2023 Annual Report

Kenora Wastewater Treatment Plant

Contents

Introduction

The City of Kenora (City) continually discharges treated wastewater effluent into the Winnipeg River that meets all required Ontario regulations as per the Environmental Protection Act and the Water Resources Act. This annual report will include:

- a description of the wastewater treatment process used;
- any captial expenses to install, repair or upgrade equipment in the system;
- the results of our effluent monitoring and how they compare to the provincial regulatory limits of the City's operating license;
- a summary of incidents of regulatory non-compliance and the corrective actions taken; and,
- a summary of the quantities and wastewater discharge rates with a comparison to the rated capacity and approved flow rates of the system

Kenora Wastewater Treatment Plant

Environmental Compliance Approval Number (ECA): 7682-7RMMVM

Sewage Works Approval Number: 1-570-78-006
Issued: June 19, 2009 (Amended)

The Kenora Wastewater Treatment Plant (WWTP) is located at 18 Sewage Treatment Plant Road and has a rated capacity of 18,180 cubic meters per day (m^3/d) of treated wastewater effluent. The receiving body of the effluent is the Winnipeg River.

This facility is a Contact Stabilization plant which includes headworks for garbage and grit removal, aeration, clarification, and Ultra-Violet light disinfection before discharging effluent into the Winnipeg River.

The WWTP is controlled through a Supervisory Control and Data Acquisition (SCADA) system that is monitored twenty-four hours per day, seven days per week.

Kenora Wastewater Collection System

The City's Wastewater Collection System consists of 130km of gravity and force main piping, and 67 lift stations to collect and convey to the WWTP.

The wastewater collection system also provides wastewater collection services to Wauzhushk Onigum Nation.

Capital Improvements Implemented over 2023

In the current reporting year, approximately $131,380 was spent on capital upgrades at the Kenora Wastewater Treatment Plant. Projects included:

Project	Expense Type	Value
Design of MCC Panel in 100 Building	Replacement	**$30,660**
North Screw Pump Bearing	Replacement	**$57,980**
Clarifier Fall Arrest System	Install	**$25,440**
Design of 500 Building Entranceway Upgrade	Replacement	**$17,300**

2023 Wastewater Performance Review

Flows remained relatively stable into the WWTP for the 2023 data period. A summary of the flow data can be found in Table 1.0. The average daily influent flow for the year was 6,465 m^3/day with the maximum average month being April at 8,304m^3/d. April peak flows are common associated with the snow melt and spring rain. The highest peak day recorded for 2023 was 11,871 m^3/d on April 13.

Table 1.0 – Kenora WWTP Influent Average Daily Flows

	Influent Monthly Average m3/d	Influent Max m3/d	Influent Min m3/d
January	5618	6050	4953
February	5630	6042	4868
March	5776	6395	5015
April	8304	11871	5835
May	7907	9705	6811
June	6701	8062	6113
July	6539	7020	5949
August	6248	7619	5779
September	5771	6614	5450
October	5999	7199	5438
November	6977	8905	5721
December	6105	7646	5632

Influent and Effluent Monitoring

Under the Environmental Compliance approval license, certain objectives have to be met for compliant operation. Regulated parameters include pH (maintain between 6.5-8.5), Total Suspended Solids (TSS-25 mg/L), and Total Biological Oxygen Demand (TBOD-25mg/L). The results have been graphed and can be found respectively in Figure 1.0 to 1.2. Compliance limit is represented by the red trace.

