City of Portage la Prairie
Wastewater Treatment Division
2021 Annual Report

Introduction

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

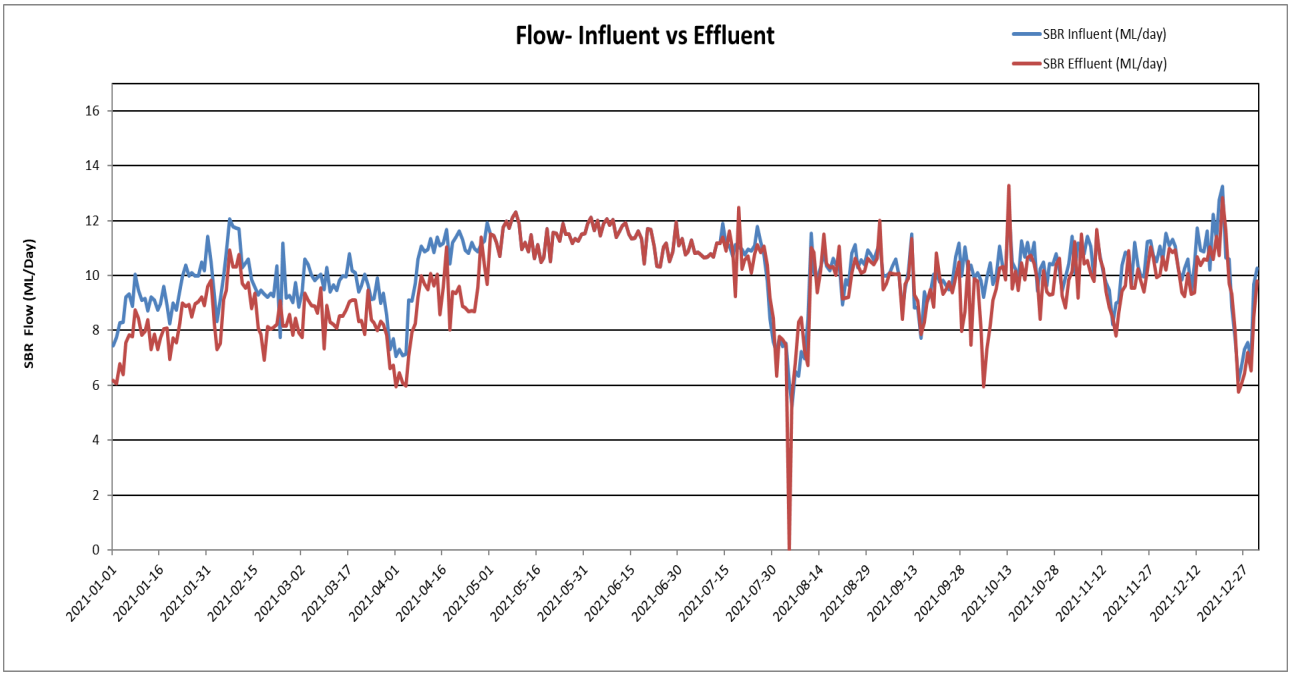
The industrial wastewater from McMillan Industrial Park and the Poplar Bluff Industrial Park is first treated in a Low-Rate Anaerobic Reactor (LRAR) for the removal of solids and organics. Once pretreated, the industrial water is combined with the domestic (residential/commercial wastewater) in a common 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 remove the organic waste in the water as well as ammonia. The treated water is then disinfected via Ultra-Violet exposure prior to 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, then anaerobically digested for stabilization. Stabilized solids are referred to as Biosolids. Biosolids are stored and then land applied to farmland as a soil supplement.

City of Portage la Prairie Water Pollution Control Facility

Facility Performance and License compliance

WPCF received an average of 9,611,000 L of wastewater each day, for a total volume of 3,508,000,000 L or 3.5 billion liters. This is a decrease from the 4.6 BL received in 2020 and is primarily due to less water usage by industries and dry weather conditions.



The peak flow occurred on October 13, 2021, when 13,261,000 L of wastewater was received, and the minimum flow of 5,750,000 L was observed on December 25. This is attributable to industrial shut down to accommodate the holiday season. On August 4, 2021, although there were incoming flows, there was no flow discharged to the river as a meter was changed out that required all flow to be held back for 24 hours. The incoming flow is 48% domestic and commercial wastewater and 52% from industrial sources.

