City of Portage la Prairie
Wastewater Treatment Division
2020 Annual Report

Introduction

The City of Portage la Prairie Wastewater Treatment Division includes the Class IV Water Pollution Control Facility (WPCF), the thirteen lift stations that convey the water to the WPCF, as well as the dedicated team of operations and maintenance personnel who strive to keep the water flowing. 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, as well as the industrial wastewater from Poplar Bluff Industrial Park and from McMillan Industrial Park.

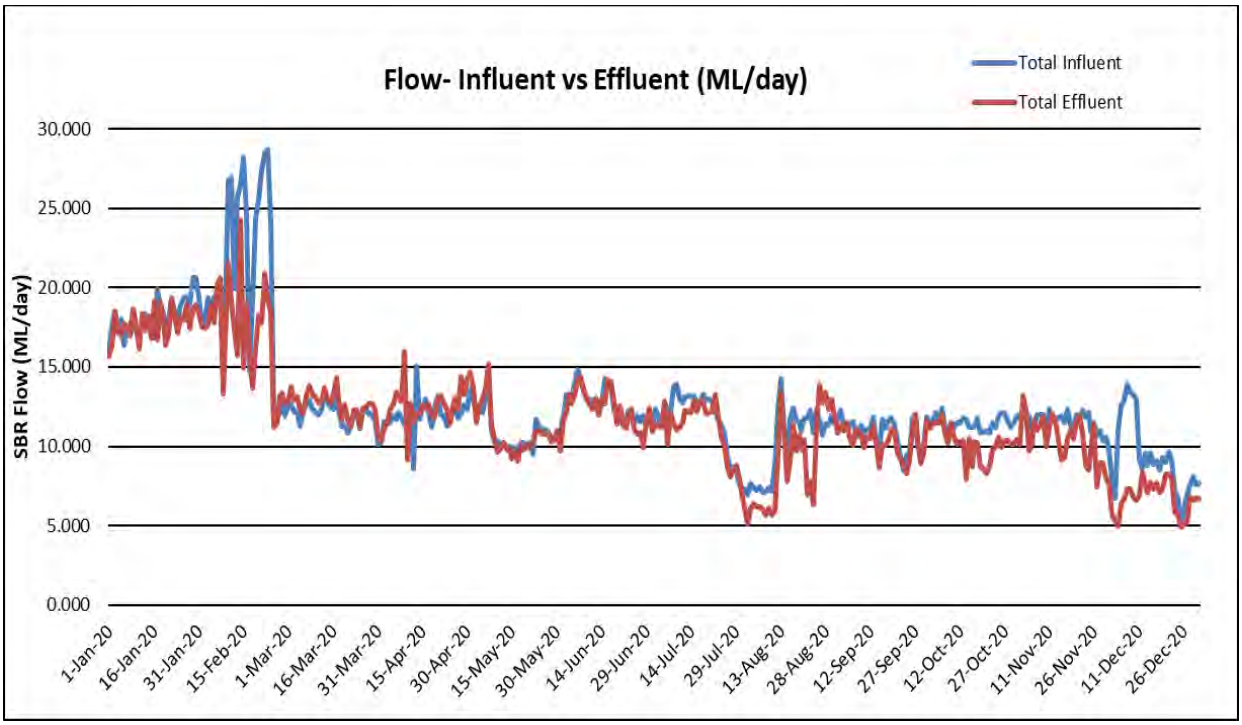
The industrial wastewater from McMillan Industrial Park and the Poplar Bluff Industrial Park is first treated in a Low-Rate Anaerobic Reactor (LRAR). Once pretreated, the industrial water is combined with the domestic (residential/commercial wastewater) in a common lift station and is pumped into one 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. 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.

Facility Performance and License compliance

WPCF received an average of 12,596,000 L of wastewater each day, for a total volume of 4,610,201,000 L or 4.6 billion liters. This is a decrease from the 5.2 BL received in 2019 and is primarily due to Simplot Foods fully commissioning their own wastewater treatment facility in March 2020 and not sending flow to the WCPF for secondary treatment.