Figure 1.0 – Effluent pH 2023

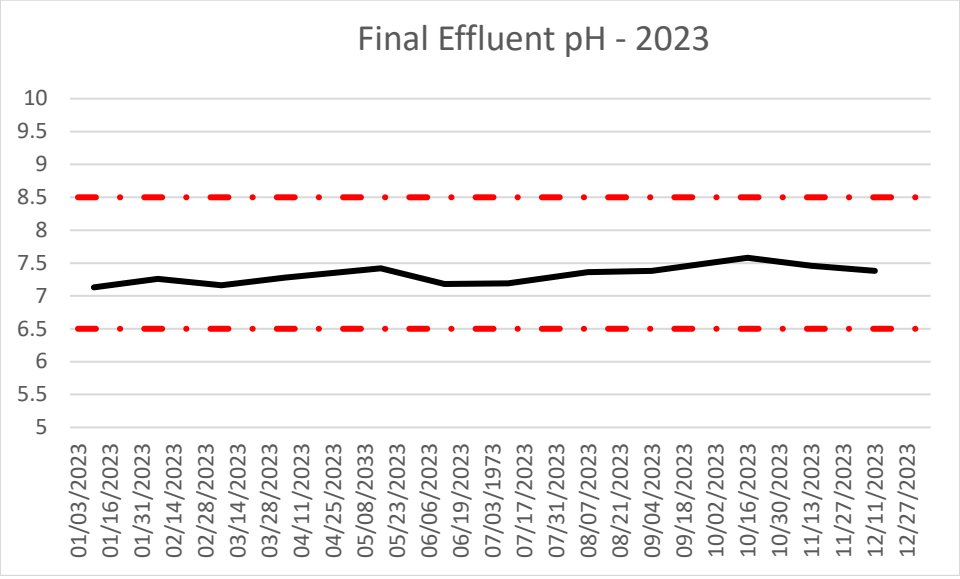


Figure 1.1 – Effluent TSS 2023

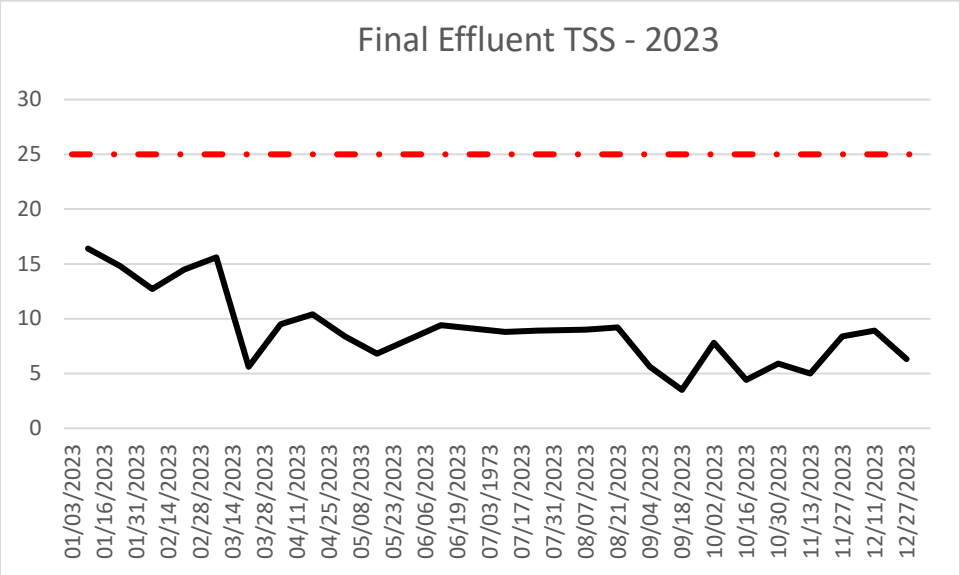
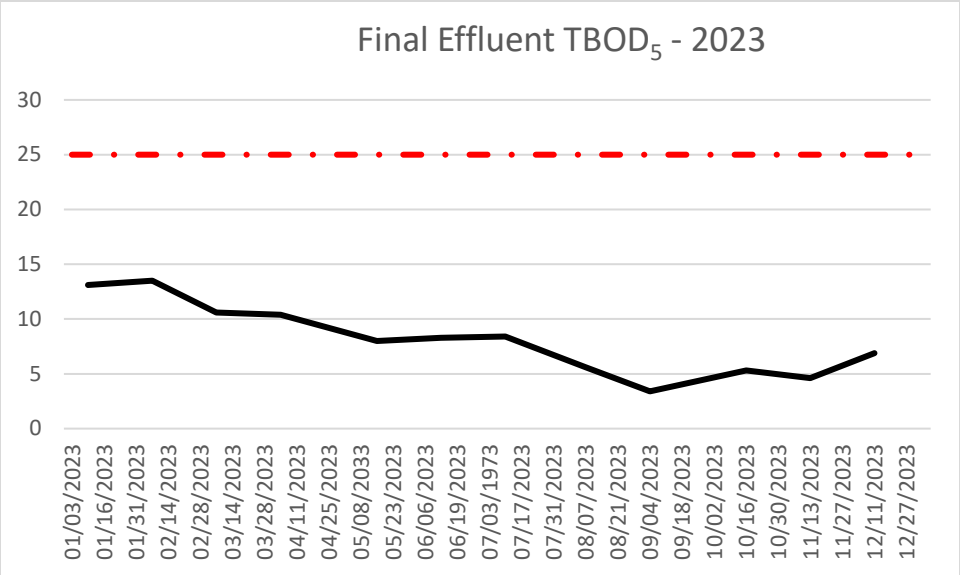


Figure 1.2 – Effluent TBOD 2023



A large number of water quality tests are also performed with respect to assessing the treatment efficiency and effectiveness of disinfection. The following tables provide a summary of the test results for both facility Influent and Effluent.

