

Lindsay Wastewater Treatment Plant

Works # 110000383

Annual Wastewater Performance Report

Prepared For: The City of Kawartha Lakes

Reporting Period of January 1st – December 31st, 2022

Issued: March 24, 2023

Revision: 0

Operating Authorities:



2022 Performance Report for the Lindsay Wastewater Treatment Plant

During 2022, the Lindsay WWTP was licensed under Environmental Compliance Approval (ECA) 1696-BPLL4R. Rivera Park Sewage Pumping Station was licensed under an individual ECA #1328-AN5PBL. Reporting requirements for all ECAs are contained in this Performance Report.

ECA1696-BPLL4R Section 4 AND ECA 1328-AN5PBL Section 8(3), require the Performance Report to contain the following:

- a) a summary and interpretation of all Influent and Imported Sewage monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;
- b) a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;
- c) a summary of all operating issues encountered and corrective actions taken;
- d) a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;
- e) a summary of any effluent quality assurance or control measures undertaken;
- f) a summary of the calibration and maintenance carried out on all Influent, Imported Sewage and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;
- g) a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations:
 - i. when any of the design objectives is not achieved more than 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent quality;
 - ii. when the Annual Average Daily Influent Flow reaches 80% of the Rated Capacity;
- h) a tabulation of the volume of sludge generated, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed; a tabulation of the measured volume of sludge accumulated in the lagoon cells in five year intervals and the estimated volume in

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the interim years and when sludge was disposed of during the reporting period, a summary of disposal locations and volumes of sludge disposed at each location;

- i) a summary of any complaints received and any steps taken to address the complaints;
- j) a summary of all Bypasses, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;
- k) a summary of all Notice of Modifications to Sewage Works completed under Paragraph 1.d. of Page 20 - NUMBER 1696-BPLL4R Condition 10, including a report on status of implementation of all modification.
- l) a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted.
- m) any changes or updates to the schedule for the completion of construction and commissioning operation of major process(es) / equipment groups in the Proposed Works.
- n) a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year.

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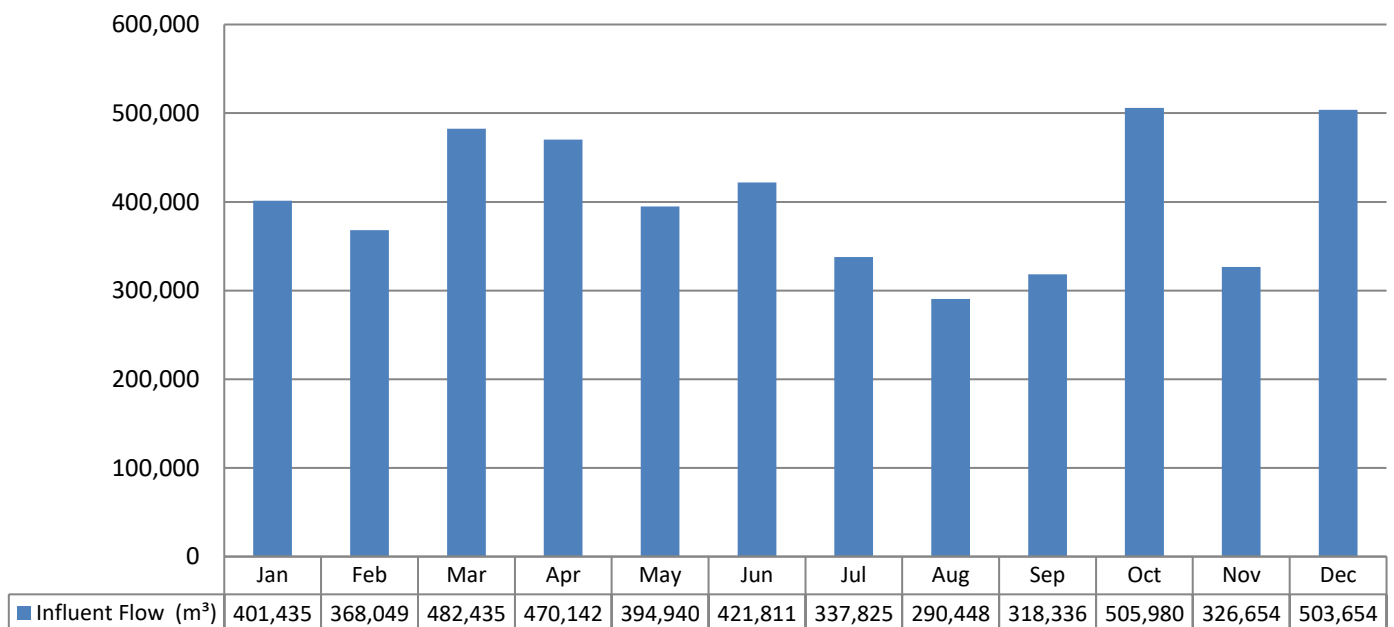
a) ECA #1696-BPLL4R requires a summary and interpretation of all Influent and Imported Sewage monitoring data, and a review of the historical trend of the sewage characteristics and flow rates.

Attached as **Appendix VII** is a copy of the 2022 Performance Assessment Report (PAR) and loading calculations for the Lindsay WWTP raw and final effluent. The PAR contains: a tabulation of all monthly average raw sewage and final effluent sample results obtained during the reporting period, a tabulation of average daily flows, and monthly volumes for the reporting period, and a tabulation of calculated total loading of BOD/CBOD⁵, suspended solids, total phosphorus, ammonia + ammonium as N (TAN), Total Kjeldahl Nitrogen (TKN), nitrite and nitrate concentrations in the final effluent.

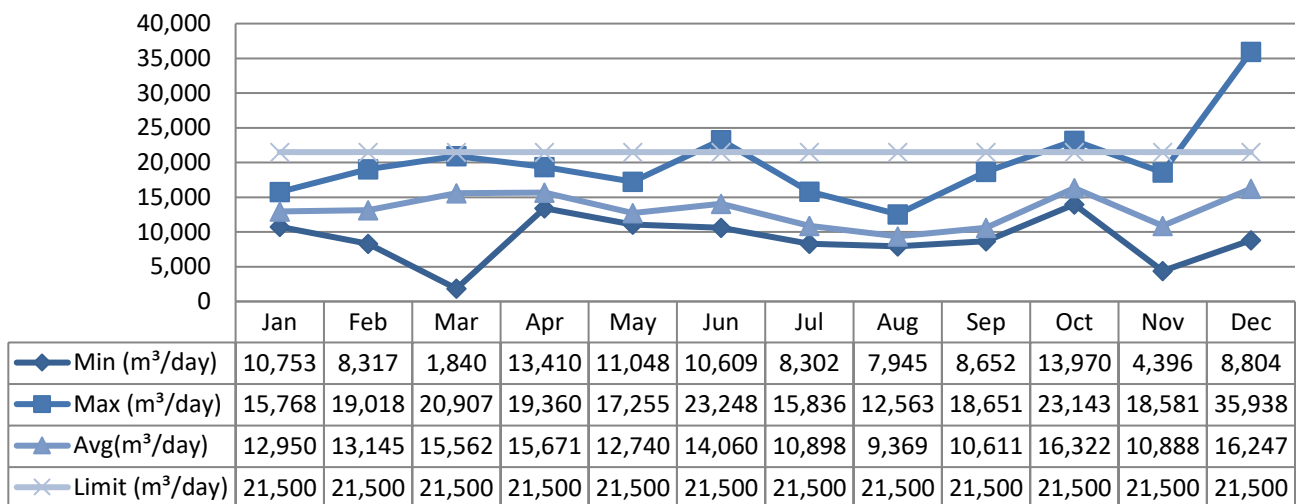
The Lindsay WWTP has a Rated Capacity of 21,500 m³/day and Actiflo rated capacity of 30,100 m³/day under ECA 1696-BPLL4R. ECA 1696-BPLL4R requires that everything practicable be undertaken to operate the Sewage Treatment Plant so that the annual average daily influent is within the Rated Capacity. The Rated Capacity of the Lindsay WWTP is 21,500 m³/day and the 2022 annual average daily influent flow was 13,210.16 m³/day or 61.4% of the Rated Capacity.

The total Influent flow in 2022 was 4,821,709.50 m³.

Graph 1: 2022 Influent Flow Monthly Totals

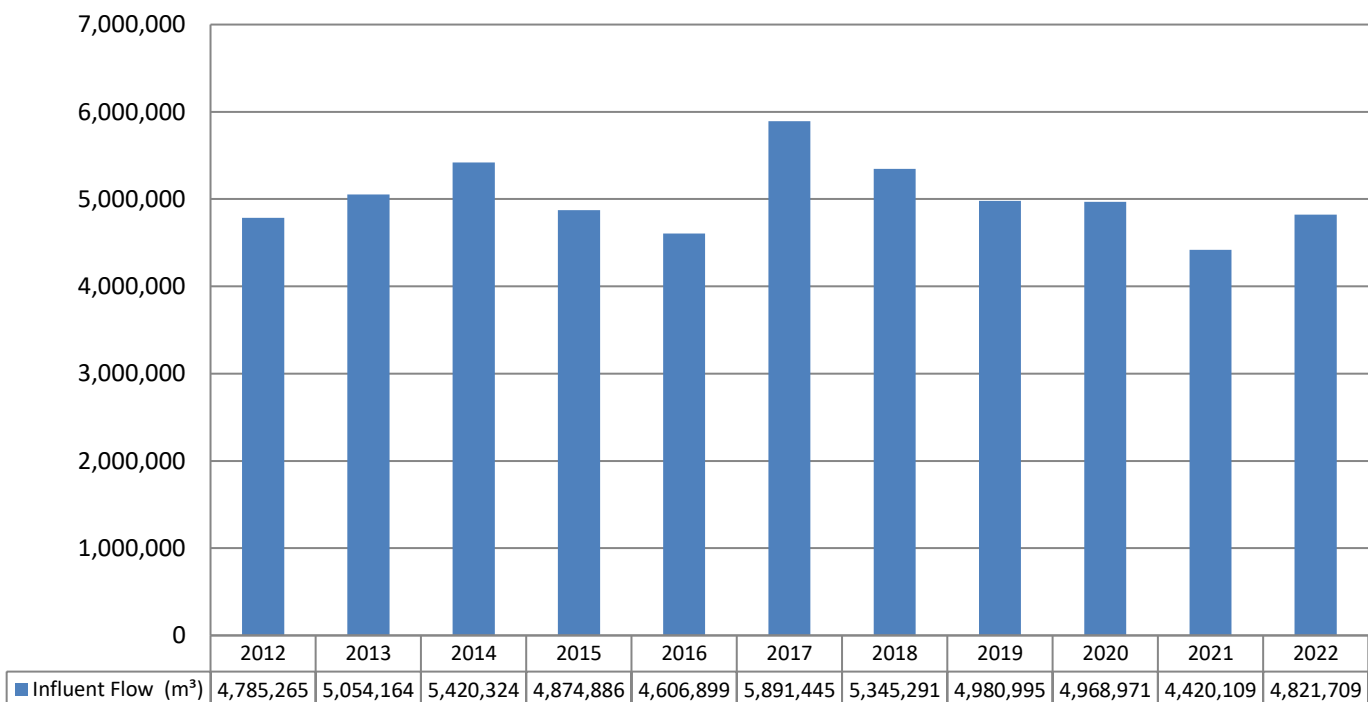


Graph 2: Influent Daily Minimum, Maximum and Average Flows



There may be instances where influent flow exceeded the Rated Capacity on a monthly basis. However, Rated Capacity is calculated as an annual average daily flow rate, which was met in 2022. The very high flows in December were caused by snowmelt and unseasonal rainfall.

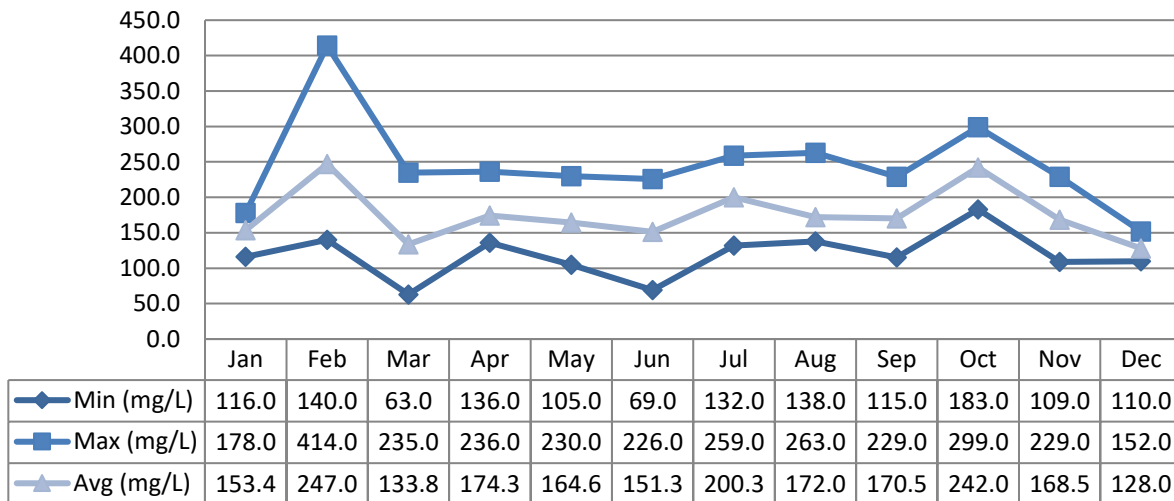
Graph 3: Historical Influent Flows from 2012 to 2022



Biochemical Oxygen Demand (BOD5)

ECA 1696-BPLL4R requires at least one composite sample be collected and analyzed weekly for Biochemical Oxygen Demand (BOD5). The Biochemical Oxygen Demand (BOD5) monthly average results ranged from 63 mg/L to 414 mg/L.

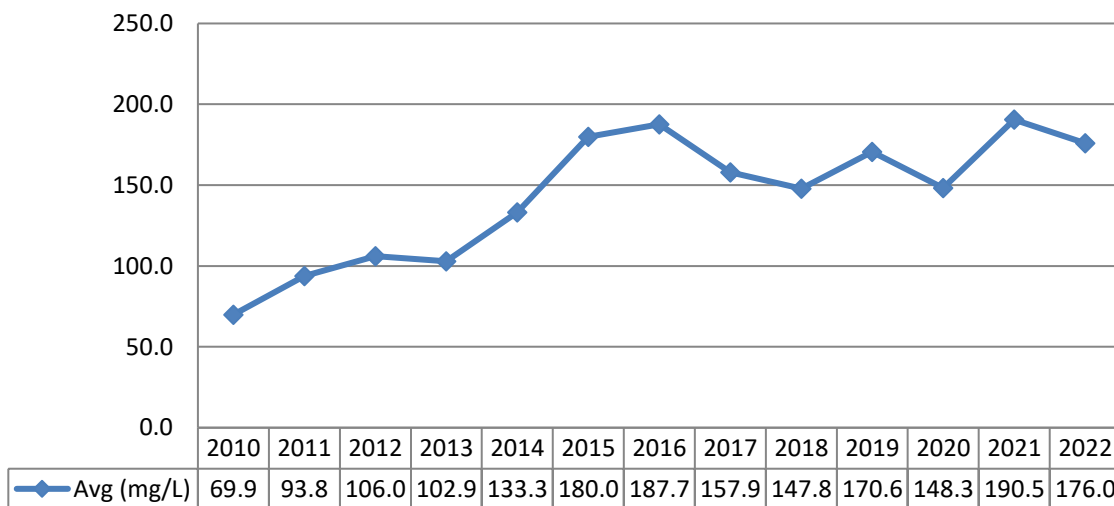
Graph 4: 2022 Monthly BOD5 Influent Concentration Comparisons



Biochemical Oxygen Demand Historical Trends

The Biochemical Oxygen Demand annual average has increased significantly between 2010 and 2022. The 2022 annual average is more than double the 2010 annual average. Although not confirmed, increased raw influent concentrations could be related to increased abattoir and septage receiving.

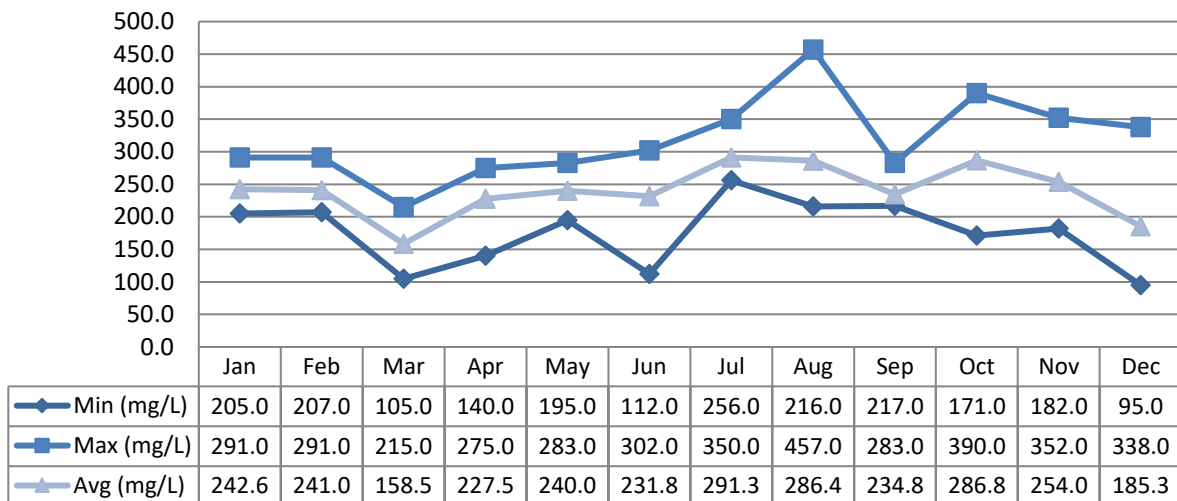
Graph 5: Historical Influent BOD5 Concentration Comparisons



Total Suspended Solids

ECA 1696-BPLL4R requires at least one composite sample be collected and analyzed weekly for Total Suspended Solids. The monthly average results ranged from 95 mg/L to 457 mg/L.