The WCPF operates under Environment Act License #2543 R, which is issued by the Province of Manitoba Department of Conservation and Climate. 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 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 Conservation and Climate within 24 hours of the limit being surpassed.

Total Suspended Solids

Total Suspended Solids (TSS) is the amount of particulate matter that is 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 2021 was 7.3 mg/L and there were seven occurrences where this limit was exceeded for a 98.08% compliance rating. These exceedances occurred as follows.

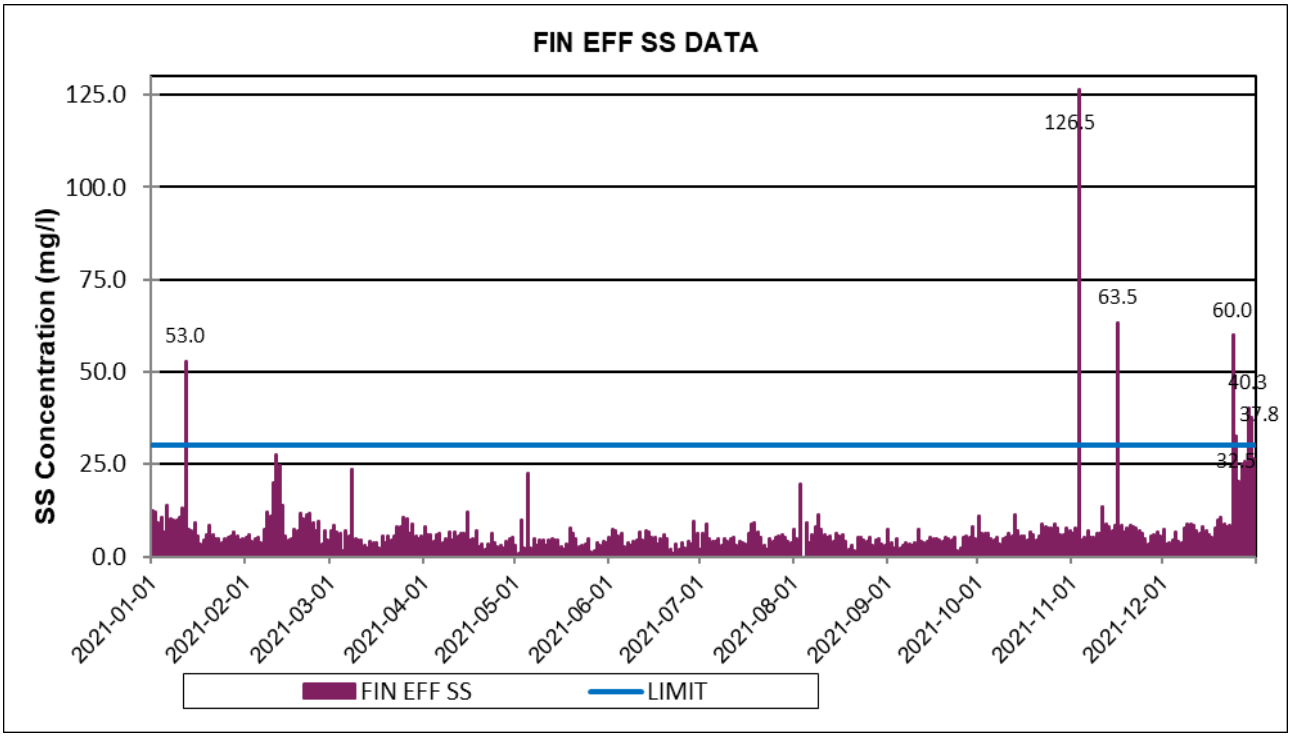
January 13- 53 mg/L- One of the SBR Basin decant headers was out of adjustment and there was a seepage of wastewater to the Equalization Basin. The Equalization Basin was cleaned out and the residual solids that had accumulated in the EQ basin were washed out with treated wastewater. Decant header was adjusted and problem was resolved.

November 3- 126.5 mg/L- The basin is an equalization tank that regulates the flow of treated wastewater through the UV system. Over time, small amounts of carryover solids from the SBR basins and algae that grows the basin itself accumulates. On this day, the Equalization Basin was cleaned out and the residual solids were washed out with treated wastewater. This is not a release of untreated wastewater.

November 16- 63.5 mg/L- Extremely high winds that were experienced throughout the 16th and the 17th caused turbulence in the basins and prevented solids from settling and being released in the treated effluent.

