Wastewater Treatment Division 2024 Annual Report

Introduction

The City of Portage la Prairie Wastewater Treatment Division is comprised of the Class IV Water Pollution Control Facility (WPCF) and thirteen lift stations within the City and one lift station in the Poplar Bluff Industrial Park that convey the wastewater to the WPCF. The WPCF receives wastewater from three main sources - domestic wastewater from the City of Portage la Prairie and the surrounding areas in the RM of Portage la Prairie, and industrial wastewater from Poplar Bluff Industrial Park as well as the McMillan Industrial Park.

The industrial wastewater from McMillan Industrial Park and the Poplar Bluff Industrial Park is first treated in a Low-Rate Anaerobic Reactor (LRAR) for the removal of solids and organics. Once pretreated, the industrial water is combined with the domestic (residential/commercial wastewater) in a common lift station and is pumped into one of the four Sequencing Batch Reactors (SBRs). Through cycles of aeration, mix, and settle, the wastewater is treated through the activity of specialized bacteria that removes the organic waste in the water as well as ammonia. The treated water is then disinfected via Ultra-Violet exposure prior to being discharged in the Assiniboine River.

The biological activity required for treatment produces residual solids that accumulate in the SBRs. A calculated volume of these solids must be removed each day. These solids are thickened, and then anaerobically digested for stabilization. Stabilized solids are referred to as Biosolids. Biosolids are stored and then applied to farmland as fertilizer.

Facility Performance and License Compliance

In 2024, the WPCF received an average of 14,078,000 L of wastewater each day, for a total volume of 5.15 billion litres. This is a 19% increase from the 4.34 BL received in 2023 and is primarily due to fluctuations in processing at the local industries.

The peak flow of 16,633,000 L was received on May 26, 2023, and the minimum flow of 6,423,000 L was observed on December 25, 2023. This is attributable to industrial shutdowns that occurred. The incoming flow is 56% of domestic and commercial wastewater and 44% from industrial sources. The incoming loading of Total suspended solids, Chemical Oxygen Demand and Total Kjeldahl Nitrogen from the industries accounts for almost 95% of what is treated.

The WCPF operates under Environment Act License #2543 R, which is issued by the Province of Manitoba Department of Environment and Climate Change. In addition to outlining requirements for treatment processes, sampling, and reporting, it also provides maximum limits on the total amount of Suspended Solids, Biological Oxygen Demand, and Ammonia that the facility can discharge in the treated wastewater each day and a

monthly geometric mean for fecal bacteria. The facility is also required to assess for toxicity on a monthly and quarterly basis. Any exceedance is reported to Manitoba Environment and Climate Change within 24 hours of the limit being surpassed.