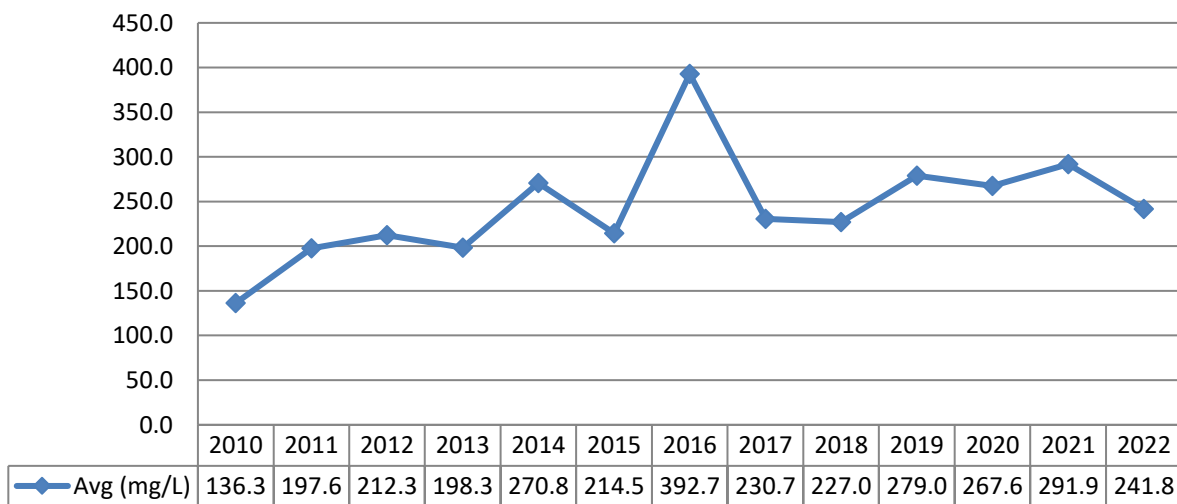
Graph 6: 2022 Monthly Total Suspended Solids Influent Concentration Comparisons



Total Suspended Solids Historical Review

The Total Suspended Solids annual average has increased significantly between 2010 and 2022 with the peak annual average in 2016. Although not confirmed, increased raw influent concentrations could be related to increased abattoir and septage receiving.

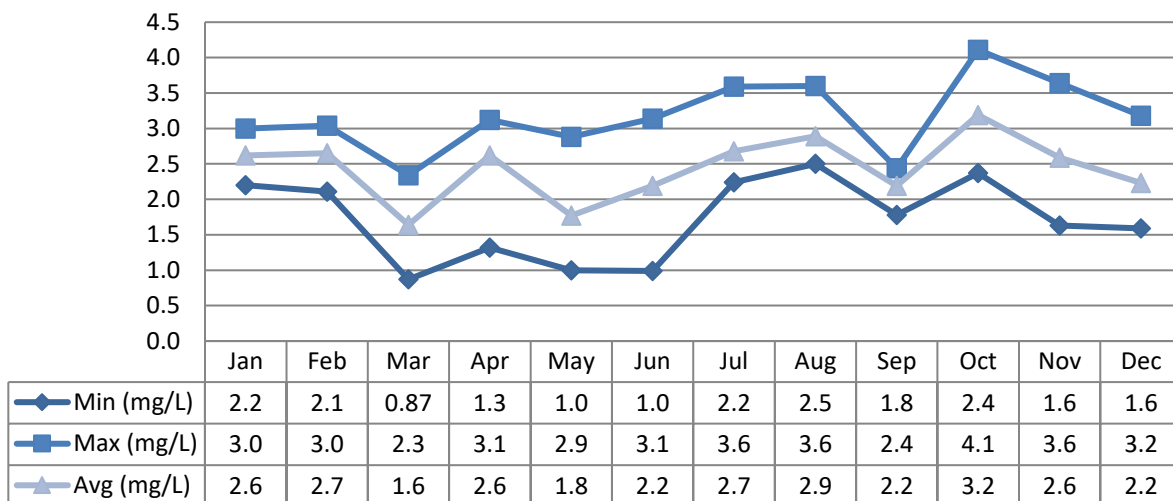
Graph 7: Historical Influent Total Suspended Solids Concentration Comparisons



Total Phosphorus

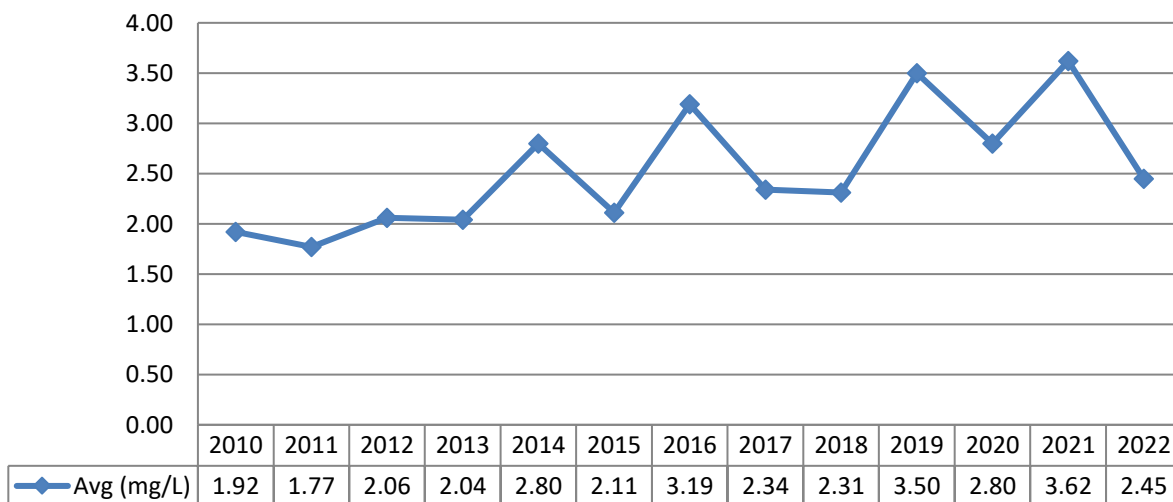
ECA 1696-BPLL4R requires at least one composite sample be collected and analyzed weekly for Total Phosphorus. The monthly average Total Phosphorus results ranged from 0.87 mg/L to 4.1 mg/L.

Graph 8: 2022 Monthly Total Phosphorus Influent Concentration Comparisons



Total Phosphorus Historical Trends

Graph 9: Historical Influent Total Phosphorus Concentration Comparisons

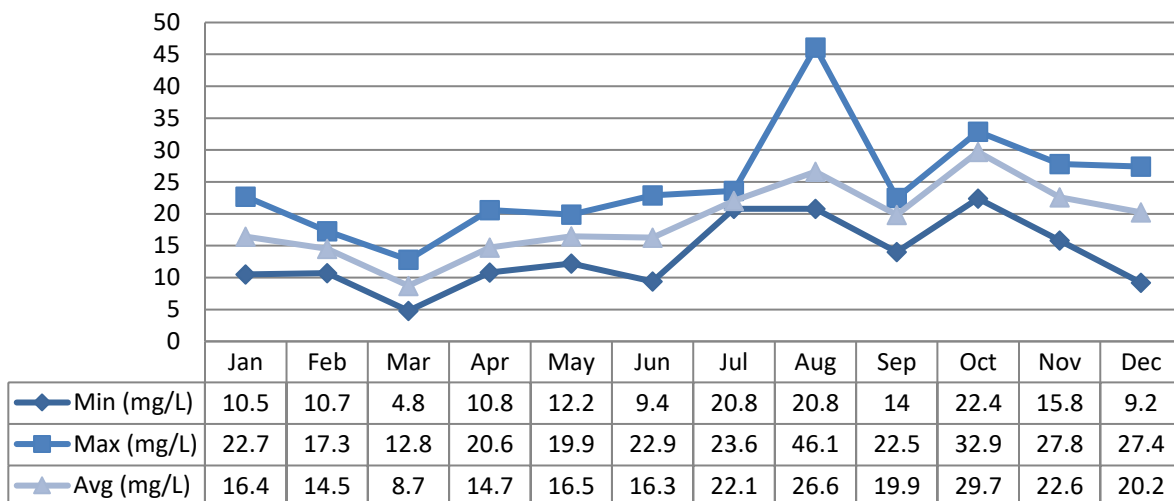


The Total Phosphorus annual average has increased between 2010 and 2022 with the minimum value being 1.77 mg/L and the maximum value being 3.62 mg/L. Although not confirmed, increased raw influent concentrations could be related to increased abattoir and septage receiving.

Total Kjeldahl Nitrogen (TKN)

ECA 1696-BPLL4R requires at least one composite sample be collected and analyzed weekly for Total Kjeldahl Nitrogen. The monthly average Total Kjeldahl Nitrogen results ranged from 4.8 mg/L to 35.6 mg/L.

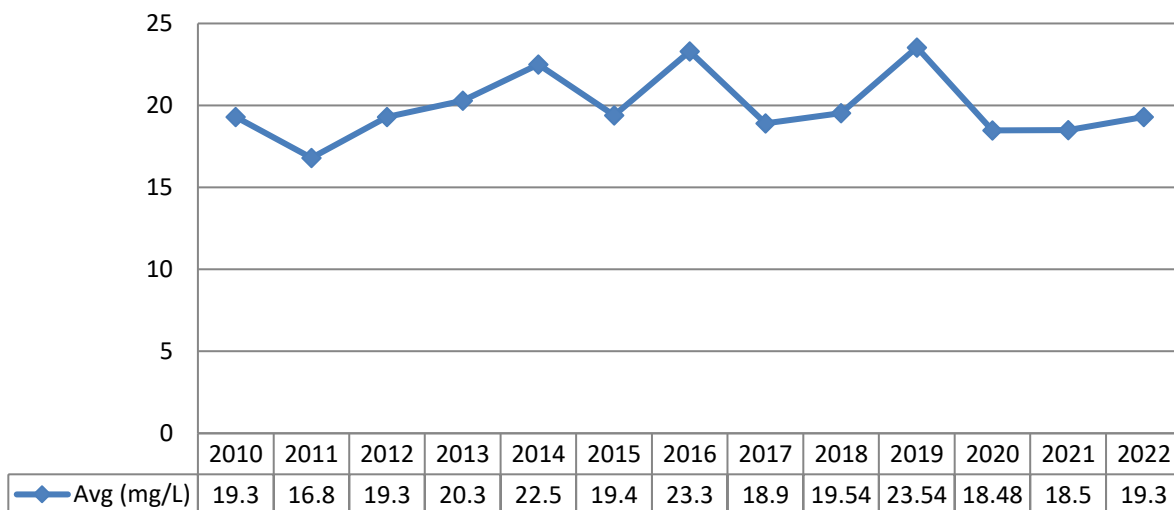
Graph 10: 2022 Monthly Total Kjeldahl Nitrogen Influent Concentration Comparisons



Total Kjeldahl Nitrogen Historical Review

The Total Kjeldahl Nitrogen annual average has remained fairly consistent between 2010 and 2022. The minimum annual average occurred in 2011 and the maximum annual average occurred in 2019.

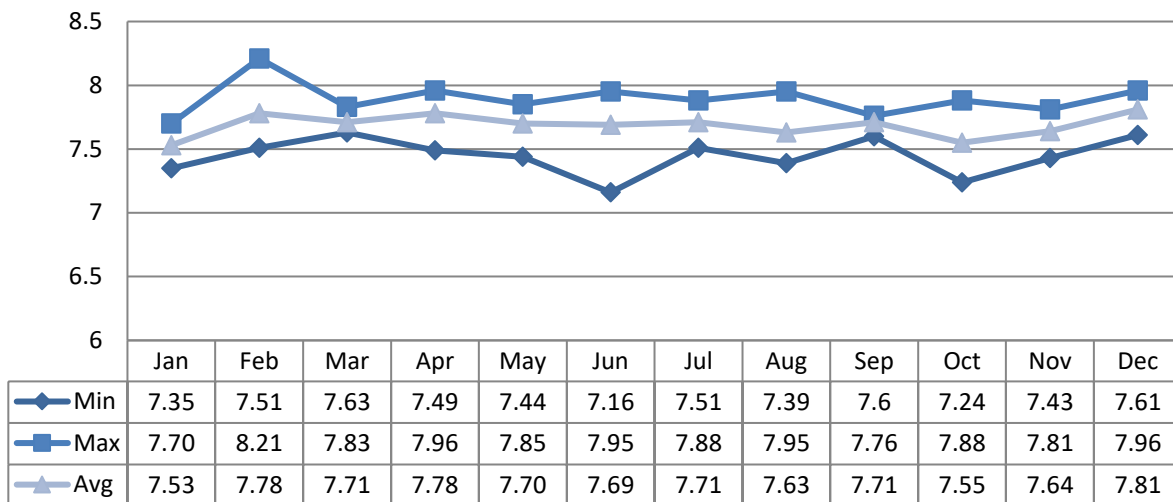
Graph 11: Historical Influent Total Kjeldahl Nitrogen Concentration Comparisons



pH

ECA 1696-BPLL4R does not require a pH sample be collected nor prescribes the sample frequency on the influent. pH results were fairly consistent throughout 2022 ranging from 7.16 to 8.21.

Graph 12: 2022 Monthly pH Influent Concentration Comparisons

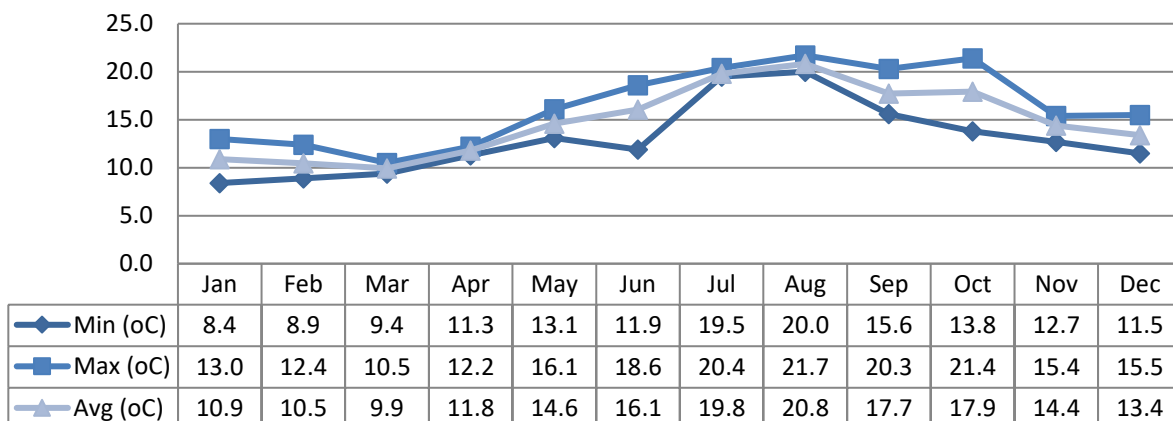


Historical pH data is only available from 2016 to 2022 and the pH levels remained fairly consistent between 6.54 and 8.21.

Temperature

ECA 1696-BPLL4R do not require a temperature sample be collected or prescribe sample frequency on the influent. Samples were collected throughout 2022. Variations in results were consistent with seasonal fluctuations. Historically, the influent water temperature drops in the freezing season (i.e. winter) and raises in the non-freezing season (i.e. summer) and this trend continued throughout 2022. Historical data is only available from 2016 to 2022 and the temperature ranged from 8.4° to 21.77°.

Graph 13: 2022 Monthly Temperature Influent Concentration Comparisons



Imported Sewage

Imported Sewage is sewage that is hauled to the sewage treatment plant by licensed waste treatment system operators. At the Lindsay WWTP Imported Sewage consists of sewage hauled to the Receiving Station at 38 Lagoon St, Lindsay and abattoir waste hauled to the Lindsay WWTP onsite storage lagoon.

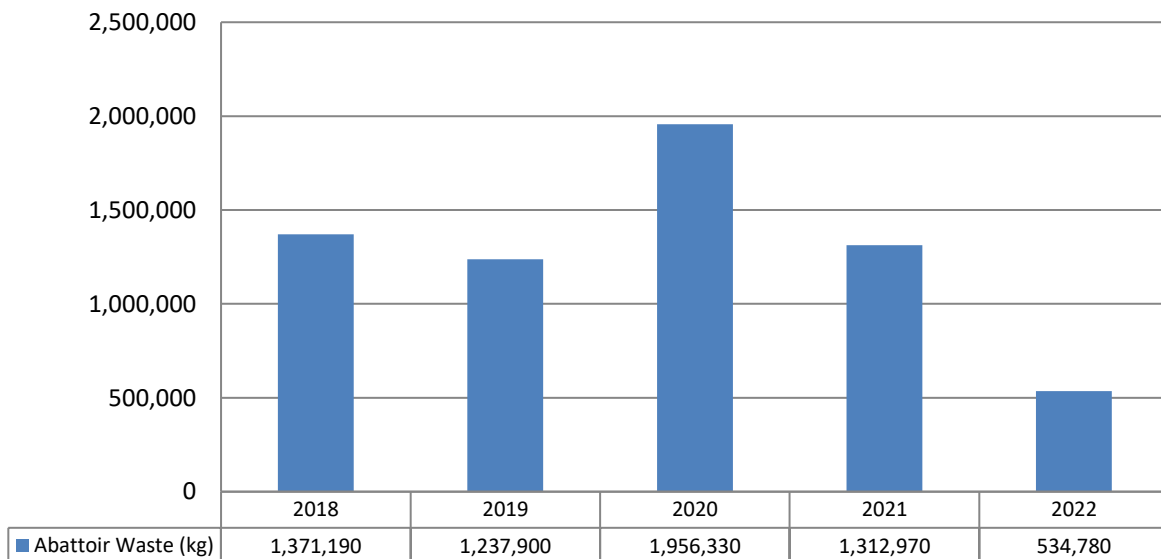
ECA 1696-BPLL4R requires monthly sampling of Imported Sewage.

Abattoir Waste

Waste from local Abattoirs is hauled to the Lindsay WWTP and deposited into Lagoon 5 which acts as a storage lagoon. During high flow events, excess raw water from the collection system is diverted into Lagoon 5 where it is stored until the collection system flows subside enough to feed the water in Lagoon 5 back into the facility Inlet. The abattoir waste mixes with the raw water in Lagoon 5 and is returned to the wastewater treatment plant through the Inlet.

