City of Portage la Prairie
Wastewater Treatment Division
2022 Annual Report

Introduction

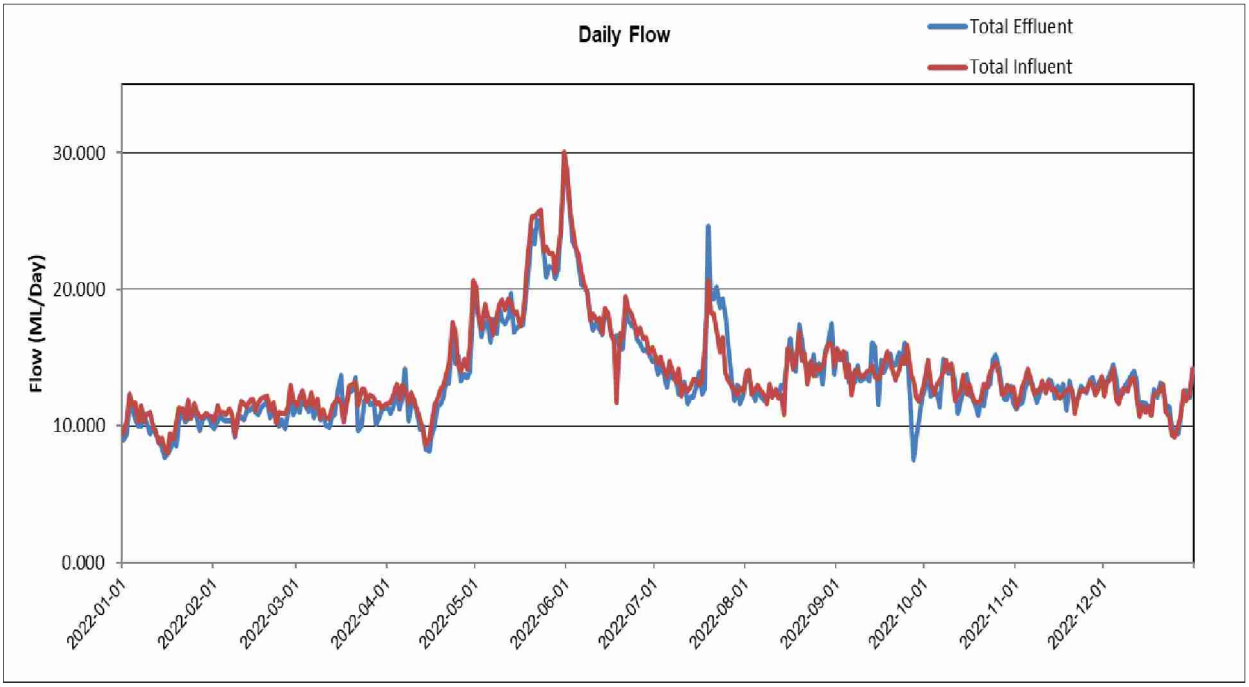
The City of Portage la Prairie Wastewater Treatment Division is comprised of the Class IV Water Pollution Control Facility (WPCF) and fourteen lift stations within the City and Poplar Bluff Industrial Park that convey the wastewater to the WPCF. The WPCF receives wastewater from three main sources - 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 and 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, mixing, and settling, 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 before being discharged into 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 is applied to farmland as fertilizer.

Facility Performance and License compliance

WPCF received an average of 13,563,000 L of wastewater each day, for a total volume of 4,950,587,000 L or 4.95 billion litres. This is an increase from the 3.5 BL received in 2021 and is primarily due to the increase in production and subsequent water usage at Roquette.



The peak flow occurred on May 31, 2022, when 30,078,000 L of wastewater was received, and the minimum flow of 8,033,000 L was observed on January 16, 2022. This is attributable to the industrial shutdown. The incoming flow is 64% domestic and commercial wastewater and 36% from industrial sources.

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

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 2022 was 10.8 mg/L and there were six occurrences where this limit was exceeded for a 99.98% compliance rating. These exceedances occurred as follows.

February 7 - 32.3 mg/L - Decant header came out of adjustment allowing solids to pass, staff begin investigating cause and source.

