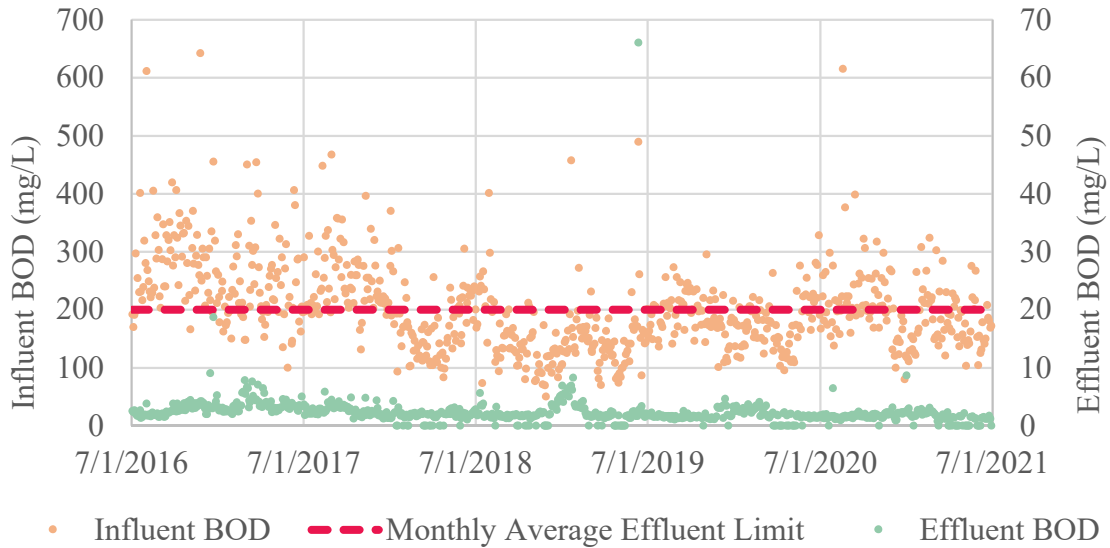


Figure 8. Influent and Effluent BOD Concentration Trends, FY17-FY21

Total Suspended Solids

Total suspended solids (TSS) is another conventional wastewater parameter included in NPDES permits. TSS is measured as the amount of solids that are trapped on a filter. As with BOD, the Clinton Plant has a benchmark of 85% TSS removal and limit of 20 mg/L in the effluent.

Figure 9 below is a plot of the influent TSS concentration and loading in FY21. Concentrations and loadings were highest in February 2021.

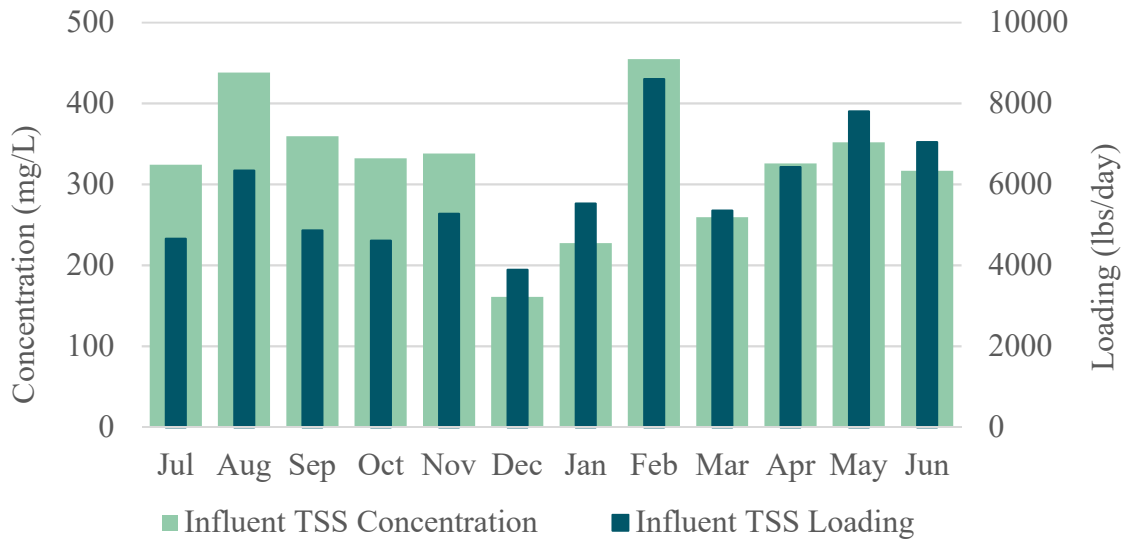


Figure 9. Influent TSS Concentrations and Loadings, FY21

Figure 10 compares TSS monthly average effluent concentration and loading against the permit limits of 20 mg/L and 500 lbs/day, respectively. The Clinton Plant effluent was well below permit limits throughout FY21. Figure 11 shows the plant's effectiveness at removing TSS from the influent, with monthly percent removal above 95% and an average removal of 99.1%.

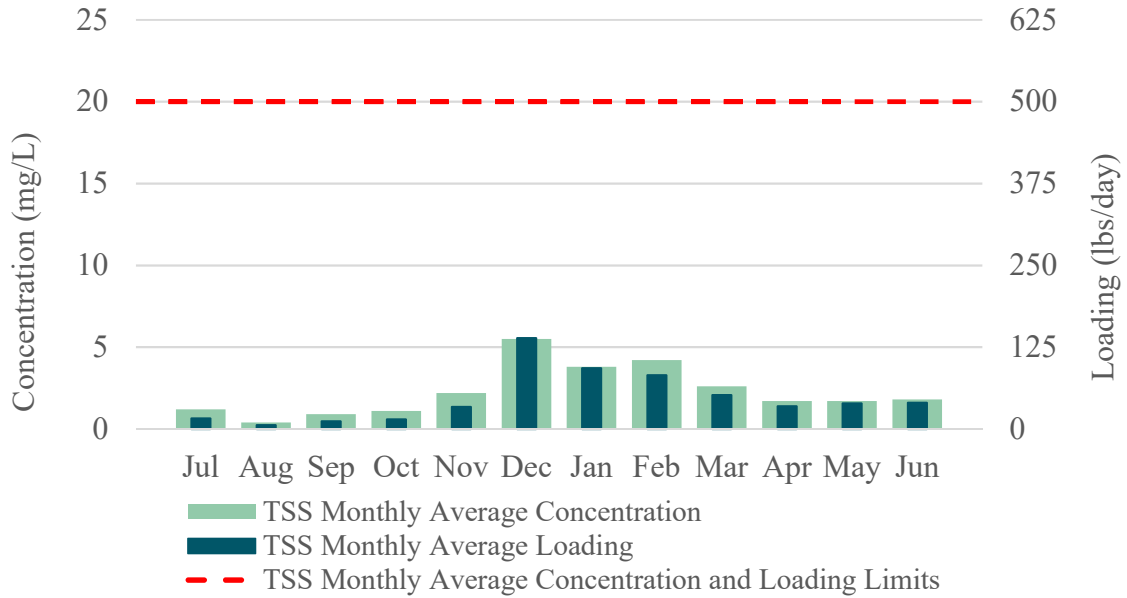


Figure 10. Effluent TSS Concentrations and Loadings, FY21

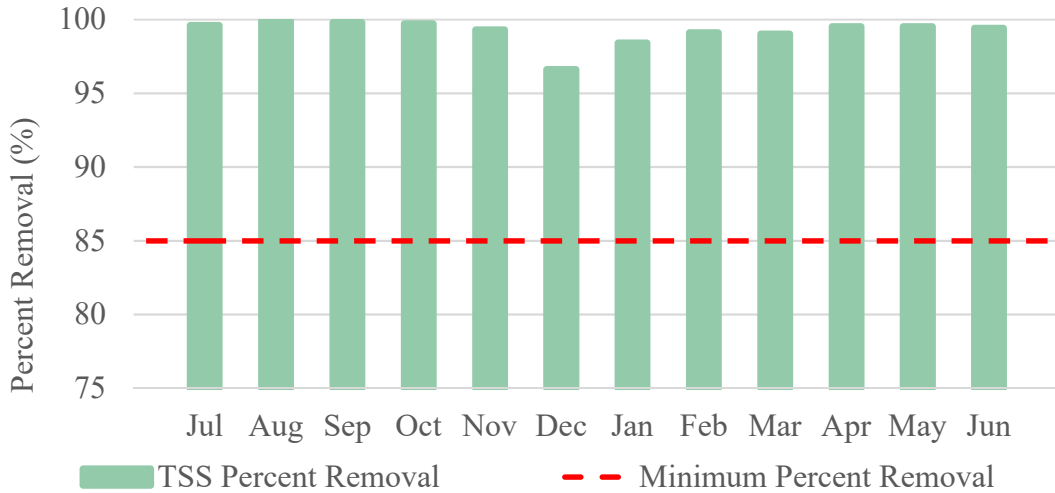


Figure 11. TSS Percent Removal, FY21

Figure 12 contains individual influent and effluent TSS test results for the previous five fiscal years. Effluent TSS concentrations are consistently well below the permit limit despite variable influent concentrations.

All FY19 and FY20 TSS results are in Appendix E.

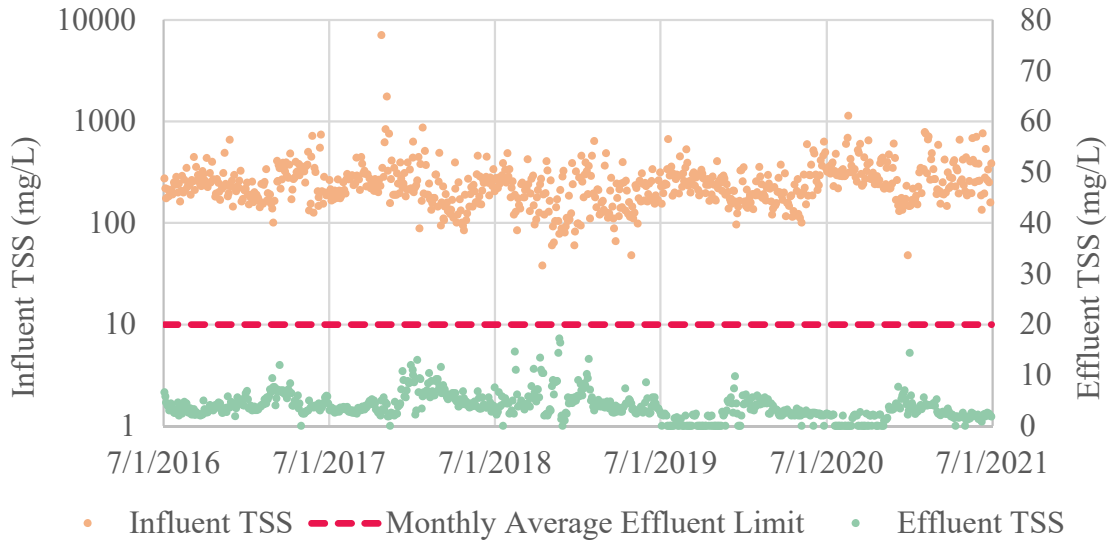


Figure 12. Influent and Effluent TSS Concentration Trends, FY17-FY21

pH

pH is a standard water quality measurement that determines how acidic or basic the water is. In the environment, pH that is too high or low can influence nutrient availability and environmental toxicity. In the Clinton Plant effluent, pH must fall between 6.5 and 8.3 Standard Units (SU) as required by Massachusetts Surface Water Quality Standards. Figure 13 compares the monthly pH range in FY21 with these limits. Results are well within the standards. Figures for FY19 and FY20 are included in Appendix F.

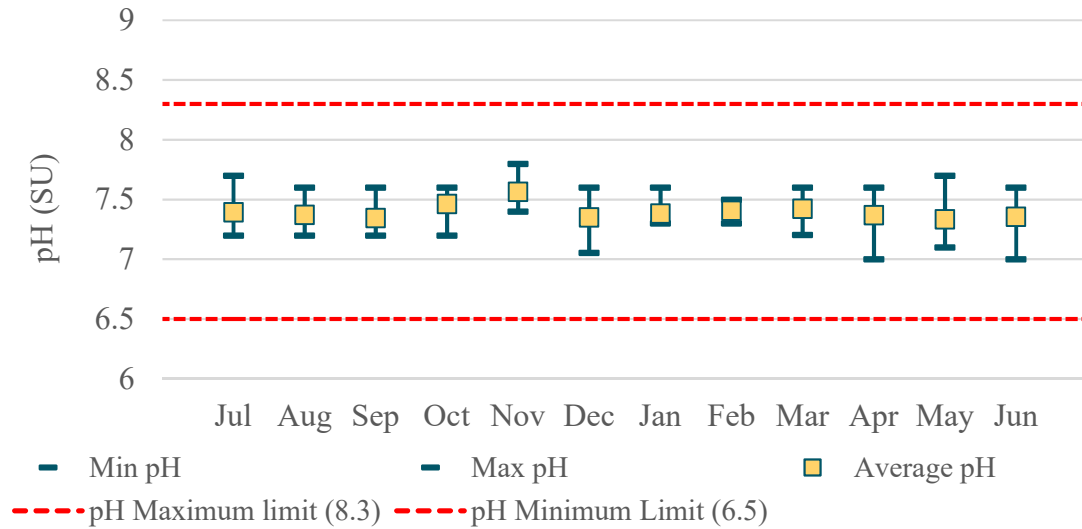


Figure 13. Effluent pH Range, FY21

Figure 14 contains all daily average pH results for FY17-FY21.

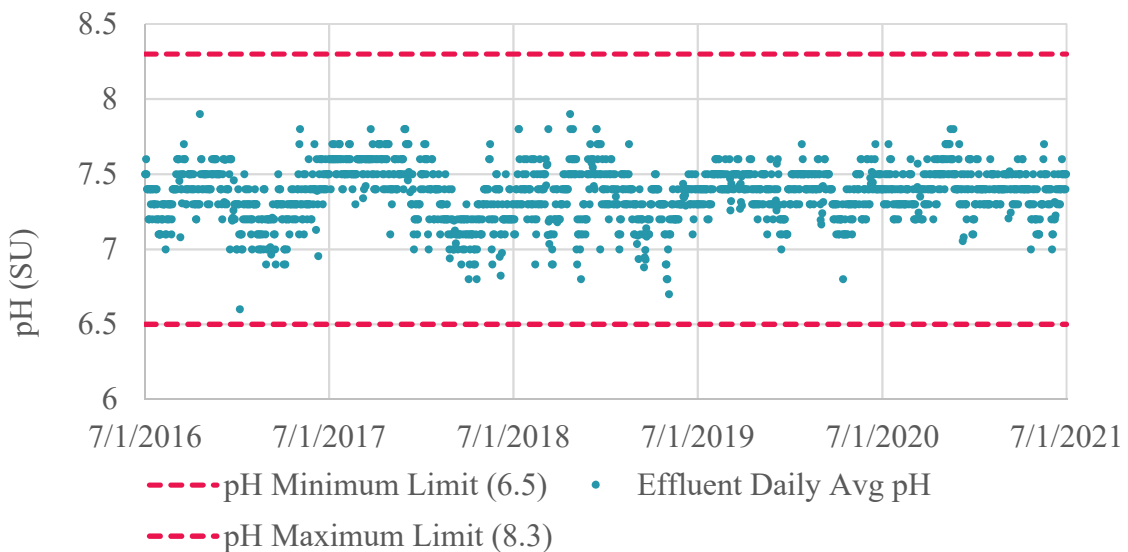


Figure 14. Effluent Daily Average pH, FY17-FY21

Dissolved Oxygen

Dissolved oxygen (DO) is a measure of the oxygen available to aquatic organisms. The Clinton Plant is required to meet a minimum DO criterion of 6.0 mg/L. Figure 15 plots the monthly DO range in FY21 against this minimum standard. Results demonstrate DO levels are higher than the minimum requirements. Figures for FY19 and FY20 are included in Appendix G.