December 24- 60 mg/L and *December 25*- 32.5 mg/L- Combined industrial shutdowns during this time reduce the flow and loading of wastewater. This is the food source for the bacteria in the secondary system. There is also a significant reduction of warm wastewater. The low food and cool temperatures reduce the efficacy of the treatment bacteria. This circumstance resolved as soon as industries began operations again.

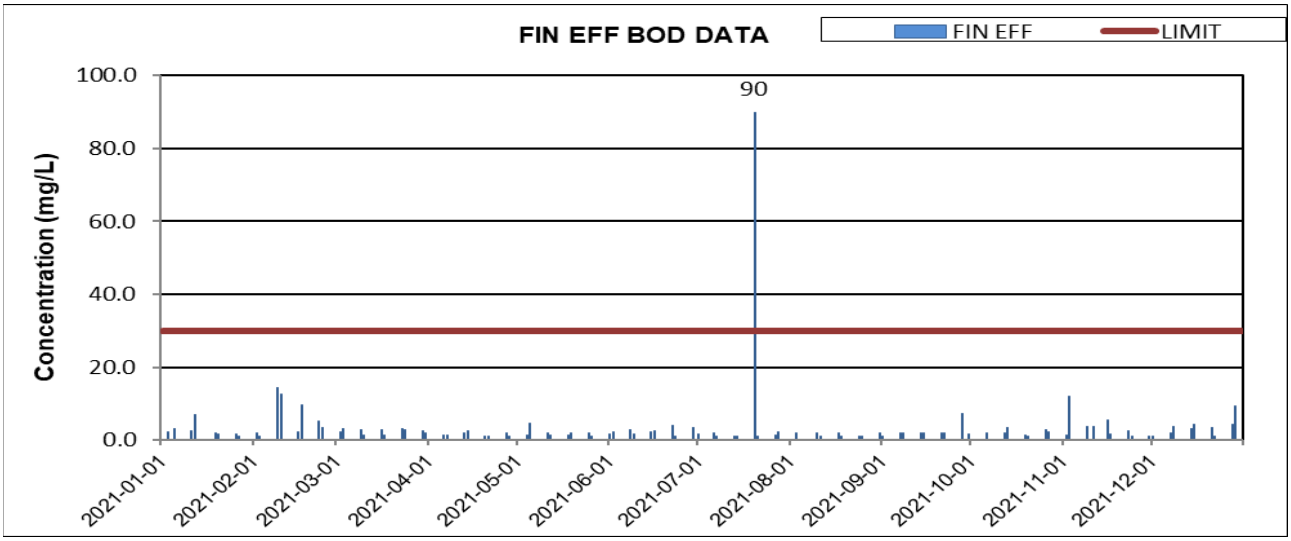
December 29- 40.3 mg/L and *December 30*- 37.8 mg/L- Combined industrial shutdowns during this time reduce the flow and loading of wastewater. This is the food source for the bacteria in the secondary system. There is also a significant reduction of warm wastewater. The low food and cool temperatures reduce the efficacy of the treatment bacteria. This circumstance resolved as soon as industries began operations again.



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 was one reported exceedence of this parameter for 99% compliance and the average daily discharge value was 3.6 mg/L.

July 20- 90 mg/L- This sample had been sent to an external lab for analysis. Typically, if the BOD is high, the COD and the cBOD would increase as these are correlating test methods. However, the COD for that day was 31 mg/L and the cBOD was <2 mg/L, neither of which correspond with a 90 mg/L BOD. As other parameters were within limit and there were no notable operational events of concern, it is possible there was an error either sampling, in transport or at the lab.