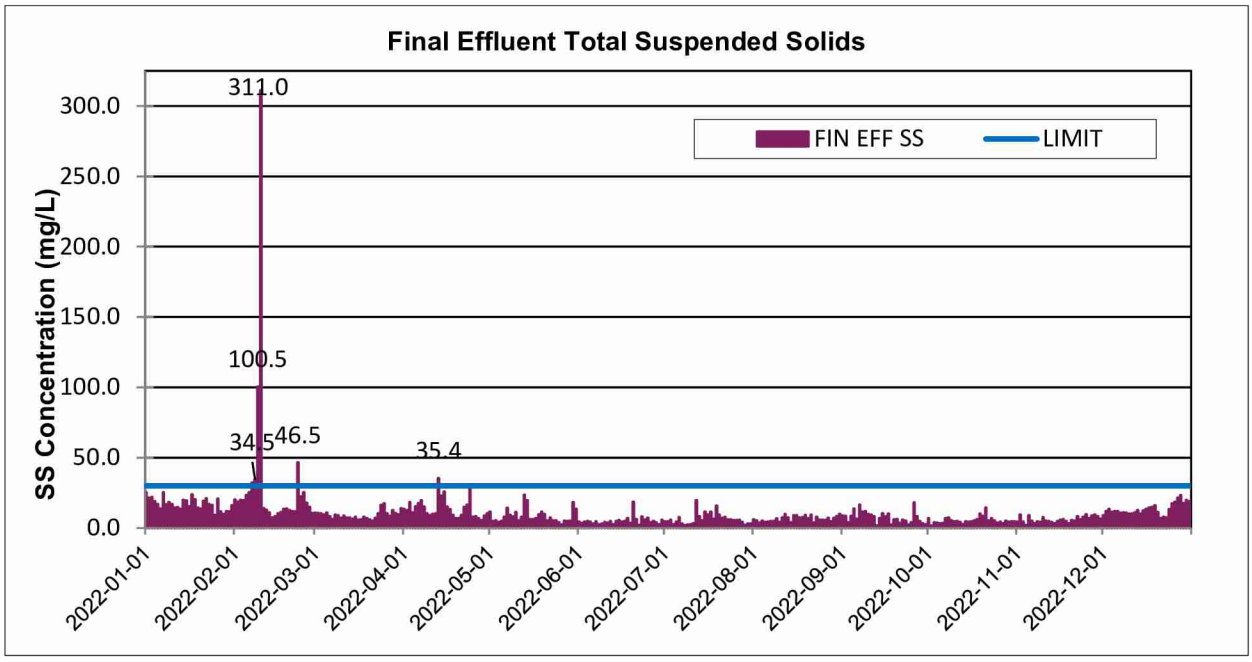
February 8 - 34.5 mg/L - Decant header continued to pass small amounts of solids.

February 9 - 100.5mg/L - EQ basin pumped lower than the typical operating level resulting in the solids collected in this tank washing out with the effluent. This was compounded by an unexpectedly large spike in flow from one of the industries resulting in the EQ being pumped down even further and in turn, more solids washed out. Decant header issue resolved.

February 10 - 311.5mg/L - Solids captured in the EQ basin during washout were slowly released with the effluent as part of a "planned" slow release to minimize the impact on receiving water.