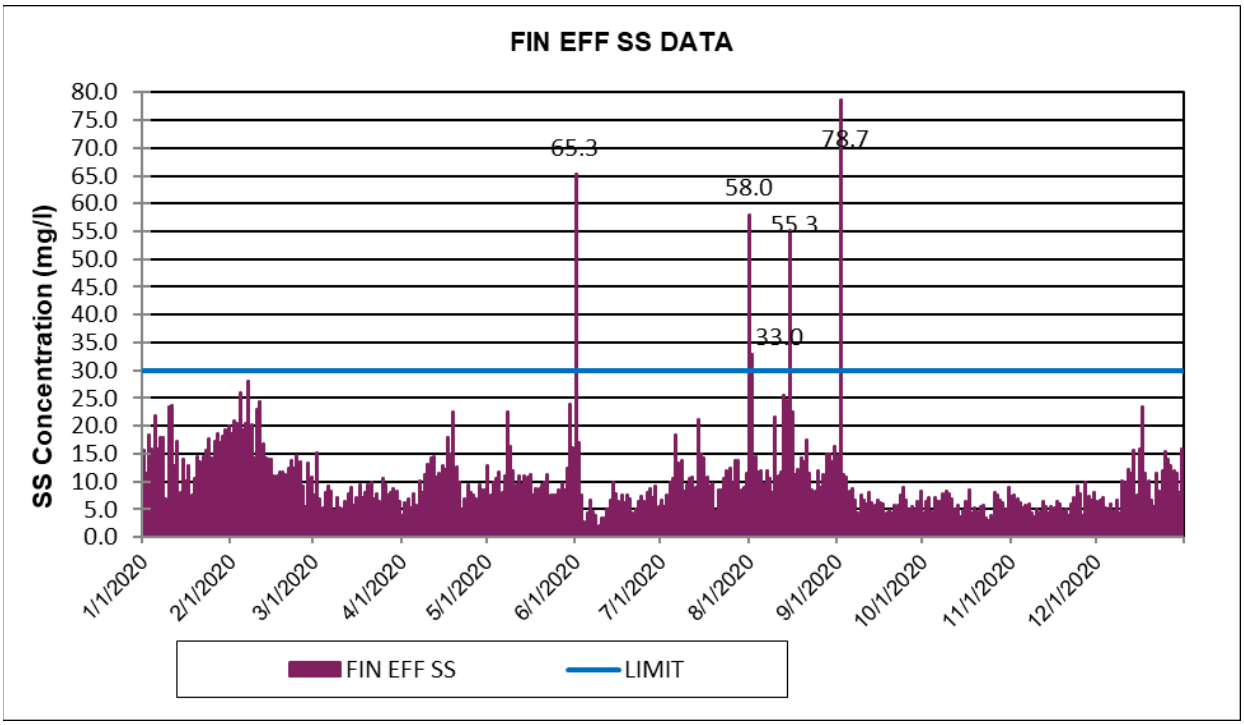
The peak flow treated occurred on February 23, 2020 when 28,674,000 L of wastewater was received. The peak day was more than double the daily average flow, as the facility received more than double the typical flow from Simplot as they had increased production and sent their wastewater to the WPCF as part of the commissioning plan. The minimum flow of 5,104,000 L was observed on December 25. This is attributable to industrial shut down to accommodate the holiday season. The incoming flow is 54% domestic and commercial wastewater and 46% 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 test for toxicity on a monthly and quarterly basis. Any exceedance is reported to Manitoba Sustainable Development within 24 hours of the limit being surpassed.