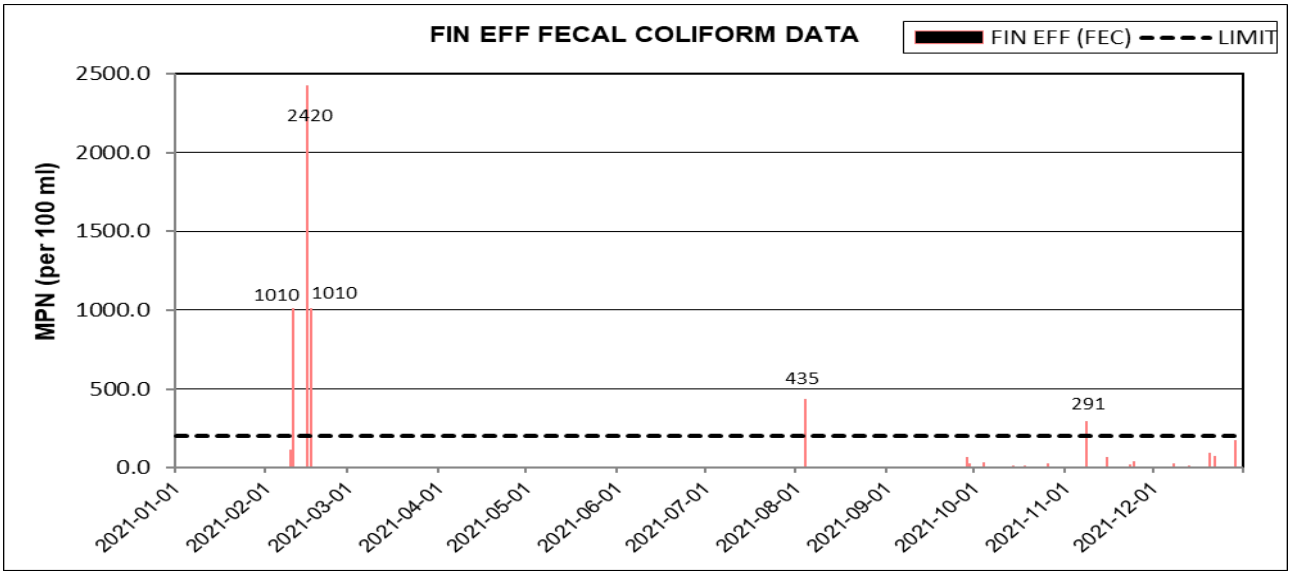
Toxicity

In addition to ammonia testing for toxicity, samples are submitted for toxicity verification through lethality testing. Daphnia toxicity occurs monthly, and trout is quarterly. These tests are reported as pass or fail. There were no failures 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

Coliforms

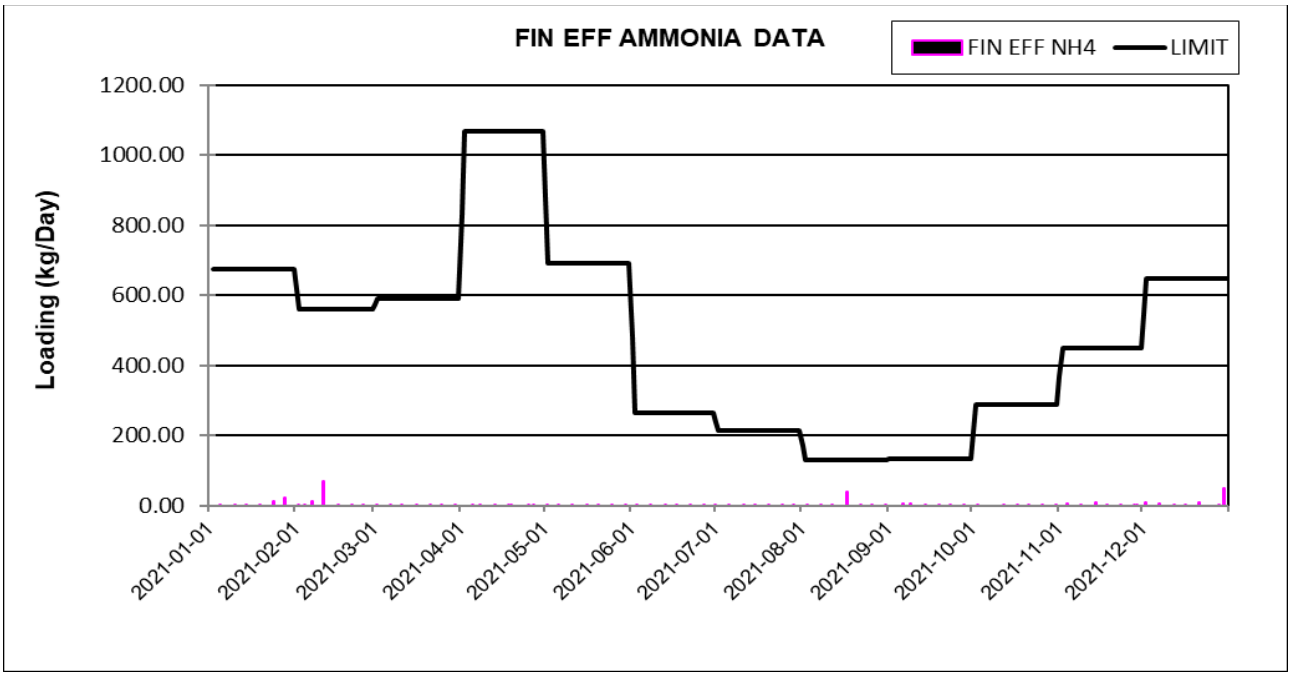
Fecal Coliform is a measurement of the amount of fecal coliform organisms within 100 mL of effluent. There is not a daily discharge limit but a limit on the monthly geometric mean that must not exceed 200 CFU/100mL. Samples must be submitted three times per week and sampled on consecutive days. In 2021, there were individual days where the results were reported above the limit, but the monthly geometric mean limit was not exceeded for 100% compliance with license.