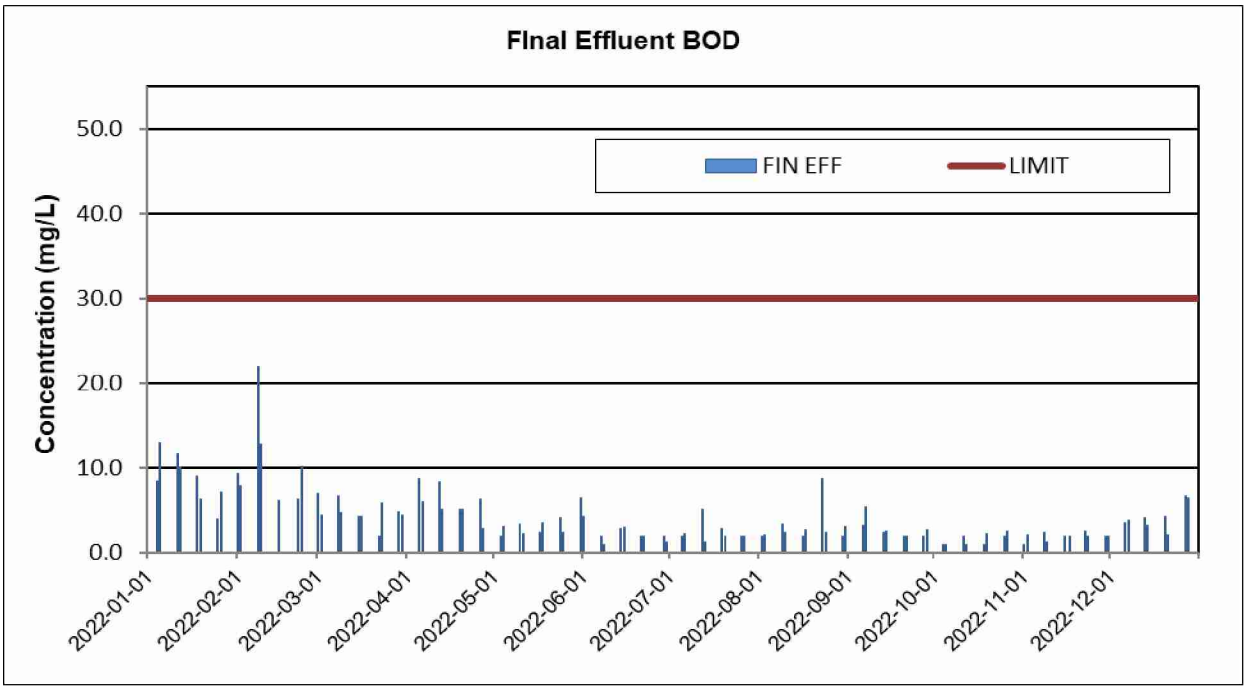
February 23 - 46.5 mg/L - Decant header #2 came out of adjustment overnight and was floating on a top water level allowing the top layer of stratified solids to be removed with each decant.

April 13 - 35.4 mg/L - extreme high winds brought on by a winter storm agitated the water in the basins and prevented proper settling of solids.