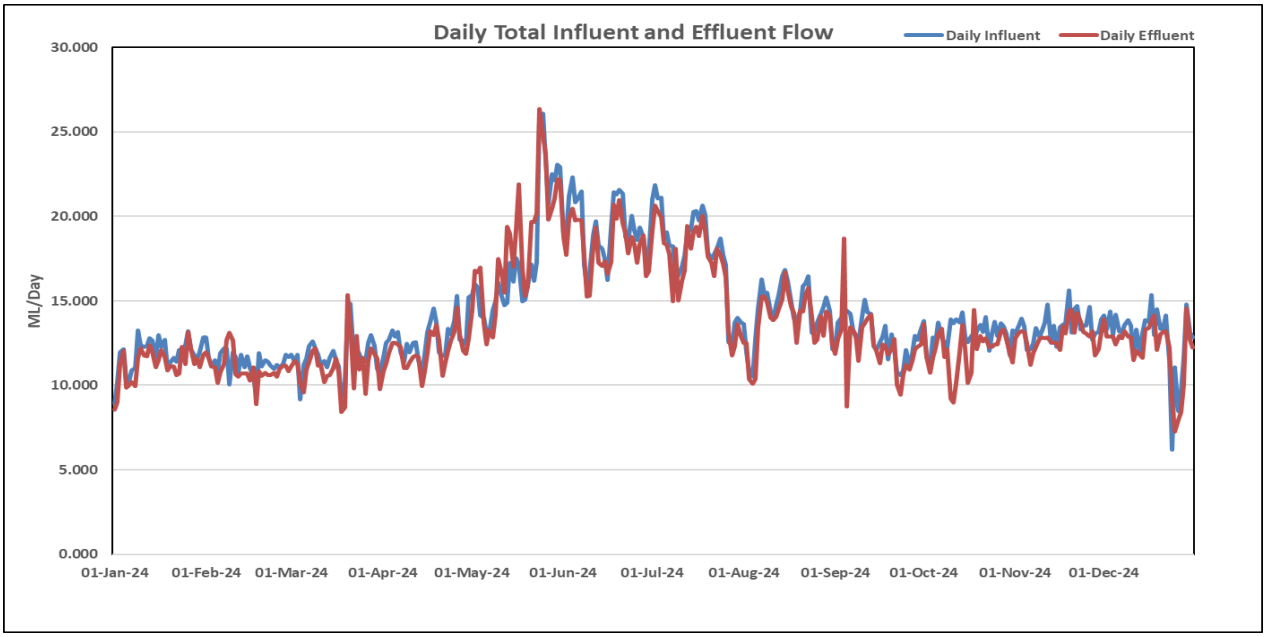


Table 1- comparison of average daily incoming and outgoing flows from WPCF in ML/D

Total Suspended Solids

Total Suspended Solids (TSS) are the amount of particulate matter suspended in the water that is released from the WPCF. By license, this is to not exceed 30 mg/L per day. The average daily TSS discharged in 2024 was 9.4 mg/L and there were two occurrences where this limit was exceeded for 99.45% compliance. These exceedances occurred as follows.

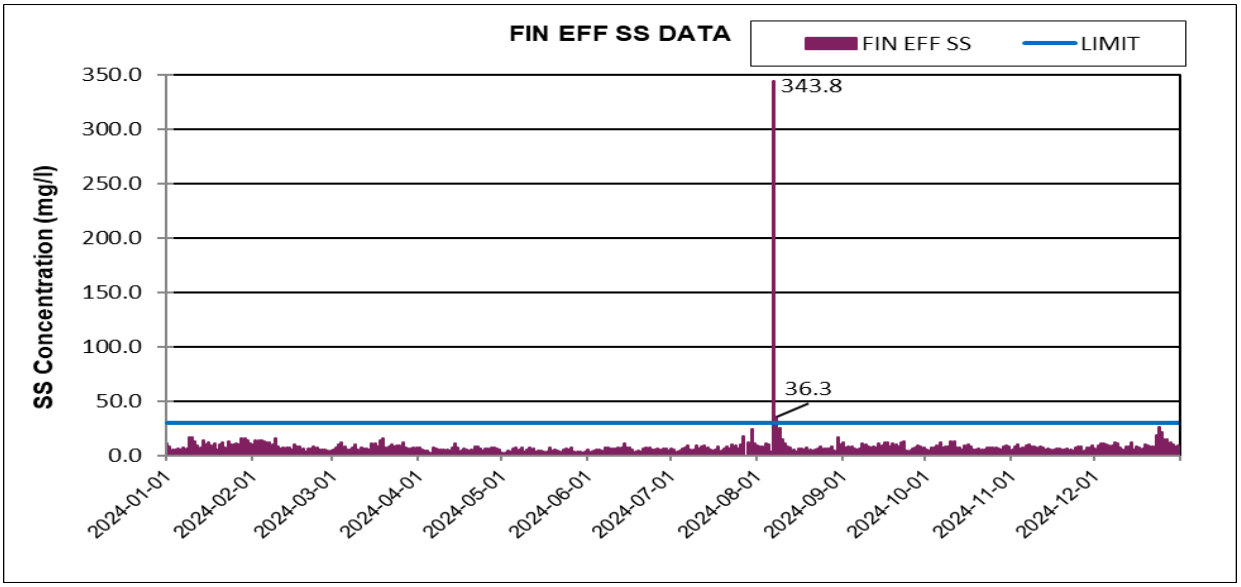


Table 2- Daily Total Suspended Solids for Final Effluent in mg/L.

August 7- 343.8 mg/L- A recirculation pump in one of the basins was left in manual mode and continued running overnight. This prevented the Waste activated sludge (WAS) from settling and was therefore discharged during decant cycles.