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 average daily amount that was recorded. Again, compliance of 100% was achieved.

Month	Limit (kg/day)	Daily average by month (kg/day)
January	673	7.6
February	560.1	13.0
March	589.3	2.4
April	1068.2	2.6
May	691.8	3.4
June	264.6	3.4
July	213.2	3.2
August	19.6	8.0
September	134.4	3.3
October	286.4	2.9
November	448	4.2
December	646.4	11.8
Daily Average		5.5



Biogas

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 Low-Rate Anaerobic Reactor and the BVF no longer in use as a pretreatment system, the BVF does not produce enough biogas for the system to work as intended. The current configuration will not allow the flare to operate safely from the anaerobic digester alone. Currently, this gas is being vented to atmosphere. The City has hired a contractor to modify the system, mostly the programming, to allow it to run off digester biogas. A Suspension of license has been requested but no response has been received. Progress reports are also provided to Manitoba Conservation and Climate. The entire biogas collection system will be refurbished during the Nutrient removal upgrade. This vented biogas does contain odorous compounds and may contribute to odour around the facility.

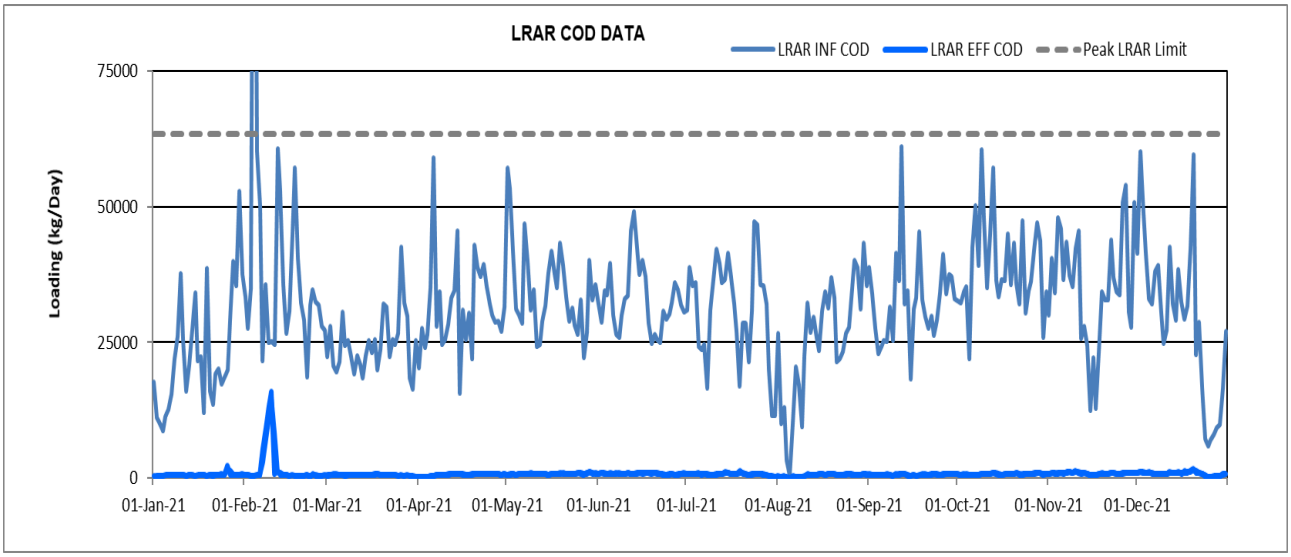
Odour

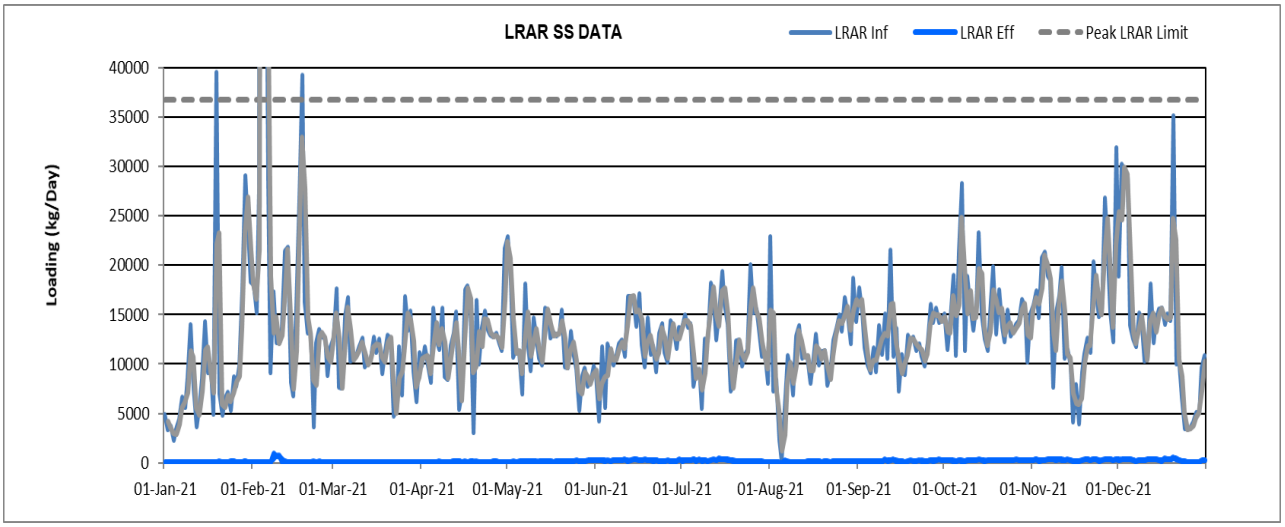
Odour is a parameter within the license that WPCF is required to control. Although there is no specific measurable, the license indicates that three written complaints, from three different sources, would constitute a license exceedance. Staff monitor and adjust the chemical feed system but without significant upgrades to the automation system, there are times that the system is over or under dosing. There were no complaints received regarding odour in 2021.

Low-Rate Anaerobic Reactor

The Low-Rate Anaerobic Reactor (LRAR) was commissioned in 2020 to replace the BVF. This system has been operational for over a year. As outlined in the Industrial Service Agreements, each industry has daily amounts of flow, total suspended solids, chemical oxygen demand (COD), and total Kjeldahl nitrogen (TKN) that each can discharge to the LRAR. Although there were exceedances of these limits, the LRAR is underloaded as compared to design and able to still perform and treat the incoming flows and loads with exceptional efficiency. The Total Suspended Solid was removed at an efficiency of 98.71% and Chemical Oxygen Demand was