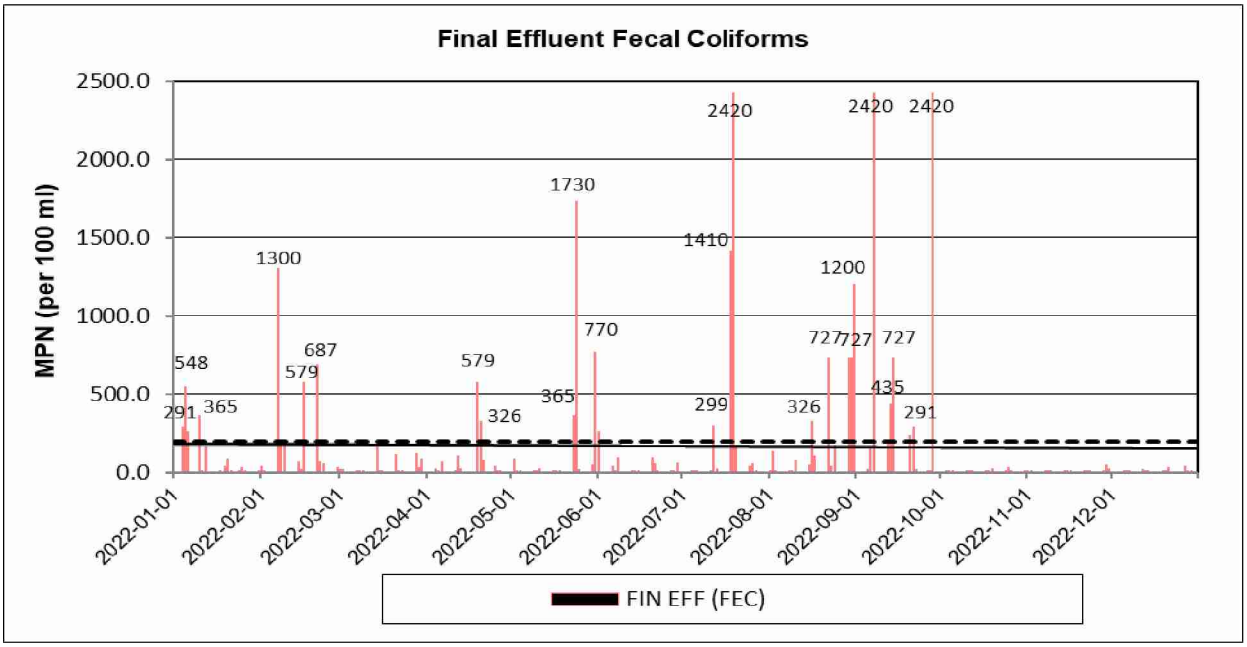
Biological Oxygen Demand

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 zero reported exceedances of this parameter for 100% compliance and the average daily discharge value was 4.2 mg/L.



Coliforms

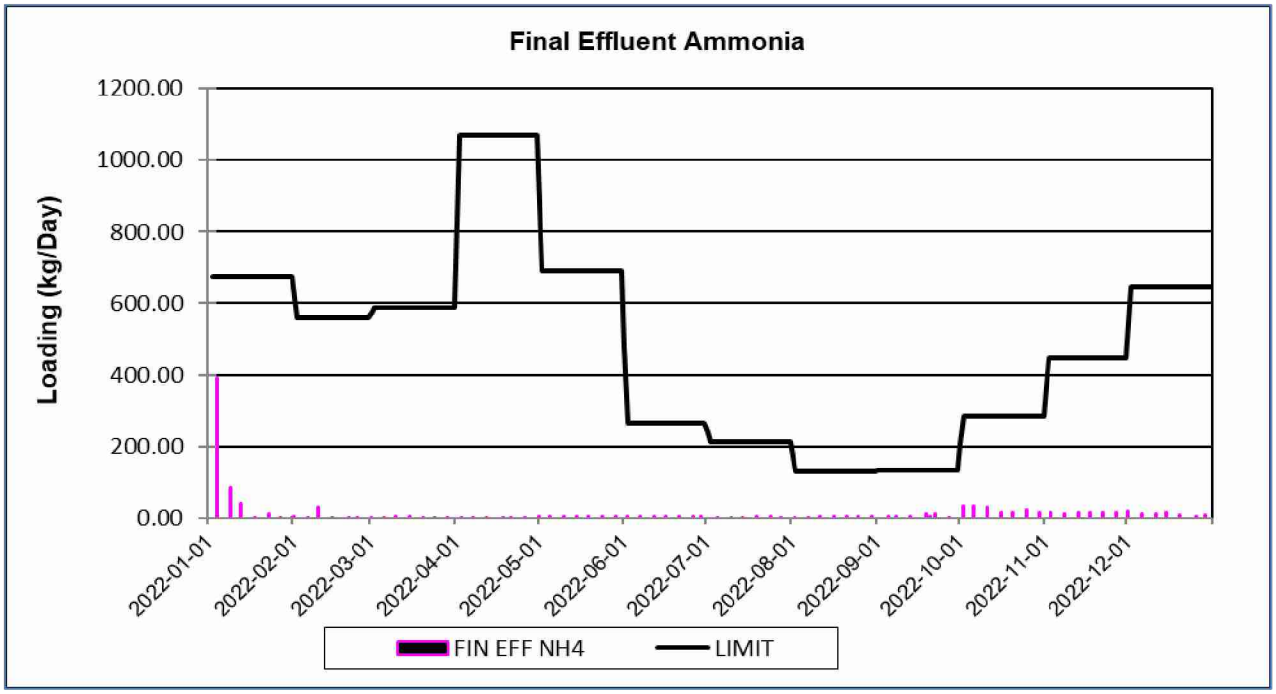
Fecal Coliform is a measurement of the amount of fecal coliform organisms within 100 mL of effluent. There is not a daily discharge limit but a limit on the monthly geometric mean that must not exceed 200 CFU/100mL. Samples must be submitted three times per week and sampled on consecutive days. In 2022, 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 the 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 the average daily amount that was recorded. Again, a compliance of 100% was achieved.