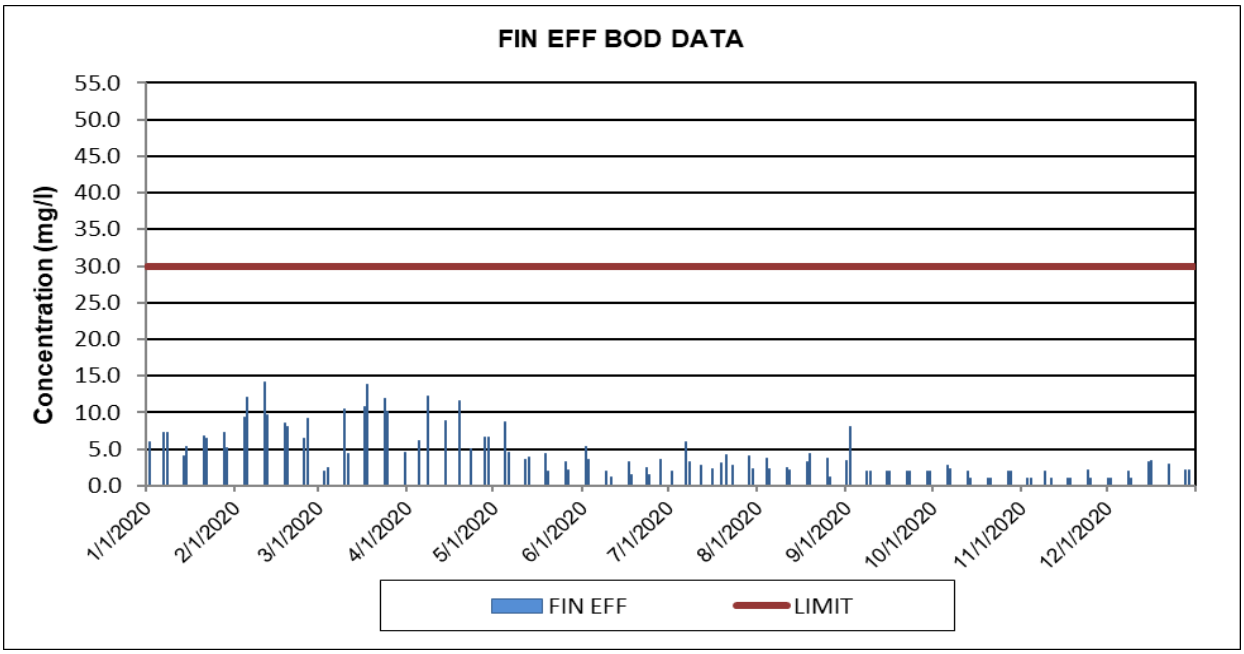
Total Suspended Solids

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 2020 was 10.7 mg/L and there were 5 occurrences where this limit was exceeded for a 98.6% compliance rating. These exceedances occurred on June 1, August 1 & 2, August 15, and September 3. Each of these events were attributed to cleaning out the Equalization (EQ) Basin. Solids accumulates in this tank. This is exacerbated by algae growth on the tank walls and floor. When the EQ Basin is cleaned, this material is flushed in the effluent to the river. As demonstrated by the table, on remaining days, the discharged solids were well below the allowable limit.



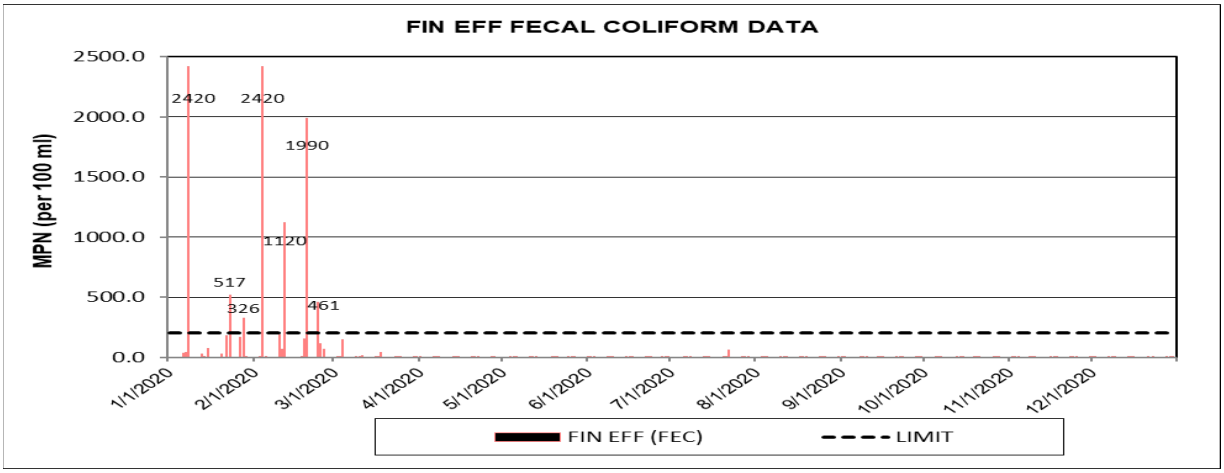
Biological Oxygen Demand

Biological Oxygen Demand (BOD) is an indicator of the amount of dissolved oxygen need by the remaining biological organisms in the effluent to break down organic matter once it reaches the river. The Environmental License permits a maximum daily discharge of 30 mg/L. There was no exceedance of this parameter for 100 % compliance and the average daily discharge amount was 4.3 mg/L.



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 rather a limit on the monthly geometric mean that must not exceed 200 CFU/100mL. Samples must be submitted three times per week and must be sampled on consecutive days. There were individual days where the results were reported above the limit, but the monthly geometric mean limit was not exceeded at all in 2020, for 100% compliance with license. Daily events do not need to be reported.