removed at an efficiency of 97.5%. This has resulted in significant reduction of solids inventory in the secondary system and in turn, reduced the amount of polymer usage for solids handling as well as a reduction in aeration needed to achieve the same level of secondary treatment.





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 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 in the BVF until they can be applied to agricultural land. Solids are also retained within the LRAR that require land application. Land application usually occurs in the fall, once fields are available- or if needed, spring application has been completed in the past. 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 prior to application.

There were 298 dry tonnes removed from the BSTs, 249 dry tonnes from the LRAR, and 59.5 dry tonnes from the BVF, for a total of 606.5 dry tonnes of biosolids applied to farmland within the RM of Portage la Prairie. A more complete report on the 2021 Biosolids Land Application Program is available and was submitted to Manitoba Conservation and Climate.

Capital and Maintenance Items

Planned capital purchases included two new SBR 125 Hp recirculation pumps, the refurbishment of the GBT Rollers, and the replacement of an incubator for the lab. Maintenance items to note included the rebuild and repair of two SBR blower motors, the replacement of the Final effluent flow meter, the installation of a check valve at the LRAR, and chemical feed pump repairs for the Odour Control System. It was also necessary to excavate and clean out the pipe section where the Poplar Bluff Force main ties into the municipal effluent line.

As part of routine maintenance, staff take one SBR basin offline each summer. In 2021, this was Basin #1. This is a laborious job as all the sludge needs to be washed from the large tank. The liner and piping systems are inspected and repaired as needed and pumps are serviced or replaced. Once the basin was filled, a final repair was required so staff had to use the boat to access the decant headers.