Monthly Influent Parameter Summary - 2023

	Influent pH	Influent TSS* (mg/L)	Influent TKN+ (mg/L)	Influent TP` (mg/L)	Influent TBOD~ (mg/L)
January	7.13	200	38.3	3.88	138
February	7.26	148	37.6	4.38	140
March	7.16	275	28.6	3.13	165
April	7.28	249	33.2	3.45	142
May	7.42	240	7.94	3.09	135
June	7.18	240	30.5	4.7	149
July	7.19	346	29	3.51	180
August	7.36	222	33	3.38	132
September	7.38	229	28.6	3.52	134
October	7.58	457	30.4	3.97	170
November	7.46	144	28.6	4.47	101
December	7.38	227	30.7	3.33	130

*TSS – Total Suspended Solids – Suspended solids within the water column
+TKN – Total Kjeldahl Nitrogen – Total measurement of biological nitrogen
'TP – Total Phosphorous – Total measurement of phosphorous
`TBOD – Total Biological Oxygen Demand -The amount of oxygen required to completely oxidize organic compounds

Monthly Average Effluent Parameter Summary - 2023

	Effluent pH	Effluent TSS (mg/L)	Effluent TKN (mg/L)	Effluent N-NH_4` (mg/L)	Effluent Nitrate~ (mg/L)	Effluent Nitrite+ (mg/)	Effluent OP* (mg/L)	Effluent TP (mg/L)	Effluent TBOD (mg/L)	Effluent CBOD^ (mg/L)
January	7.45	15.6	13.8	9.32	3.49	1.89	0.07	0.9	13.1	12.8
February	7.52	13.6	10.6	7.02	7.39	0.176	0.04	0.58	13.5	9.95
March	7.52	10.6	10	7.23	8.1	0.082	0.07	0.37	10.6	9.1
April	7.57	9.95	11.6	7.91	7.64	0.12	0.06	0.40	10.4	10.5
May	7.80	7.6	9.2	6.22	5.98	0.15	0.138	0.30	8	6.7
June	7.84	8.5	9.7	5.54	4.71	0.35	0.07	0.35	8.3	7.2
July	7.83	8.85	8.64	5.26	4.58	0.41	0.09	0.31	8.4	7.7
August	7.74	9.1	9.58	6.1	8.26	0.28	0.07	0.26	5.6	5.0
September	7.92	4.55	8.14	5.86	5.56	0.52	0.04	0.23	3.4	3.2
October	8.06	6.03	8.43	6.82	1.06	0.17	0.07	0.26	5.3	4.7
November	7.92	6.7	9.31	6.24	3.28	0.12	0.03	0.18	4.6	3.7
December	7.78	7.6	11.1	7.3	2.54	0.216	0.026	0.263	6.9	5.7

'N-NH4 – Ammonium – Inorganic Nitorgen
~Nitrate – Nitrogen Based Compounds
+Nitrite – Intermediate product of oxidation of ammonia to nitrate
*OP – Orthophosphate – Soluble Phosphate
^CBOD – Carbonaceous Oxygen Demand - The amount of oxygen required to completely oxidize carbonaceous and nitrogenous components

Microbiological Testing

	Number of Samples	*E. Coli** Results *MPN/100ml* (min - max)	Maximum Monthly Geomean Limit MPN+/100ml	Exceedances of Limit
WWTP Effluent	53	0 – 3260	200	None

***E. Coli -** Escherichia coli is a bacteria associated with human waste
+MPN/100 mL **-** Most Probable Number of bacteria per 100 millilitres of water
Geomean - Geometric Mean of a dataset

Toxicity Testing

	Number of Samples	*Pass/Fail*	Exceedances of Limit
WWTP Effluent Trout Bioassay	1	Pass	None

Biosolids Disposal

A total of 2446 tonnes of biosolids were disposed of at the Kenora Area landfill for the operating year of 2023. Biosolids are analyzed once per year for a wide range of parameters. Biosolids will continue to be hauled to the landfill for 2024.

Operational Compliance

No inspection occurred in 2023 with the Ministry of Environment Conservation and Parks. Collected monitoring results submitted to the Ministry did not exceed our operational ECA requirements.

No bypasses were recorded at the facility or collection system stations for 2023.

No complaints were received over the 2023 operational year.

Operational Process Audit

An internal process audit was initiated to determine the accuracy of process control data. Using standard engineering criteria and comparing it to influent wastewater analytical data, effluent analytical data, and biosolids production, it can be used to verify the existing process measurement program or identify areas of improvement. Improvement ultimately can assist in improving treatment efficiency, and potentially reduce operating costs.