Trucks hauling abattoir waste are weighed at the Lindsay Landfill Inbound Scale and the Outbound Scale and the difference between the two readings is the amount of abattoir waste deposited into Lagoon 5. The amount of abattoir waste deposited in 2022 was 534,780.00 kg. This was a decrease in abattoir waste deposited over 2021, equaling a 59% decrease in volume.

Graph 14: Historical Abattoir Volume Comparisons



ECA 1696-BPLL4R requires a grab sample be collected monthly and analyzed for BOD5, Total Suspended Solids, Total Phosphorus and Total Kjeldahl Nitrogen for each type of imported sewage. Although not required by the ECA, Total Ammonia Nitrogen

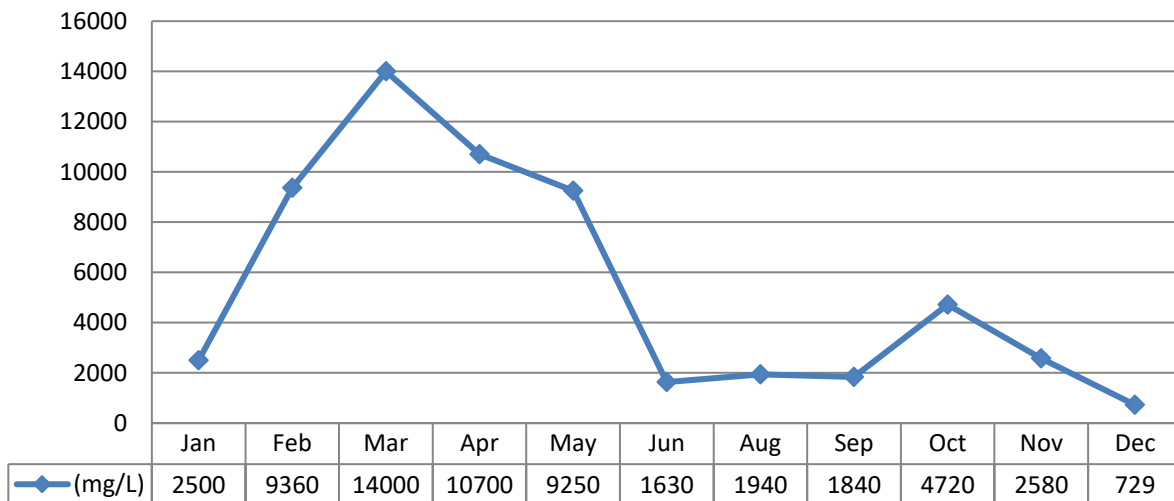
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was sampled and analyzed monthly in 2022. Abattoir sample was not collected July 2022. See Section N for further details.

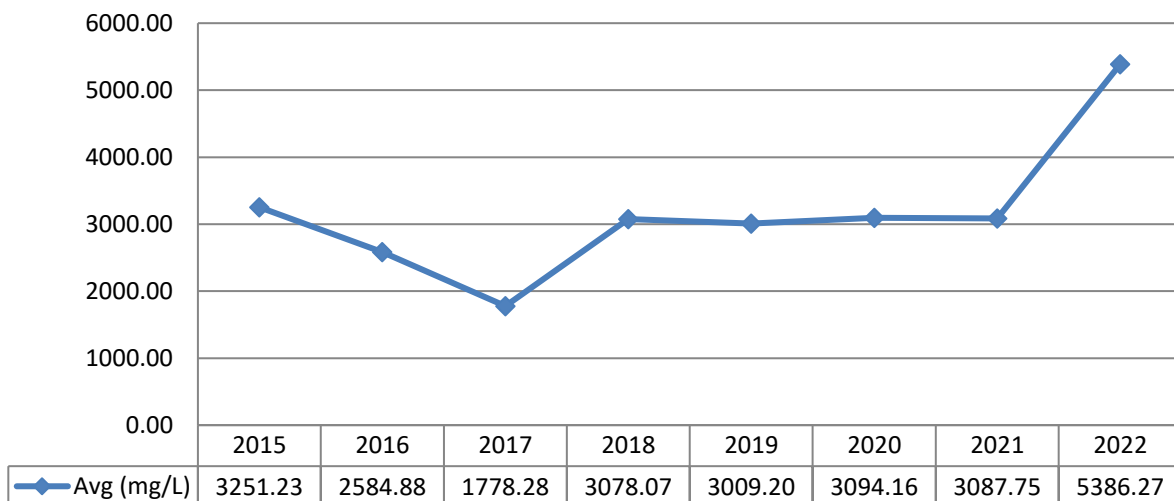
Biochemical Oxygen Demand (BOD5)

ECA 1696-BPLL4R require one grab sample be collected monthly and analyzed for BOD5. The BOD5 sample results ranged from 729 mg/L to 14,000 mg/L.

Graph 15: 2022 Monthly BOD5 Abattoir Waste Concentration Comparisons



Graph 16: Historical BOD5 Abattoir Waste Concentration Comparisons

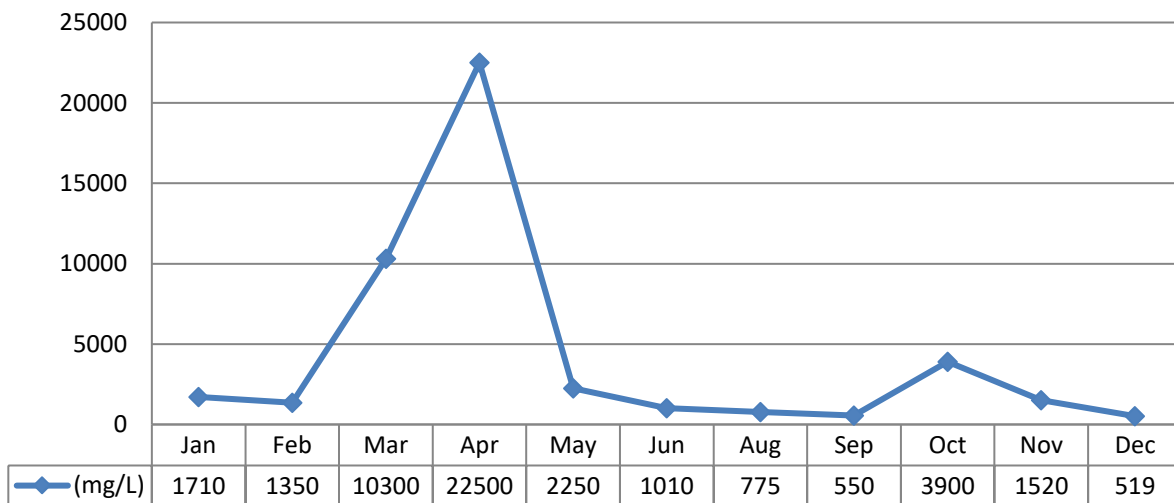


The BOD5 annual average has remained fairly consistent between 2015 and 2021. There was a large increase in average BOD in 2022. The minimum annual average concentration occurred in 2017 and the maximum annual average concentration occurred in 2022.

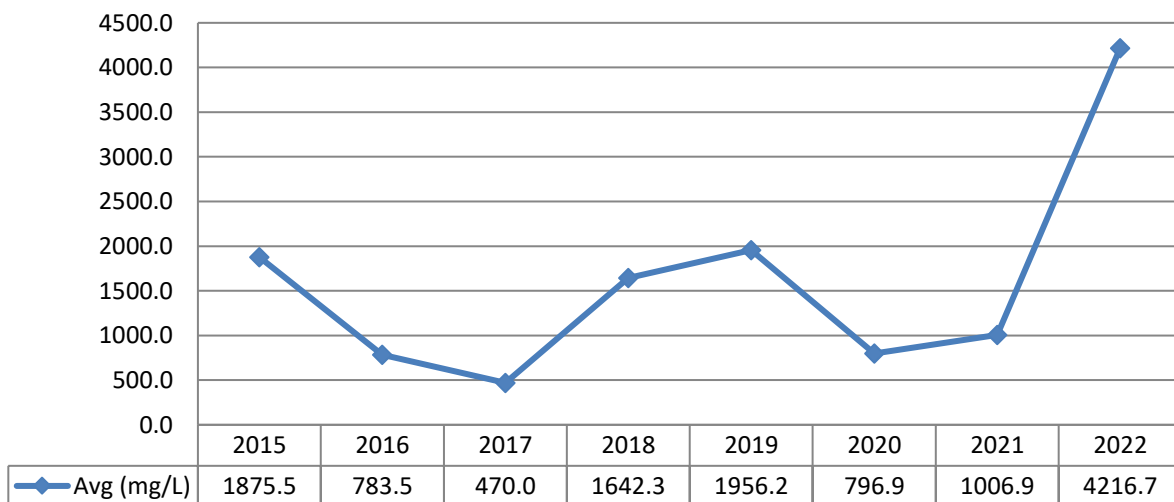
Total Suspended Solids

ECA 1696-BPLL4R requires one grab sample be collected monthly and analyzed for Total Suspended Solids. The Total Suspended Solids sample results ranged from 519 mg/L to 22,500 mg/L in 2022.

Graph 17: 2022 Monthly Total Suspended Solids Abattoir Waste Concentration Comparisons



Graph 18: Historical Total Suspended Solids Abattoir Waste Concentration Comparisons

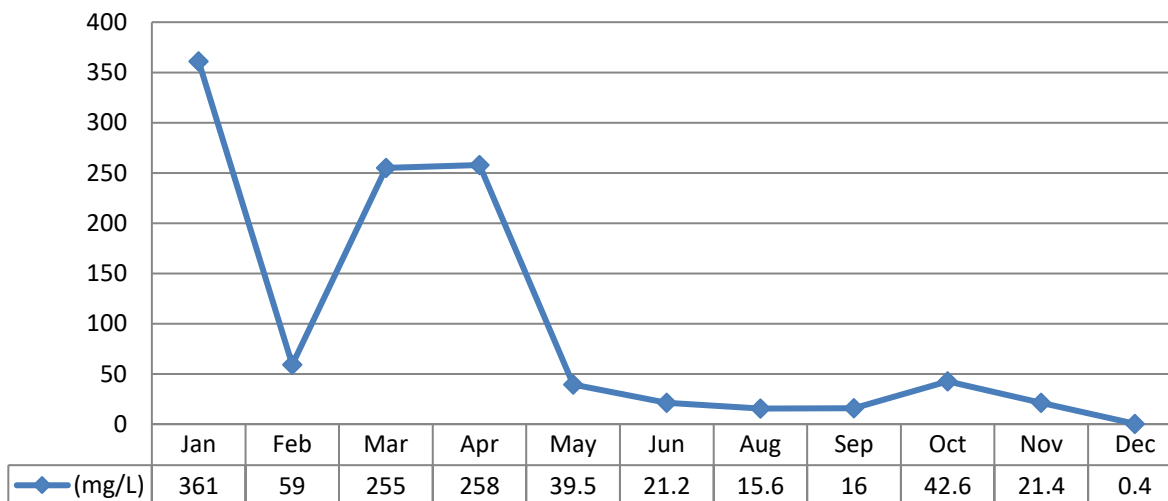


The Total Suspended Solids annual average has remained fairly consistent between 2015 and 2021. There was a significant increase in the annual average in 2022. The minimum annual average concentration occurred in 2017 and the maximum annual average concentration occurred in 2022.

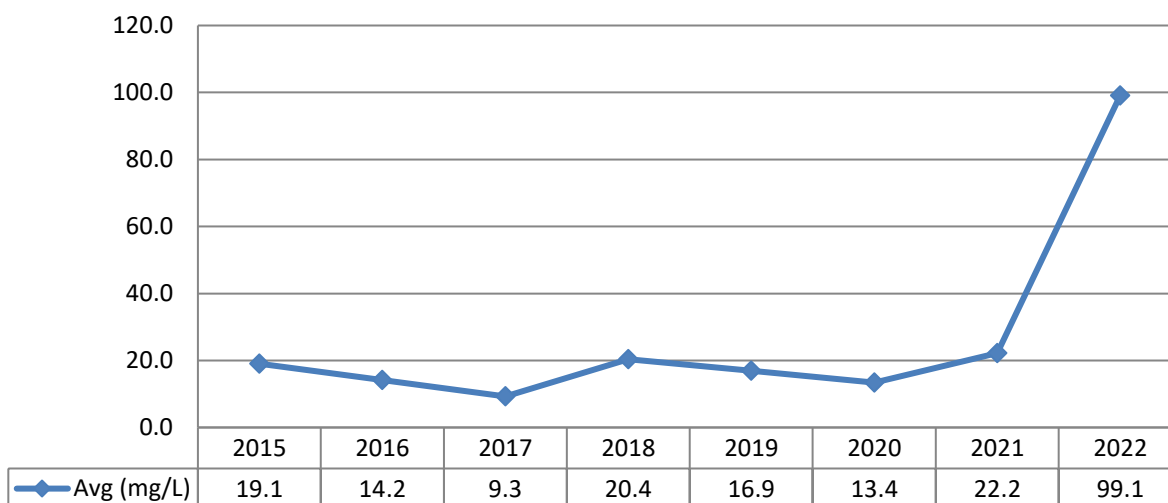
Total Phosphorus

ECA 1696-BPLL4R requires one grab sample be collected monthly and analyzed for Total Phosphorus. Results ranged from 0.4 mg/L to 253 mg/L.

Graph 19: 2022 Monthly Total Phosphorus Abattoir Waste Concentration Comparisons



Graph 20: Historical Total Phosphorus Abattoir Waste Concentration Comparisons

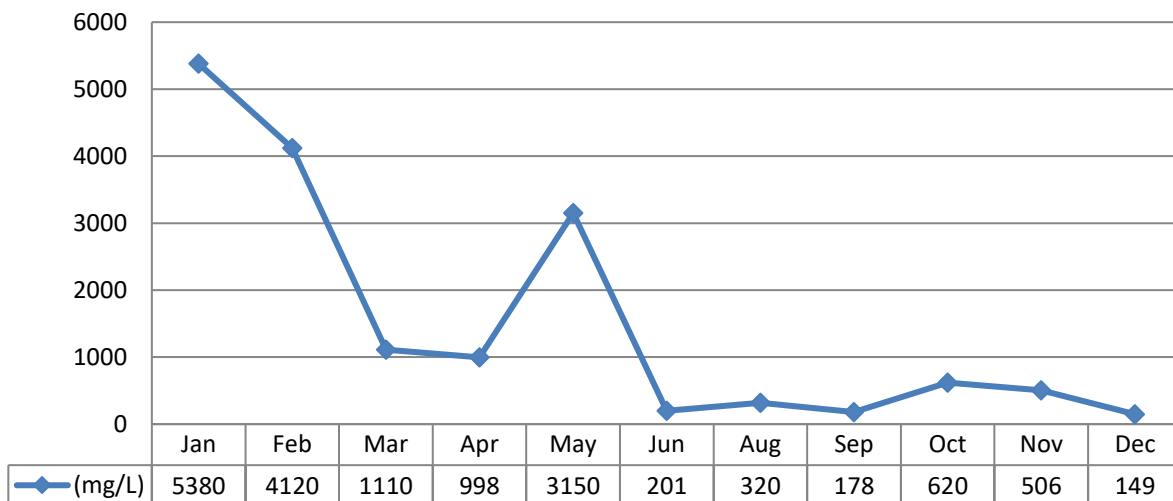


The Total Phosphorus annual average has remained fairly consistent between 2015 and 2021. There was a significant increase in the annual average in 2022. The minimum annual average concentration occurred in 2017 and the maximum annual average concentration occurred in 2022.

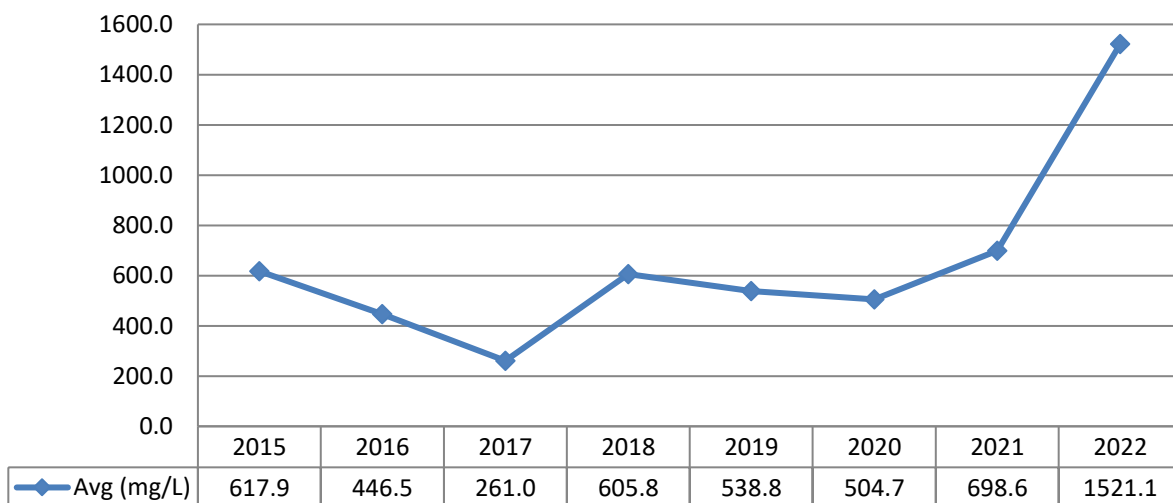
Total Kjeldahl Nitrogen (TKN)

ECA 1696-BPLL4R requires one grab sample be collected monthly and analyzed for Total Kjeldahl Nitrogen. The Total Kjeldahl Nitrogen results ranged from 149 mg/L to 5,380 mg/L.