August 8- 36.6 mg/L- This was a continuation of the event from August 7. The pump continued to run until staff reported to work in the morning.

Biological Oxygen Demand

Biological Oxygen Demand (BOD) is an indicator of the amount of dissolved oxygen needed by the remaining biological organisms to break down organic matter once it reaches the river. The EAL permits a maximum daily discharge of 30 mg/L. There were one reported exceedances of this parameter for 94.3% compliance and the average daily discharge value was 5.6 mg/L.

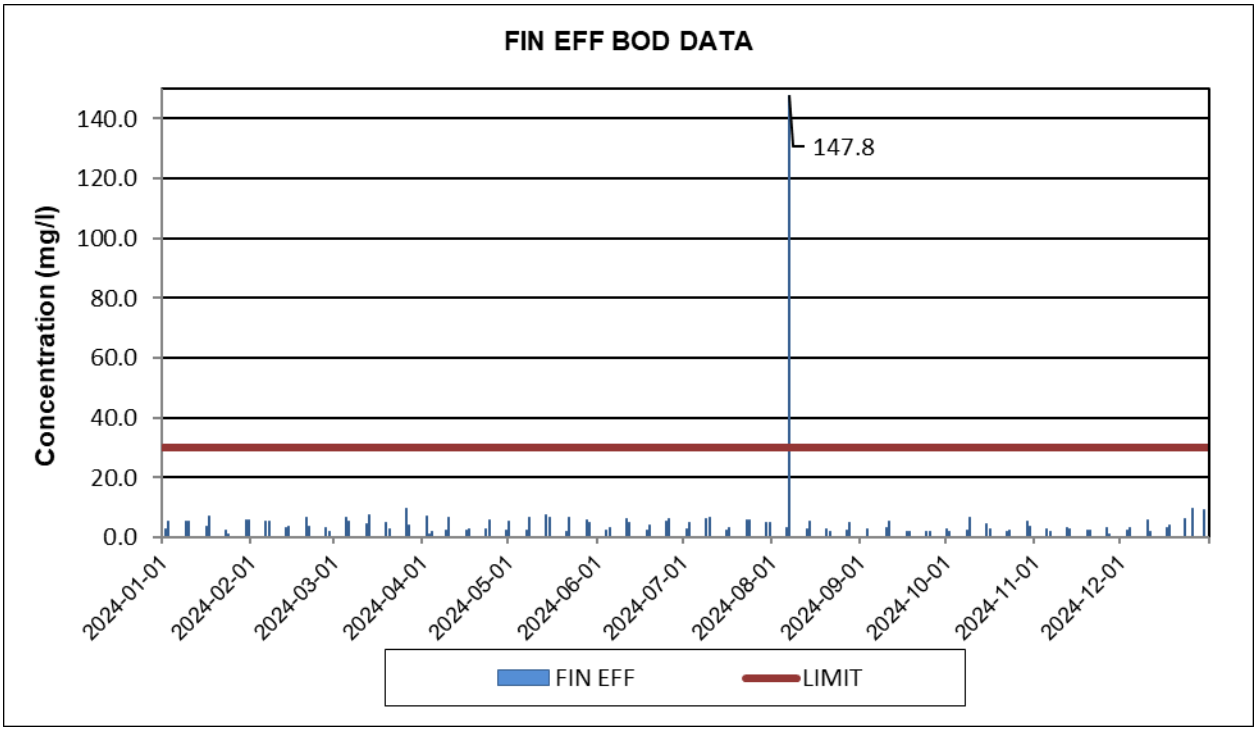


Table 3- Daily BOD for Final Effluent in mg/L.

August 7- 147.8 mg/L- A recirculation pump in one of the basins was left in manual mode and continued running overnight. This prevented the Waste activated sludge (WAS) from settling and was therefore discharged during decant cycles.

Coliforms

Fecal Coliform is a measurement of the amount of fecal coliform organisms within 100 mL of effluent. There is not a daily discharge limit but a limit on the monthly geometric mean that must not exceed 200 CFU/100mL. Samples must be submitted three times per week and sampled on consecutive days. Although there were individual days where the results were reported above the limit, the monthly geometric mean limit was not exceeded for 100% compliance with the license.