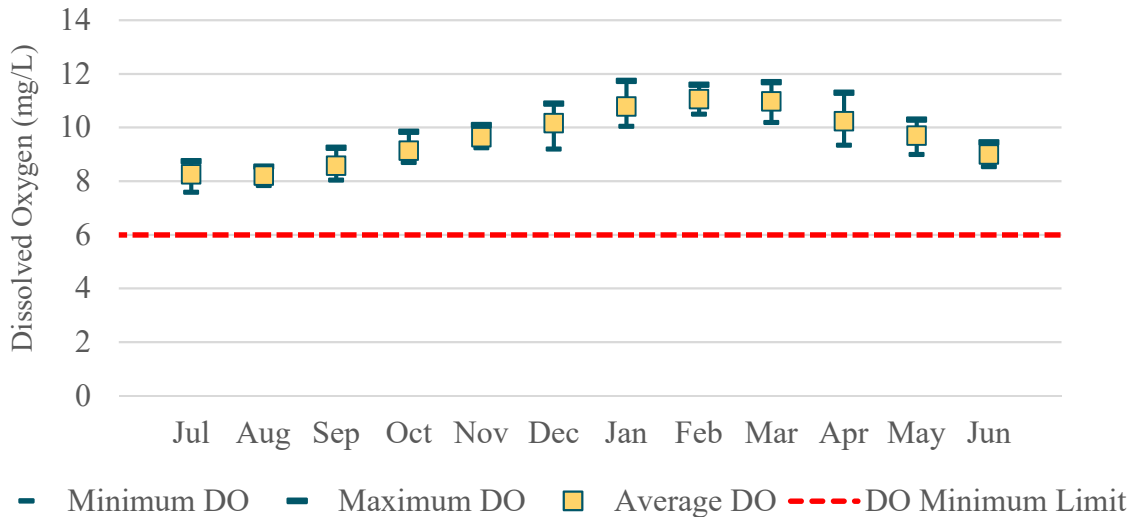


Figure 15. Effluent DO Range, FY21

Figure 16 plots the 5-year daily average DO results against the minimum DO requirement of 6.0 mg/L. There is seasonality to DO in the effluent, as oxygen is more soluble in water at lower temperatures. During all seasons, DO levels are above minimum requirements.

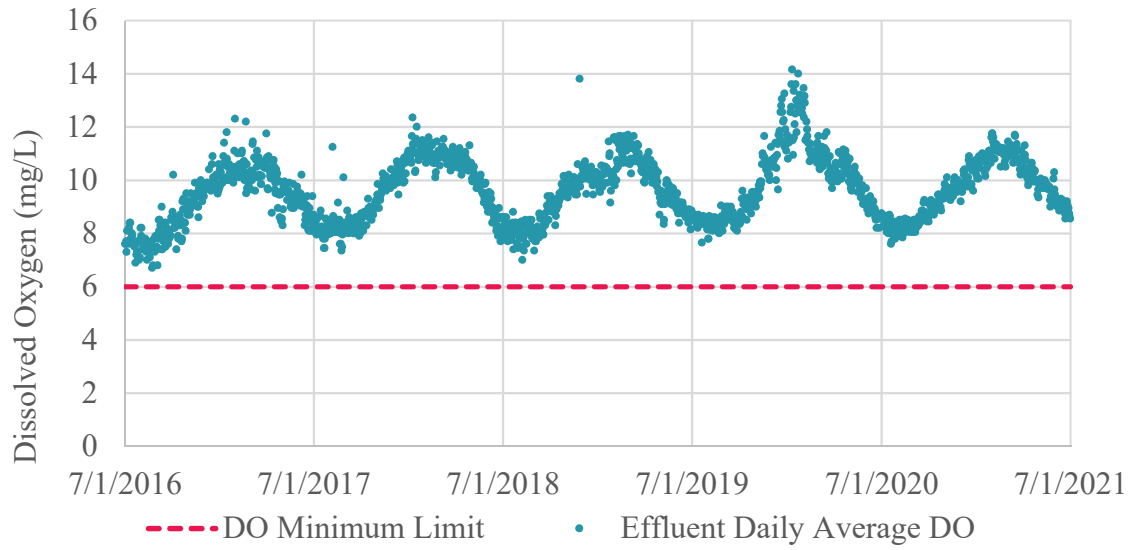


Figure 16. Effluent Daily Average Dissolved Oxygen, FY17-FY21

E. coli

Wastewater treatment plants monitor indicator bacteria to measure the effectiveness of disinfection at the end of the treatment process. As a freshwater discharger in Massachusetts, the Clinton Plant permit requires monitoring of *E. coli*, with a daily maximum limit of 409 colonies per 100mL. The permit further requires a monthly limit of 126 colonies per 100mL calculated as a geometric mean (geomean). Figure 17 below shows the results for FY21, plotted on a logarithmic scale. Results are well below maximum standards.

FY19 and FY20 results can be viewed in Appendix H. The daily geomean was exceeded in February 2019 as the result of a return activated sludge failure in Final Clarifier 2.

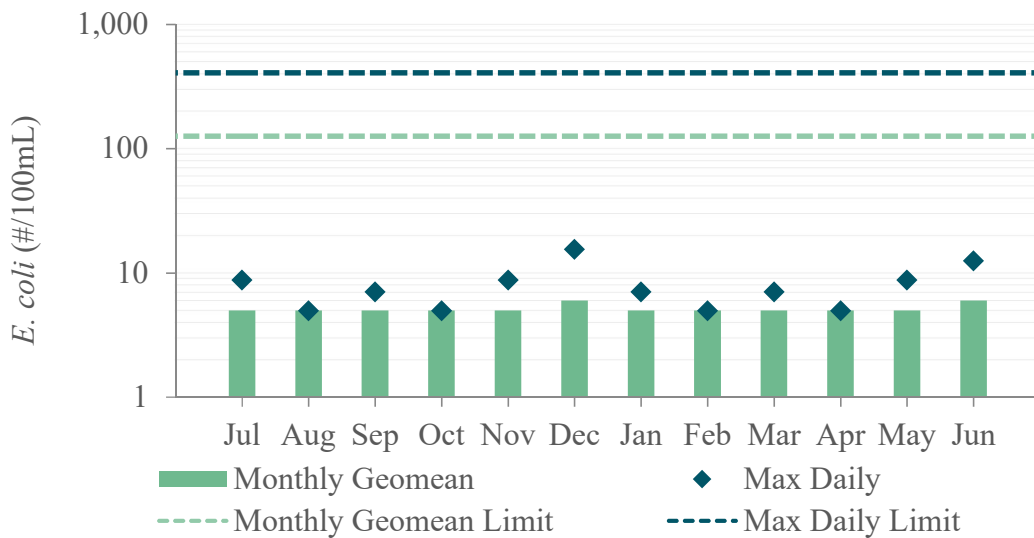


Figure 17. Effluent *E. coli* Monthly Geometric Mean (Geomean) and Daily Maximum Concentrations, FY21

Total Chlorine Residual

Total Chlorine Residual (TCR) is a measure of free chlorine and bound chlorine present in water. Chlorine is the disinfecting agent in the final stages of wastewater treatment at the Clinton Plant. Following disinfection, the plant dechlorinates the wastewater with sodium bisulfite to ensure the disinfecting agents and chlorine compounds do not reach the environment. The NPDES permit contains limits for a daily maximum and monthly average TCR based on Massachusetts Surface Water Quality Standards. As shown in Figure 18, the chlorine residual in FY21 was generally non-detectable, with sampling performed at least twice per day.

FY19 and FY20 can be viewed in Appendix I. Two exceedences of the maximum daily limit occurred in April 2019 as a result of rapid flow changes from rain events. Most samples taken during these high flows did not detect residual chlorine. The sodium bisulfite pump was dosing at a rate that should have neutralized the chlorine, however, rapid flow changes may have resulted in brief periods where the pump did not adjust rapidly enough.

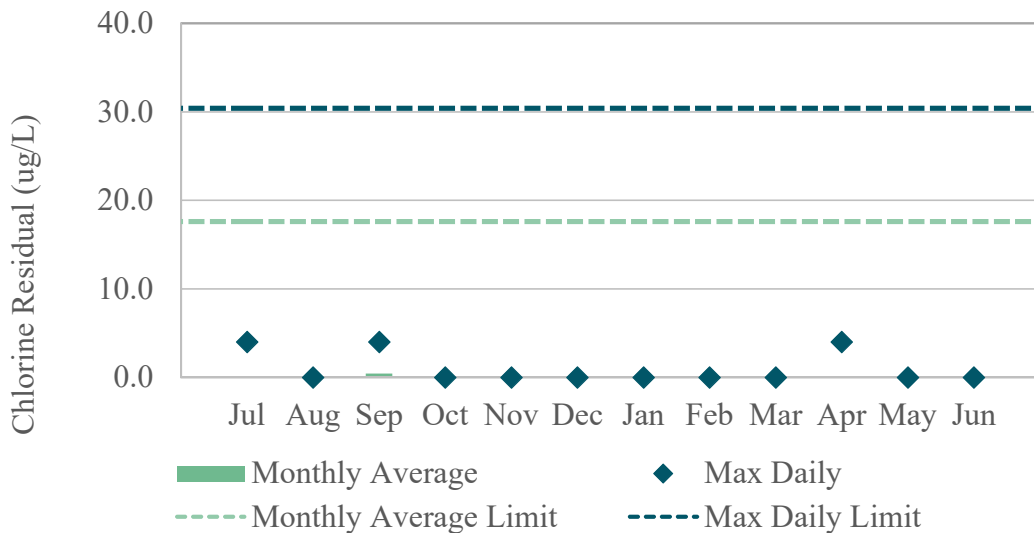


Figure 18. Effluent Total Chlorine Residual Concentrations, FY21

Total Phosphorus

In a freshwater system, over-enrichment of total phosphorus (TP) can result in eutrophication and subsequent oxygen depletion. Elevated phosphorus and eutrophic conditions have been observed in the Nashua River Watershed well downstream of the Clinton Plant, particularly in the Pepperell Pond Impoundment. The Massachusetts Department of Environmental Protection developed a draft Total Maximum Daily Load (TMDL) for the Nashua River¹ for total phosphorus in 2007.

While the Clinton Plant and the South Branch of the Nashua River represent a small portion of the total phosphorus load to the impoundment, more stringent seasonal phosphorus limits were added to the NPDES permit in 2017, requiring the construction of a new Phosphorus Reduction Facility (PRF). The permit included a compliance schedule, with the current limits ultimately going into effect on April 1, 2019. The Clinton Plant has met its total phosphorus limits as shown in Figure 19 below. FY19 and FY20 results are included in Appendix J.

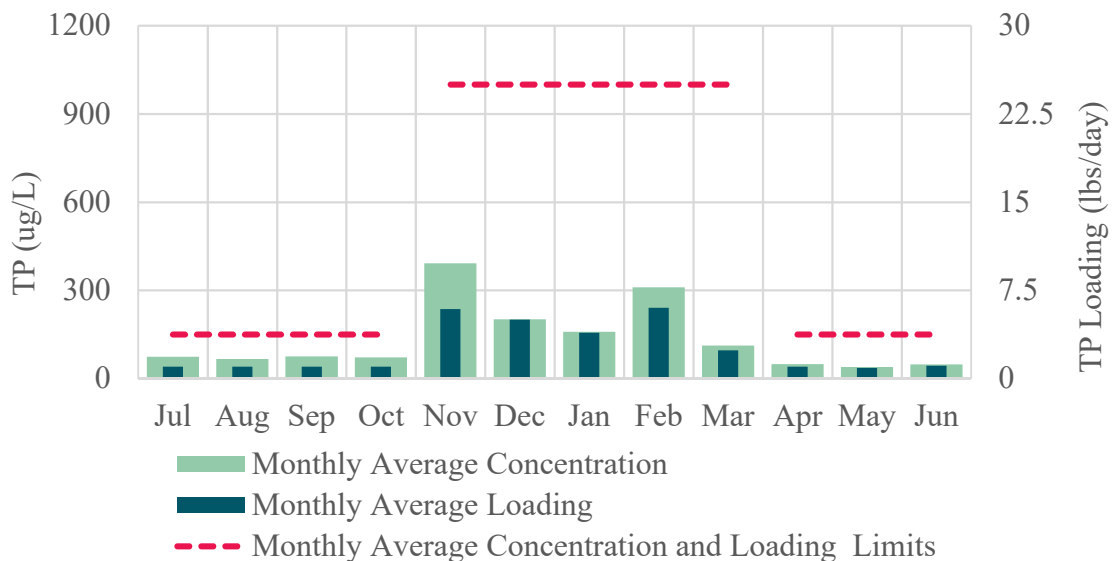


Figure 19. Effluent Total Phosphorus Concentrations and Loadings, FY21

¹ Draft - Nashua River, Massachusetts – Total Maximum Daily Load for the Nutrient Phosphorus
<https://www.mass.gov/files/documents/2016/08/mx/nashua.pdf>

Total Ammonia, as N

Ammonia (NH₃-N) removal is a critical and challenging process for wastewater treatment plants. It is present in high concentrations in wastewater and potentially toxic in the environment if not removed in later stages of treatment.

The Clinton Plant has seasonal effluent limits for ammonia in its NPDES Permit. The limits are most stringent during the growing season, from June through October. There are no maximum daily limits in April and May; results are to be reported. The plant met both the daily maximum and monthly average concentration limits in FY19-21, as shown in Figure 20 below and in Appendix K. Note that only months where there was a detection above zero are displayed.

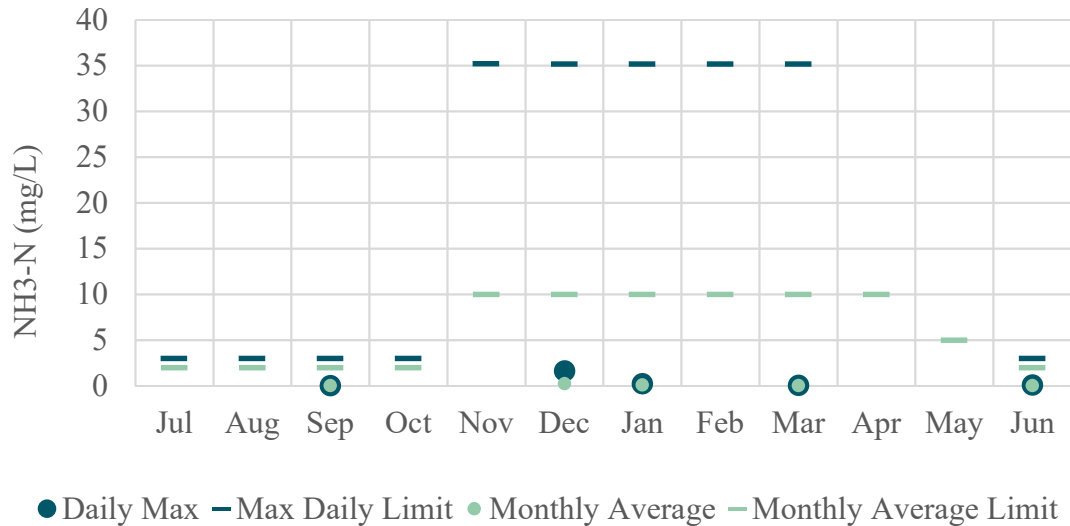


Figure 20. Effluent Ammonia Concentrations, FY21

Total Recoverable Copper

Copper, like other metals, can be toxic to aquatic life. The Clinton Plant has monthly average and daily maximum effluent limits of 11.6 and 14.0 $\mu\text{g/L}$, respectively. Copper is tested more frequently during quarterly toxicity sampling. Figure 21 below shows copper results for FY21, which met permit limits. FY19 and FY20 monthly copper concentration metrics are included in Appendix L.