Graph 21: 2022 Monthly TKN Abattoir Waste Concentration Comparisons



Graph 22: Historical Total Kjeldahl Nitrogen Abattoir Waste Concentration Comparisons

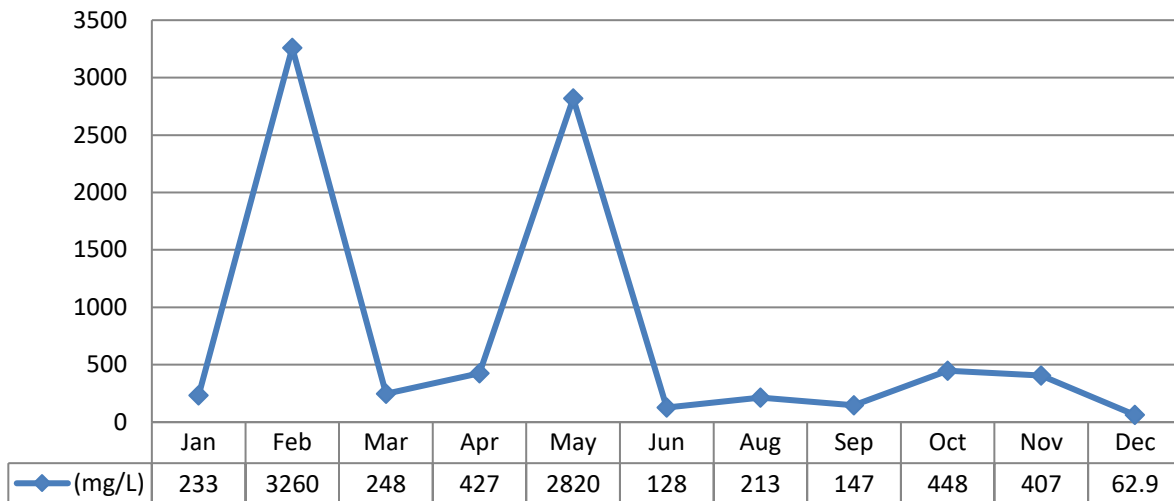


The Total Kjeldahl Nitrogen annual average has ranged between 261.0 mg/L and 1,521.1 mg/L. The minimum annual average concentration occurred in 2017 and the maximum annual average concentration occurred in 2022.

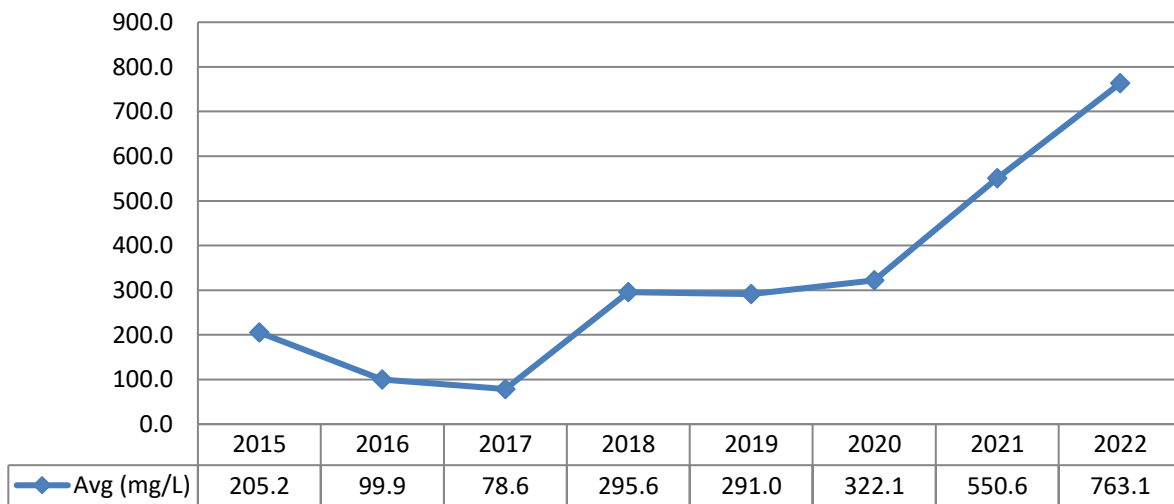
Total Ammonia Nitrogen (TAN)

One grab sample was collected of the Abattoir waste each month in 2022 except July and analyzed for Total Ammonia Nitrogen. The results ranged from 62.9 mg/L to 3,260 mg/L.

Graph 23: 2022 Monthly TAN Abattoir Waste Concentration Comparisons



Graph 24: Historical TAN Abattoir Waste Concentration Comparisons



Since 2015 the Total Ammonia Nitrogen annual average has fluctuated between 78.6 mg/L and 763.1 mg/L. The minimum annual average concentration occurred in 2017 and the maximum annual average concentration occurred in 2022.

Receiving Station

ECA 1696-BPLL4R requires monthly sampling of the Receiving Station testing for BOD5, Total Suspended Solids, Total Phosphorus, and Total Kjeldahl Nitrogen. Although not required by the ECA, Total Ammonia Nitrogen was sampled and analyzed monthly in 2022.

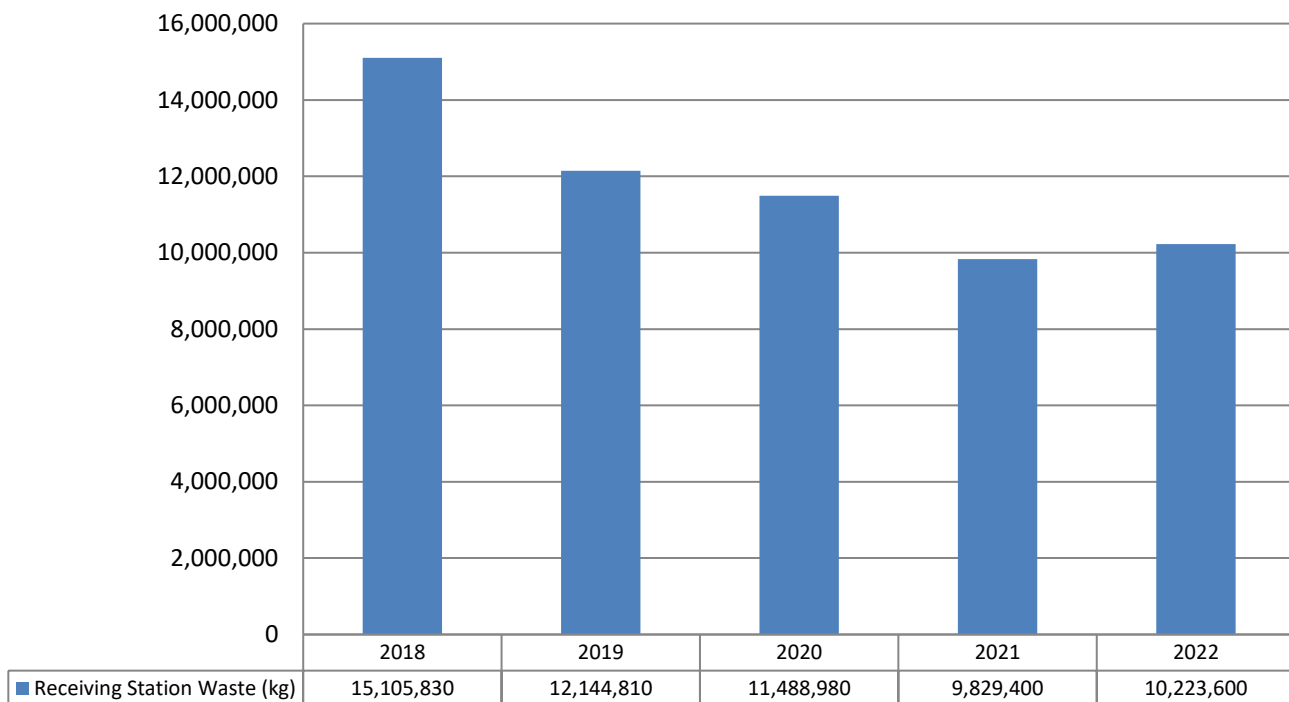
As sampling of the Receiving Station began in November 2018 a historical review of the result is limited. The 2018-2022 results are included below. It should be noted that the sewage from the Receiving Station flows to the Inlet Building where the Inlet (Raw) samples are collected so Receiving Station water would form a portion of the Inlet (Raw) sample results.

Table 1: Historical Review Receiving Station Sample Results

| Parameter | Nov, 2018 | Dec, 2018 | 2019 Annual | 2020 Annual | 2021 Annual | 2022 Annual |
|--------------------------------|----------------------|----------------------|------------------------|------------------------|------------------------|------------------------|
| BOD5 (mg/L) | 5884 | 1060 | 3094.2 | 4549.40 | 4797.77 | 5545.17 |
| Total Suspended Solids (mg/L) | 2880 | 740 | 5397.5 | 8390.00 | 7046.85 | 6165.58 |
| Total Phosphorus (mg/L) | 13.5 | 23.6 | 128.75 | 106.42 | 132.50 | 149.72 |
| Total Kjeldahl Nitrogen (mg/L) | 104 | 196 | 2239.5 | 1238.40 | 1148.05 | 2120.50 |
| Total Ammonia Nitrogen (mg/L) | 4.5 | 156 | 1417.8 | 753.74 | 788.35 | 1081.24 |

Trucks hauling waste are weighed at the Lindsay Landfill Inbound Scale prior to arriving at the Receiving Station and at the Outbound Scale after leaving the Receiving Station. The difference between the two scale readings is the amount of waste deposited into the Lagoon St Receiving Station. The amount of waste deposited into the receiving station in 2022 was 10,223,600 kg. This is a 4% increase in the volume deposited in 2021, and represents an overall steady trend.

Graph 25: Historical Receiving Station Volume Comparisons



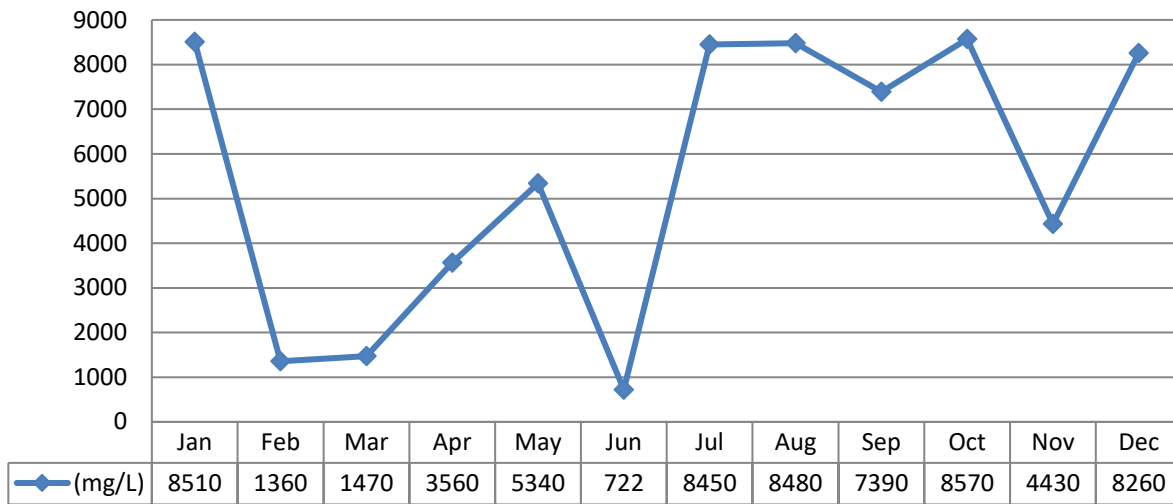
Sample Results

ECA 1696-BPLL4R requires a grab sample be collected monthly and analyzed for BOD5, Total Suspended Solids, Total Phosphorus and Total Kjeldahl Nitrogen. Although not required by the ECA, Total Ammonia Nitrogen was sampled and analyzed monthly in 2022.

Biochemical Oxygen Demand (BOD5)

ECA 1696-BPLL4R requires one grab sample be collected monthly and analyzed for BOD5. The BOD5 sample results ranged from 722 mg/L to 8570 mg/L.

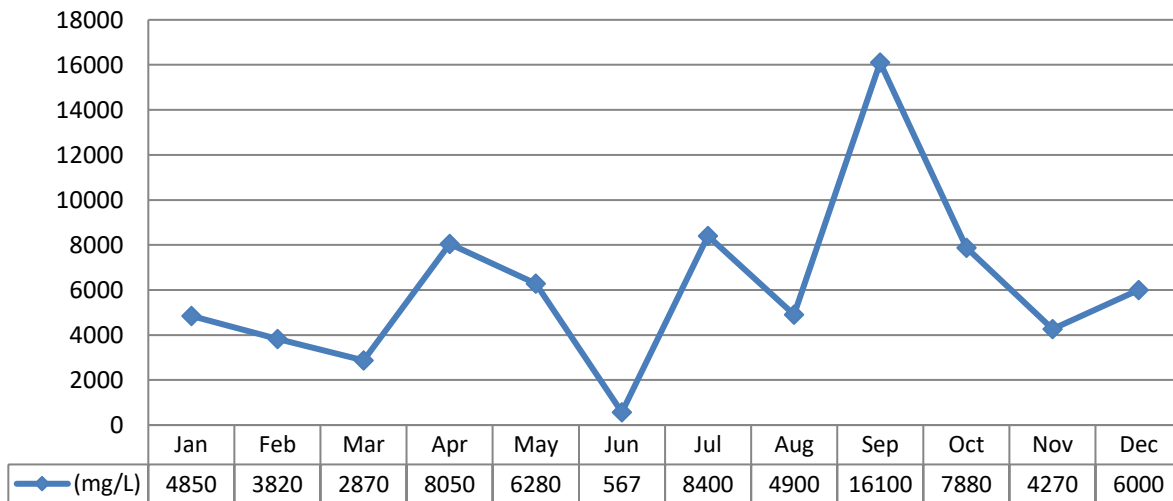
Graph 26: 2022 Monthly BOD5 Receiving Station Waste Concentration Comparisons



Total Suspended Solids

ECA 1696-BPLL4R requires a grab sample be collected monthly and analyzed for Total Suspended Solids. The Total Suspended Solids sample results ranged from 567 mg/L to 16100 mg/L in 2022.

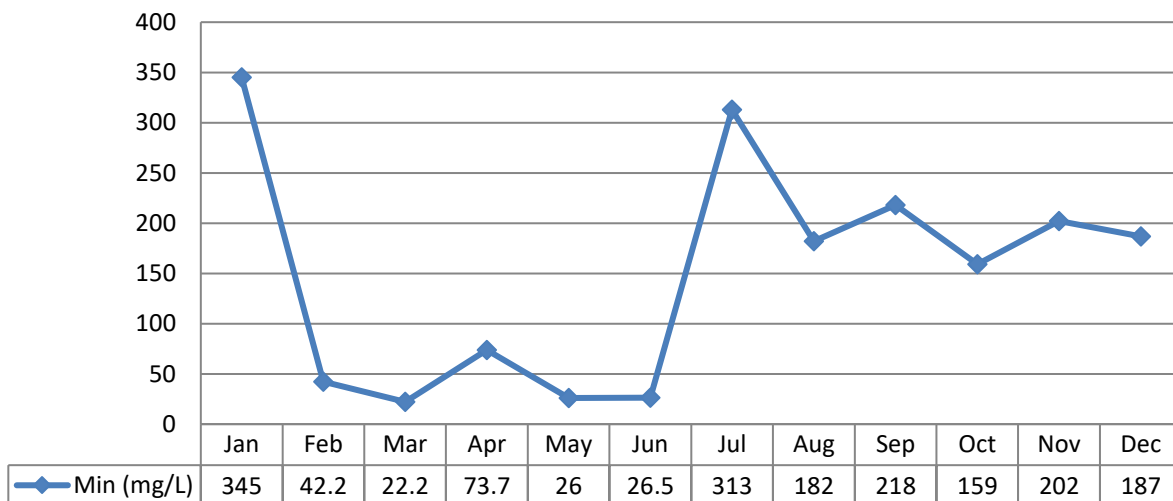
Graph 27: 2022 Monthly Total Suspended Solids Receiving Station Waste Concentration Comparisons



Total Phosphorus

ECA 1696-BPLL4R requires one grab sample be collected monthly and analyzed for Total Phosphorus. Results ranged from 22.2 mg/L to 345 mg/L.

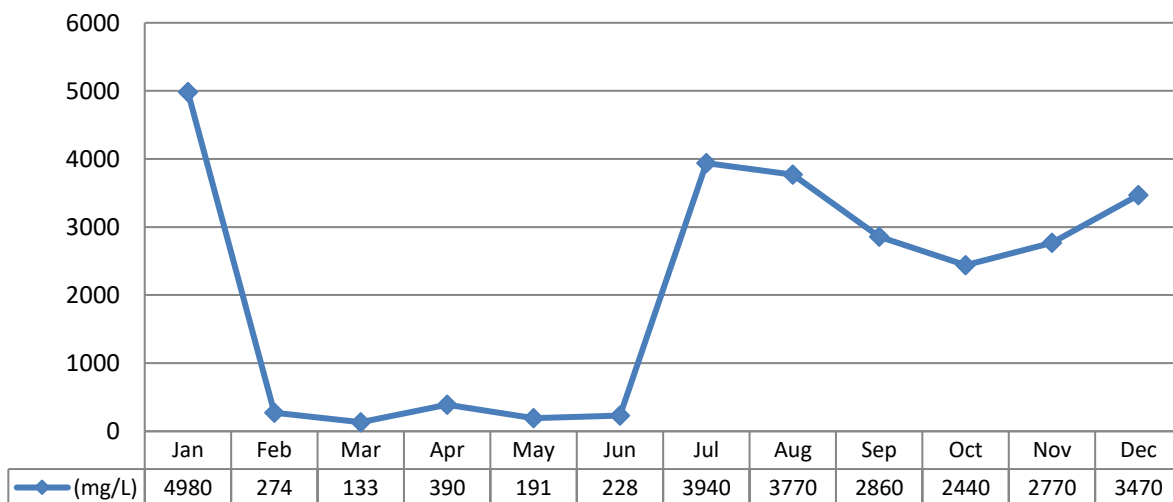
Graph 28: 2022 Monthly Total Phosphorus Receiving Station Waste Concentration Comparisons



Total Kjeldahl Nitrogen (TKN)

ECA 1696-BPLL4R requires one grab sample be collected monthly and analyzed for Total Kjeldahl Nitrogen. Monthly Total Kjeldahl Nitrogen results ranged from 133 mg/L to 4980 mg/L.

