RM of East St. Paul Water System
2021 Annual Report

March 14, 2022

Prepared for:

RM of East St. Paul
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Prepared by:

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Project No. 111220600

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1.0 WATER SYSTEM

1.1 DESCRIPTION OF WATER SYSTEM

The Rural Municipality of East St. Paul (RM) Water System consists of groundwater pumping, UV disinfection, chlorination, treated water storage, distribution pumping and distribution piping. Refer to **Figure 1.0** for a process flow diagram of the existing water system.

1.1.1 Groundwater Source

Groundwater is conveyed to the water treatment plant (WTP) using a series of wells. The RM has historically operated a total of six (6) production wells. Production wells PW1, PW4, PW5, PW6 and PW8 are located east of the Floodway, off Oasis Road in the RM of Springfield, while PW7 is located adjacent to the WTP off Wenzel Street in the RM of East St. Paul. Production wells PW1, PW4, PW5 and PW6 were decommissioning in 2019 and therefore PW8 and PW7 are the only production wells in service.

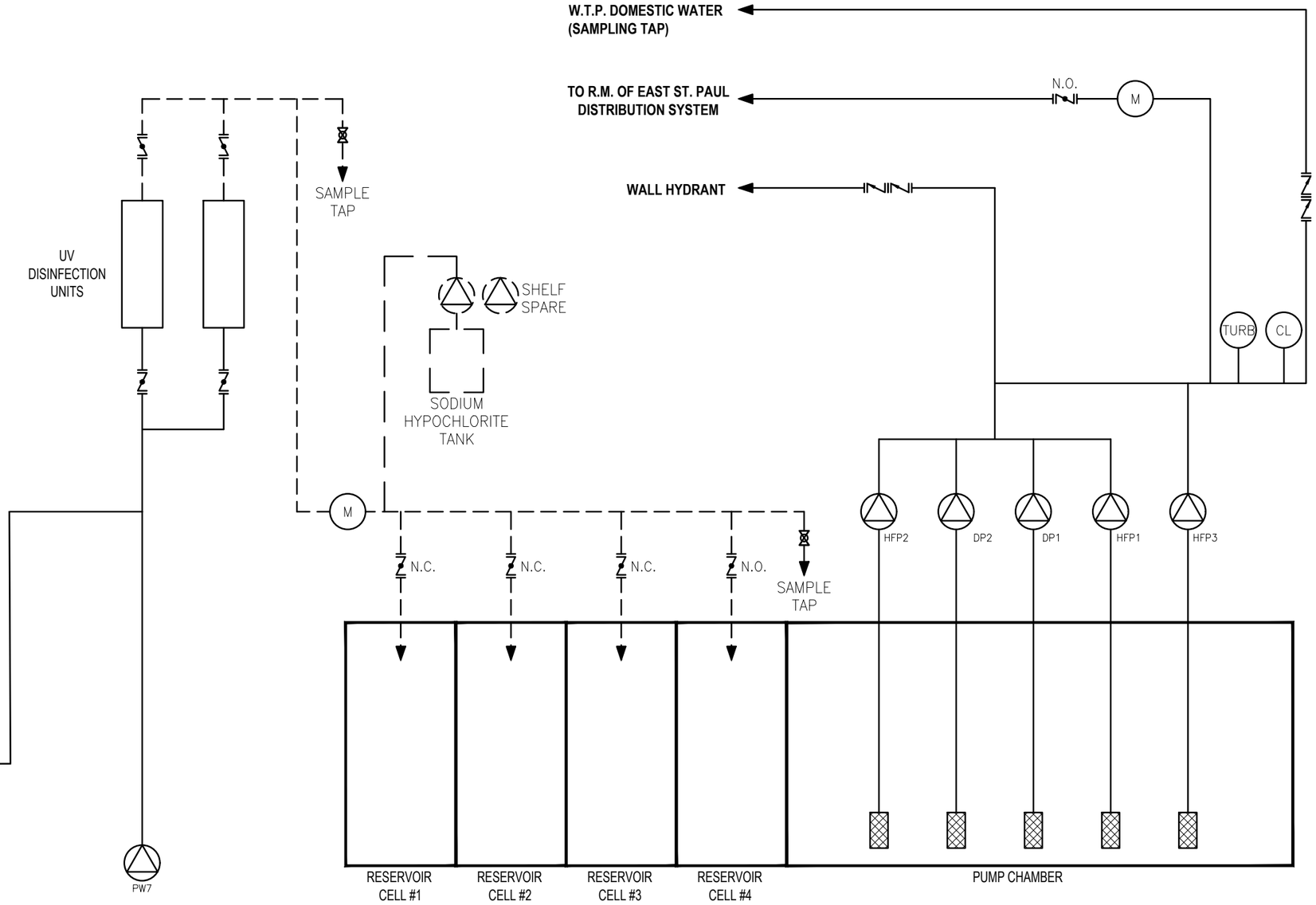
Production well PW8 withdraws groundwater from a bedrock carbonate aquifer at a depth of approximately 43 meters below grade and can provide 20 L/s to the WTP. Water Rights License No. 2005-060 authorizes the withdrawal of 195,000 m^3/yr. at a maximum rate of 20 L/s from this well. Two (2) metering chambers measure the quantity of groundwater withdrawn from each aquifer. There is also a turbidity meter in each metering chamber to monitor the raw water turbidity of the groundwater source.