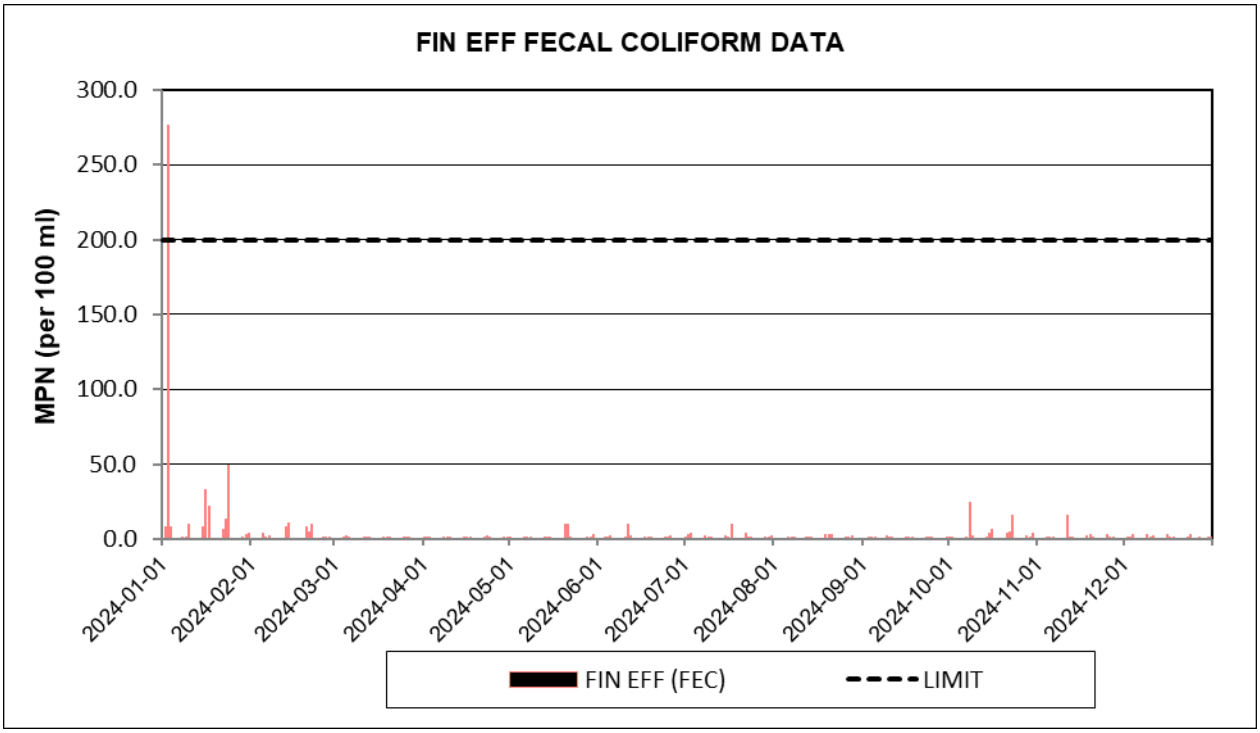


Table 4- Fecal Coliform results for Final Effluent

Fin Eff Coliform Data (FEC)		
	Monthly Geometric mean	Total samples analyzed
January	8.2	15
February	3.1	11
March	1.1	12
April	1.1	14
May	1.6	13
June	1.4	12
July	2.0	15
August	1.4	12
September	1.0	13
October	2.9	14
November	2.0	12
December	1.4	14

January 3- 276 CFU- Possible sampling or testing error or due to an increase in flows after industrial start up after the holiday break. . The day immediately before and after were less than 10 CFU, no other results were out of normal range and there was no known process issue.