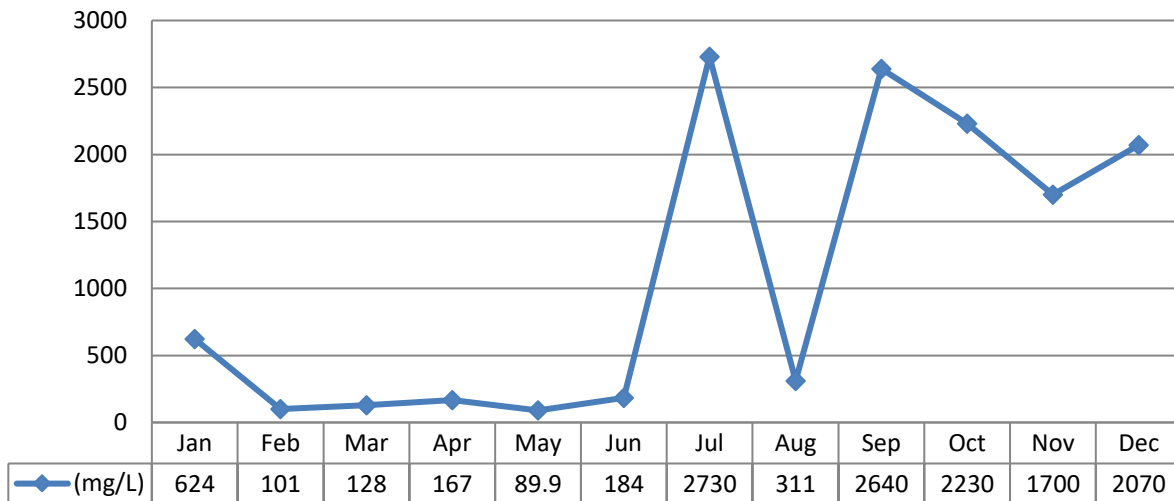
Graph 29: 2022 Monthly TKN Receiving Station Waste Concentration Comparisons



Total Ammonia Nitrogen (TAN)

One grab sample was collected from the Receiving Station waste each month in 2022 and analyzed for Total Ammonia Nitrogen. The monthly average concentration results ranged from 89.9 mg/L to 2,730 mg/L.

Graph 30: 2022 Monthly TAN Receiving Station Waste Concentration Comparisons

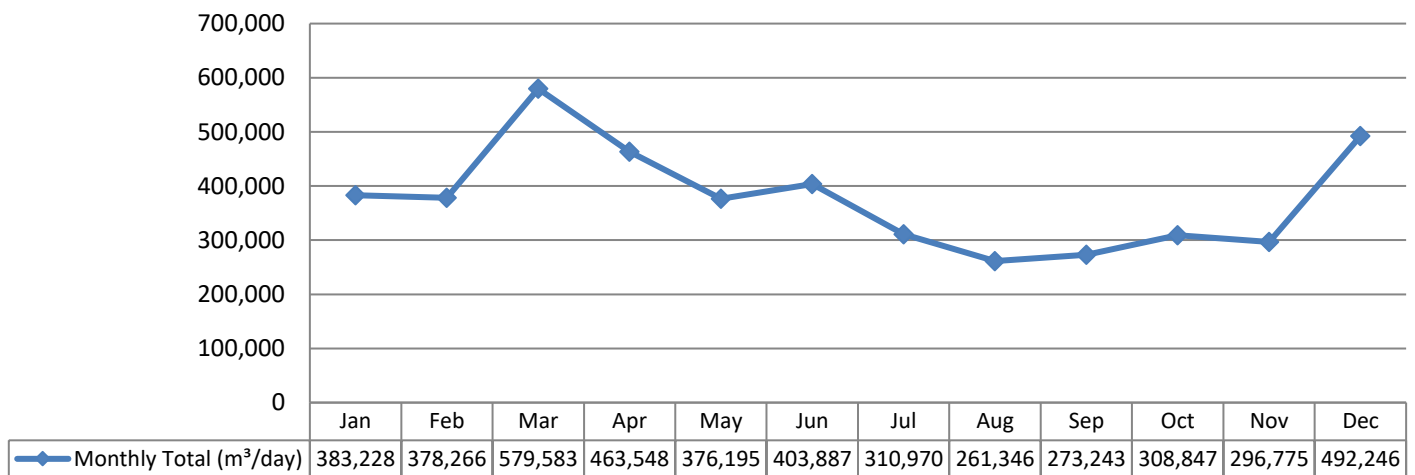


B) Environmental Compliance Approval # ECA 1696-BPLL4R requires a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits, including an overview of the success and adequacy of the works be included in the report.

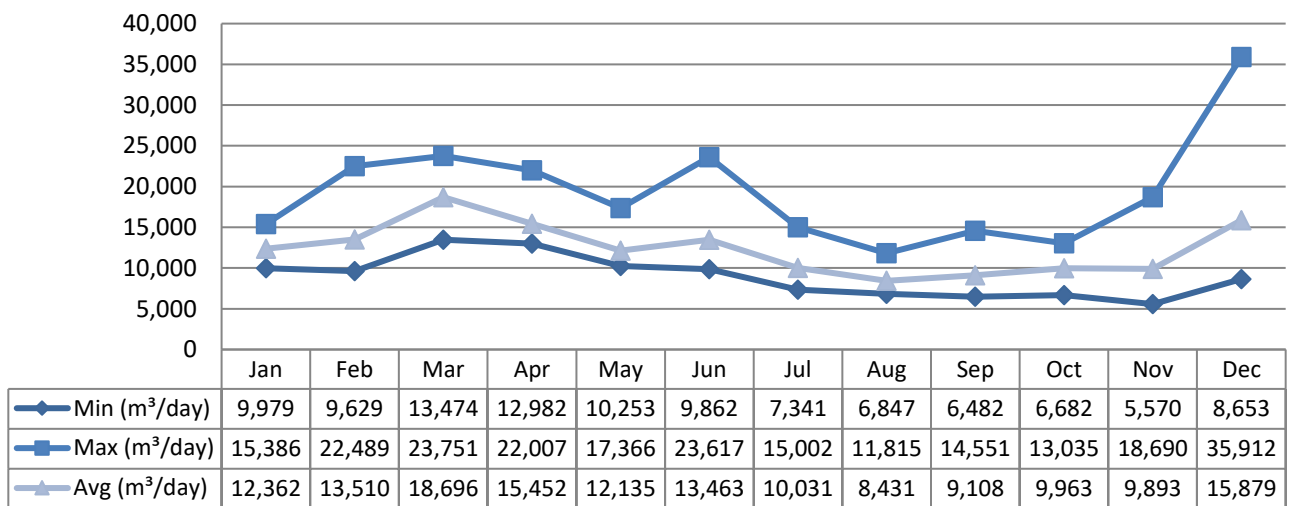
The 2022 Lindsay WWTP annual average daily effluent flow was 12,405.846 m³/day and the total Effluent flow in 2022 was 4,528,134.00 m³.

Effluent Flow Monthly Totals

Graph 31: 2022 Final Effluent Monthly Flows



Graph 32: 2022 Final Effluent Daily Minimum, Maximum and Average Flows



Final Effluent Lab Results

Carbonaceous Biochemical Oxygen Demand (CBOD₅)

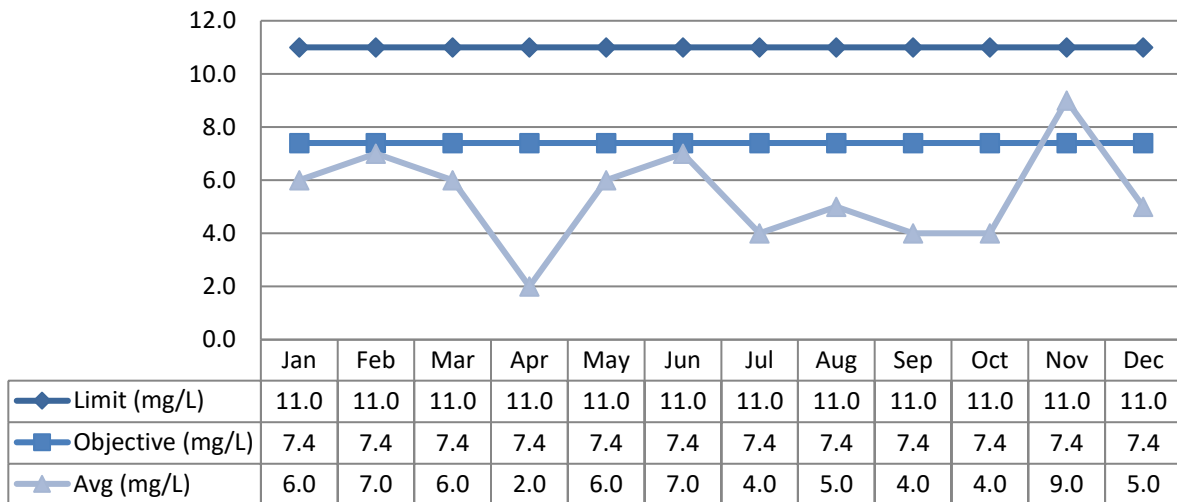
ECA 1696-BPLL4R set the CBOD₅ annual average concentration limit at 11.0 mg/L and the monthly objective at 7.4 mg/L. The 2022 annual average concentration was 3.7 mg/L and the maximum monthly average concentration was 9.0 mg/L.

The annual average waste loading limit is 238 kg/day and the annual average waste loading was 81.07 kg/day.

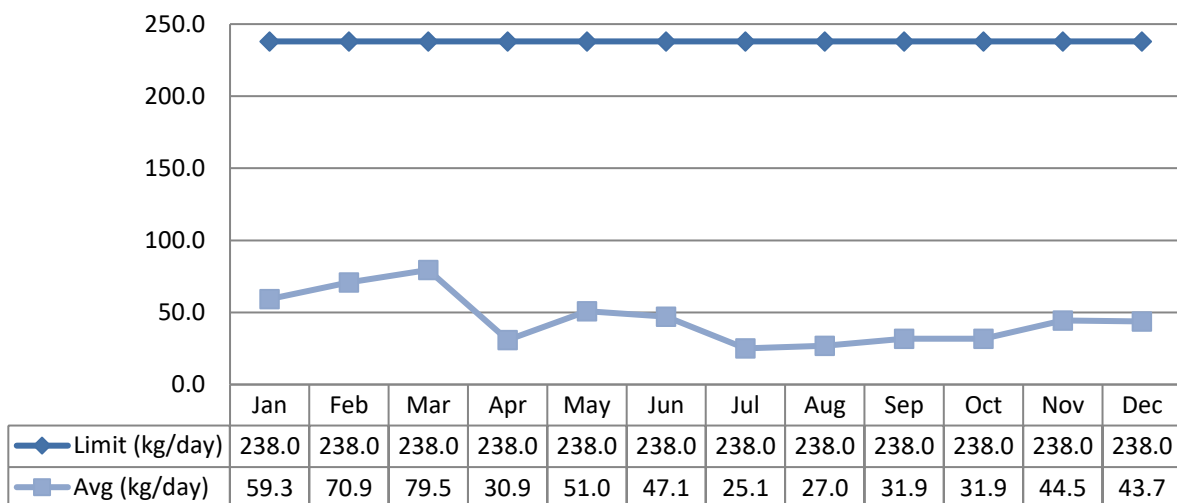
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The monthly objective was met in every month except for November 2022. However the ECA requirement is based on the annual average and all CBOD5 limits were met in 2022

Graph 33: 2022 Monthly Final Effluent CBOD5 Concentration Comparisons



Graph 34: 2022 Monthly Final Effluent CBOD5 Average Waste Loading Comparisons



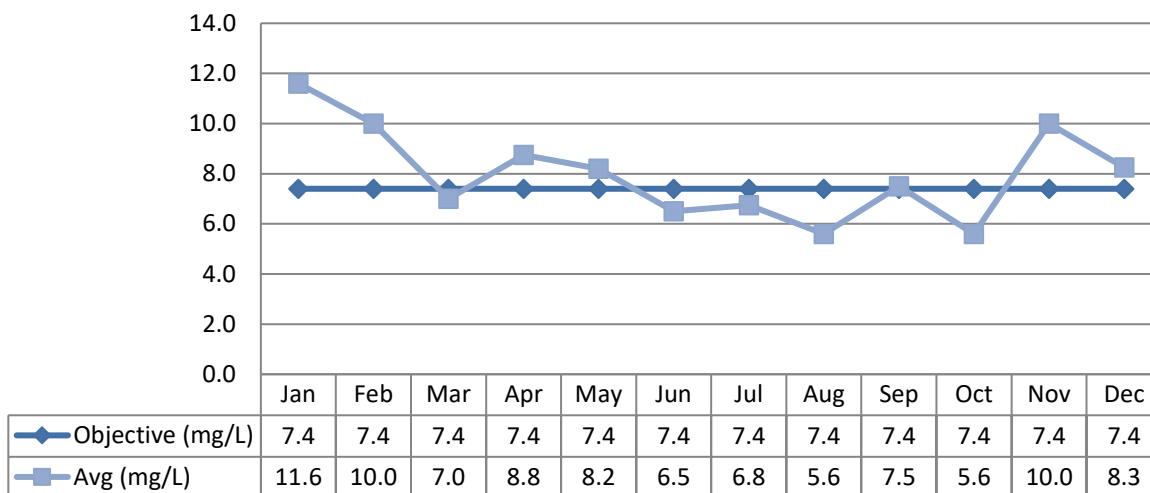
Total Suspended Solids (TSS)

ECA 1696-BPLL4R set the TSS annual average concentration limit at 11.0 mg/L and the annual average waste loading at 238 kg/day. The 2022 annual average concentration was 7.96 mg/L and the annual average waste loading was 194.43 kg/day.

ECA 1696-BPLL4R set the Total Suspended Solids monthly concentration objective at 7.4 mg/L and this objective was not met in months of 2022. Throughout 2022, the Total

Suspended Solids monthly removal rates ranged from 95.2% to 98.1.5%. Continuous efforts made to meet the Effluent Objectives are discussed in Section H.

Graph 35: 2022 Monthly Final Effluent TSS Concentration Comparisons



Total (Ammonia+Ammonium) Nitrogen (TAN)

ECA 1696-BPLL4R set the Total (Ammonia+Ammonium) Nitrogen (TAN) monthly average concentration limit at 1.5 mg/L between May 1 – September 30 and 3.0 mg/L between October 1 to April 30.

The monthly average waste loading limit is 32.3 kg/day between January 1 to April 30 and between October 1 to December 31 is 64.5 kg/day. The TAN monthly concentration objective is 1.0 mg/L between May 1 – September 30 and is 2.0 mg/L between January 1 to April 30 and between October 1 to December 31.

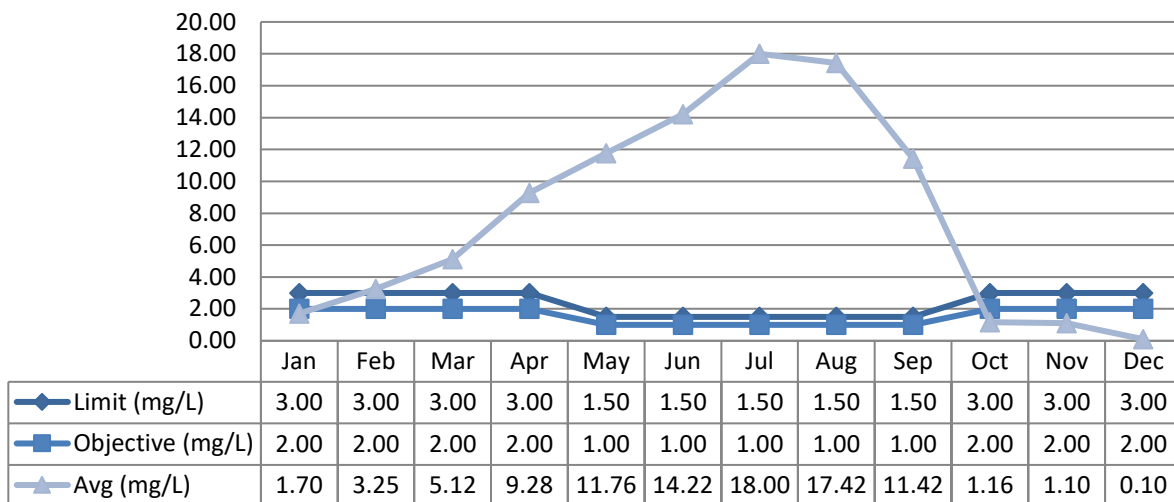
The TAN limit was met each month in 2022 except for February, March, April, May, June, July, August, and September. These exceedances were reported to the Ministry of the Environment, Conservation and Parks in accordance with ECA-BPLL4R Section 11.

The TAN monthly average waste loading limit was met in each month in 2022 except for March, April, May, June, July, August, and September.

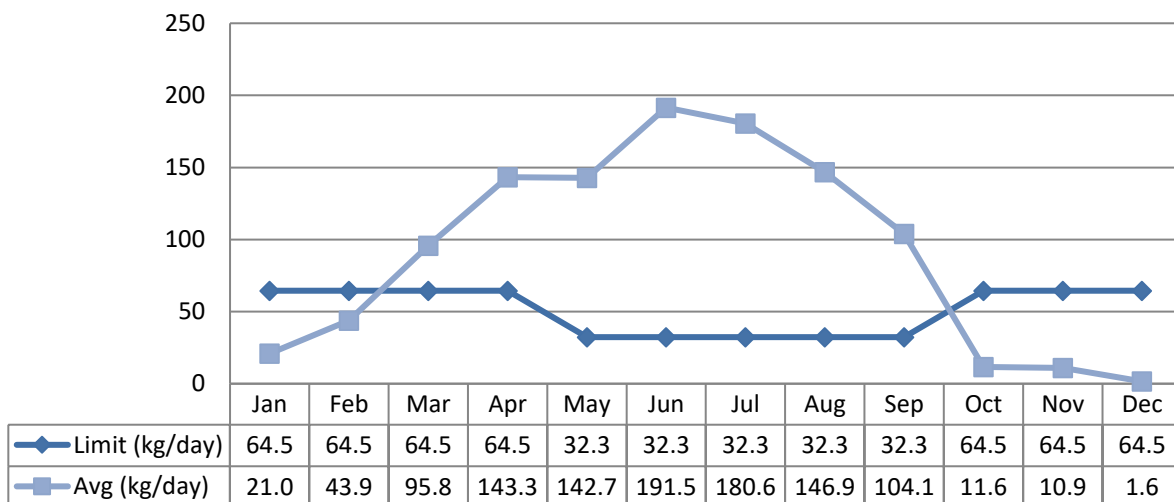
Repeated failures of mechanical aerators caused significant impediments to TAN removal. The loss of aerators affected the dissolved oxygen levels in the aeration lagoon which impacted the TAN results. City of Kawartha Lakes capital upgrades began in 2021 to construct a new aeration basin. Coarse and fine air diffusion aeration basin online on September 30, 2022.