PW7 withdraws groundwater from the bedrock aquifer and can provide up to 19 L/s to the WTP. Water Rights License 2009-030 was issued July 16, 2009 and authorizes the withdrawal of 612,000 m^3/yr at a maximum rate of 19 L/s from this well.

The RM is in the process of developing a new production well (PW10) at the Oasis Road well field.

1.1.2 UV Disinfection

The raw water is disinfected by ultraviolet (UV) light. The intent of the UV disinfection process is to provide three log reduction credits for *Giardia* and *Cryptosporidium*. There are two completely redundant UV disinfection units that operate in duty / standby mode. The UV dose is automatically adjusted based on raw water flow.



NOTE:
PRODUCTION WELLS PW1, PW4, PW5
AND PW6 WAS DECOMMISSIONED IN 2019

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Legend

RAW WATER	PUMP	R	RELIEF VALVE	M	METER
POTABLE WATER	PW	WELL PUMP		BUTTERFLY VALVE	TURB	TURBIDIMETER
CHEMICAL FEED	JP	JOCKEY PUMP		GATE VALVE	CL	CHLORINE ANALYZER
TREATED WATER	HFP	HIGH FLOW PUMP	N.C.	NORMALLY CLOSED		BACKFLOW PREVENTER
	DP	DOMESTIC PUMP	N.O.	NORMALLY OPEN		

Client/Project
R.M. OF EAST ST. PAUL
WATER SYSTEM

Figure No.
1.0

Title
PROCESS FLOW DIAGRAM

1.1.3 Chlorination

The groundwater entering the plant is chlorinated prior to being discharged to a reservoir for storage. Liquid chlorine (sodium hypochlorite – 12%) is dosed to the groundwater using a chemical feed pump based on flow. The chlorine dose is manually adjusted based on the chlorine residual entering the distribution system.

1.1.4 Treated Water Storage

Treated water is stored in a four (4) cell reservoir. The reservoir buffers the peak instantaneous demands in the distribution system and also provides storage for fire protection. The total active storage volume is 2,895 m^3.

1.1.5 Distribution Pumping

The distribution pumping system is made up of five (5) vertical turbine pumps. Two (2) domestic pumps (DP1 & DP2) each rated at 27 L/s, one high flow pump (HFP1) rated at 53 L/s and two high flow pump (HFP2 & HFP3) each rated at 65 L/s. The total and firm pumping capacity is 237 L/s and 172 L/s, respectively. All distribution pumps are operated by variable frequency drives that vary to maintain a distribution system pressure of 65 psi in the header in the WTP.

1.1.6 Distribution System

The distribution system is comprised of approximately 37,005 meters of PVC and HDPE. There are approximately 1,355 service connections in the distribution system as of December 2021.

1.2 DISINFECTION

The raw water source is deemed groundwater water under the direct influence (GUDI) of surface water and therefore is required to provide:

- 3 log reduction for *Giardia* and *Cryptosporidium*
- 4 log reduction of viruses
- 20 minutes of chlorine contact time

UV and chlorine are both relied on for disinfection. UV provides 3 log reduction for *Giardia and Cryptosporidium*, while chlorine contract time provides 4 log reduction for viruses and satisfies the 20-minute contact time requirement for bacteria.

The operating license requires a minimum UV dose of 33 mJ/cm^2 for 95% of the readings in one month to provide 3 log reduction for *Giardia and Cryptosporidium*. The effectiveness of the UV system is tracked by monitoring UV intensity and calculating the UV dose based on an operator entered UV transmittance.