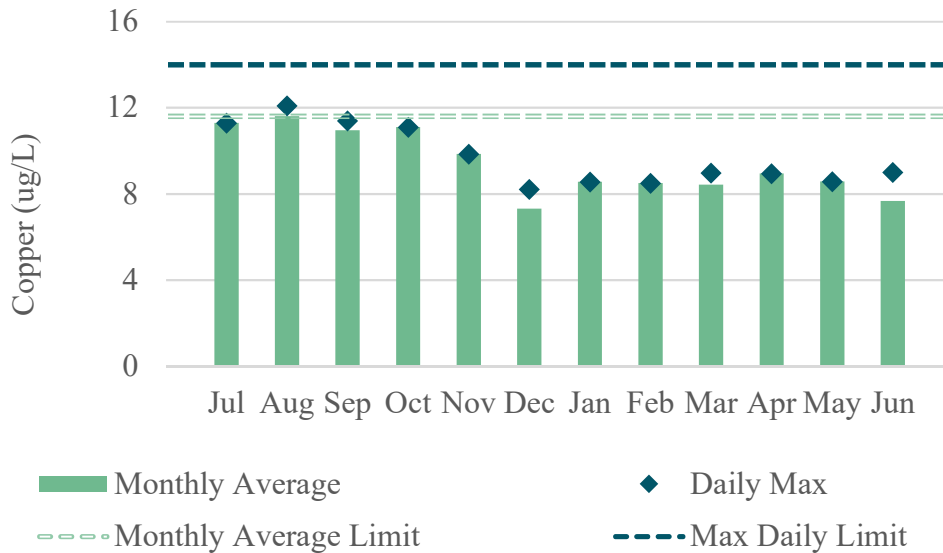


Figure 21. Effluent Copper Monthly Average and Daily Maximum Concentrations, FY21

Figure 22 presents FY17-FY21 copper results. Prior to the current permit, the Clinton Plant was under an EPA Administrative Order to meet an interim effluent copper limit of 20 $\mu\text{g/L}$.

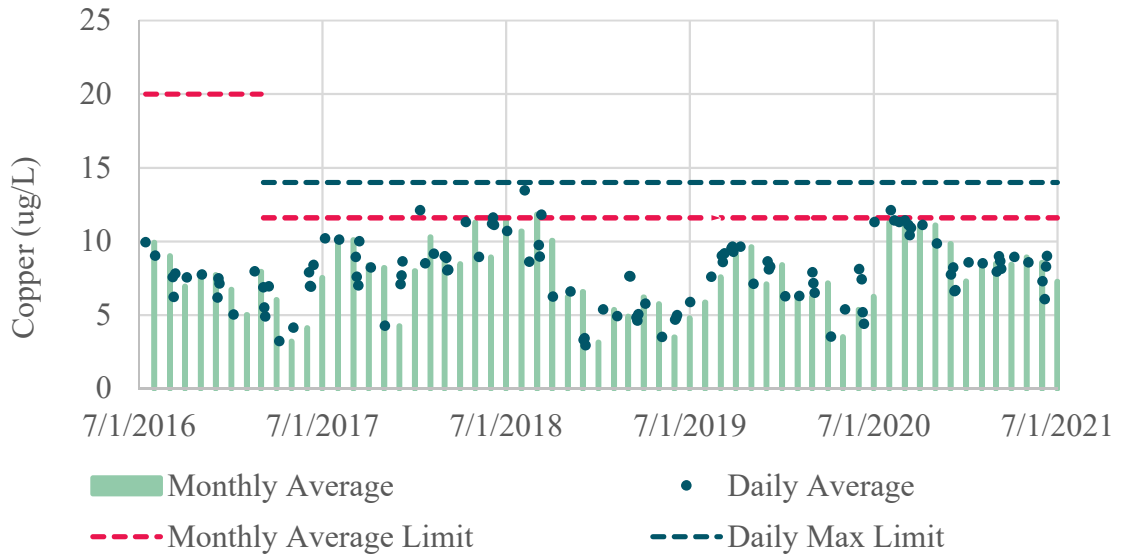


Figure 22. Effluent Copper Monthly Average and Daily Maximum Concentrations, FY17-FY21

Whole Effluent Toxicity

Whole Effluent Toxicity (WET) testing measures specific organisms' response to the cumulative effect of all potential pollutants in wastewater effluent. The toxicity limits are minimum values that must be achieved: 50% survival when exposed to 100% effluent (LC50) (acute toxicity) or no observed effect (NOEC) to growth or reproduction in the test organisms exposed to a sample of 62.5% effluent (chronic toxicity). Toxicity limit testing is performed quarterly using freshwater daphnid shrimp (*Ceriodaphnia dubia*). The Clinton Plant met these limits in FY21 for acute toxicity, as shown in Figure 23. Chronic toxicity limits were met in all but the first quarter as seen in Figure 24. FY19 and FY20 results can be viewed in Appendix M; there was one permit violation in FY19.

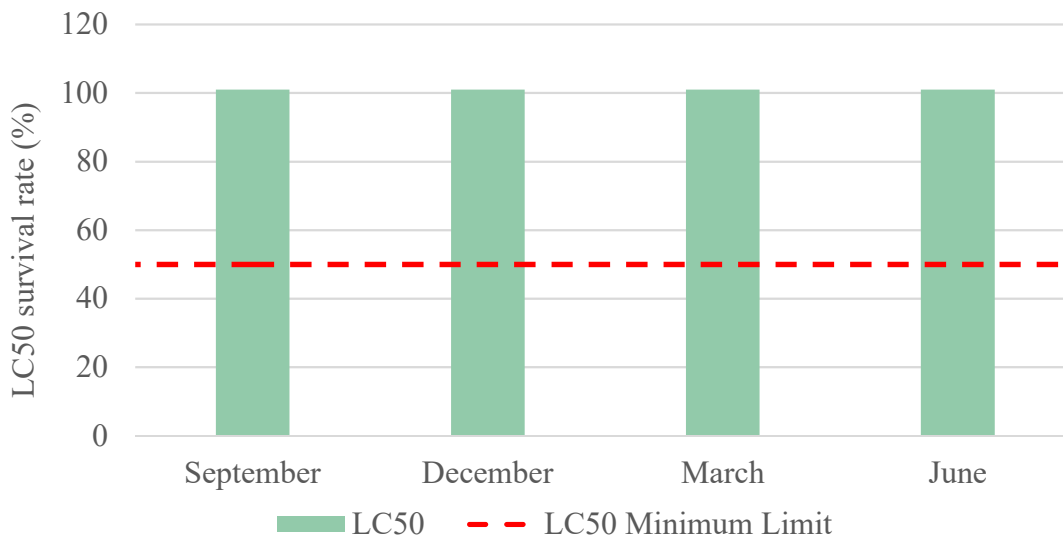


Figure 23. Quarterly Acute Toxicity Results, FY21

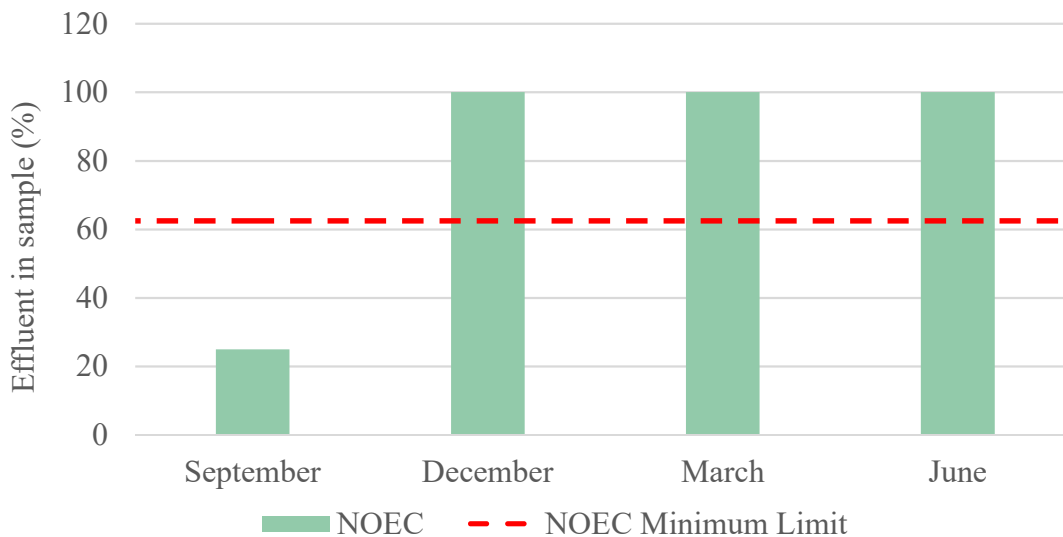


Figure 24. Quarterly Chronic Toxicity Results, FY21

Additional Permit Requirements

Industrial Pretreatment Program

MWRA's Toxic Reduction and Control (TRAC) Department is responsible for developing and enforcing local limits for industrial users in the Clinton Plant collection system. The local limits program is designed to prevent pollutants from entering the treatment system that would interfere with the operation of the treatment plant or pass through untreated to contaminate the receiving water. TRAC also submits an Industrial Waste Annual Report² for each fiscal year by October 31st of the following year. The appendices of these reports contain information on concentrations of priority pollutants in the Clinton Plant influent and effluent.

Operation and Maintenance of the Sewer System

MWRA submits an annual report detailing activities related to the operation and maintenance of the MWRA-owned portion of the collection system leading to the Clinton Plant – a single, 5,399-foot long interceptor.

Unauthorized Discharges

Discharge of wastewater from any other point source, including sanitary sewer overflows (SSOs), is not authorized by the Clinton NPDES permit. There were no unauthorized discharges from the Clinton Plant or the MWRA-owned portion of the collection system in FY19-21.

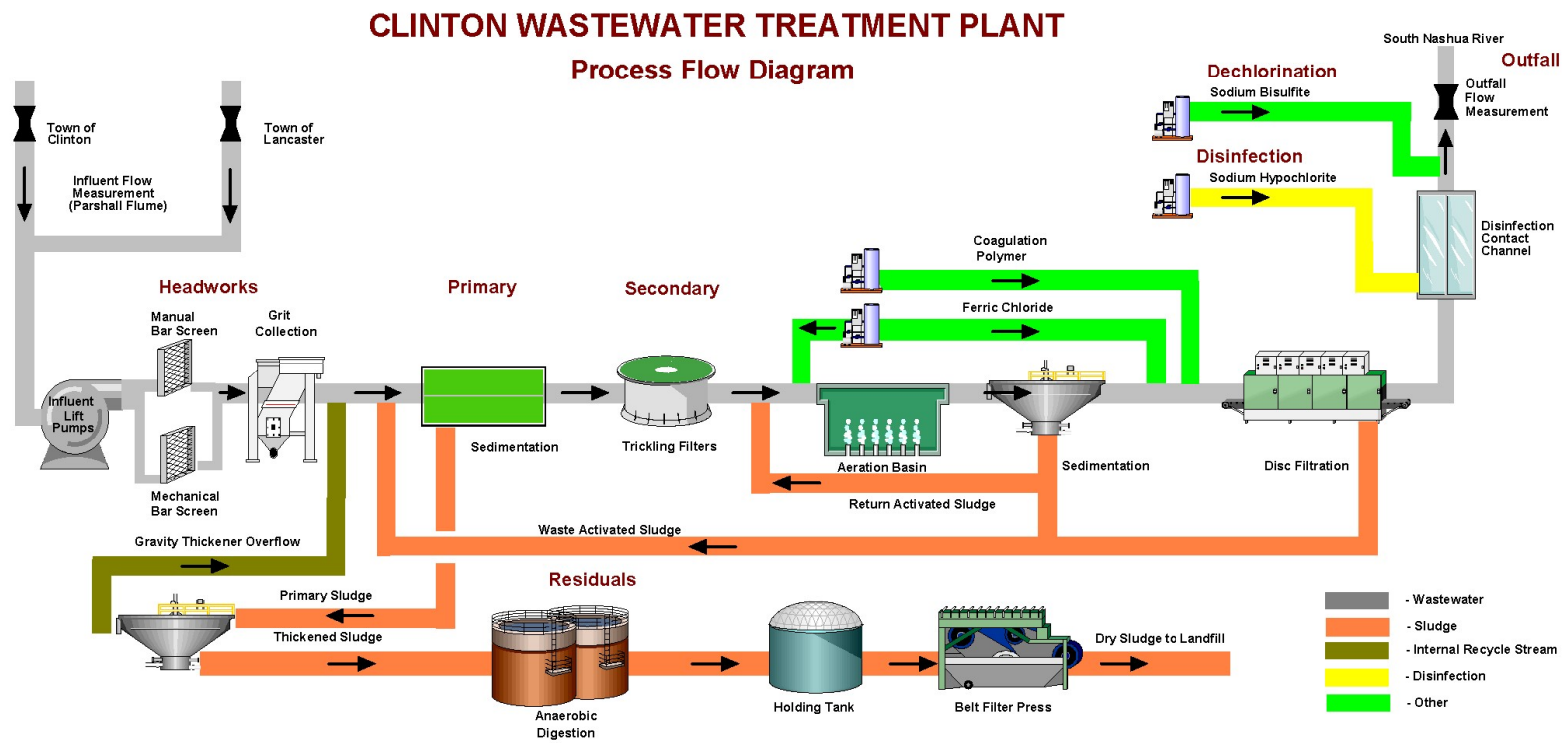
Sludge Processing

MWRA trucks dewatered sludge to a residuals landfill located in the Town of Clinton, owned and operated by MWRA. This sludge landfill is double-lined and includes a leachate collection system that pumps to the Town of Clinton's sewer system to be treated at the Clinton Plant. Soil cover is applied to the sludge following each delivery to keep the sludge from attracting pests as required by 40 CFR 503.33(b)(11). By February 19th of each year, MWRA must submit to EPA (i) certification that this requirement is being met, and (ii) the number of dry metric tons of sludge disposed of in the landfill. Groundwater around the landfill is monitored to ensure that metals and other pollutants do not pass through the liner.