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. The sample submitted on April 7 passed, however, some of the test species died or showed signs of distress. A new sample was submitted on April 14 which failed. Additional samples were submitted on April 20, 24, and 27 which all passed- with no mortality or stress reported. During this time, SBR Basin #2 was being brought back online after being out of service for repairs. It is thought that the ammonia levels in basin 2 were high and when the "grab" sample was taken on April 14, it would have contained all decanted water from Basin 2- the high ammonia levels would have impacted the Trout. The high level of ammonia was not noted as ammonia is typically performed on a composite sample- and would have contained water from all basins over 24 hours, thus diluting the ammonia being discharged from Basin 2 and not being flagged as "over-limit". When the concern was noted, staff immediately adjusted the aeration process in Basin 2 and began testing each decant to ensure low ammonia levels were achieved prior to discharge. This parameter is calculated as 94% compliant based on 1 failure of 17 total samples.

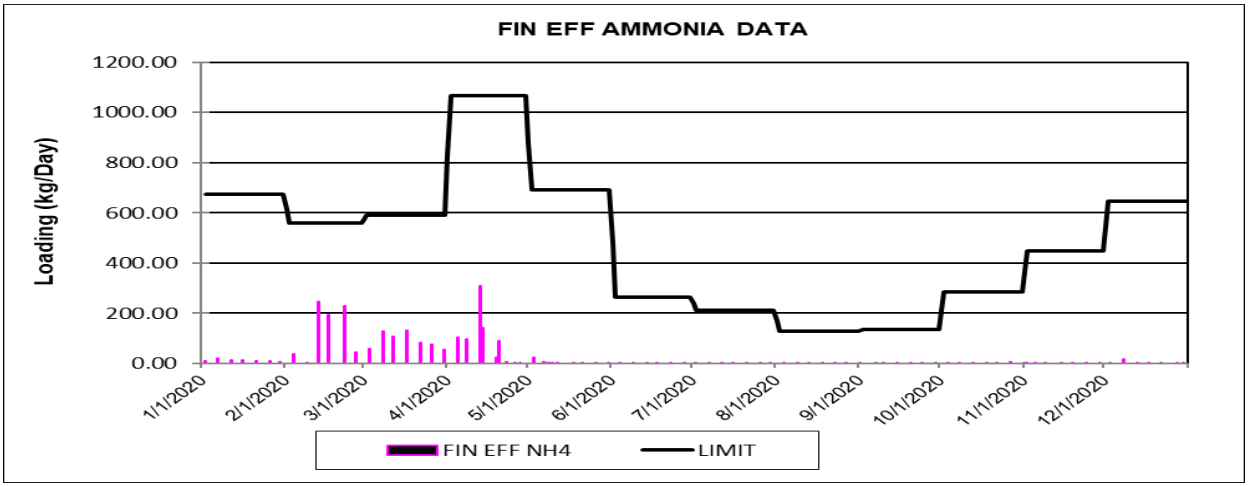
Month	Toxicity Test	Pass/Fail
January	Trout	Pass
February	Daphnia	Pass
March	Daphnia	Pass
April 7	Trout	Pass
April 14	Trout	Fail
April 20	Trout	Pass
April 24	Trout	Pass

April 24	Daphnia	Pass
April 27	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

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	12.5
February	560.1	126.4
March	589.3	92.60
April	1068.2	86.71
May	691.8	5.7
June	264.6	3.7
July	213.2	3.3
August	19.6	2.8
September	134.4	3.2
October	286.4	3.6
November	448	3.1
December	646.4	1.3
Daily Average		28.98



Although five instances of TSS exceedance were reported, none of these were due to treatment inefficiency or mechanical failures. The toxicity event was believed to be an isolated incident and measures were implemented immediately once the concern was noted. The employees at the WPCF strive to ensure wastewater is treated and returned to the environment at the highest quality possible. This is evident through the 98.5% compliance that was achieved in 2020.

Biosolids

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 almost 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), in the Bulk Volume Fermenter (BVF), or Low-Rate Anaerobic Reactor (LRAR) until it can be applied to agricultural land. 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.

The application of biosolids is permitted under a separate Environment Act License, #1907. This license requires that all solids material be stabilized through anaerobic digestion for 30 days at 20°C prior to land application. The mixing system in the anaerobic digester has not been functioning for a few years. Material continues to build up in the tank, reducing the overall capacity and reducing the retention time in the digester, meaning the 30 days cannot be obtained. The long-term solution is to construct a second anaerobic digester and then retrofit the existing system with mixing.