The daily average, minimum and maximum UV dose is tracked and reported against the required UV dose to provide 3 log reduction of *Giardia and Cryptosporidium*.

The Drinking Water Safety Act (DWSA) also requires a minimum free chlorine residual entering the distribution system of 0.5 mg/L and a minimum free chlorine residual of 0.1 mg/L at all locations in the distribution system. The RM continuously measures the chlorine level entering the distribution system using an online analyzer and reports the reading every 5 minutes. The RM also manually measures the chlorine level entering the distribution system on a daily basis and the chlorine level at various locations in the distribution system on a biweekly basis.

The compliance with respect to monitoring the UV dose and chlorine residual is summarized in **Table 1.1.**

Table 1.1 – Disinfection Testing Performance

Description	Requirement	Compliance
Free Chlorine residual entering the distribution system based on manual daily sample	≥ 0.5 mg/L	100%
Free chlorine residual entering the distribution system based on 5-minute sample results	≥ 0.5 mg/L	99.8%
Frequency of testing daily at WTP	Daily	100%
Free Chlorine residual in the distribution system	≥ 0.1 mg/L	100%
Frequency of testing in the distribution system	weekly	100%
Report Submission	Monthly	100%
UV dose	≥ 33 mJ/cm^2 (95% / month)	100%

1.3 SAMPLING, TESTING AND REPORTING

1.3.1 Bacteriological Sampling

While the RM is required to sample the raw water entering the WTP, treated water leaving the WTP and treated water in the distribution system on a biweekly basis, the RM samples weekly in an effort to be proactive. Samples are sent to ALS Laboratory Group for Total Coliform and E. Coli testing.

Total coliform and *E. Coli* were not detected in the treated water leaving the WTP or the distribution samples collected weekly in 2021. Total coliform was detected in some of the raw water samples in July and August. The total coliform levels ranged from 1 to 3 most probable number (MPN) per 100 mL.

Sampling results for the treated water are summarized in **Table 1.2** as follows:

Table 1.2 – Bacteriological Testing Performance

Description	Requirement	Results	Compliance
Sampling Frequency	Bi-weekly	Weekly	100%
Total Coliform	< 1 MPN / 100 mL	0	100%
E. Coli	< 1 MPN / 100 mL	0	100%

1.4 CHEMICAL AND RADIOLOGICAL PARAMETERS

The RM is required to sample and test for chemical and radiological parameters once every year. The RM completed the sampling on November 3, 2021. The results for key parameters related to the Guideline for Canadian Drinking Water Quality (GCDWQ) aesthetic objectives (AO) and the DWSA maximum acceptable concentration (MAC) are summarized in **Table 1.3**.

Table 1.3 – Raw and Treated Water Quality Data Collected in 2021

Parameter	Raw	Treated	[MAC] / AO
Total Alkalinity (mg/L as $CaCO_3$)	238	231	N/A
pH	7.88	7.94	7.0 ~ 10.0
Colour (TCU)	< 5.0	< 5.0	≤ 15
Conductivity	620	575	N/A
Hardness (mg/L as $CaCO_3$)	321	201	N/A
TDS (mg/L)	337	311	≤ 500
Turbidity (NTU)	< 0.1	< 0.1	≤ 1
Arsenic (mg/L)	0.00029	0.00029	[0.01]
Fluoride (mg/L)	0.17	0.161	[1.5]
Nitrate-N (mg/L)	0.0501	0.0657	[10]
Uranium (mg/L)	0.00257	0.00223	[0.02]
Iron (mg/L)	< 0.010	< 0.010	0.3
Manganese (mg/L)	0.00157	0.00099	[0.12]/≤ 0.02
Lead (mg/L)	< 0.000050	0.000176	[0.005]
Sodium (mg/L)	11.9	10.9	≤ 200
Zinc (mg/L)	0.0047	0.0082	≤ 5.0

Parameter	Raw	Treated	[MAC] / AO
Chloride (mg/L)	21.6	24.5	250
Sulphate (mg/L)	70	49.6	≤ 500
Dissolved Organic Carbon (DOC)	0.95	0.89	N/A
Total Organic Carbon (TOC)	0.81	0.78	N/A
UVT (%/cm) at 254 nm	96.8	97.3	N/A

Since 2016 the RM has been required to take quarterly samples from the distribution system that are to be analyzed for total trihalomethanes (TTHMs) and haloacetic acids (HAAs) every second year. The RM took four (4) samples in 2021 the results of which are summarized in **Table 1.4**. Based on the data presented, both THM and HAA are well within the MAC limits.