² <https://www.mwra.com/annual/tracindustrialwastereport/industrialwastereports.htm>

Appendices

Appendix A – Clinton Wastewater Treatment Plant Schematic



Appendix B – NPDES Permit Compliance Results, FY19-20

FY 2019
July 2018 – June 2019

Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Flow (MGD, million gallons per day)												
<i>Limit</i>	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
Monthly Average	1.92	2.87	2.94	3.26	5.4	4.06	3.13	2.81	3.32	3.54	3.17	2.39
12-Month Rolling Average	2.51	2.61	2.73	2.84	<u>3.09</u>	<u>3.26</u>	<u>3.3</u>	<u>3.27</u>	<u>3.23</u>	<u>3.17</u>	<u>3.21</u>	<u>3.23</u>
Biochemical Oxygen Demand (BOD)												
<i>Limit (mg/L)</i>	20	20	20	20	20	20	20	20	20	20	20	20
Monthly Average	2.5	1.7	1.4	1.3	1.3	3.3	5.5	2.6	1.5	1.3	0.9	7.1
Weekly Average	3.8	1.8	1.8	1.7	2.2	4.6	7.1	3.7	2.1	2.2	1.6	<u>23.5</u>
<i>Limit (lbs/day)</i>	500	500	500	500	500	500	500	500	500	500	500	500
Monthly Average	42	44	36	35	60	108	145	61	38	32	22	141
Weekly Average	59	73	52	49	108	143	180	99	47	58	40	464
<i>Limit</i>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Percent Removal	98.9	98.9	99	99.1	98.7	97.1	96.7	98.5	98.9	99	99.3	96.3
Total Suspended Solids (TSS)												
<i>Limit (mg/L)</i>	20	20	20	20	20	20	20	20	20	20	20	20
Monthly Average	4.3	5.3	5.5	6.1	7.5	4.4	7.9	4.1	3.6	4.2	3.6	3.9
Weekly Average	4.8	9.3	7.7	10	12.3	5.2	10.9	5.9	4.4	5.4	3.7	5.4
<i>Limit (lbs/day)</i>	500	500	500	500	500	500	500	500	500	500	500	500
Monthly Average	70	154	148	177	350	143	209	94	97	126	92	78
Weekly Average	78	359	239	288	<u>592</u>	168	279	173	102	176	156	118
<i>Limit</i>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Percent Removal	98.5	97.2	97.4	96.9	95.1	97.1	97.1	98.1	97.9	97.7	98.2	98.2
pH (SU)												
<i>Limit</i>	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3
Range	7.1-7.8	6.9-7.6	6.9-7.8	7.2-7.9	6.8-7.7	7-7.8	7-7.6	7.1-7.7	6.9-7.4	6.9-7.5	6.7-7.4	7.1-7.5
Dissolved Oxygen (mg/L)												
<i>Limit</i>	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Conc.	7.4	7	7.7	8.3	9.4	9.5	9.2	9.8	9.9	8.7	8.4	8.2
E. coli Bacteria (cfu/100mL)												
<i>Limit</i>	126	126	126	126	126	126	126	126	126	126	126	126
Monthly Geometric Mean	8	21	21	13	7	5	6	7	6	6	5	6
<i>Limit</i>	409	409	409	409	409	409	409	409	409	409	409	409
Maximum Daily	54	315	164	113	44	9	26	<u>667</u>	12	14	14	31

Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Total Residual Chlorine (µg/L)												
<i>Limit</i>	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Monthly Average	0	0	0.22	0	0	0	0	0	0.24	4.7	0.08	0
<i>Limit</i>	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
Maximum Daily	0	0	6.67	0	0	0	0	0	4	<u>57.14</u>	2.5	0
Total Phosphorus * Interim limits												
<i>Limit</i>	150*	150*	150*	150*	1,000*	1,000*	1,000*	1,000*	1,000*	150	150	150
Monthly Average Conc. (µg/L)	329.9	174.8	165.1	55.2	41.0	94.4	270.8	166.6	69.1	53.6	46.3	64.0
<i>Limit</i>	3.8*	3.8*	3.8*	3.8*	25.1*	25.1*	25.1*	25.1*	25.1*	3.8	3.8	3.8
Monthly Average Loading (lbs/day)	5.5	4.3	4.1	1.6	1.8	3.4	7.1	3.6	1.8	1.5	1.2	1.3
Total Ammonia, as N (mg/L)												
<i>Limit</i>	2	2	2	2	10	10	10	10	10	10	5	2
Monthly Average	0.04	0	0.03	0	0.03	0.01	0.09	0.81	0.25	0.11	0.1	0.04
<i>Limit</i>	3	3	3	3	35.2	35.2	35.2	35.2	35.2	-	-	2
Maximum Daily	0.55	0	0.17	0	0.12	0.04	0.29	1.54	1.14	0.15	0.14	0.14
Total Recoverable Copper (µg/L)												
<i>Limit</i>	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
Monthly Average	10.7	11.03	10.16	6.23	6.59	3.22	5.36	4.92	5.94	5.75	3.49	4.82
<i>Limit</i>	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Maximum Daily	10.7	11.03	10.16	6.23	6.59	3.22	5.36	4.92	5.94	5.75	3.49	4.82
Whole Effluent Toxicity (%)												
<i>Limit</i>			>100			>100			>100			>100
Acute Toxicity (LC50)			101			101			101			101
<i>Limit</i>			62.5			62.5			62.5			62.5
Chronic Toxicity (NOEC)			100			100			62.5			<u>25</u>

Values that are bold and underlined are permit limit violations

FY 2020
July 2019 – June 2020

Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Flow (MGD, million gallons per day)												
<i>Limit</i>	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
Monthly Average	2.11	1.83	1.59	1.69	1.85	2.97	2.82	2.36	2.44	4.07	2.88	1.97
12-Month Rolling Average	<u>3.25</u>	<u>3.16</u>	<u>3.05</u>	2.92	2.62	2.53	2.51	2.47	2.4	2.44	2.42	2.38
Biochemical Oxygen Demand (BOD)												
<i>Limit (mg/L)</i>	20	20	20	20	20	20	20	20	20	20	20	20
Monthly Average	1.7	1.5	1.6	1.4	1.6	2.5	2.7	2.9	1.7	0.9	1	1.5
Weekly Average	1.9	1.7	1.9	1.6	2.6	3.2	3	3.3	2.5	1.5	1.6	1.6
<i>Limit (lbs/day)</i>	500	500	500	500	500	500	500	500	500	500	500	500
Monthly Average	30	23	21	20	26	62	64	57	33	32	20	25
Weekly Average	34	28	25	22	45	80	78	67	48	57	44	28
<i>Limit</i>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Percent Removal	99	99.3	99.3	99.2	99.2	98.4	98.2	98.5	99	99.3	99.5	99.3
Total Suspended Solids (TSS)												
<i>Limit (mg/L)</i>	20	20	20	20	20	20	20	20	20	20	20	20
Monthly Average	0.8	0.7	0.7	0.4	1.7	3.8	4.5	4.4	2.9	2.5	2.3	2
Weekly Average	2.2	1	1.5	1.3	4.2	6.6	5.1	4.9	3.8	2.9	2.8	2.4
<i>Limit (lbs/day)</i>	500	500	500	500	500	500	500	500	500	500	500	500
Monthly Average	14	11	9	6	27	92	107	86	59	86	52	32
Weekly Average	39	16	20	17	72	166	137	102	72	110	86	41
<i>Limit</i>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Percent Removal	99.7	99.8	99.7	99.8	99.3	98.1	97.5	98.1	98.6	98.5	99.1	99.5
pH (SU)												
<i>Limit</i>	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3	6.5 -8.3
Range	7.2-7.5	7.4-7.6	7.3-7.6	7.2-7.6	7.1-7.6	7-7.6	7.3-7.7	7.3-7.6	7.2-7.6	6.8-7.4	7.1-7.6	7.3-7.7
Dissolved Oxygen (mg/L)												
<i>Limit</i>	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Conc.	7.7	7.8	8.1	8.4	9	9.7	10.8	10.7	9.7	10	9.1	8.2
E. coli Bacteria (cfu/100mL)												
<i>Limit</i>	126	126	126	126	126	126	126	126	126	126	126	126
Monthly Geometric Mean	6	5	5	5	6	8	5	5	5	6	6	5
<i>Limit</i>	409	409	409	409	409	409	409	409	409	409	409	409
Maximum Daily	79	7	7	7	189	70	7	7	7	14	38	9

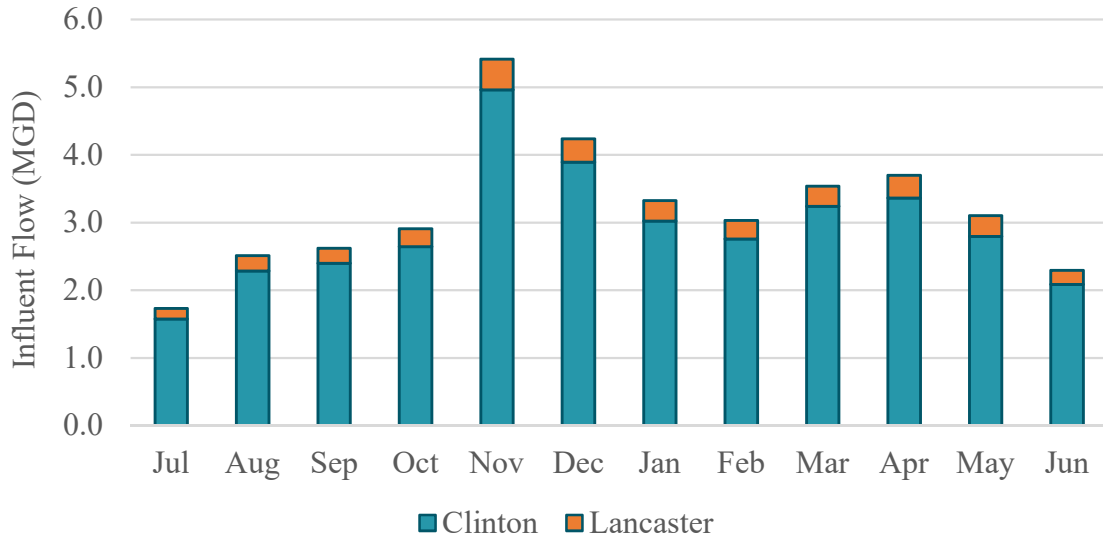
Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Total Residual Chlorine (µg/L)												
<i>Limit</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>	<i>17.6</i>
Monthly Average	0	0.13	0.53	0	0	0.24	0.26	0	0.26	0.13	0.13	0.13
<i>Limit</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>	<i>30.4</i>
Maximum Daily	0	4	4	0	0	4	8	0	4	4	4	4
Total Phosphorus												
<i>Limit</i>	<i>150</i>	<i>150</i>	<i>150</i>	<i>150</i>	<i>1,000</i>	<i>1,000</i>	<i>1,000</i>	<i>1,000</i>	<i>1,000</i>	<i>150</i>	<i>150</i>	<i>150</i>
Monthly Average Conc. (µg/L)	66.9	59.2	71.9	59.3	156.5	183.9	153.3	322.3	146.4	41.2	68.4	73.5
<i>Limit</i>	<i>3.8</i>	<i>3.8</i>	<i>3.8</i>	<i>3.8</i>	<i>25.1</i>	<i>25.1</i>	<i>25.1</i>	<i>25.1</i>	<i>25.1</i>	<i>3.8</i>	<i>3.8</i>	<i>3.8</i>
Monthly Average Loading (lbs/day)	1.1	0.9	1	0.8	2.5	4.6	3.6	6.4	2.8	1.4	1.5	1.2
Total Ammonia, as N (mg/L)												
<i>Limit</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>5</i>	<i>2</i>
Monthly Average	0	0	0.02	0	0	0.2	0.02	0	0.05	0.08	0	0.01
<i>Limit</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>35.2</i>	<i>35.2</i>	<i>35.2</i>	<i>35.2</i>	<i>35.2</i>	<i>-</i>	<i>-</i>	<i>2</i>
Maximum Daily	0	0	0.04	0.05	0	1.2	0.12	0	0.29	0.18	0	0.04
Total Recoverable Copper (µg/L)												
<i>Limit</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>	<i>11.6</i>
Monthly Average	5.87	7.58	9.2	9.62	7.1	8.33	6.26	6.27	7.18	3.52	5.36	6.27
<i>Limit</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>	<i>14.0</i>
Maximum Daily	5.87	7.58	9.62	9.62	7.1	8.63	6.26	6.27	7.89	3.52	5.36	8.1
Whole Effluent Toxicity (%)												
<i>Limit</i>			<i>>100</i>			<i>>100</i>			<i>>100</i>			<i>>100</i>
Acute Toxicity (LC50)			101			101			101			101
<i>Limit</i>			<i>62.5</i>			<i>62.5</i>			<i>62.5</i>			<i>62.5</i>
Chronic Toxicity (NOEC)			62.5			100			100			62.5