Month	**Limit (kg/day)**	**Daily average by month (kg/day)**
January	673	77.2
February	560.1	9.1
March	589.3	3.8
April	1068.2	2.4
May	691.8	5.9
June	264.6	5.6
July	213.2	4.7
August	19.6	5.0
September	134.4	6.9
October	286.4	24.4
November	448	15.6
December	646.4	12.8
Daily Average		14.76



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 passing or failing. There was one failure of this parameter out of twelve samples for 91.7% compliance.

Month	**Toxicity Test**	**Pass/Fail**
January	Trout	Fail
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

January - the initial trout sample failed as trout mortality was observed. It was determined that a Dissolved Oxygen probe in one of the basins was faulty and giving inaccurate oxygen readings, so ammonia was not sufficiently removed. As trout toxicity is a grab sample, that basin must have been decanting at the time of the sample - as combined/ composite samples did not indicate a concern. Once resolved, a new sample was submitted and passed.

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 that the system is over or under-dosing. There were no complaints received regarding odour in 2022.

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 or flared.

LRAR - There were three occurrences where flaring of biogas from the LRAR was not possible and venting of the biogas to the atmosphere was required to prevent the build-up of gas and pressure under the covered tank.

January 19 (3:00 am - 11:30 am) - The flame that burns the biogas from the LRAR stopped working and staff were not able to get it restarted. The operator opened the bypass vent and the maintenance team started working on the system once reporting to

work. The system was repaired, and the flare was put back into service allowing the emergency vent to be closed.

April 15 (10:00pm) - April 19 (11:00am) - Due to a frozen pipe, caused by damaged heat-trace lines, the bio-gas flare system that burns the biogas stopped working. Extensive work was required to replace the heat trace. During the repair work, staff monitored the flare system to see if it had thawed, with the intent to relight the flame as soon as possible. During this timeframe, various industries were offline due to the blizzard, so the biogas produced was minimal.

May 31 (5:45 am - 11:00am) - Due to a storm, a power outage caused the flare to go out and with the extremely high winds, the operators were unable to get the flare to ignite. To prevent additional problems from the continual attempt to auto-ignite, the system was turned off. The winds calmed by late morning and the flame was relit.

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. Currently, this gas is being vented into the atmosphere. The City continues to work on solutions to allow this gas to be captured and flared. 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.

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 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.

The 2022 Land Application of Biosolids program was successful with 630 dry tonnes of material injected into farmland on land within the RM of Portage la Prairie. Delays in receiving results from the external lab initially caused some concerns with the level of Organic Nitrogen being applied, however, adjustments to the application rates were made to bring the application process well within the license parameters and the overall applied concentration for that field section was 106 kg/ha compared to the limit of 100 kg/ha.

Parameters such as metals, solids, and Phosphorous were within license limits. There were no spills or concerns with transportation to report. A more complete report on the 2022 Biosolids Land Application Program is available and was submitted to Manitoba Environment and Climate.

Capital and Maintenance Items

Planned capital purchases included the replacement of the lab dishwasher, an air compressor for the Odour control system, two new composite samplers, SBR Basin #1 & #3 Influent valves, and an automatic valve operator.

As part of routine maintenance, staff take one SBR basin offline each summer. In 2022, this was Basin #3. 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, it takes diligent monitoring and adjustment to ensure adequate treatment before putting the basin back in service.

Light beacon replacement using lift

Staff tie off before entering confined space

One significant operational issue became apparent in the last quarter of 2022. The automation system that controls the facility stopped working altogether in one area of the plant and would randomly turn on/off in other areas. City staff, with assistance from the Automation contractor, worked consistently to find the cause. Due to the age and condition of the hardware and software, this proved challenging. A specialist was required to be brought in from Ontario and the situation was resolved, however, this event reinforced how fragile this major component of the facility is. The intent is to replace the automation and controls, but it is a major expense and is to be done as part of the Nutrient removal upgrade. As that project continues to be delayed-interim replacement measures might need to be considered.

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.

The 2022 budget included a 9.4hp pump for Brandon Ave Lift Station as well as pump casings and rotating assemblies for McMillan Lift station pumps. Valves were replaced at the 6th Ave Lift Station. To ensure no interruption to wastewater collection, large tanker trucks were utilized to divert wastewater from the work area and haul it to WPCF.