A suspension of the clause in the license that requires the time and temperature was requested, and approved, for land application of biosolids for the 2020 Fall application program. The basis for this approval was granted on the basis that pathogenic kill and material stabilization has still been obtained within the system due to long storage times. There was 175 dry tonnes removed from the BSTs and 729 dry tonnes from the BVF, for a total of 904 dry tonnes of biosolids applied to farmland within the RM of Portage la Prairie to land owned by two different farmers. A more complete report on the 2020 Biosolids Land Application Program is available and was submitted to Manitoba Conservation and Climate.

Anaerobic Digester

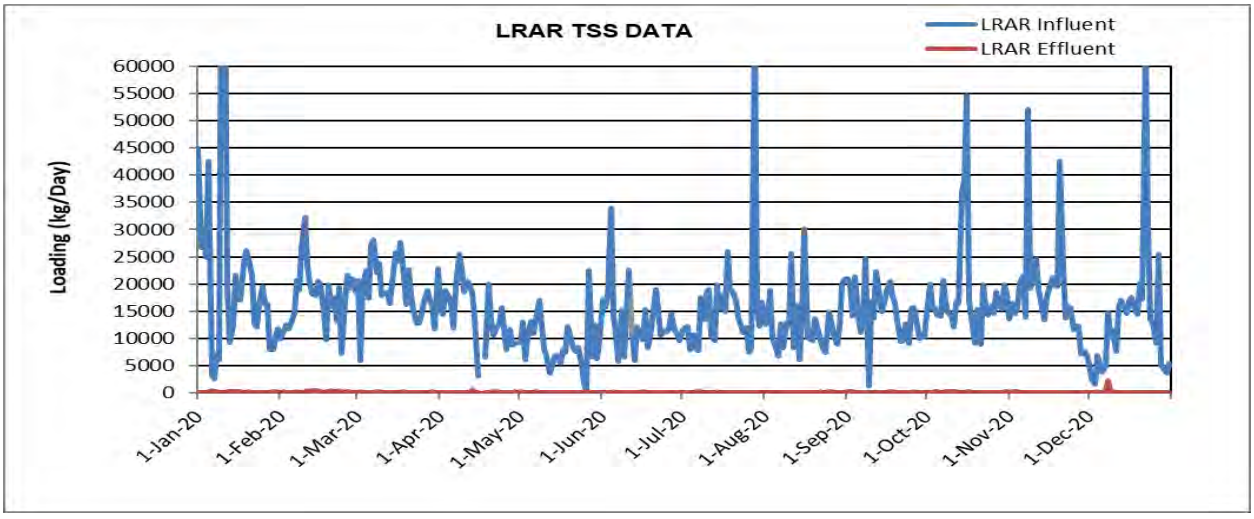
The purpose of the anaerobic digester is to stabilize the Waste Activated Sludge prior to storage for land application. By long term exposure to high temperature and lack of oxygen, is reduces the volatile solids and reduction of bacteria and viruses.

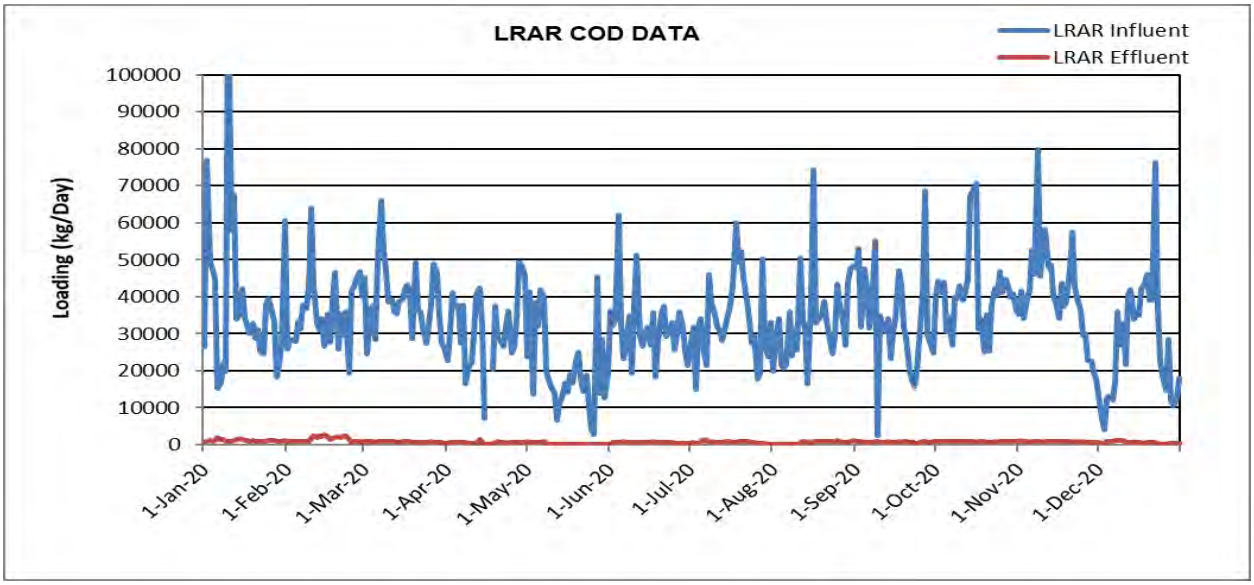
In July and August 2020, the City engaged a contractor to clean all the contents from the Anaerobic Digester. Most of this material was hardened biosolids that were liquified and pumped to the BVF. Any grit and non-biodegradable materials were dewatered and sent to landfill. A summary of this activity was submitted to Manitoba Conservation and Climate. Once the digester was cleaned, maintenance staff installed and one mixer back into the digester. It is anticipated that this will provide sufficient mixing to reduce solids build up and maintain the