Values that are bold and underlined are permit limit violations

Appendix C – Flow, FY19-20

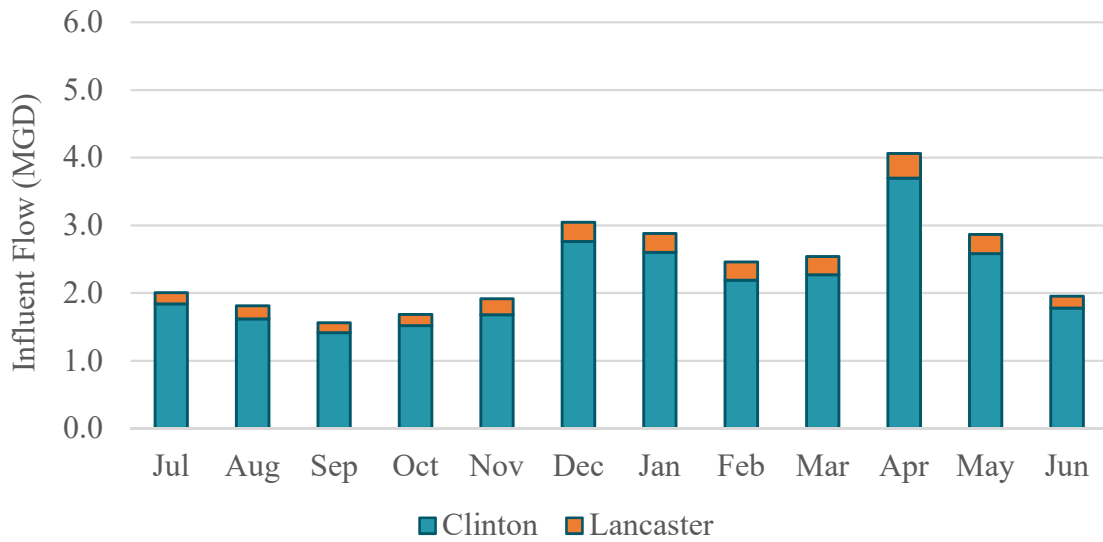
Monthly Average Influent Flow

FY 2019
July 2018 – June 2019



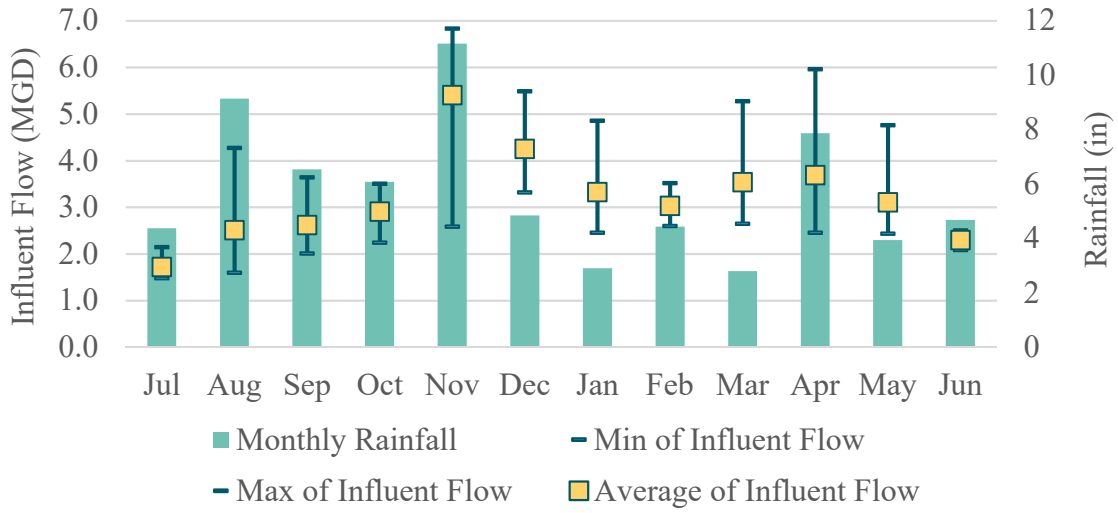
Monthly Average Influent Flow

FY 2020
July 2019 – June 2020



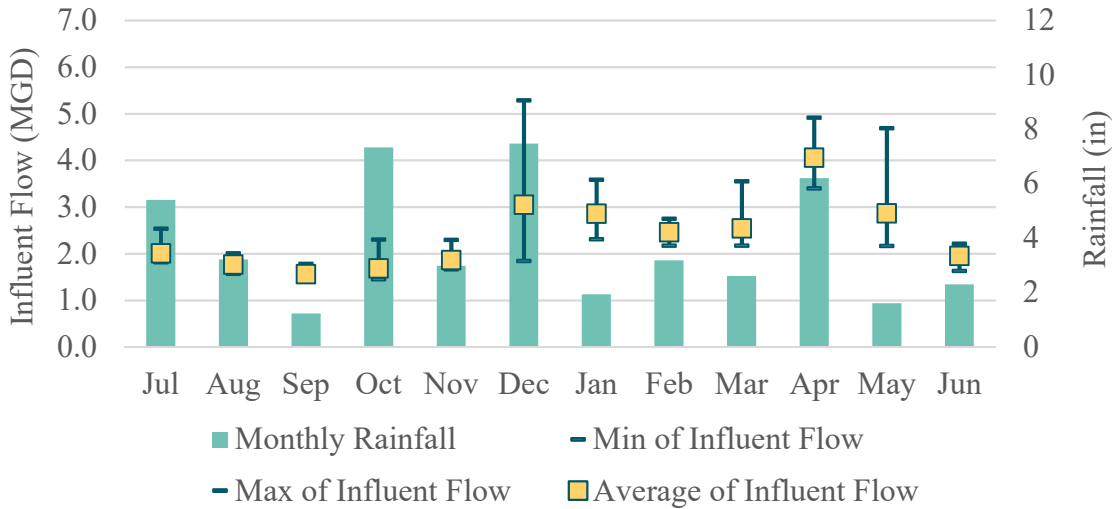
Influent Flow Compared to Precipitation

FY 2019
July 2018 – June 2019



Influent Flow Compared to Precipitation

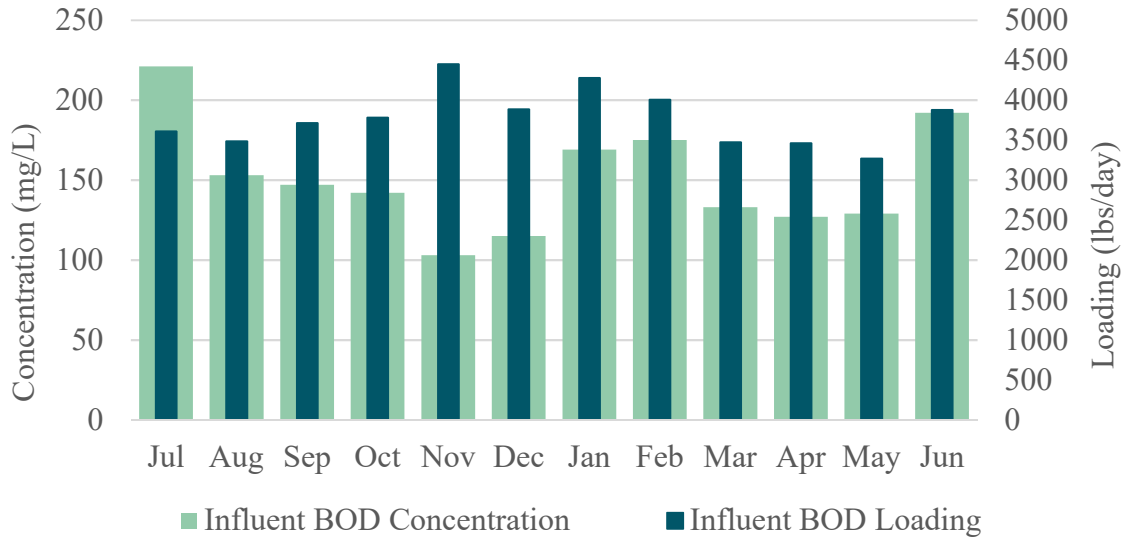
FY 2020
July 2019 – June 2020



Appendix D – BOD, FY19-20

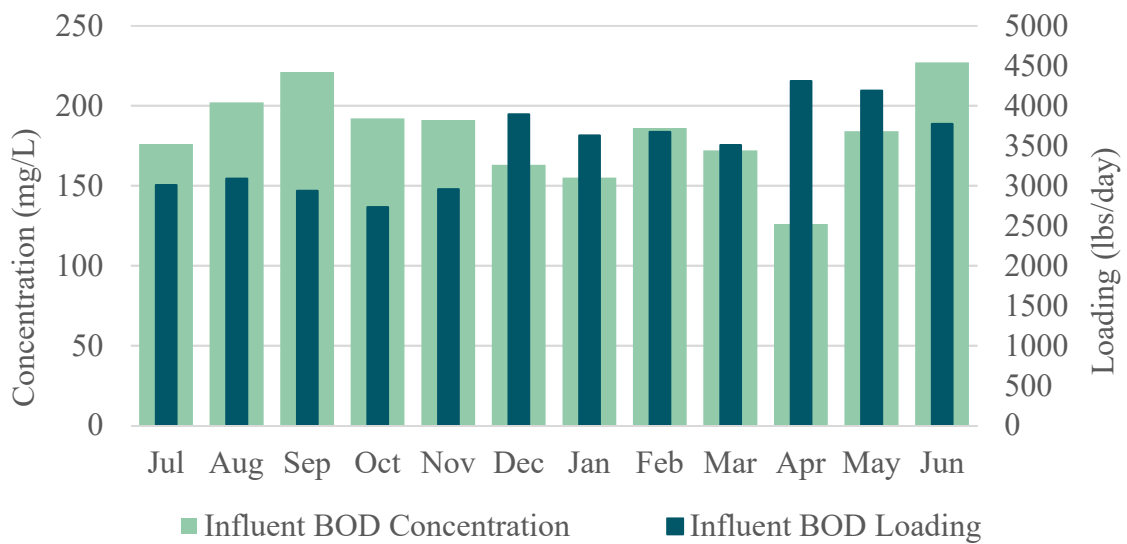
Influent Biochemical Oxygen Demand (BOD) Concentration and Loadings

FY 2019
July 2018 – June 2019



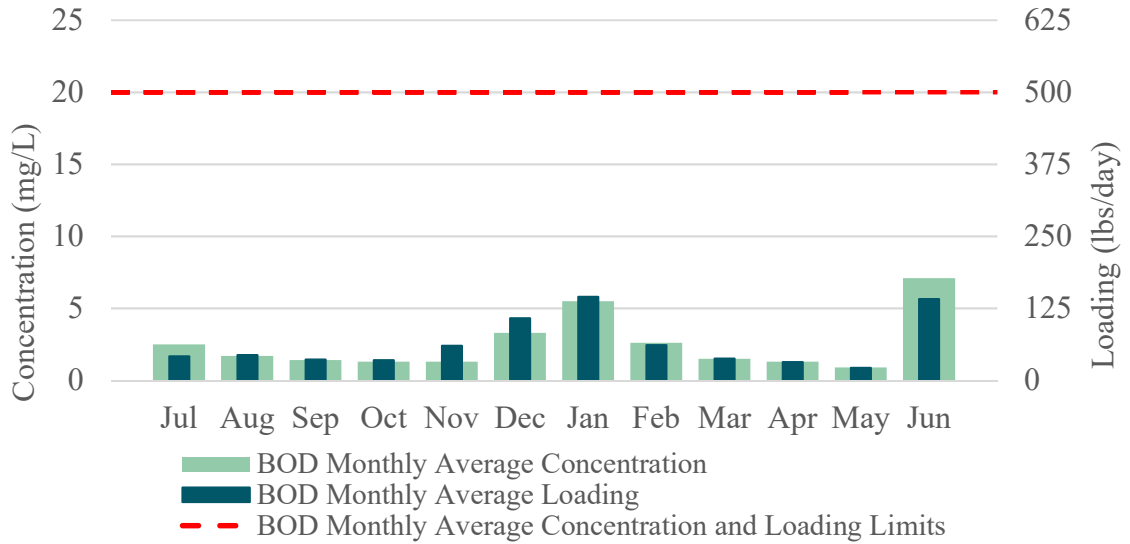
Influent Biochemical Oxygen Demand (BOD) Concentration and Loadings

FY 2020
July 2019 – June 2020



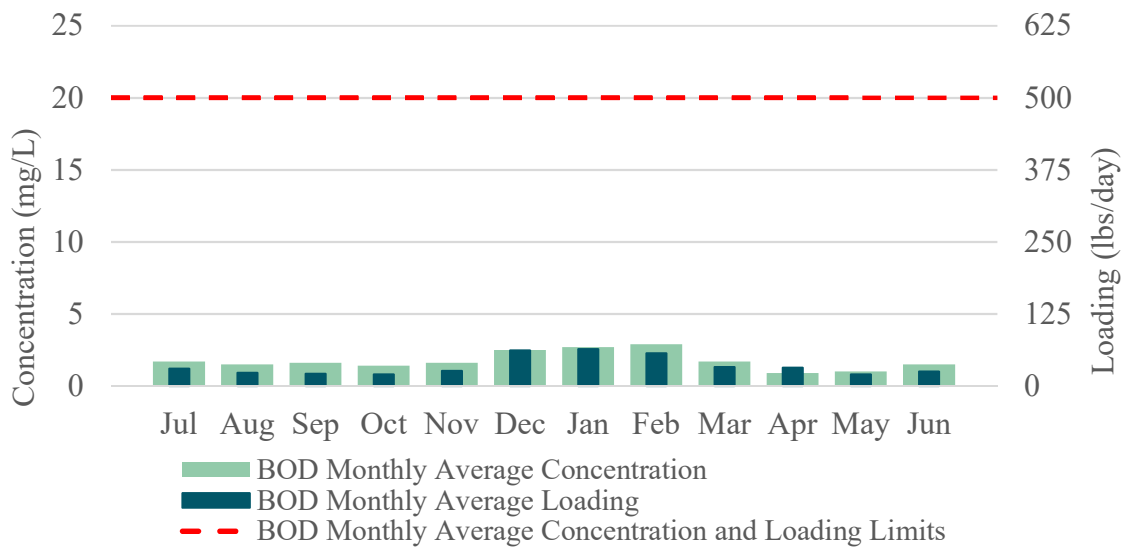
Effluent Biochemical Oxygen Demand (BOD) Concentration and Loadings

**FY 2019
July 2018 – June 2019**



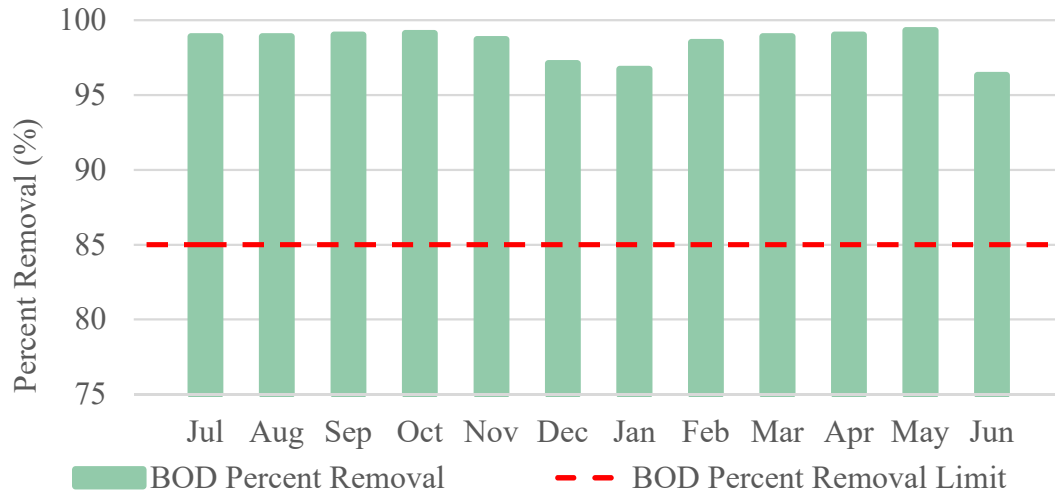
Effluent Biochemical Oxygen Demand (BOD) Concentration and Loadings

**FY 2020
July 2019 – June 2020**



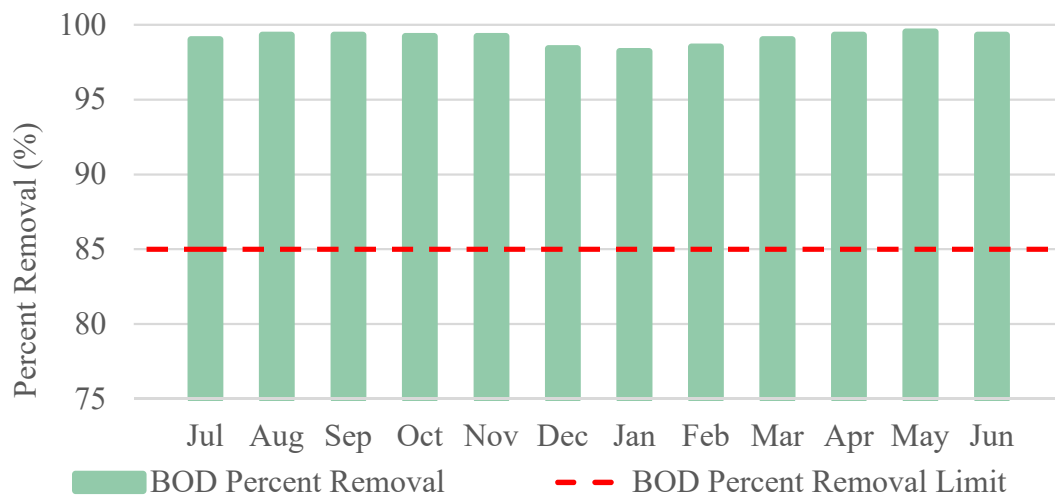
Biochemical Oxygen Demand (BOD) Percent Removal