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 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 2022 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. One of the operator positions remained vacant for the year and some of this workload was completed through the assistance of a term labourer. For the second consecutive year, WPCF staff have received the “Rookie of the Year” award at the annual Manitoba Water and Wastewater Association Conference.

The Collection System was staffed by two lift station maintenance staff. One has level 2, and the other is an Operator in Training but will obtain level 1 early in 2023. The Lift Station Maintenance Supervisor also holds a level 2 certificate in Collections. The facility maintenance department was fully staffed with three additional certified electricians and/or millwrights.

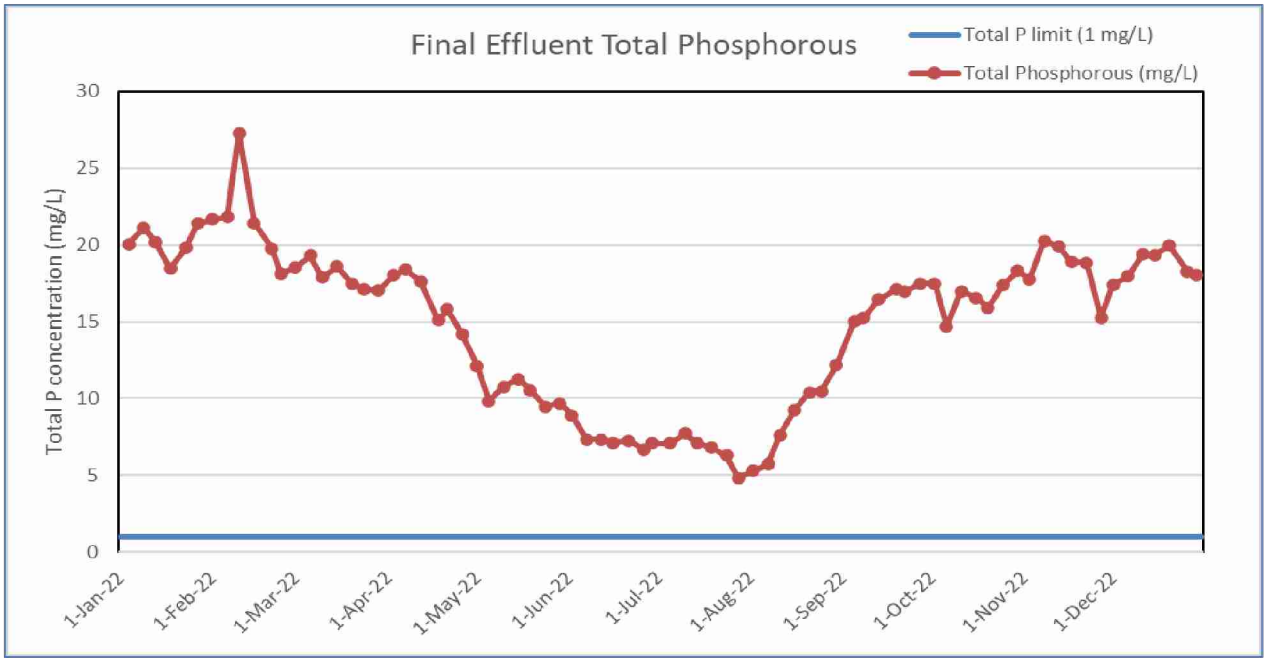
Rookie of the Year Recipients
Justine Duarte (2022) &
Brittany Denommee (2021)