required retention time within the digester. A majority of the biosolids pumped to the BVF were removed as part of the fall biosolids land application.

Low-Rate Anaerobic Reactor

The new Low-Rate Anaerobic Reactor (LRAR) was constructed in 2018-2019 to replace the BVF. This system has been operational for a full 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 it can discharge to the WPCF pre-treatment. Although there were exceedances of these limits, without Roquette wastewater, the LRAR is underloading 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 99.1% and Chemical Oxygen Demand was removed at an efficiency of 97.8%. 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.





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.

Another source of odour is from the BVF and anaerobic digester. The biogas from the anaerobic digester and a small amount produced in the BVF are piped to the BVF biogas flare system. The current configuration will not allow the flare to operate safely from the anaerobic digester alone. In turn, this gas is being vented to atmosphere. This vented biogas does contain odourous compounds and may contribute to odour around the facility. A Suspension of license has been requested but no response has been received and administration is working with an Engineering group to develop a solution while considering the entire system will be refurbished during the Nutrient removal upgrade.

Pumping Stations

The City of Portage la Prairie operates and maintains twelve pumping stations throughout the city. These stations collect and pump wastewater to the treatment facility. All pump stations functioned as expected throughout the year. In 2020, the older Poplar Bluff lift station, as well as the force main it services, was turned over to Simplot Foods for ownership and operational responsibility.

Meters and valving replacements were conducted at Bridge Road and Broadway Ave Lift Stations. These were considered higher risk jobs as they required diversion of flow to tanker trucks as well as employees working under supplied air for the length of the job. All jobs were completed safely with no interruption to wastewater collection.

Staff working at Bridge Road Lift Station

Several improvements were made at other lift stations including ventilation at 6th Ave, new pumps at Scanlon, Broadway and Bridge Road, as well as electrical, ventilation, piping, check valves, and pump casings at McMillan Lift Station.

Reporting

Reporting is a major component of the WPCF. There are several reports that are required by various partners throughout the year. 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, 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 fully staffed throughout 2020 by a Manager (level 4), an operations supervisor (level 3), four operators (1 at level 4, 1 at level 3 and 2 staff at level 1), and a lab technician. The Collection System was staffed by two lift station maintenance person that has obtained level 2. The Lift Station Department Supervisor also holds a level 2 certificate. In August, there was a vacancy in the maintenance after a long-servicing staff member retired. This position was filled early in 2021.

Covid-19 Pandemic

The Covid-19 Pandemic began in 2020. The Wastewater Treatment Division and the need for wastewater collection and treatment is an essential service and vital to the ongoing functionality of the City of Portage la Prairie. As such, there were little changes to the operation and maintenance functions of the WCPF and lift stations. Protocol such as increased PPE and social distancing measures were implemented. Daily temperature checks and increased sanitizing of high touch surfaces are also in place. No staff have tested positive- and all employees are very aware of the impact that this would have to the rest of the team should they be exposed. Alternative schedules are prepared and ready to implement should the need arise to go to reduced staffing.