FY 2019
July 2018 – June 2019



Biochemical Oxygen Demand (BOD) Percent Removal

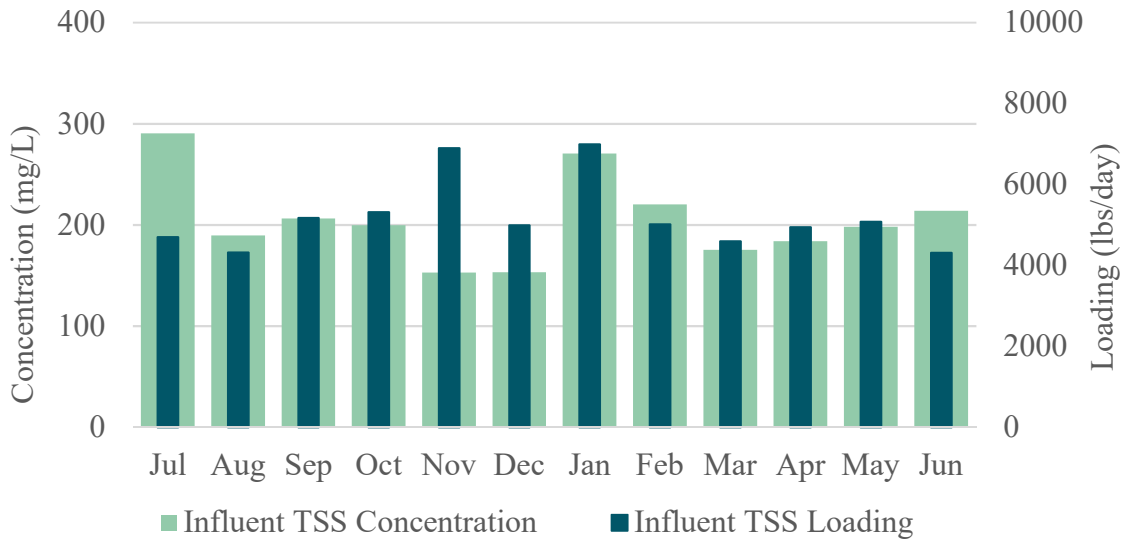
FY 2020
July 2019 – June 2020



Appendix E – TSS, FY19-20

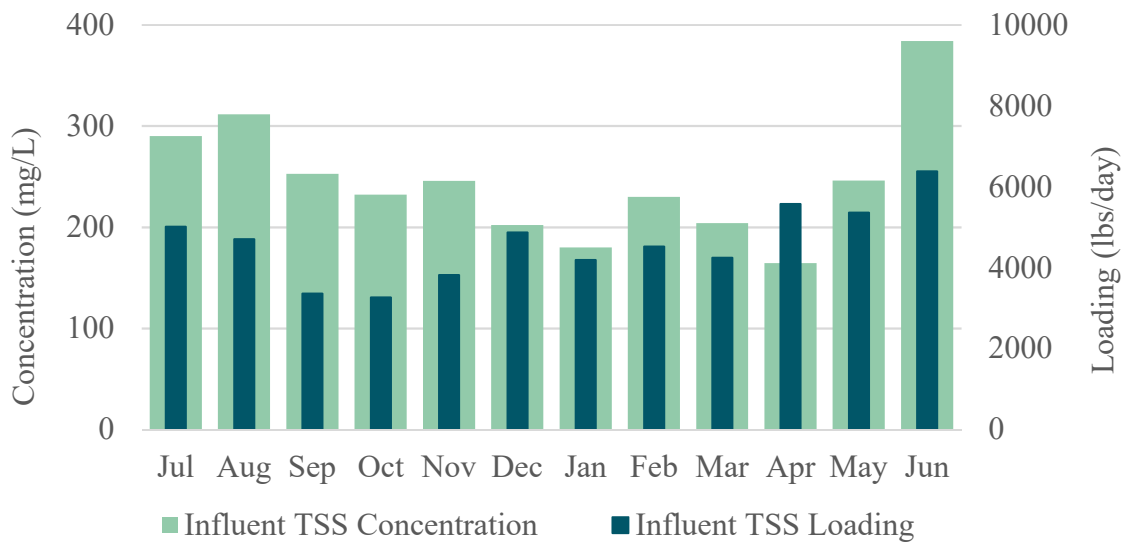
Total Suspended Solids (TSS) Influent Concentration and Loadings

FY 2019
July 2018 – June 2019



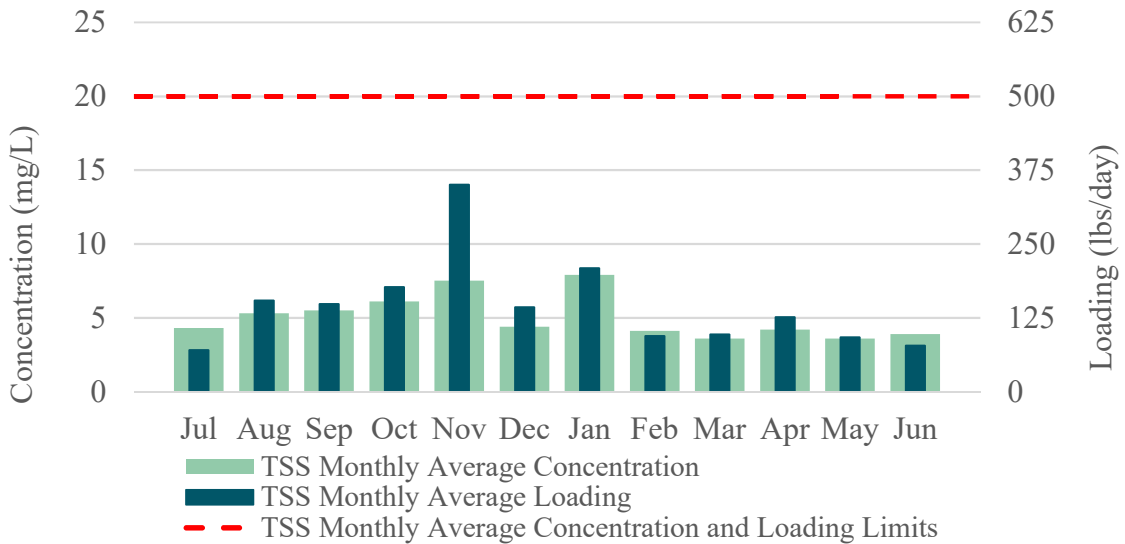
Total Suspended Solids (TSS) Influent Concentration and Loadings

FY 2020
July 2019 – June 2020



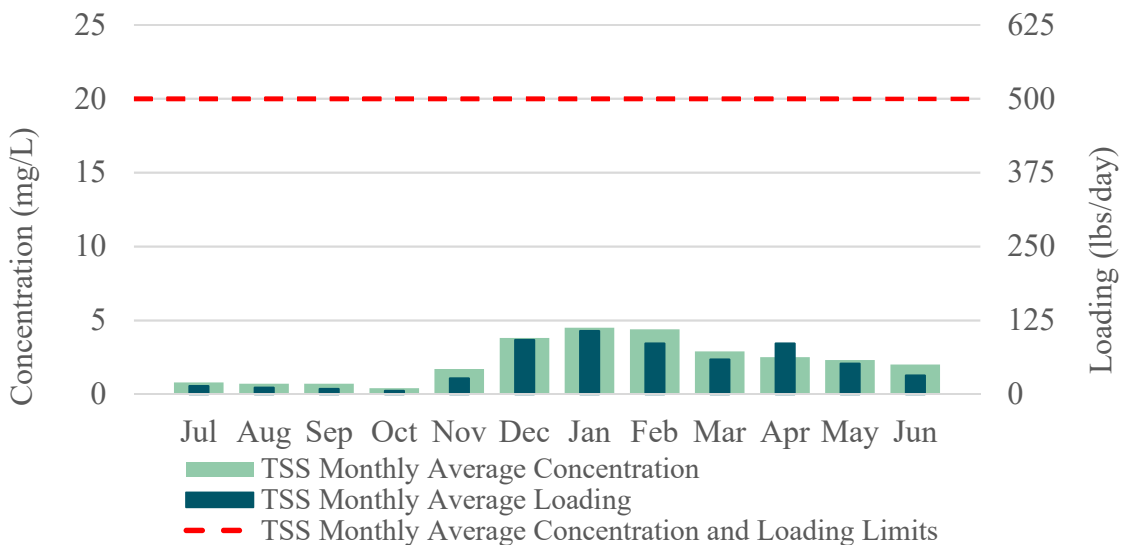
Total Suspended Solids (TSS) Effluent Concentration and Loadings

**FY 2019
July 2018 – June 2019**



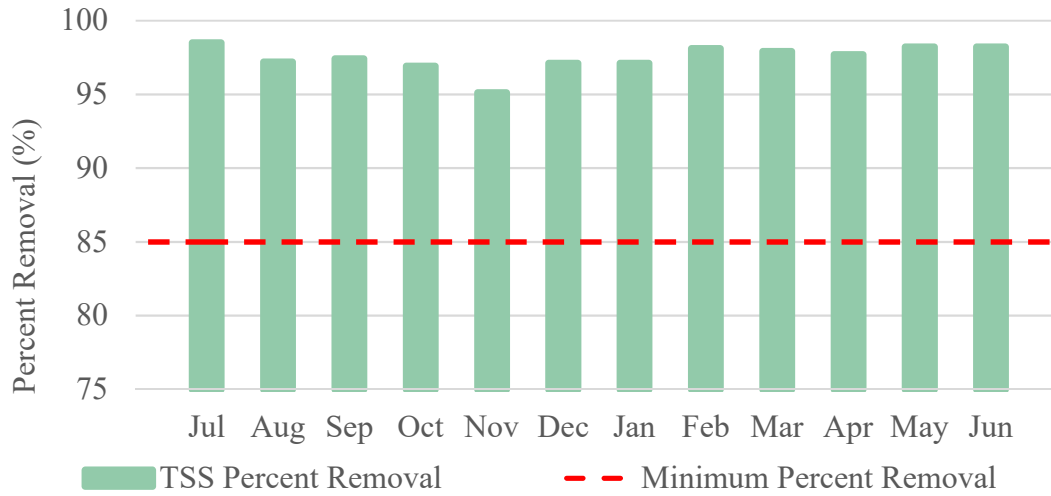
Total Suspended Solids (TSS) Effluent Concentration and Loadings

**FY 2020
July 2019 – June 2020**



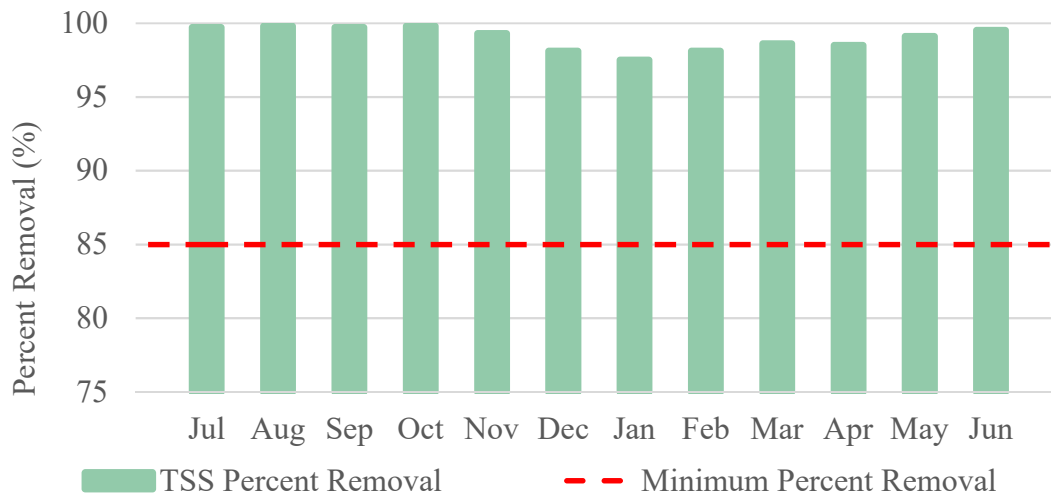
Total Suspended Solids (TSS) Percent Removal