Staff utilizing the boom truck to remove a SBR Recirculation Pump

Clean out of Poplar Bluff connection point

Staff adjusting the SBR Decant Header

Pumping Stations

The City of Portage la Prairie operates and maintains fourteen pumping stations throughout the city. These stations collect and pump wastewater to the treatment facility. All pump stations functioned as expected throughout the year.

Valves were replaced at the Sisson Lift Station as well as check valves and pump overhauls occurred at McMillan Lift Station. Two new backup power generators were installed- one 6th Ave Lift Station and the other at Broadway Lift Station. All jobs were completed safely with no interruption to wastewater collection.

Other improvements included the purchase of spare pumps for Scanlon and heater replacements at Broadway and Splash Island Stations.

Staff use SCBA and supplied air to enter lift station wet wells when replacing valves and pumps

Generators at Broadway and 6th Ave Lift Station

Reporting

Reporting is a major component of the Wastewater Treatment Division. All reports were submitted on-time, as required. These are as follows.

Monthly- final effluent report and groundwater sampling results to Manitoba Conservation and Climate, summary reports and exceedance letters (if required) to industrial partners, Nutrient Removal Upgrade update for City Council.

Quarterly- Wastewater Systems Effluent Report to the Government of Canada, Nutrient Reduction updates to Manitoba Conservation and Climate, Utility summary report to City Council

Annual- Annual WPCF Summary Report and Biosolids to City Council and Manitoba Sustainable Development, Total Phosphorous Discharge summary for Manitoba Conservation and Climate, National Pollutant Release Inventory

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 as 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.

WPCF Operations team was staffed throughout 2021 by Manager/ Director of Utility (WWT 4, WC 2), Operations Supervisor (WWT 3, WWC2), four Operators (1- WWT 4, WC 2; 1- WWT 3, WC2; 2- WWT 2, WC 2), and a lab technician. One of the level 2 Operators resigned in the fall and this position remains vacant. The Collection System was staffed by two lift station maintenance staff. One has level 2, and the other is an Operator in Training and will qualify for Level 1 early in 2022. The Lift Station Maintenance Supervisor also holds a level 2 certificate in Collections. The facility maintenance department was fully staffed with certified electricians and/or millwrights.

Projects

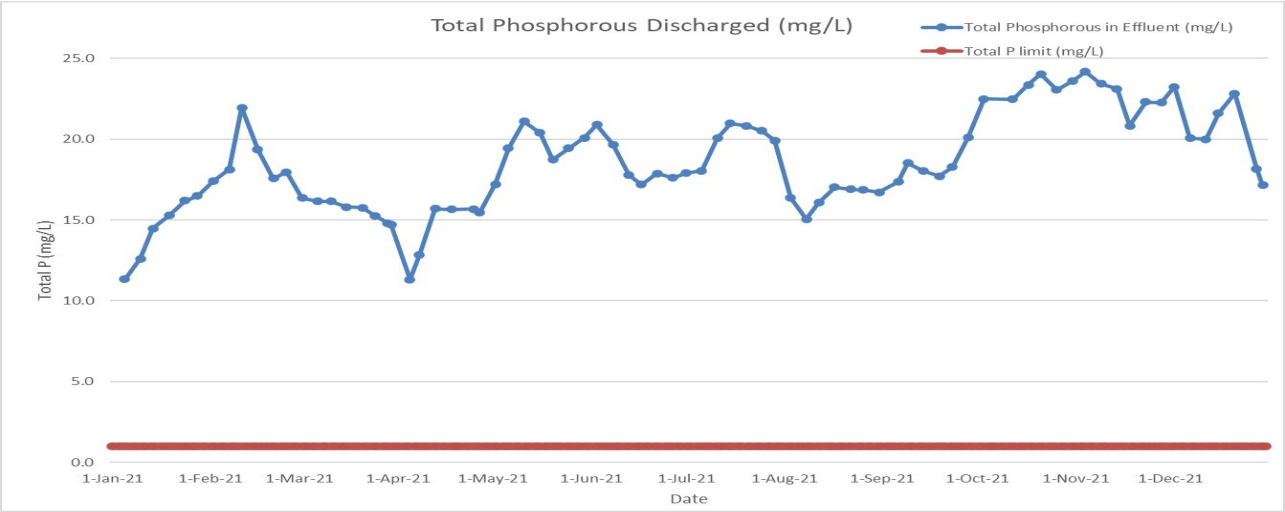
Condition and Capacity Study of Industrial Parks