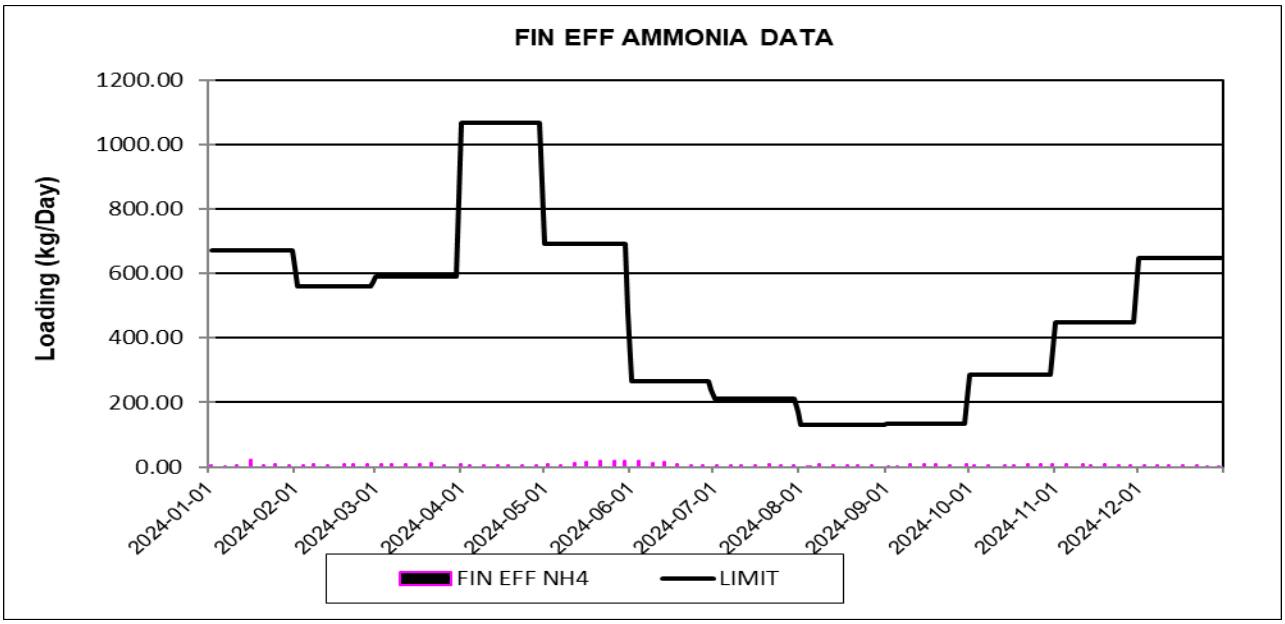
December 22- coliform sample was not collected for analysis so the required three consecutive daily samples did not occur. The Department of Environment and Climate

change was notified. Additional sampling was conducted for the remainder of the week. No results were above limit.

Ammonia

Ammonia is a pollutant that may be toxic to aquatic life depending on the concentration. The allowable daily load of ammonia that can be discharged to the Assiniboine River changes each month. There were no incidents of ammonia exceedance, and the daily average is significantly less than the allowable limits, regardless of the monthly limit. The chart below indicates the discharge limit for each month compared to the average daily amount that was recorded. A compliance of 100% was achieved.

Month	Limit (kg/day)	Daily average (kg/day)
January	673	7.87
February	560.1	8.57
March	589.3	8.99
April	1068.2	6.72
May	691.8	14.85
June	264.6	11.57
July	213.2	5.95
August	19.6	4.50
September	134.4	6.32
October	286.4	7.52
November	448	7.36
December	646.4	4.40
Daily Average		7.82



Toxicity

In addition to ammonia testing for toxicity, samples are submitted for toxicity verification through lethality testing. Daphnia toxicity sampling occurs monthly, and trout toxicity is completed quarterly. These tests are reported as passing or failing. There were no failures reported for 100% compliance.

Month	Toxicity Test	Pass/Fail
January	Trout	Pass
February	Daphnia	Pass
March	Daphnia	Pass
April	Trout	Pass
May	Daphnia	Pass
June	Daphnia	Pass
July	Trout	Pass
August	Daphnia	Pass
September	Daphnia	Pass
October	Trout	Pass
November	Daphnia	Pass
December	Daphnia	Pass

Odour

The EAL speaks to the requirement to limit nuisance odours. Three written complaints, from three different sources must be received to be considered “non-compliant.” Staff monitor and adjust the chemical feed system but without significant upgrades to the automation system, there are times when the system is over or under-dosing. There were no complaints received regarding odour in 2024.