**FY 2019
July 2018 – June 2019**



Total Suspended Solids (TSS) Percent Removal

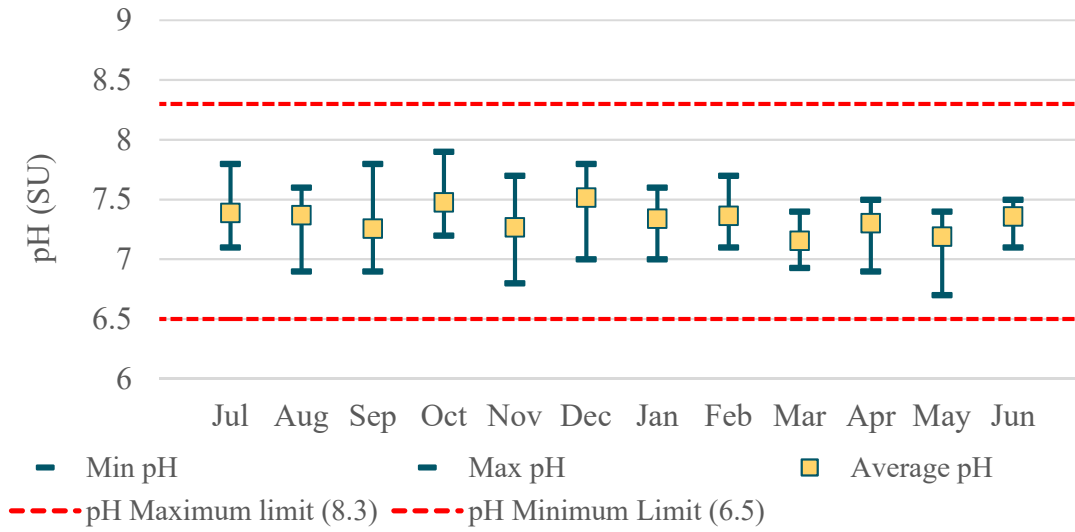
**FY 2020
July 2019 – June 2020**



Appendix F – pH, FY19-20

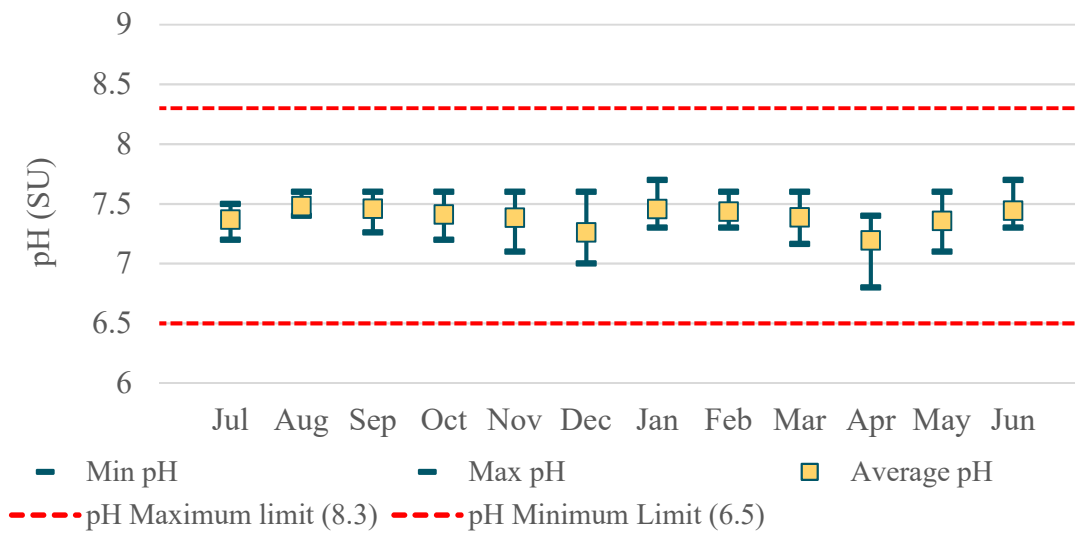
Effluent pH

FY 2019
July 2018 – June 2019



Effluent pH

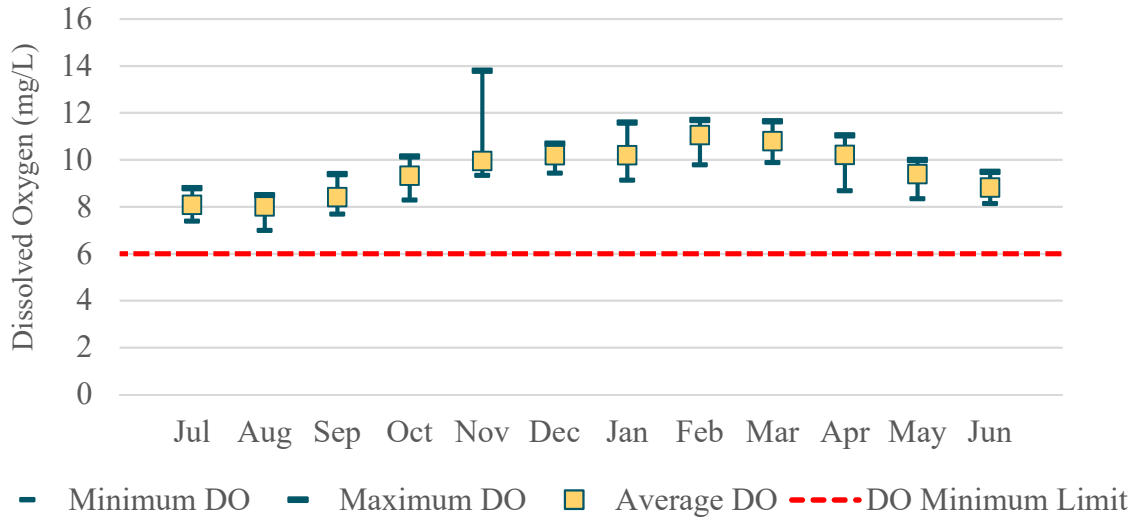
FY 2020
July 2019 – June 2020



Appendix G – DO, FY19-20

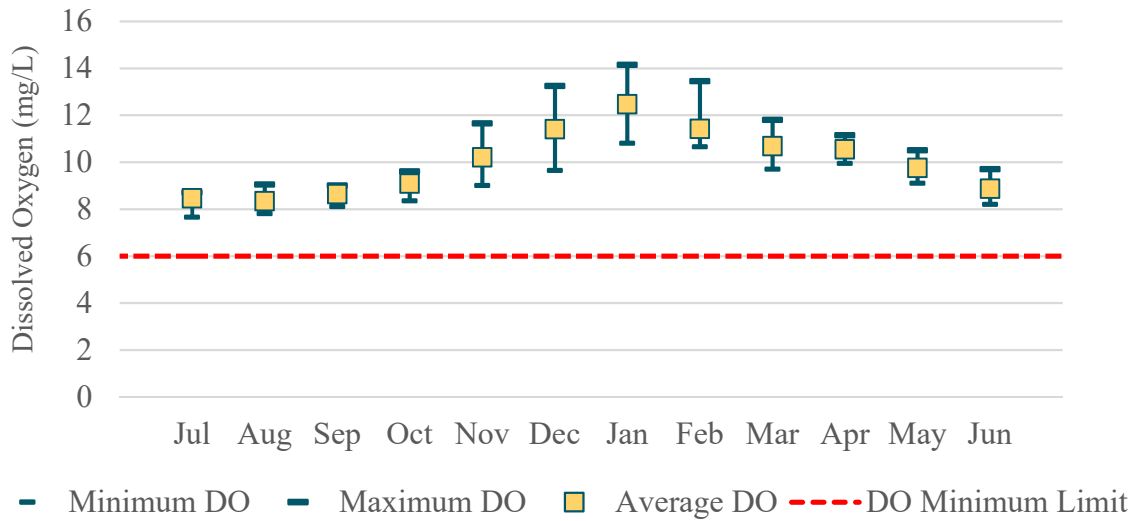
Effluent Dissolved Oxygen (DO)

FY 2019
July 2018 – June 2019



Effluent Dissolved Oxygen (DO)

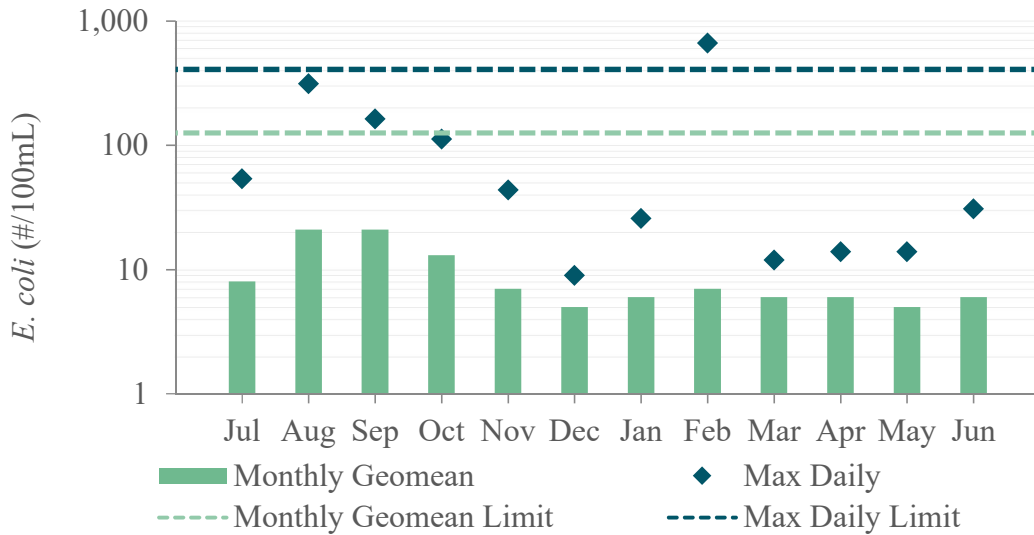
FY 2019
July 2018 – June 2019



Appendix H – *E. coli*, FY19-20

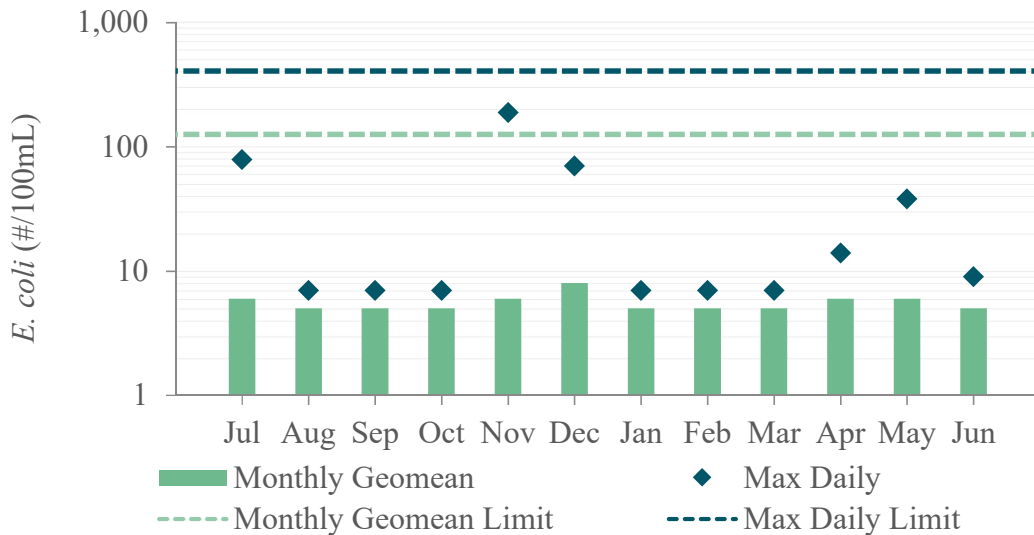
Effluent *E. coli*

**FY 2019
July 2018 – June 2019**



Effluent *E. coli*

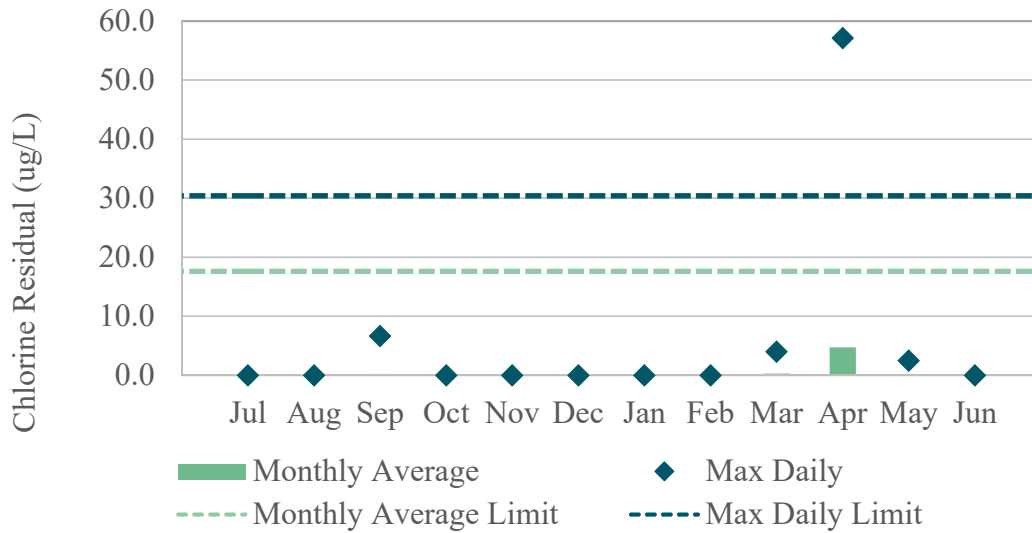
**FY 2020
July 2019 – June 2020**



Appendix I – TCR, FY19-20

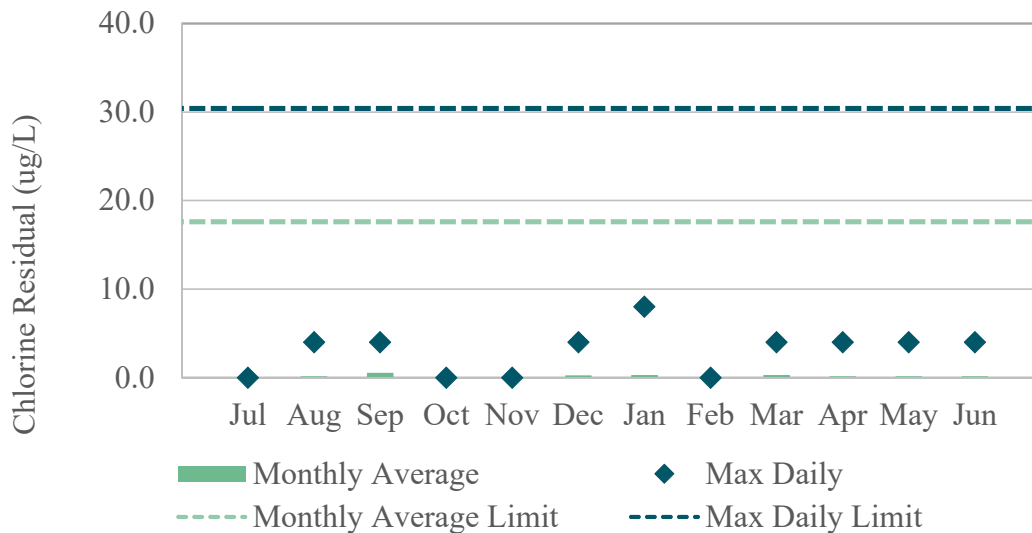
Effluent Total Chlorine Residual (TCR)

**FY 2019
July 2018 – June 2019**



Effluent Total Chlorine Residual (TCR)

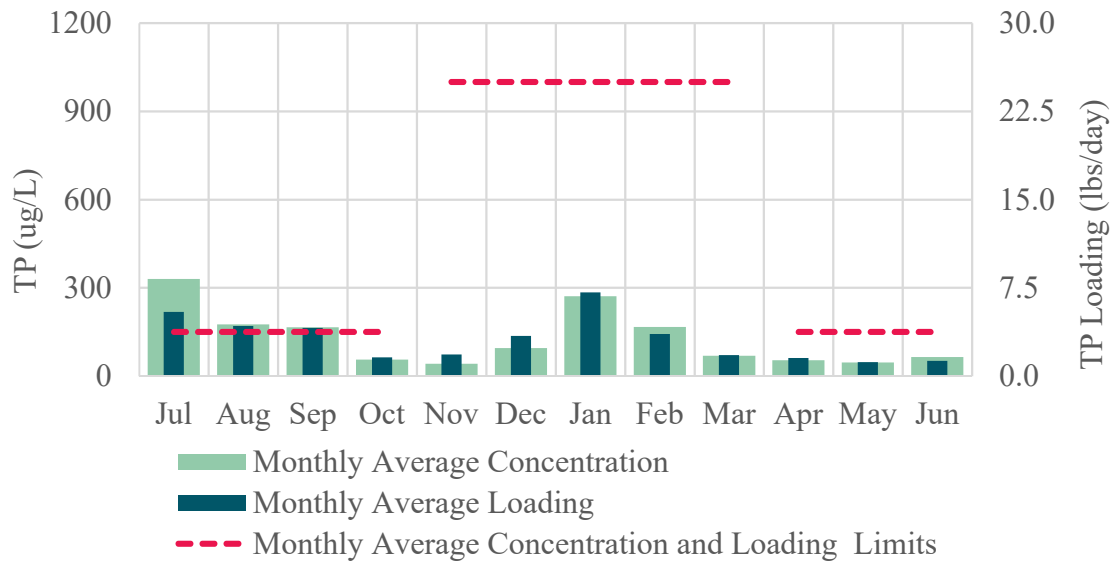
**FY 2020
July 2019 – June 2020**



Appendix J – TP, FY19-20

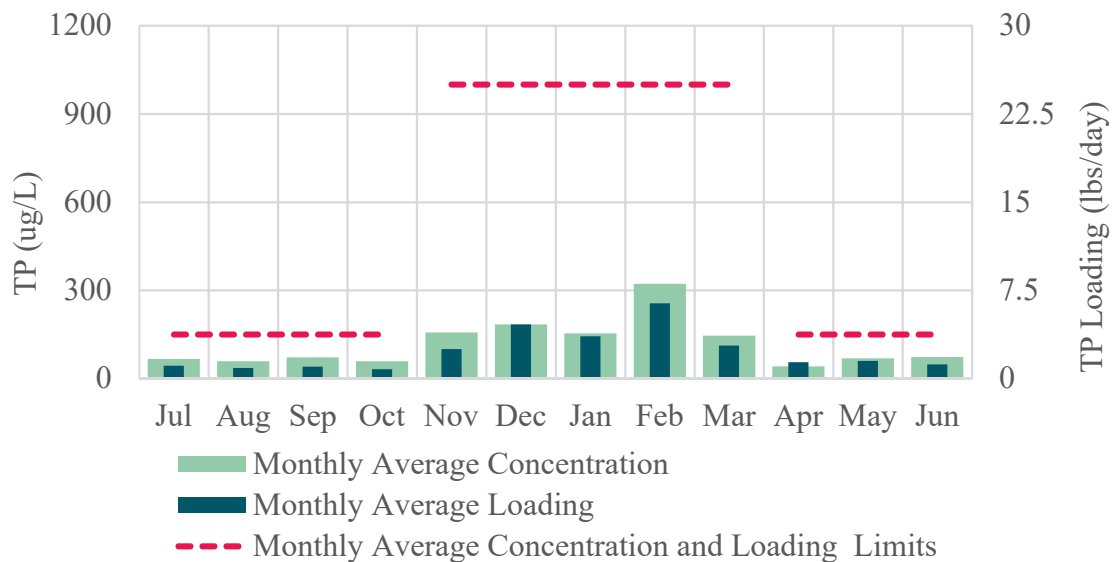
Effluent Total Phosphorus (TP)

FY 2019
July 2018 – June 2019



Effluent Total Phosphorus (TP)