Continuous efforts made to meet the Effluent Objectives are discussed in Section H.

Graph 36: 2022 Monthly Final Effluent TAN Concentration Comparisons



Graph 37: 2022 Monthly Final Effluent TAN Average Waste Loading Comparisons

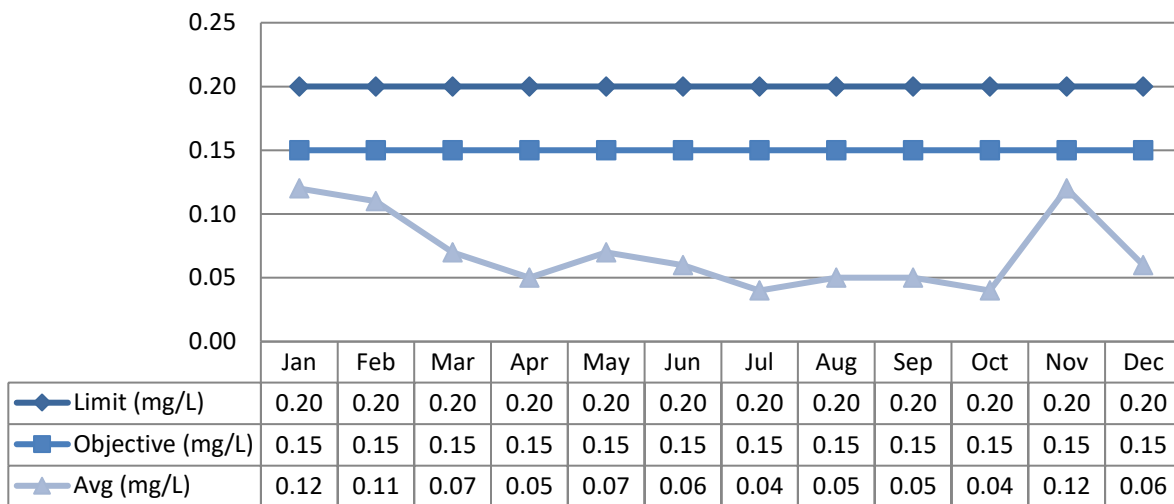


Total Phosphorus (TP)

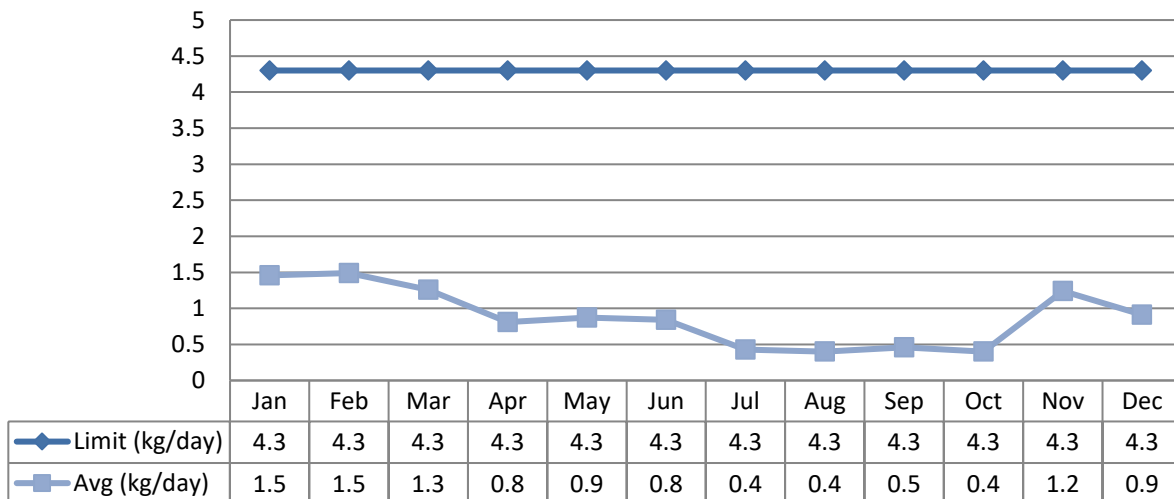
ECA 1696-BPLL4R set the Total Phosphorus monthly average concentration limit at 0.2 mg/L and the monthly average waste loading at 4.3 kg/day. The monthly Total Phosphorus average concentration results and monthly average waste loading results throughout 2022 were in compliance with the limits outlined in the ECA.

ECA 1696-BPLL4R set the Total Phosphorus monthly concentration objective at 0.15 mg/L. The monthly Total Phosphorus average concentration results throughout 2022 were less than the concentration objectives.

Graph 38: 2022 Monthly Final Effluent Total Phosphorus Concentration Comparisons



Graph 39: 2022 Monthly Final Effluent Total Phosphorus Average Waste Loading Comparisons

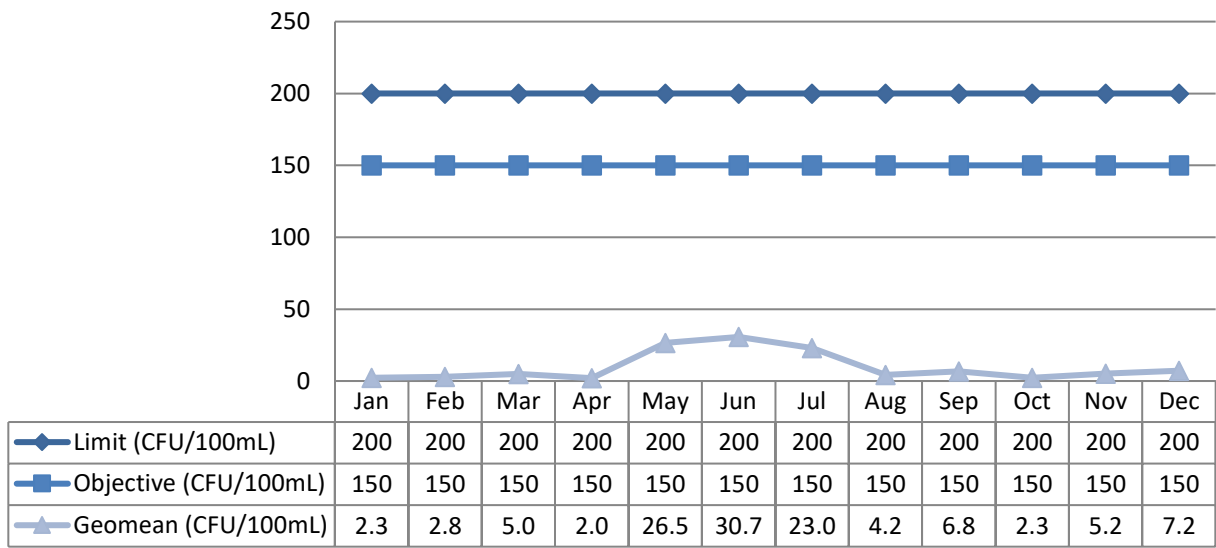


E.coli

ECA 1696-BPLL4R sets the monthly geometric mean density concentration limit at 200 CFU/100 and the monthly objective at 150 CFU/100 mL.

The final effluent results were less than the E. coli monthly geometric mean density limit and objective throughout 2022.

Graph 40: 2022 Monthly Final Effluent E. coli Concentration Comparisons



Acute Lethality to Rainbow Trout and Daphnia Magna

Quarterly effluent samples were collected on February 16, April 20, July 4, and October 4, 2022 for analysis for acute lethality to rainbow trout and daphnia magna.

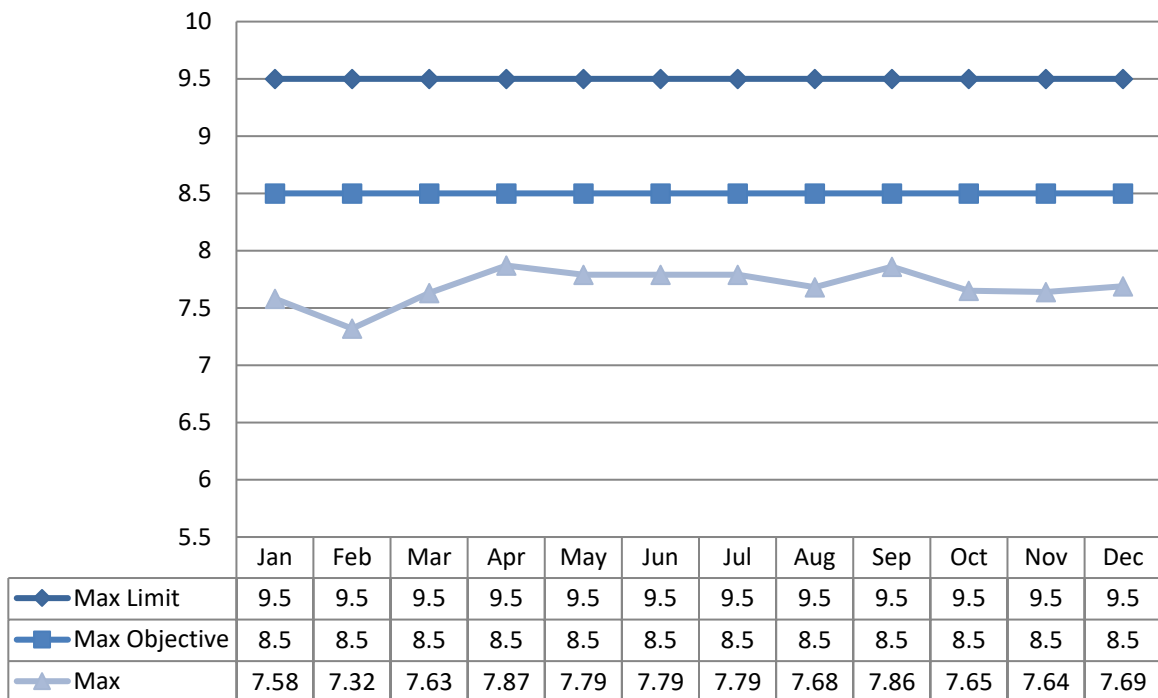
All of the 2022 samples resulted in a 0% mortality rate for both Rainbow Trout and Daphnia Magna. A summary of the results are provided in **Appendix I: Acute Lethality Analysis Results**.

pH

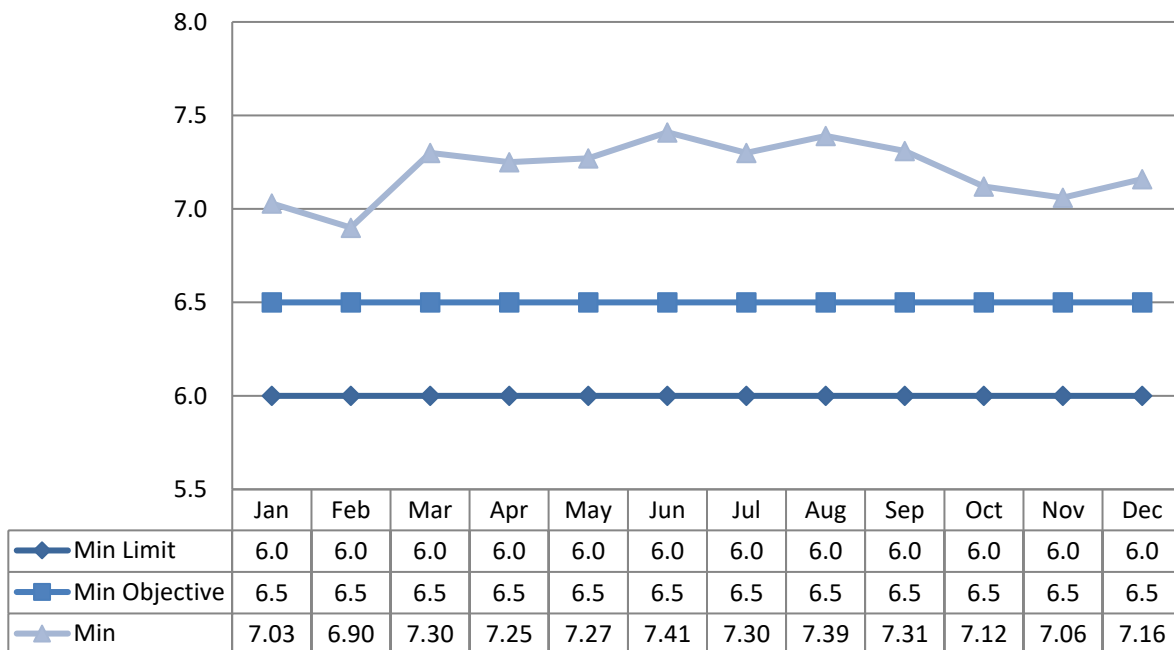
ECA 1696-BPLL4R set a pH compliance limit within the range of 6.0 to 9.5, inclusive, at all times on the effluent. Every pH reading in 2022 was within the compliance limits set by the ECA.

ECA 1696-BPLL4R set the pH objective of each single sample result between 6.5 and 8.5, inclusive, at all times on the effluent. Every pH reading in 2022 was within the compliance objectives set by the ECA.

Graph 41: 2022 Monthly Final Effluent Maximum pH Concentration Comparisons



Graph 42: 2022 Monthly Final Effluent Minimum pH Concentration Comparisons



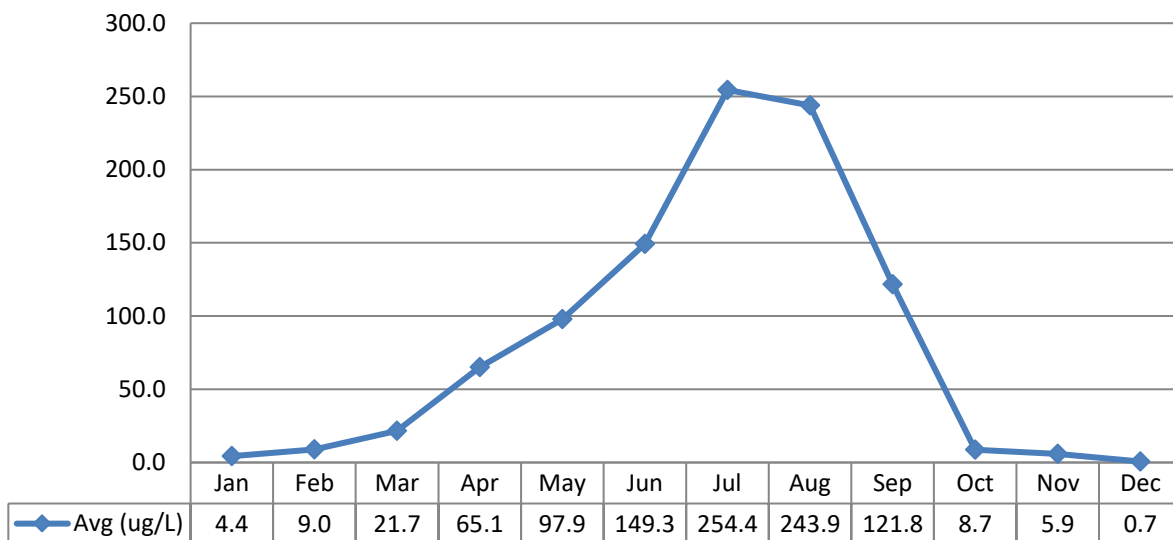
Unionized Ammonia

Unionized Ammonia is calculated monthly based on the final effluent total ammonia nitrogen results and the field pH and temperature collected at the same time as the TAN

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sample. The average monthly results ranged between 0.7 ug/L and 254.4 ug/L. ECA 1696-BPLL4R does not set a Unionized Ammonia limit or objective.

Graph 43: 2022 Monthly Final Effluent Unionized Ammonia Average Concentration



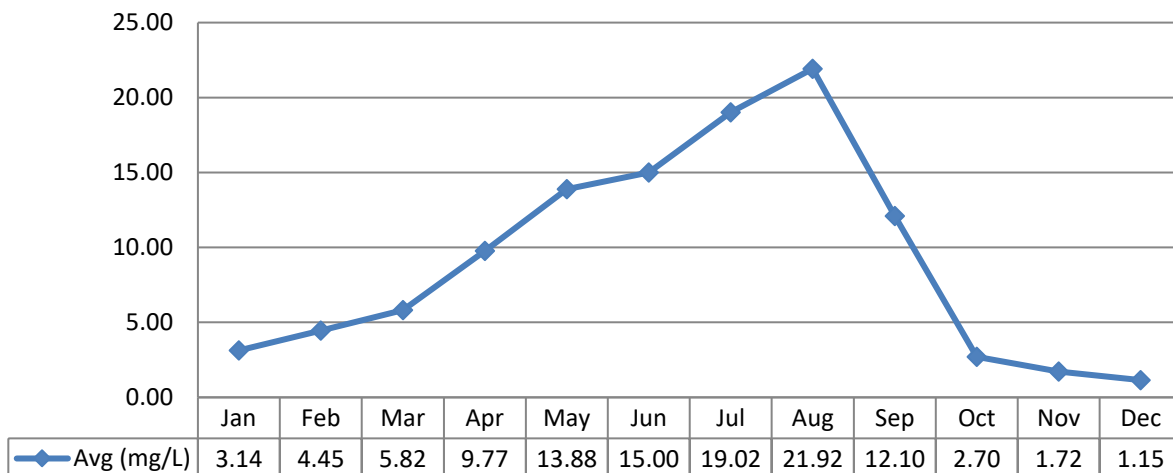
Additional Parameters

The following parameters are requirements of ECA 1696-BPLL4R, but are not designated average concentration limits or average waste loading limits.

TKN

Total Kjeldahl Nitrogen is sampled weekly and the average monthly results ranged between 1.15 mg/L and 21.92 mg/L.