Biogas

Biogas is a form of gas that is produced from the biological activity of anaerobic bacteria. At WPCF, this is produced in the LRAR, the anaerobic digester and potentially in the BVF. The EAL requires biogas to be captured and reused, however, the City has permission to flare this gas until the facility is upgraded for Nutrient removal.

LRAR- There were no occurrences of biogas being vented to the atmosphere. All biogas was flared.

BVF and Anaerobic Digester- The biogas from the anaerobic digester and a small amount produced in the Bulk Volume Fermenter (BVF) are piped to the BVF biogas flare system. With the construction of the LRAR and the BVF no longer in use, the current configuration will not allow the flare to operate safely from the anaerobic digester alone.

This vented biogas does contain odorous compounds and may contribute to the odour around the facility.

Biosolids

The application of biosolids is permitted under a separate Environment Act License, 1907. The land application of biosolids is a beneficial reuse of nutrients and metals contained in the residual solids' material generated as part of the wastewater treatment process as fertilizer for local farmland. Excess Waste waste-activated sludge (WAS) is removed from the SBR basins daily to maintain a proper amount of WAS within each basin. WAS is thickened and anaerobically digested, then stored in the Biosolids Storage Tanks (BSTs) or the BVF until they can be applied to agricultural land. Solids are also retained within the LRAR that require land application. The land application typically occurs in the Fall, once crops are harvested and land is available. The application of biosolids is a highly regulated process with restrictions on the field types, location to nearby housing and waterways, and background metals concentrations all being part of the verification process before application.

In 2024, 747 dry tonnes of material were injected on land within the RM of Portage la Prairie. Parameters such as metals, solids, and phosphorus were within license limits. There were no spills or concerns with transportation to report. A more complete report on the 2024 Biosolids Land Application Program is available and was submitted to Manitoba Environment and Climate Change.

Capital and Maintenance Items

Several planned capital purchases were completed including two new pumps for the Outfall and for SBR recirculation. A LRAR grinder was replaced, and the lab received a new RO water system and oven. The WPCF office building received a new roof, and two new HVAC units were installed.

A tender was also awarded to replace all the PLC systems as well as the software required for all the processes at WPCF. Many of these are obsolete and becoming increasingly difficult to maintain. The automated functionality of the facility was compromised so funds for the Nutrient removal upgrading project were advanced for this project.

There were several costly unanticipated repairs that were required in 2024. Early in the year, it was determined that the municipal line that directs flow from the headworks to the SBRs had a leak. After inspecting the line with a camera, a very large hole was found. Due to the condition of the rest of the pipe as well, it was determined that installing a new section of pipe within the existing pipe would be the best course of action. The section where the large hole was goes to another area of the facility that is no longer in use, so this was disconnected from the system.

As part of routine maintenance, staff take one basin offline each summer. In 2024, Basin #1 was selected. Once drained, it was discovered that a large section of the aeration pipe had disconnected. New piping, supports, and valves were required to replace this section. This was an unplanned expense and availability of parts was an issue. The basin was offline for five months; however treatment and plant operation were not impacted.

Two other significant repairs included replacement of the main fire panel and an emergency repair to the power supply to the BST after it ceased working.

Pumping Stations

The City of Portage la Prairie operates and maintains fourteen pumping stations throughout the city. These stations collect and pump wastewater into the treatment facility.

The 2024 budget included five new pumps for various lift stations- some of which are interchangeable with several locations. A new portable generator was purchased in 2023, which was received in the summer of 2024.

A standby generator was also purchased for installation at Bridge Road Lift Station. This was ordered, however, due to delivery delays, it will be installed in spring 2025.

Reporting

Reporting is a major component of the Wastewater Treatment Division. All reports were filed as required.

Monthly- final effluent report and groundwater sampling results to Manitoba Environment and Climate; summary reports and exceedance letters to industrial partners; Nutrient Removal Upgrade update.

Quarterly- Wastewater Systems Effluent Report to the Government of Canada; Nutrient Reduction updates to Manitoba Environment and Climate

Annual- Annual WPCF Summary Report; Annual Biosolids Report; Total Phosphorous Discharge Summary; National Pollutant Release Inventory; Greenhouse Gas Emissions Summary.