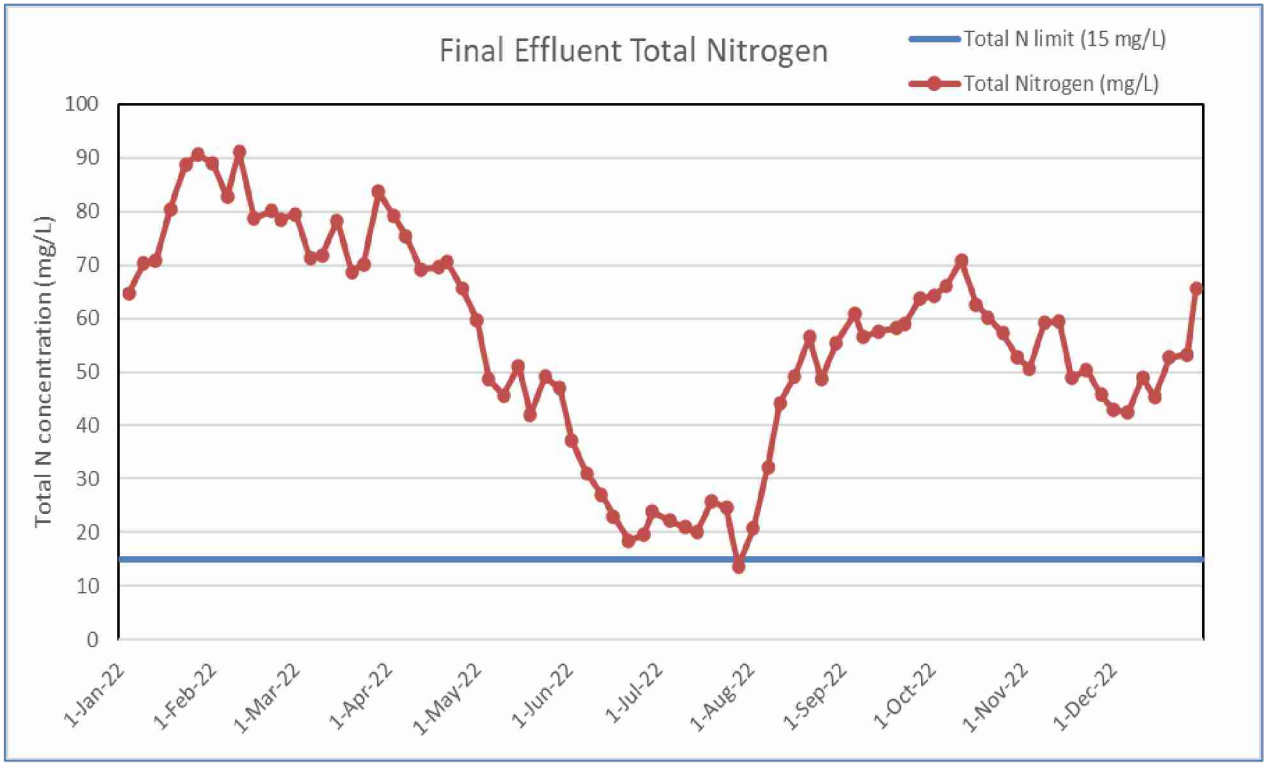
Millwright Adam Bell using a lathe

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 1 mg/L of Phosphorous and 15 mg/L of Nitrogen. As demonstrated in the graphs below, 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. 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.

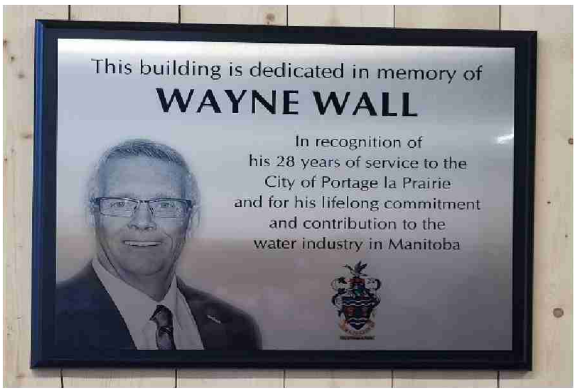




This project will be implemented through a Private-Public Partnership and will consist of a Design, Build, Finance, Operate and Maintain contract for the WPCF including the existing infrastructure as well as the new processes required. In 2020, the City shortlisted three proponents: Plenary/PCL Environmental 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 are being explored and the projected timeline for RFP releases is Fall 2023. 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 present value. It is intended that a final contract will be signed later in 2024 with construction to occur in 2025-2027.

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. As there was no space large enough within the existing City buildings, it was necessary to construct a new Utility Maintenance facility. A new shop that is large enough to also house the Waterworks Division was substantially completed in December 2022 with final deficiency items to be resolved in 2023. Staff will relocate to this new facility early in 2023. This building was dedicated to Wayne Wall for his contribution to the Utility and Water industry in Manitoba.



Summary

The Operations and Maintenance staff are a dedicated team of water professionals and are committed to ensuring the collected wastewater is 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 98.6%, which is notable considering almost five billion litres of wastewater was processed.