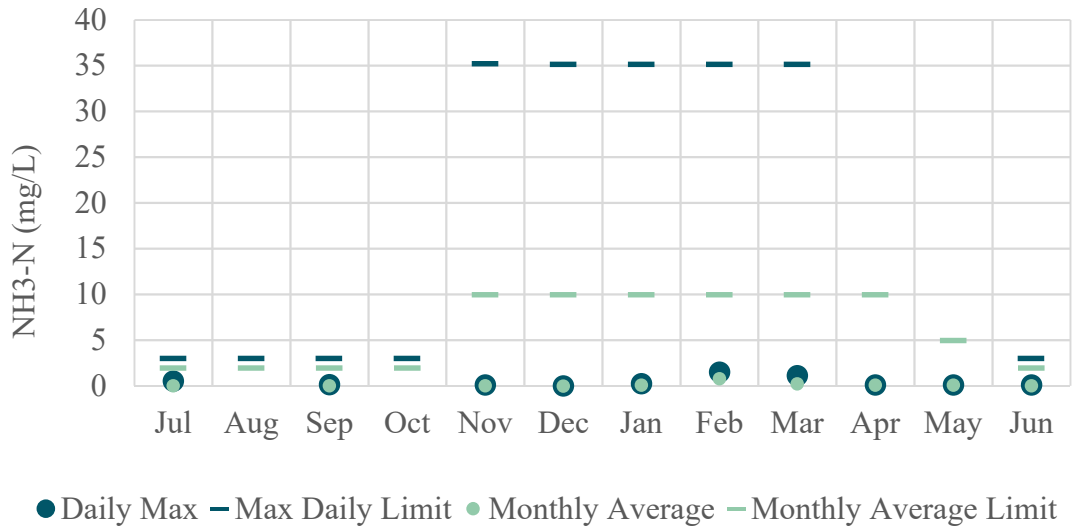
FY 2020
July 2019 - 2020



Appendix K – NH₃-N, FY19-20

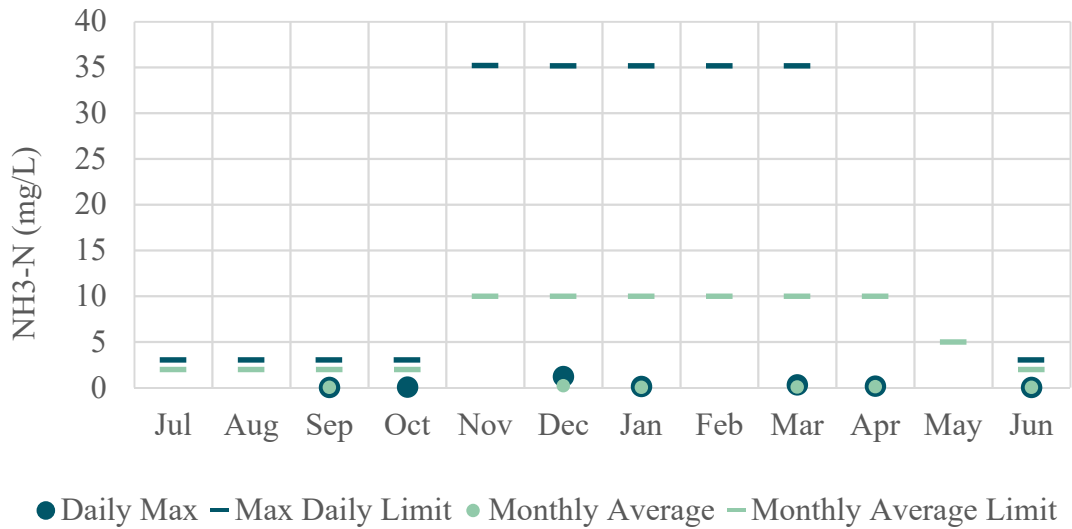
Effluent Ammonia (NH₃-N)

FY 2019
July 2018 – June 2019



Effluent Ammonia (NH₃-N)

FY 2020
July 2019 - 2020

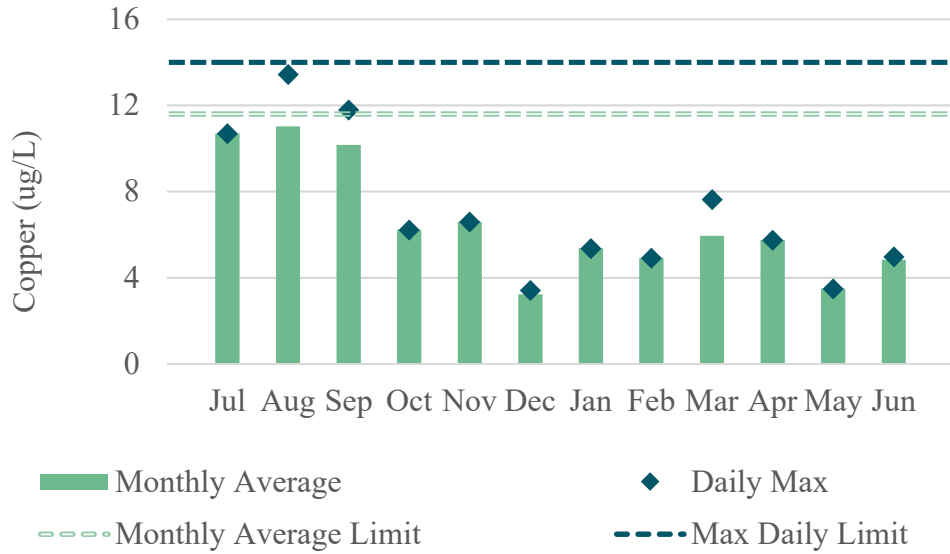


There are no maximum daily limits in April and May; results are to be reported. Note that only months where there was a detection above 0 are displayed.

Appendix L – Total Recoverable Copper, FY19-20

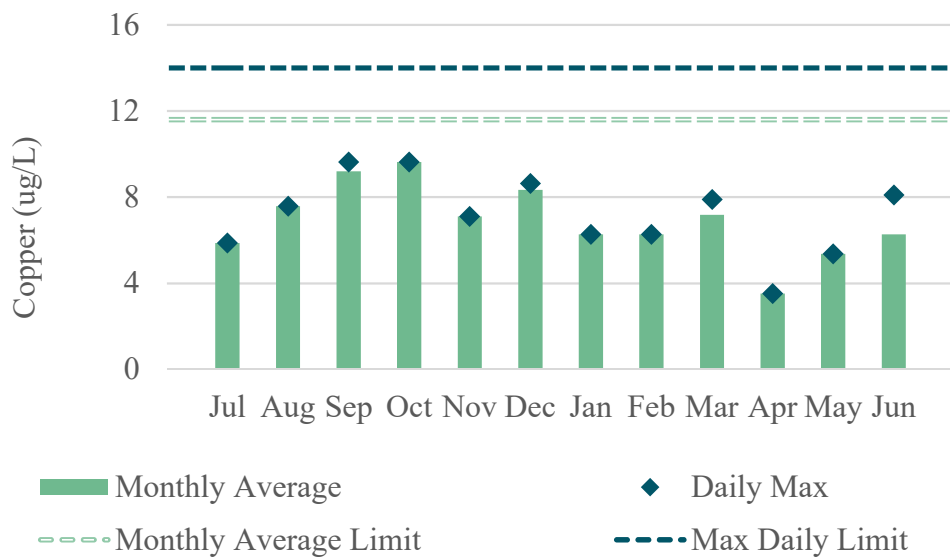
Effluent Copper

FY 2019
July 2018 – June 2019



Effluent Copper

FY 2020
July 2019 – June 2020

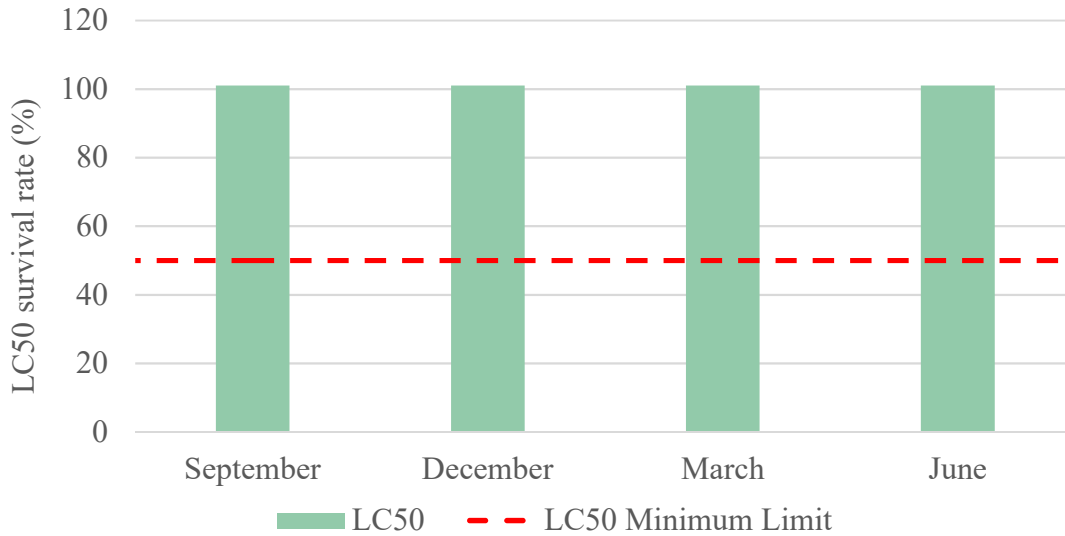


Appendix M – Whole Effluent Toxicity, FY19-20

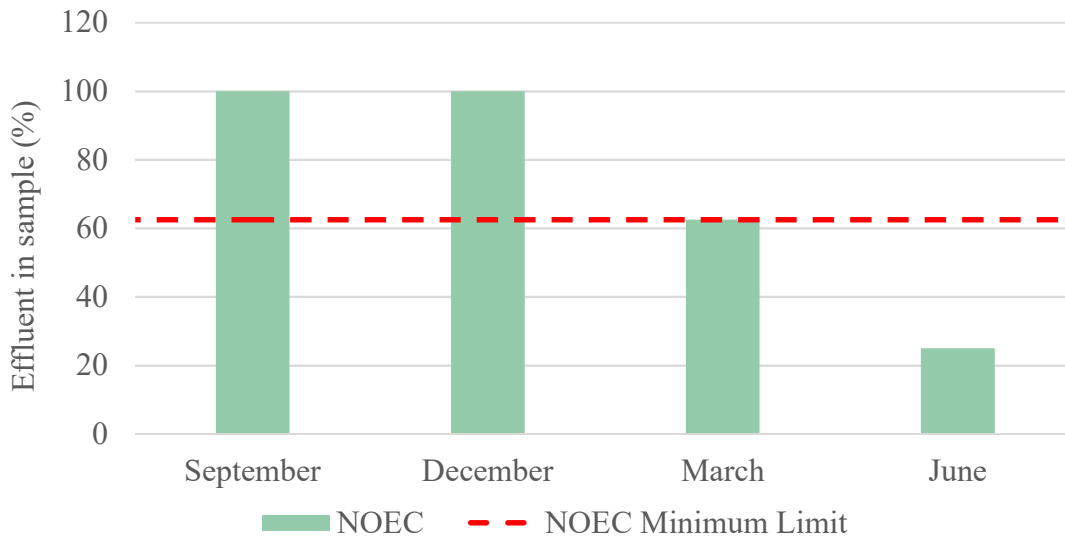
Whole Effluent Toxicity

FY 2019
July 2018- June 2019

Quarterly 50% Lethal Concentration (LC50) Toxicity Results



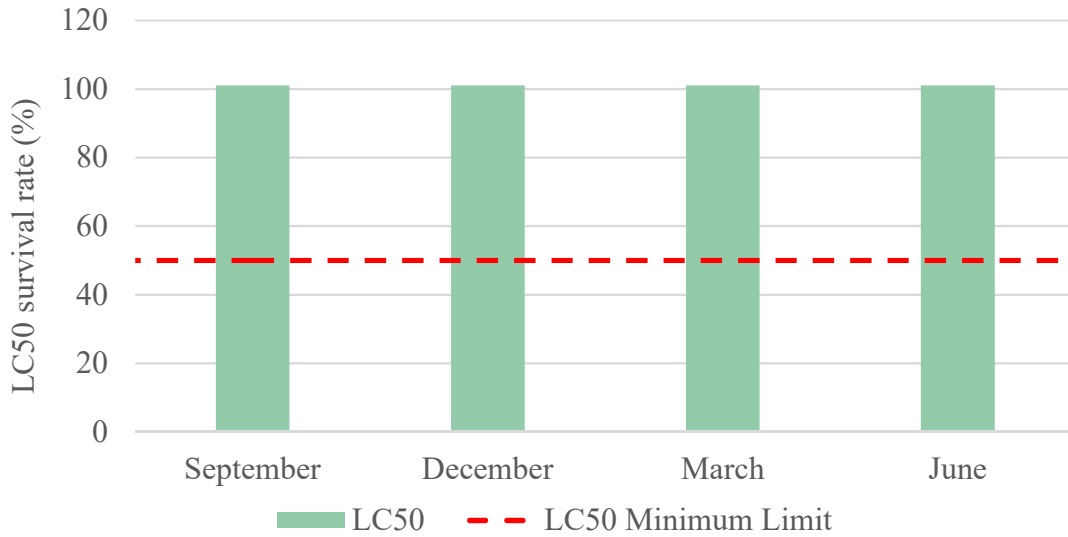
Quarterly No Observable Effect Concentration (NOEC) Toxicity Results



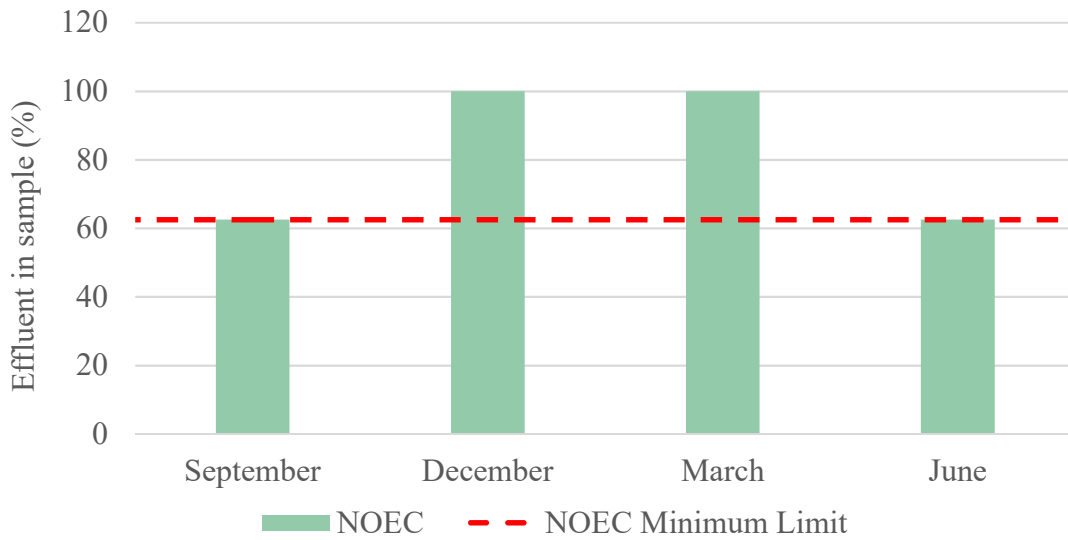
Whole Effluent Toxicity

FY 2020
July 2019 – June 2020

Quarterly 50% Lethal Concentration (LC50) Toxicity Results



Quarterly No Observable Effect Concentration (NOEC) Toxicity Results





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