Table 1.4 – Disinfection Byproduct Sampling Results (mg/L)

Parameter	March 17, 2021	June 2, 2021	August 18, 2021	January 12, 2022	Average	MAC
Total Trihalomethanes (TTHMs)	0.0102	0.0072	0.0106	0.0076	0.0089	0.10
Total Halocetic Acids (HAAs)	< 0.0054	<0.0022	<0.0054	<0.0018	< 0.0037	0.08

1.4.1 Physical Parameters

There are no physical limits specified in the RM's operating license, although the new operating license requires the RM to take one sample per day of the raw water and analyze it for turbidity. Turbidity is also to be noted in the distribution system at the time of bacteriological sampling. The RM was 100% compliant with the requirement for daily raw water turbidity analysis. Based on the reported daily readings for 2021, the raw water turbidity was always less than the aesthetic objective of 1 NTU.

1.4.2 Microbial Parameters

The RM's operating license requires:

- 3 log reduction for *Giardia* and *Cryptosporidium*
- 4 log reduction of viruses
- 20 minutes of chlorine contact time

UV disinfection satisfies the 3 log reduction requirement for *Giardia* and *Cryptosporidium*, while chlorine contact time in the reservoir satisfies the 20 minute chlorine contact time requirement and the 4 log reduction requirement for viruses.

1.5 RECORD KEEPING

The RM retains all the testing data and stores one copy at the WTP. Copies of the chlorination and UV data are submitted to the ODW on a monthly basis. Bacteriological testing results are also copied to the Regional Drinking Water Officer.

The Office of Drinking Water (ODW) completed an audit of the water system in February, 2022 and the ODW noted that the RM was in compliance with all Treatment Standards. The report is attached in **Appendix A**.

1.6 DRINKING WATER SAFETY ORDERS

There were no drinking water safety orders issued to the RM in 2021.

1.7 BOIL WATER ADVISORIES

There were no boil water advisories issued to the RM in 2021.

1.8 MAJOR EXPENSES INCURRED

The RM has initiated work on upgrading the WTP PLC and communication with the Oasis Road well site. The project is in progress and is anticipated to be completed in 2022.

The RM completed watermain looping in the distribution system from Gateway Rd. to Saddleridge Lane.

1.9 UPCOMING EXPENSES

The RM is anticipating the following upcoming expenses related to the water system:

- The WTP PLC upgrading project is intended to be completed.
- Development of Production Well PW 10.
- Complete a feasibility study related to a new production well at Bray Road.
- Complete upgrades to the WTP distribution header and twin the distribution line exiting the WTP.

APPENDIX A

ODW AUDIT REPORT

Environment, Climate and Parks

February 14, 2022

2021 Annual Compliance Audit

Water System: EAST ST. PAUL - PWS	**Code:** 57.50
Water System Owner: Rural Municipality of East St. Paul	**Address:** Unit 1 - 3021 Birds Hill Road, East St. Paul, MB R2E1A7
Operating Licence: PWS-10-472-02	**Expiry Date:** November 30, 2025
Water System Assessment Due Date: March 1, 2026	
Public Water System Annual Report Due Date: March 31, 2022	**Advisory Notification Plan Due Date:** May 1, 2022

1) This report documents compliance of the East St. Paul Public Water System for the period from January 1 to December 31, 2021.

2) This report provides specific information on the non-compliance incidents identified in the summary below.

3) Other than the information provided in this report, the water supplier has complied with The Drinking Water Safety Act, its supporting regulations, and the terms and conditions of the water system's current operating licence.

4) This report is based on information submitted by the water supplier, agents of the water supplier, and / or the Province of Manitoba.

5) Where non-compliance items are identified, the issues do not necessarily translate into increased public health risk. The Office of Drinking Water uses processes, including boil water advisories, to notify water users of a public health risk.

Non-compliance with Treatment Standards:

Water system was compliant in the audited time period.

Non-compliance Incidents:

Water system was compliant in the audited time period.

If you have any questions, please do not hesitate to contact me at (204) 391-1811.

Sincerely,

Dylan Lyng
Regional Drinking Water Officer