Staff Compliment

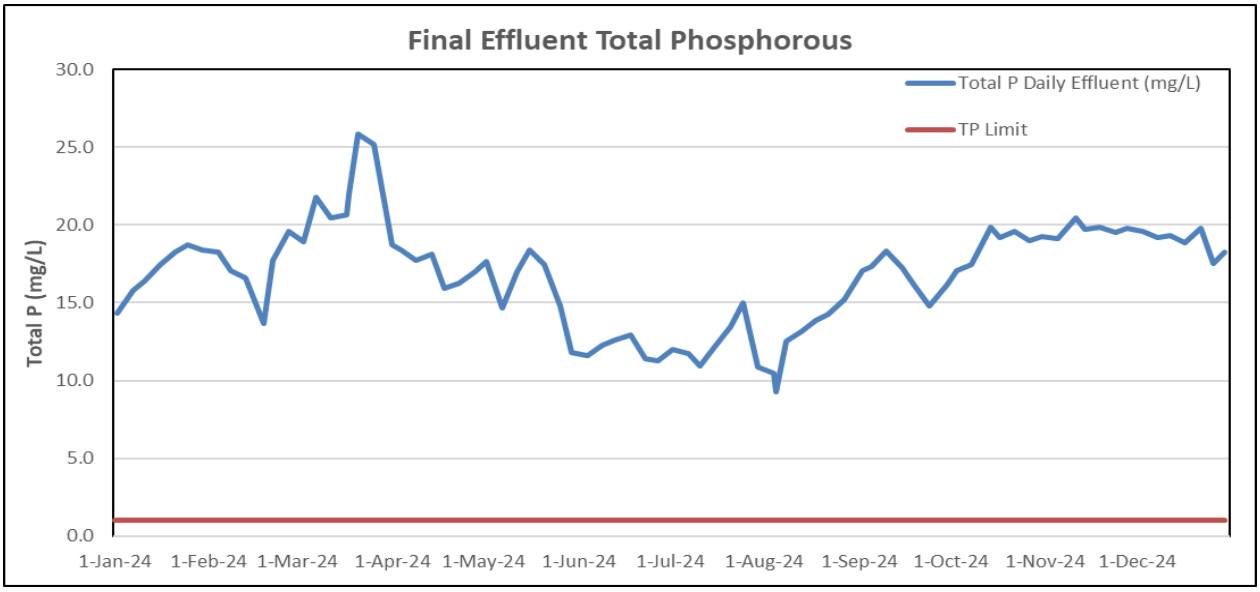
The Province of Manitoba requires operators and pumping station maintenance staff to be certified according to the classification of the facility. The Water Pollution Control Facility is deemed Class 4, and the collection system is classified as Class 2. All operators must continue to work toward obtaining the same level of certification as the facilities they operate, through ongoing education and examination as well as on-the-job experience. Staff must also continually participate in ongoing education to maintain their certification levels.