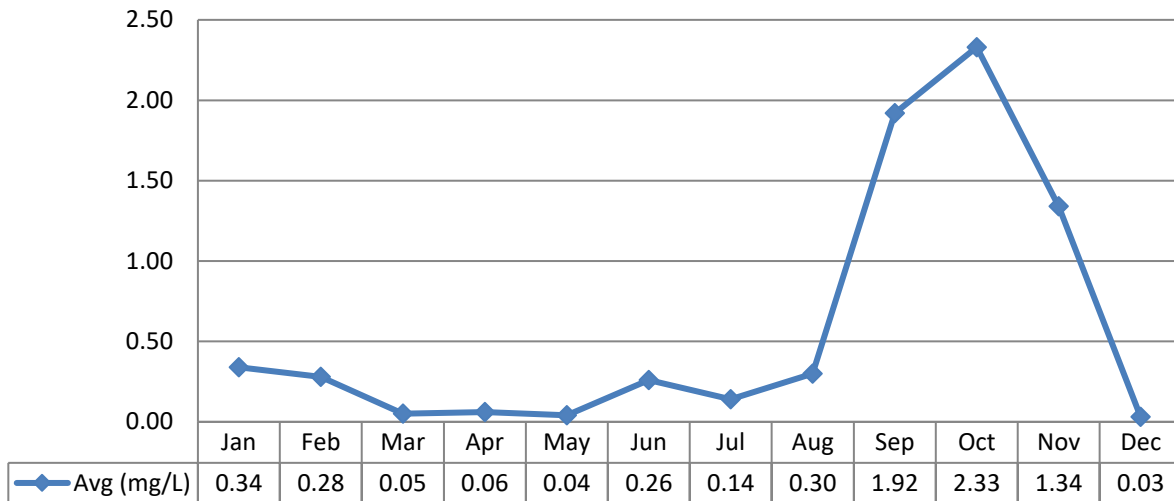
Graph 44: 2022 Monthly Final Effluent TKN Average Concentration



Nitrite as Nitrogen

Nitrite is sampled weekly and the average monthly results ranged between 0.04 mg/L and 2.33 mg/L.

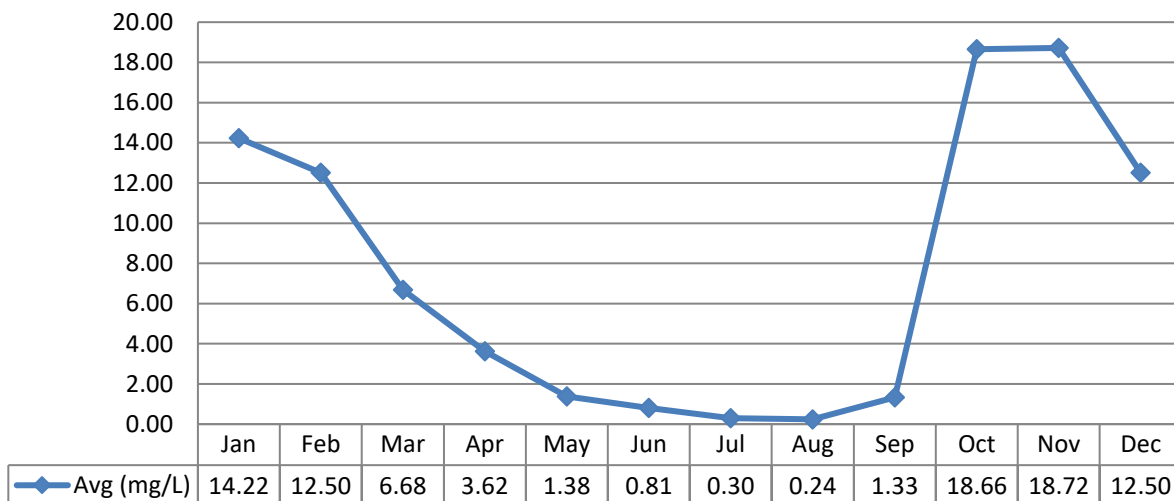
Graph 45: 2022 Monthly Final Effluent Nitrite Average Concentration



Nitrate as Nitrogen

Nitrate is sampled weekly and the average monthly results ranged between 0.3 mg/L and 18.72 mg/L.

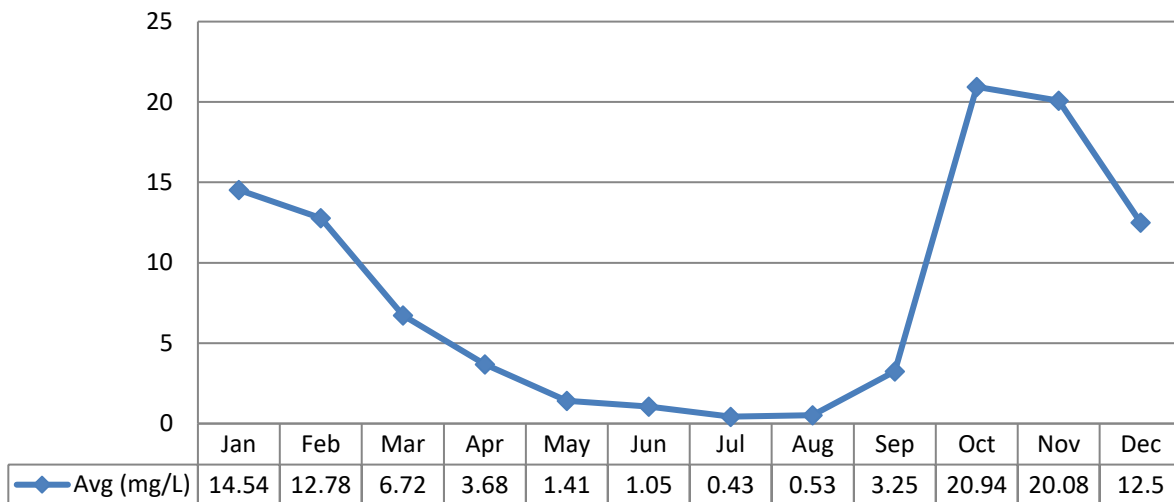
Graph 46: 2022 Monthly Final Effluent Nitrate Average Concentration



Nitrite+Nitrate as Nitrogen

Nitrite+Nitrate is sampled weekly and the average monthly results ranged between 0.43 mg/L and 20.94 mg/L.

Graph 47: 2022 Monthly Final Effluent Nitrite+Nitrate Average Concentration



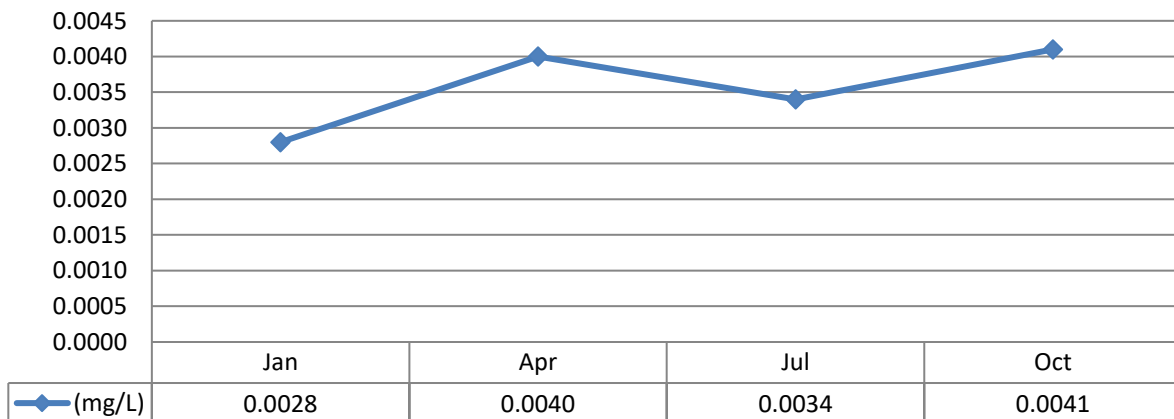
Final Effluent Samples Used For Leachate Related Monitoring

Samples are collected of the Final Effluent quarterly for the purpose of Leachate related monitoring for the Lindsay Landfill as a requirements of ECA 1696-BPLL4R.

Copper

Copper was sampled quarterly in 2022 and the results ranged between 0.0028 mg/L and 0.0041 mg/L.

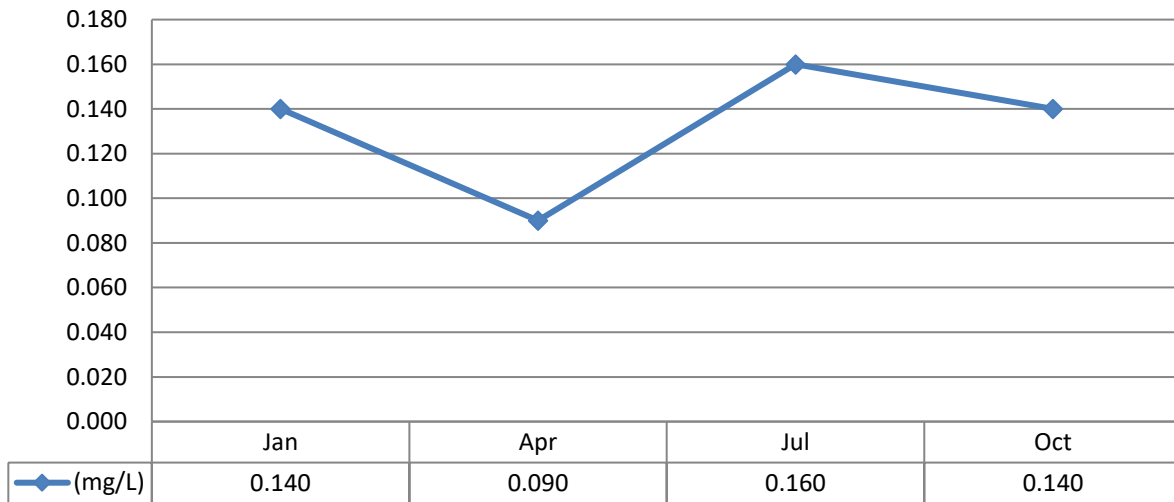
Graph 48: 2022 Final Effluent Copper Concentration



Boron

Boron was sampled quarterly in 2022 and the results ranged between 0.09 mg/L and 0.16 mg/L.

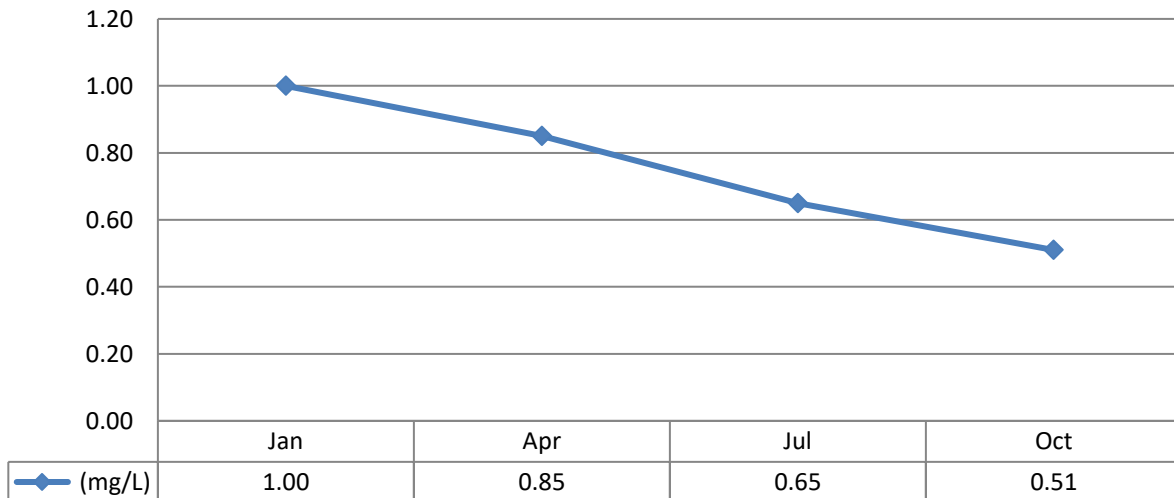
Graph 49: 2022 Final Effluent Boron Concentration



Aluminum (Total)

Aluminum was sampled quarterly in 2022 the results ranged between 0.51 mg/L and 1.00 mg/L.

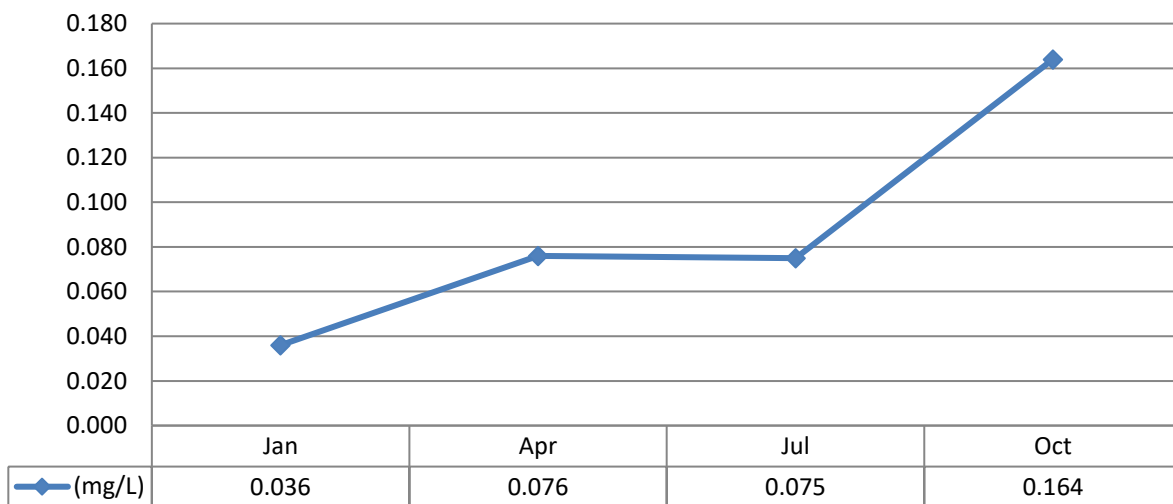
Graph 50: 2022 Final Effluent Aluminum Concentration



Iron (total)

Iron was quarterly in 2022 and the results ranged between 0.03 mg/L and 0.164 mg/L.

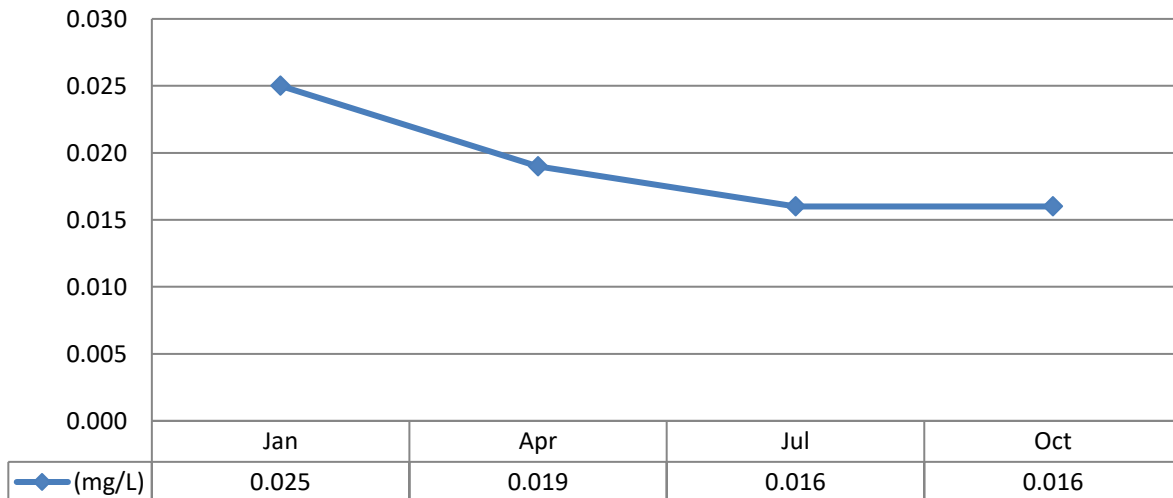
Graph 51: 2022 Final Effluent Iron Concentration



Zinc (total)

Zinc was sampled quarterly in 2022 and the results ranged between 0.016 mg/L and 0.025 mg/L.

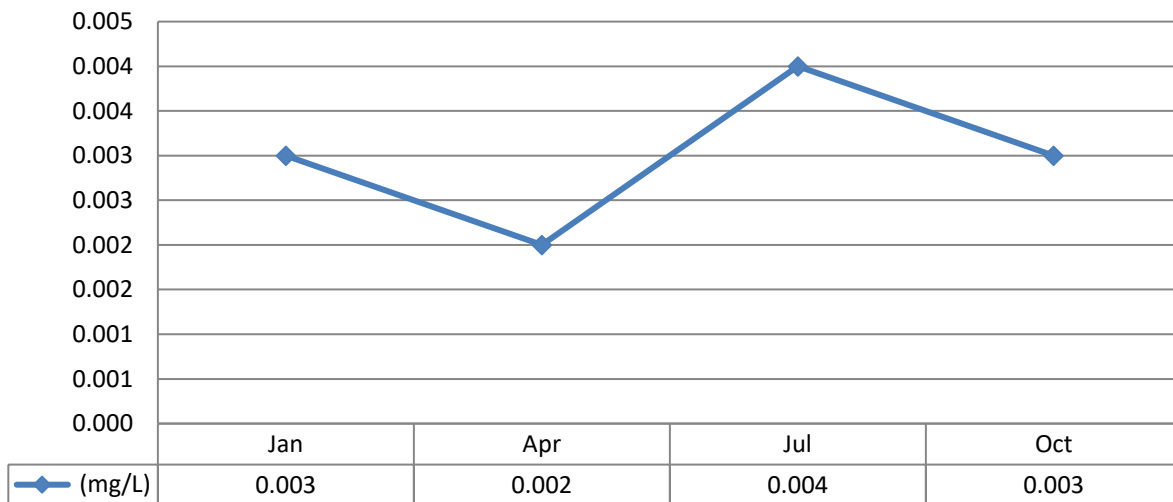
Graph 52: 2022 Final Effluent Zinc Concentration



4AAP-Phenolics

4AAP-Phenolics was sampled quarterly in 2022 and the results ranged between 0.002 mg/L and 0.043 mg/L.

Graph 53: 2022 Final Effluent 4AAP-Phenolics Concentration



Benzene

Benzene was sampled quarterly in 2022 and the results were consistent each quarter at <0.5 ug/L.

Toluene

Toluene was sampled quarterly in 2022 and the results were consistent each quarter at <0.5 ug/L.