Process Measurement Results

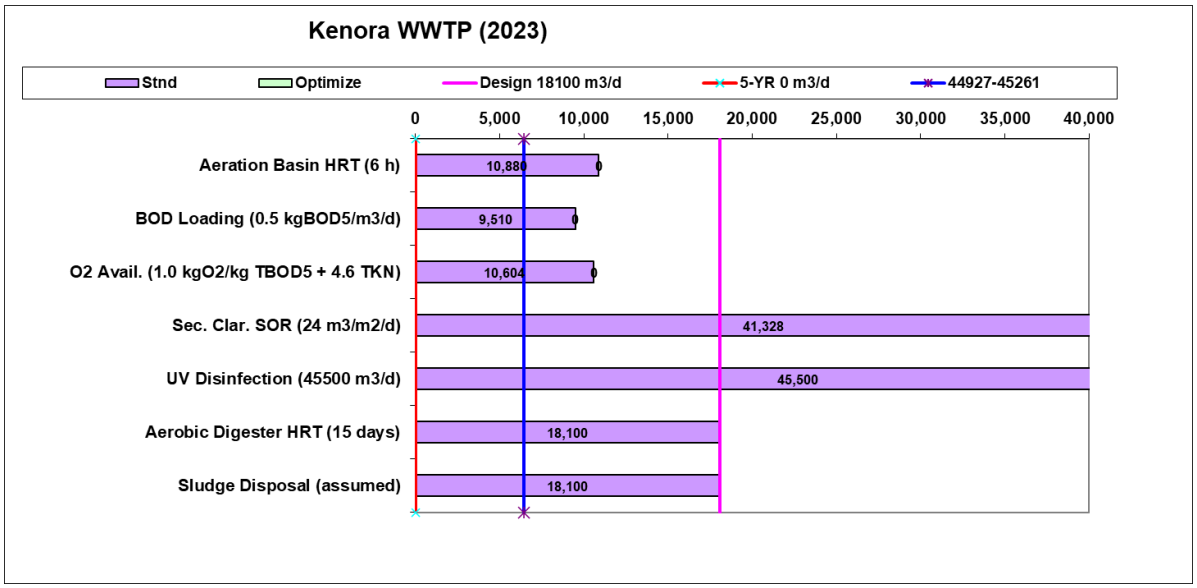
To assess the efficacy of a wastewater treatment process control program, sampling and monitoring accuracy is critical. A tool to measure this metric would be the use of a Sludge Accountability calculation. Sludge Accountability looks at the sampling data collected, and compares it to a projected sludge mass based on the wastewater collection area. An acceptable result would be +/- 15% of collected vs. projected measurements. Over the 2023 monitoring period the projected sludge mass was anticipated to be 2185kg/d. What was measured in the plant was approximately 7,774 kg/d. This evaluation tool indicates the results did not fall in the typical range of accuracyddesired.d.

From an operational perspective, increased sampling and monitoring needs to be increased at the Kenora WWTP. Additional samplers will be purchased in 2024, and additional sampling at the facility will be increased. This is essential to fully understand the waste characteristics of the collection area and have accurate information for any upgrades that need to occur to maintain infrastructure into the future.

Current Plant Capacity Relative to Unit Process

Figure 1.3 is a Performance Potential graph which uses typical engineering criteria to determine a plant's potential capacity to treat wastewater with respect to its approved capacity. Capability is impacted by loading characteristics and or operation of the facility. The Kenora WWTP has a nominal treatment capacity of 18,100m^3/d, and is currently running at 36% of its design rating. Capability of the facility can change with new source loadings coming online, and increases of service population. All unit processes are capable to support current operation.

Figure 1.3 – Kenora WWTP Performance Potential Graph



The City of Kenora is launching a Wastewater Optimization Program in 2024 to aid in the monitoring and sampling efficacy and address any process bottlenecks that may be limiting plant capability. Preliminary results of this program will be communicated in the 2024 annual report.

Maintenance Activities for 2023

Preventative maintenance activities were conducted which included service of the plant's two standby power generators, flow meter calibrations, backflow preventer testing, and vibration testing of key process mechanical equipment.

Other key maintenance activities included oil replacement for the detritor gearbox, the two helicoid pump gear boxes and the two secondary clarifiers. The Ultra-Violet lamps were replaced and cleaned as needed for the secondary disinfection process.

More Information or Questions

This report is available free of charge to anyone who requests a copy. An electronic copy is available on the City of Kenora website, and anyone wanting to be provided a paper copy can make arrangements to pick one up from the Wastewater Treatment Plant.

Any inquiries or concerns or request for copies of this report can be directed to:

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