Projects

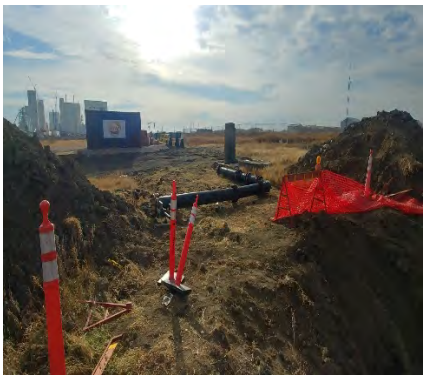
Retwining of Poplar Bluff Force main

There are two force mains that run from Poplar Bluff industrial park toward the WPCF. Both used to connect to the secondary system to service Simplot Foods. With Simplot implementing their own treatment, and the construction of a second lift station. The "South" force main from Poplar Bluff to Simplot's discharge point was transferred to Simplot. The "North" force main and the remaining South force main from Simplot's discharge point to WPCF remain intact and are connected to the LRAR. In the fall of 2020, a connection pipe was put in place to reconnect the North and South force mains after Simplot's discharge point to allow for usage of both lines from that connection point- which increased capacity and provides some redundancy.

Poplar Bluff North and South Force mains – before and after connection

Poplar Bluff Force Main Swabbing

It was determined that the North Force main contained a significant buildup of material that was impacting the pressures and ability to pump flow to the WPCF. This needed to be addressed before Roquette begins production. The City contracted SFE to provide swabbing and flushing services to remove the buildup of material. They were onsite for several weeks, and despite some setbacks with weather, were able to remove a significant amount of material. Communication between departments was key to the success of this project and a variety of measures were put in place to ensure the washout material did not impact the WPCF. A settling tank was used to capture the swabs as well as the debris. A full report on this project is available.