Ethylbenzene

Ethylbenzene was sampled quarterly in 2022 and the results were consistent each quarter at <0.5 ug/L.

Xylene

Xylene was sampled quarterly in 2022 and the results were consistent each quarter at <0.5 ug/L.

Quarterly Samples

ECA 1696-BPLL4R requires a grab sample be collected at least quarterly and analyzed for Bis (2-ethylhexyl) Phthalate, Cobalt, Magnesium, Manganese, Potassium and Strontium. Limits are not defined in the ECA.

Table 2: 2022 Final Effluent Results for Samples Required by ECA 1696-BPLL4R.

| Parameter | January 4, 2022 | April 7, 2022 | July 4, 2022 | October 4, 2022 |
|-------------------------------------|-----------------|---------------|--------------|-----------------|
| Bis (2-ethylhexyl) Phthalate (ug/L) | <2 | <2 | <2 | <2 |
| Cobalt (mg/L) | 0.000193 | 0.000154 | 0.00018 | 0.000188 |
| Magnesium (mg/L) | 13.9 | 13.6 | 15.0 | 14.3 |
| Manganese (mg/L) | 0.0332 | 0.0335 | 0.0685 | 0.00597 |
| Potassium (mg/L) | 15.0 | 12.6 | 13.5 | 16.5 |
| Strontium (mg/L) | 0.397 | 0.400 | 0.331 | 0.302 |

C) The following details describe all operating problems encountered during the reporting period and the corrective actions taken.

Table 3: 2022 Lindsay WWTP Operational Challenges

| Month | Challenges | Corrective Actions |
|-----------------|---|--|
| January | Aerator 314 Repair | Replace broken aircraft cable. |
| | Capital Construction | Capital construction continued through all of 2022. |
| February | Aerator 306 Failure | Replaced with spare aerator. |
| | Capital Construction – Facility Shut Down | February 2 and 24, 2022 – Full facility shut down for new electrical Blower building tie in to MCC. All influent flow diverted to lagoon. Lagoon barscreen checked every 20 minutes during shutdown. |
| | February 2022 Monthly TAN Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between October and April at 3.0 mg/L and the February 2022 TAN average concentration was 3.25 mg/L. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| March | Aerator 301 and 306 Failure | Both aerator removed on March 15 and spare aerator installed into 306 position. Aerator 301 shipped for repair. Rental aerator installed into 301 position on March 31, 2022. |
| | March 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between October and April at 3.0 mg/L and the monthly average waste loading limit at 64.5 kg/day. |

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| Month | Challenges | Corrective Actions |
|--------------|---|---|
| | | The March 2022 TAN average concentration was 5.1 mg/L and loading limit 95.8kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| | Grit Removal System Malfunction | Air separator malfunction, replacement part ordered. Received and reinstalled August 10, 2022. |
| April | April 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between October and April at 3.0 mg/L and the monthly average waste loading limit at 64.5 kg/day. The April 2022 TAN average concentration was 9.28 mg/L and loading limit 134.97 kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| May | Aerator 301 | Returned from repair and reinstalled on May 6, 2022. |
| | Aerator 304 Failure | Taken out of service |
| | May 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between May and September at 1.5 mg/L and the monthly average waste loading limit at 32.3 kg/day, and the May 2022 TAN average concentration was 11.26 mg/L and loading limit 142.71 kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| June | Lindsay St N Leachate Pump Replacement | Pump 2 replaced June 20, 2022 |
| | June 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between May and September at 1.5 mg/L and the monthly average waste loading limit at 32.3 kg/day, and the June 2022 TAN average concentration was 14.23 mg/L and loading limit 191.53 kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |

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| Month | Challenges | Corrective Actions |
|------------------|---|--|
| July | New Fine and Course Air Diffusers | Wet tested on July 25 |
| | Aerator 306 | Returned from repair and reinstalled on July 27. Spare aerator removed. |
| | July 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between May and September at 1.5 mg/L and the monthly average waste loading limit at 32.3 kg/day, and the July 2022 TAN average concentration was 18.00 mg/L and loading limit 180.56 kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| August | Aerator 304 | Received from being repaired and re-installed on August 2. |
| | Red Influent – August 16, 2022 | Operator notice bright orange influent while on rounds. Contacted owner to troubleshoot cause. Influent cleared by end of day. Grab sample taken and tested. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| | August 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between May and September at 1.5 mg/L and the monthly average waste loading limit at 32.3 kg/day, and the August 2022 TAN average concentration was 17.4 mg/L and loading limit 146.86 kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| September | September 2022 Monthly TAN and Loading Limit Exceedance | Environmental Compliance Approval #1696-BPLL4R sets the monthly TAN average concentration effluent limit between May and September at 1.5 mg/L and the monthly average waste loading limit at 32.3 kg/day, and the September 2022 TAN average concentration was 11.42 mg/L and loading limit 104.06 kg/day. See Appendix VI - Bypasses, Overflows, Spills, Abnormal Events for details. |
| | New Aeration | New aeration online to South Clarifier on September 22, 2022 |

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| Month | Challenges | Corrective Actions |
|-----------------|-------------------------------------|---|
| | Surface Aeration | Decommissioned and drained on September 30, 2022. All influent going through new aeration system. |
| December | Outside Normal Operating Conditions | Rated flow capacity exceeded on Actiflo units on December 31, 2022 |

Operating issues which impacted the Lindsay WWTP meeting the Final Effluent concentration limits, loading limits or concentration objectives are addressed above in Section B.

D) OCWA uses a Work Maintenance System (WMS) to schedule normal maintenance activities and track repairs. WMS is a maintenance tracking system that can generate work orders as well as give summaries of completed and scheduled work. During the year, the operating authority at the facility generates scheduled work orders on a weekly, monthly and annual basis. The service work is recorded in the work order history. This ensures routine and preventive maintenance is carried out and assets are maintained to manufacturer's and/or industry standards. Emergency and capital repair maintenance is completed and added to the system.

Refer to **Appendix III: WMS Work Order Summary**.

E) Effluent quality assurance is maintained in several ways. Laboratory samples are sent to an accredited laboratory (SGS Canada Inc. or AquaTox Testing & Consulting Inc.) for analysis of all effluent parameters. Sampling calendars issued to the operators denoting frequency of sampling and these calendars are submitted to the Process Compliance Technician at the end of each month. Raw and effluent samples are collected as per the Environmental Compliance Approval and the results are reviewed on a regular basis to ensure compliance with the site's objectives and limits.

Work orders illustrating all scheduled and preventative maintenance to be completed are issued to the operator and/or mechanic. Upon completion staff enter results of the work order into OCWA's WMS system. OCWA conducts internal audits of the facility and develops Action Plans to ensure deficiencies are identified.

F) Calibrations on effluent monitoring equipment were performed by Franklin Empire in December 2022 for equipment located at the Lindsay Wastewater Treatment Plant and Pumping Stations. Masstec Weighing Systems completed calibrations on the Inbound and Outbound scales at the Lindsay Landfill on June 8, 2022 and November 16, 2022.

Refer to **Appendix IV: Calibration Reports**.

G) Continuous efforts were made to meet the Effluent Objectives in 2022:

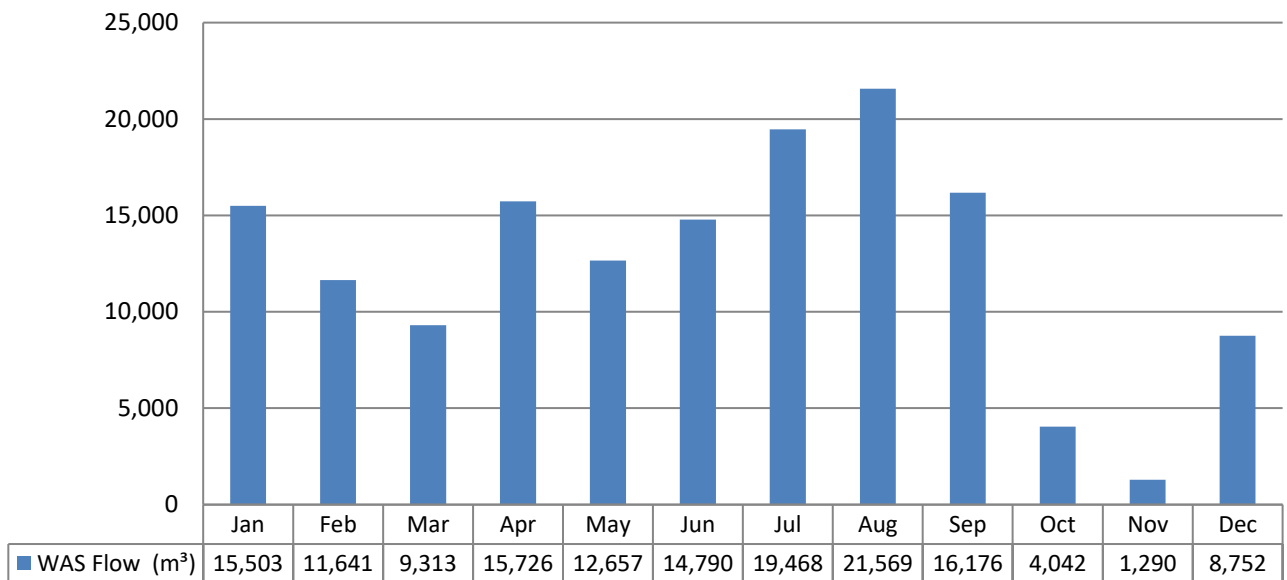
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1. Development of the sampling plan which meets or exceeds the minimum sample requirements as required in the ECA;
2. Visual Inspection of the entire process while performing rounds;
3. Influent monitoring;
4. Ensuring that chemicals are being dosed and adjusting as required;
5. Continually optimizing the Actiflo process;
6. Calibration of lab equipment;
7. Annual calibration of flow meters;
8. Performing preventative maintenance activities in accordance with work order schedules;
9. Performing in-house lab tests on days that data is collected;
10. Monitoring treatment processes by performing regular laboratory analysis and reviewing of lab results;
11. Sludge monitoring of primary clarifiers & adjustments to pumping volume based on tank levels to reduce solids carryover to the secondary clarifiers;
12. Visual review of microbiological activity of activated sludge to ensure appropriate F/M ratio;
13. Removing vegetation from the aeration lagoon.
14. Continual maintenance of aerators to ensure adequate oxygenation and ammonia removal.
15. Desludging project which will help reduce sludge lagoon decant liquid concentrations and lower influent loadings.
16. Pumping lagoon wastewater back to headworks was managed to reduce influent loadings when DO was low.

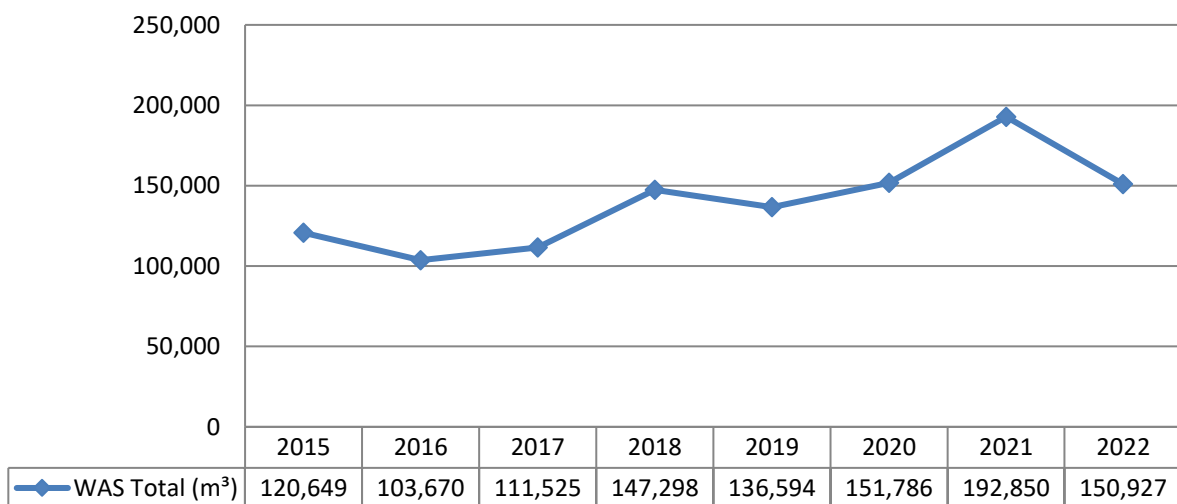
H) The total volume of sludge generated in 2022 was 150,927 m³ which was a 21.7 percent decrease over the volume generated in 2021. Sludge is stored in onsite storage lagoons at the Lindsay WWTP and the volume is not expected to be appreciably different in the next reporting period.

Graph 54: 2022 Monthly Sludge Generation Volumes

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Graph 55: Historical Sludge Volume Comparisons



Sludge Removal

There was no sludge removed from the Lindsay WWTP in 2022.

l) Summary of community complaints received during 2022 can be found in **Appendix V: Community Complaints**.

j) Summary of By-passes, Overflows, situations outside Normal Operation Conditions, spills within the meaning of Part X of EPA and abnormal discharge events during 2022.

Bypasses

There were not any bypasses at the Lindsay WWTP in 2022

Overflows

There were not any overflows at the Lindsay WWTP or pumping stations in 2022.

Refer to **Appendix VI: Bypasses, Overflows, Spills or Abnormal Events** for copies of the quarterly Bypass and Overflow reports submitted to the Ministry of the Environment, Conservation and Parks.

Situations outside Normal Operation Conditions

"Normal Operating Condition" means the condition when all unit process(es), excluding Preliminary Treatment System, in a treatment train is operating within its design capacity. In the instances of Situations outside Normal Operation Conditions, ECA 1696-BPLL4R directs to collect daily sample(s) of the Final Effluent, on any day when there is any situation outside Normal Operating Conditions and sample for CBOD, TSS, Total phosphorus, TKN. As a best practice, samples were also tested for TAN, Nitrite, Nitrate and Nitrite+Nitrate.

There was one instance of Situations outside Normal Operating Conditions in 2022.

On December 31, 2022 the final flow through the Actiflo units exceeded the rated design capacity of 30,100 m³/day. This was caused due to an unseasonal thaw with rain. The composite sampler was set on December 31, 2022 and sample collected January 1, 2023.

Refer to **Appendix VI: Bypasses, Overflows, Spills or Abnormal Events** for the Certificate of Analysis.

Spills

There were not any spills at the Lindsay WWTP in 2022.

Abnormal Discharge Events

There were not any abnormal discharge events at the Lindsay WWTP in 2022.

K) There were not any Notices of Modifications to Sewage Works initiated, worked on or completed in 2022.

A summary of all modifications completed which did not require a Notices of Modifications to Sewage Works are included in **Appendix III: WMS Work Order Summary**.

L) During the 2022 reporting period there were no incidents of a bypass or overflow within the sanitary sewer system or the WWTP. Therefore no proposed projects to eliminate bypasses or overflows are forecasted for the 2023 reporting period.

M) ECA 1696-BPLL4R states that the annual report must contain “any change or updates to the schedule for the completion of construction and commissioning operations of major process(es)/equipment groups in the Proposed Works”

N) ECA 1696-BPLL4R states that the annual report must contain “a summary of any

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deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year”

The 2022 sample plan states that weekly samples would be collected on Mondays and monthly samples would be collected on the first Monday of each month. Annual samples were scheduled to be sampled on July 4 2022. Weekly samples around the holiday Mondays throughout the year were pre-planned to be taken on the following Tuesday. Samples that fell within the Christmas holidays were pre-planned to be taken on Wednesday December 28, 2022 to accommodate for accredited lab holiday hours.

As noted in an email from Sargol Okhovatian, Ministry of the Environment, Conservation and Parks – Review Engineer Assistant, dated October 12, 2018, since neither the City of Kawartha Lakes nor the Ontario Clean Water Agency has control of the delivery schedule of Imported Sewage the monthly Imported Sewage samples are not required to be sampled on specific dates. As long as there is a minimum of one sample from each Imported Sewage stream (Abattoir Waste and Receiving Station) each month then there will be no deviation from the Sample Plan.

There were deviations from the Sample Plan in 2022:

Table 4: 2022 Deviations from Sample Plan

| Date | Deviation | Reason |
|------------------|--|--|
| January 4, 2022 | Quarterly - Acute Lethality tested only Rainbow Trout – did not test Daphnia Magna. | Obsolete Chain of Custody used from past Rainbow Trout only resample. Resample collected and sampled February 16, 2022 |
| January 17, 2022 | Weekly - Samples scheduled for January 17, sampled on January 19. | Weekly samples were off schedule due to staff error. |
| April 4, 2022 | Quarterly – Samples scheduled for April 4. Collected on April 7. Bis (2-ethylhexyl) Phthalate, parameter of quarterly sample requirements, not sampled on April 7. Collected on April 12. Acute Lethality scheduled for April 4, collected April 20. | Quarterly samples were off schedule due to staff error. Bis (2-ethylhexyl) Phthalate bottle missed during sample collection due to staff error. |
| April 11, 2022 | Weekly – Samples scheduled for April 11, collected on April 12. | Raw water composite sampler plugged and did not collect enough sample to test parameters. Decision |

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| Date | Deviation | Reason |
|-----------------|---|---|
| | | was made operationally to shift both Raw and Effluent sampling to the following day. |
| June 13, 2022 | Weekly – Samples scheduled for June 13, collected on June 14. | Effluent water composite sampler malfunctioned and did not run automatic program. Sampler reset. Decision was made operationally to shift both Raw and Effluent sampling to the following day. |
| July 2022 | Monthly – Abattoir sample not collected | Monthly abattoir sample missed being collected due to staff error. |
| August 2, 2022 | Weekly – Samples scheduled for August 2, collected on August 3. | Raw water composite sampler did not run automatically due to a setting change. Setting returned and sampler reset. Effluent water composite sampler unable to collect when foot valve lifted up on effluent gate and out of the effluent channel. Foot valve released from gate. |
| October 3, 2022 | Quarterly – Samples scheduled for October 3, collected October 4 Acute Lethality scheduled for October 3, collected October 4. | Quarterly and Acute Lethality samples off schedule due to staff error. |

For the Lindsay WWTP 2023 Sample Plan refer to **Appendix II: 2023 Sample Plan**.