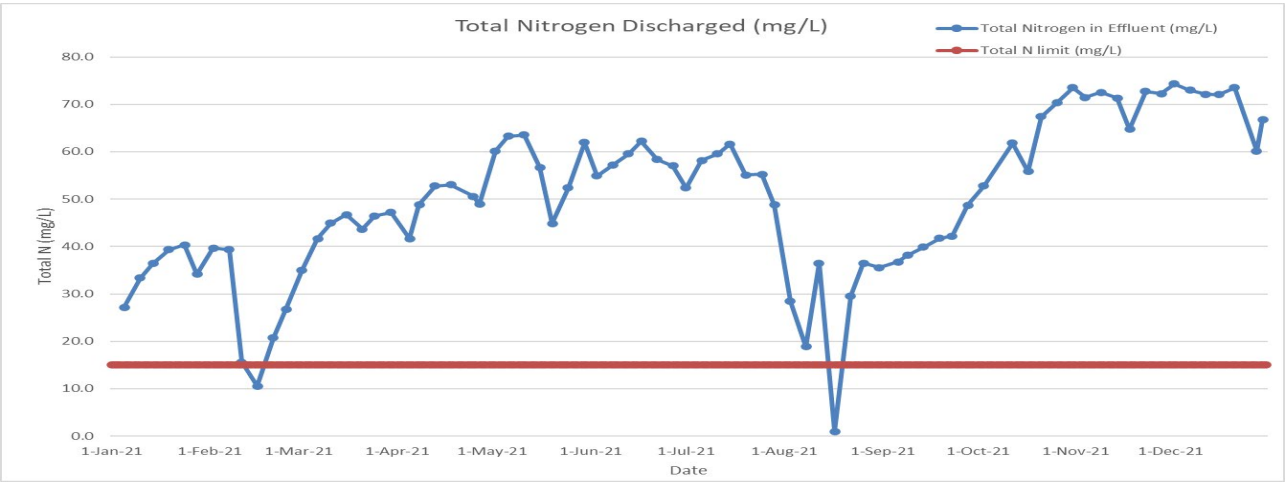
The City of Portage la Prairie partnered with the Manitoba Water Services Board to begin a comprehensive study of the capacity and condition of McMillan and Campbell Soup industrial parks, the West End commercial district and the Jolin Force main, as well as the smaller lift stations and piping that service these areas. The purpose is to gain a better understanding of where the limitations are within the utility for water and sewer servicing for industrial needs and provide insight as to where priority areas should be. The final report is expected early in 2022.

Nutrient Removal Facility Upgrade/ P3 Project

The Water Quality Standards, Objectives and Guidelines regulation requires any wastewater facility that discharges into Lake Winnipeg to reduce nutrients from the effluent by January 1, 2016. The limits imposed were l mg/L of Phosphorous and 15 mg/L of Nitrogen. The existing

facility was not designed to meet the regulatory limits. To meet these limits, the facility will require new treatment processes to be added as well as supplemental systems to be incorporated with the existing treatment stream. There are also several areas of the facility that are deteriorating, are inefficient and other components have been identified that lack redundancy and therefore the ability to properly maintain.





This project will be implemented through a Private- Public Partnership and will consist as 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's Advisory team, which includes Technical, Finance/Business, Legal, Human Resources, Communications, and Fairness experts, as well as the Project Manager, 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 solution to address this risk are being explored and the projected timeline for RFP releases is Spring 2022. This will start a 9–12-month negotiation process before 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 present value. It is intended a final contract will be signed early in 2023 with construction to occur in 2023-2025.

With the implementation of this project as a P3, the Utility Maintenance team and the Director of Utility that currently work out of the WPCF will no longer be able to utilize that space and require a different location. There is no space large enough within the existing City buildings, and it is necessary to construct a new Utility Maintenance area. It was decided to design and build a new shop that is large enough to also house the Waterworks Department which will allow for renovations and better use of space within the existing Public Works building. The construction of this facility was awarded to PCL. This timeline for this project has been delayed due to material shortages being experienced worldwide due to Covid-19. It is anticipated that construction will be complete by mid-2022 allowing sufficient time for staff relocation prior to the P3 contractor mobilizing to the WPCF.

Summary

As demonstrated throughout this report, in 2021, the Wastewater Treatment Division successfully received and effectively treated 3.6B liters of wastewater before discharging to the Assiniboine River.