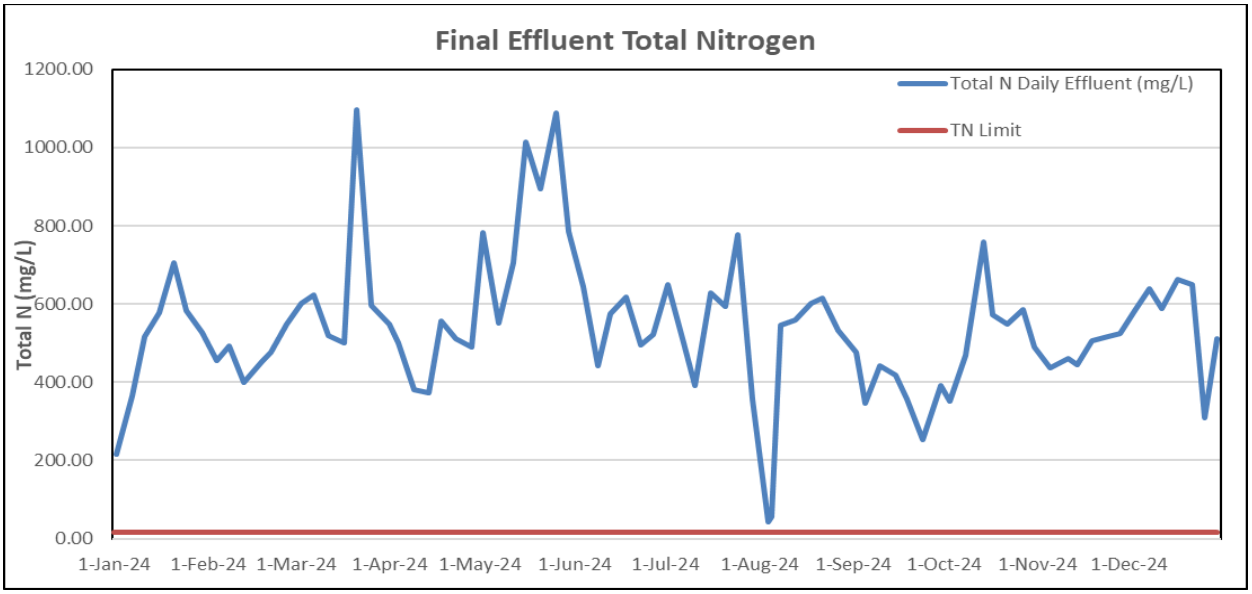
The WPCF Operations team was staffed throughout 2024 by the Manager/Director of Utility (WWT 4, WC 2), Operations Supervisor (WWT 3, WC2), three Operators (1- WWT 4, WC 2; 1- WWT 4, WC2; 1- WWT 3, WC 2), and a lab technician. A vacant operator position was filled in October 2024 (WWT 1). To offset some of the workload, two Seasonal staff were hired for most of the summer and a student was hired to assist in the lab, freeing up an operator for a few months.

The Collection System was staffed by two lift station maintenance staff (1- WWC 2; 1-WWC 1). The Lift Station Maintenance Supervisor also holds a level 2 certificate in Collections. The facility maintenance department was staffed with three additional certified electricians and/or millwrights. A fourth position was added however this position was not filled. A Seasonal staff member was hired to assist with workload for the summer.

Nutrient Removal Facility Upgrade/ P3 Project

The Water Quality Standards, Objectives and Guidelines regulation states that any wastewater facility discharges into Lake Winnipeg to reduce nutrients from the effluent by January 1, 2016. The limits imposed were 1 mg/L of phosphorus and 15 mg/L of Nitrogen. As demonstrated in the next two graphs, the existing facility was not designed to meet these limits and the quantities of each nutrient discharged daily are well above the regulatory requirement.





To address the regulatory change, the facility will require new treatment processes to be added as well as supplemental systems to be incorporated with the existing treatment stream. Several areas of the facility are deteriorating and are inefficient and other components have been identified that lack redundancy and therefore the ability to properly maintain. For this reason, several items were advanced in 2024 including a roof replacement, the replacement of two HVAC units, and upgrading of the entire PLC control system.

This project is intended to be implemented through a Private-Public Partnership and will consist of a Design, Build, Finance, Operate and Maintain contract for the WPCF including the existing infrastructure as well as the new processes required. In 2020, the City shortlisted three proponents: Plenary/PCL Environmental Infrastructure, Portage Water Solutions (Sacyr/SNC Lavalin/Ledcor), and EPCOR Water Resource Partners. The final Request for Proposal has not yet been released. There have been delays due primarily to the financial risk of this project as the City's main source of revenue is from three industrial companies. Various solutions to address this risk have been investigated, however, the RFP will not be released until this risk is resolved. Once the RFP is released, this will start a 9–12-month negotiation process before the final submission is received. The City will select the successful proponent based on their submission for design compliance with the technical requirements as well as operation and maintenance plan and overall net value. The City is working with the Province of Manitoba to find a mutually beneficial solution to move this project forward.

Summary

Through the dedication, perseverance, and professionalism of the WPCF team, there was only two days of non-compliance with the environmental license and the remainder of the year, wastewater was discharged well below limits. As demonstrated throughout this report, the Wastewater Treatment Division successfully collected and treated over five billion litres of wastewater before being discharging to the Assiniboine River.