Build up in pipe ***Set up at Poplar Bluff and WPCF***

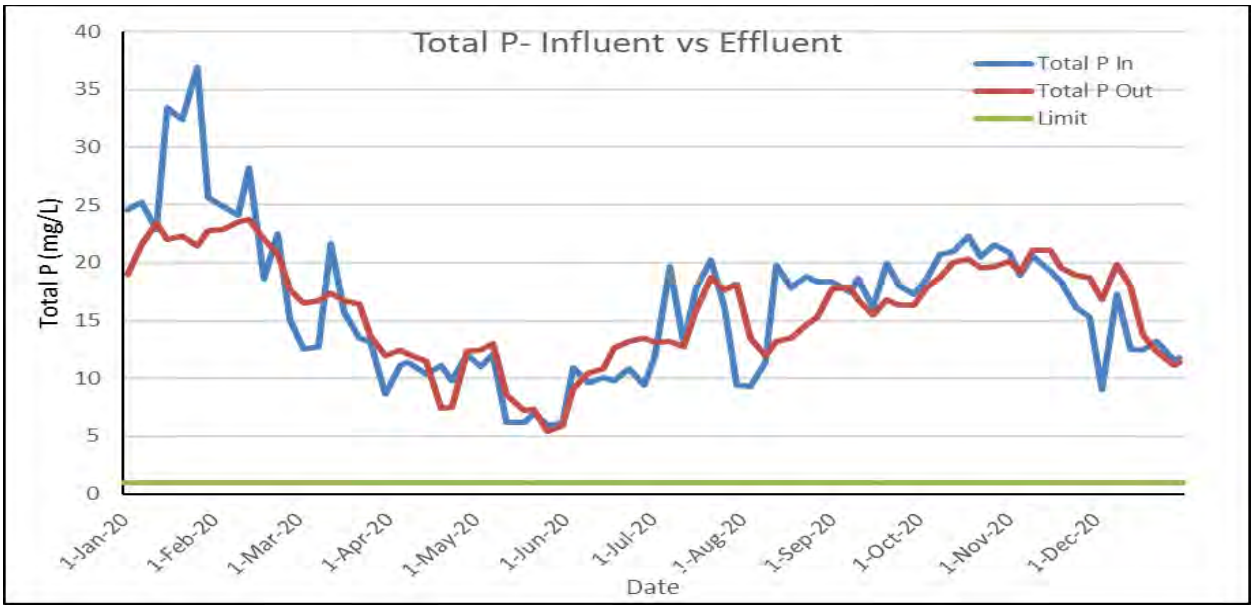
Municipal Effluent Pipe Replacement

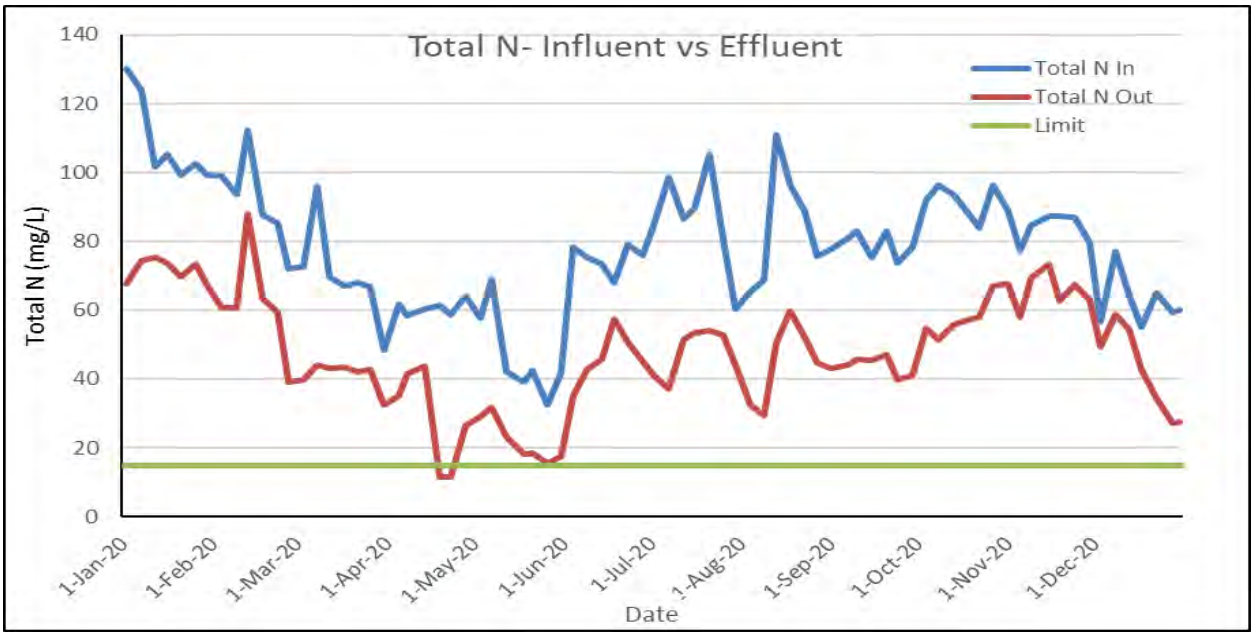
In October 2019, the pipeline that conveys municipal wastewater from the Headworks to the SBR Lift Station broke. The pipe was temporarily repaired via a patch, but the entire pipe was assessed as high risk for failure and required replacement. A video inspection of the pipe was completed to determine the areas of greatest concern and it verified the pipe from a previous connection point just outside the building to the lift station needed replacement. This work was completed in December 2020 with minimal interruption to service. Municipal flow was diverted to the LRAR to by-pass this section of the plant and allow for the pipe to be replaced. Work was completed within 5 days.


Before and after pictures of municipal effluent pipe

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. Although the existing facility does remove some amounts of these nutrients, it was not designed to meet the regulatory limits. As demonstrated in the graphs, the amount removed does not bring discharged amounts near the regulatory requirements. To meet these limits, the facility will require a 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, some lack efficiency and other components have been identified that lack redundancy and therefore the ability to properly maintain.





Funding for the upgrade was confirmed late in 2019. Although funding agreements have not yet been received, authorization was received to start the process of selecting a private company who would be contracted to Design, Build, Finance, Operate and Maintain the WPCF including the existing infrastructure as well as the new processes required. Advisors were procured as part of the City team and include Technical, Finance/Business, Legal, Human Resources, Communications, and Fairness.

This team collaborated to issue the Request for Qualifications where interested parties submitted detailed information outlining their bid team. Four proposals were submitted, and the Evaluation Committee shortlisted three proponents; Plenary/PCL Environmental Infrastructure, Portage Water Solutions (Sacyr/SNC Lavalin/Ledcor), and EPCOR Water Resource Partners. A Request for Proposals will be released to these three companies early in 2021 and the City will select the

successful proponent based on their submission for design as well as operation and maintenance plan. It is intended a final contract will be signed early in 2022 with construction to occur in 2022-2024.

Summary

The Wastewater Treatment Division was successful at ensuring the collected wastewater was treated effectively and efficiently before discharge to the Assiniboine River. The facility operated well below license requirements throughout most of the year, reporting a compliance rating of 98.5%. The Operations and Maintenance staff are a dedicated team of water professionals and are committed to ensuring the WPCF is producing high quality effluent year-round.