



**RM of East St. Paul Water System
2020 Annual Report**



June 16, 2021

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**RM OF EAST ST. PAUL WATER SYSTEM
2020 ANNUAL REPORT**

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Appendix A: ODW Audit Report (2020)



Water System
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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. Four (4) of these production wells (PW1, PW4, PW5 and PW6) draw groundwater from a sand and gravel aquifer at a depth of approximately 24 meters below the existing grade and can provide a combined 18 L/s to the WTP. Water Rights License No. 2007-074 authorizes the withdrawal of 358,000 m³/yr. at a maximum rate of 11.4 L/s from these four wells.

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 m³/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 Two (2) metering chambers measure the quantity of groundwater withdrawn from each aquifer.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.

A sixth production well (PW7) is located adjacent the WTP off Wenzel Street in the RM of East St. Paul. 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 m³/yr. at a maximum rate of 19 L/s from this well.

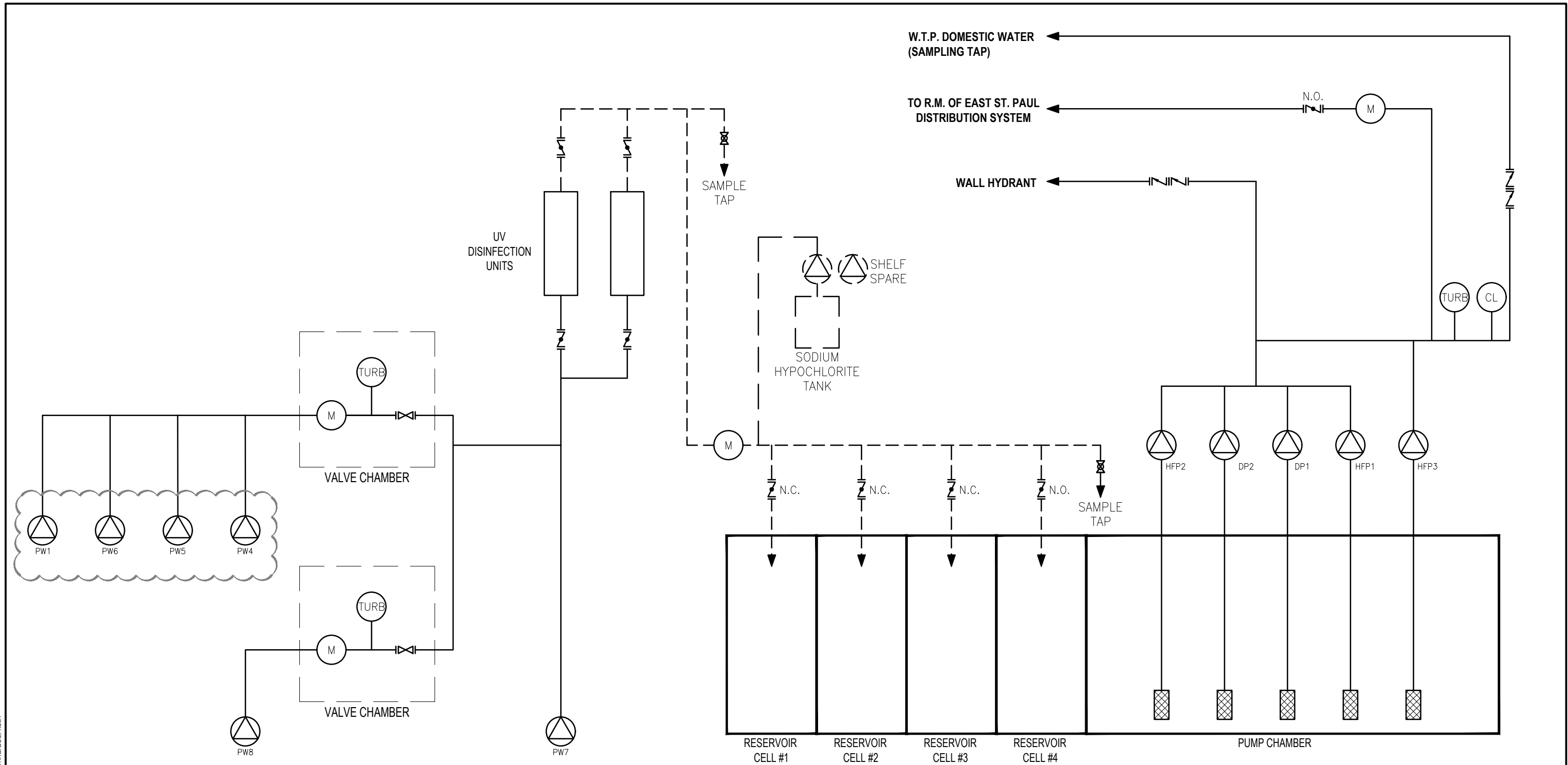
Production wells PW1, PW4, PW5 and PW6 have since been decommissioned in November 2019. Production wells PW7 and PW8 currently serves as the only source of drinking water for the RM. The RM is still in the process of developing a new production well (PW10) at the Oasis Road well field.

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.



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

May, 2020
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Legend							
	RAW WATER		PUMP		RELIEF VALVE		METER
	POTABLE WATER		WELL PUMP		BUTTERFLY VALVE		TURBIDIMETER
	CHEMICAL FEED		JOCKEY PUMP		GATE VALVE		CHLORINE ANALYZER
	TREATED WATER		HIGH FLOW PUMP	N.C.	NORMALLY CLOSED		BACKFLOW PREVENTER
			DOMESTIC PUMP	N.O.	NORMALLY OPEN		

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 Figure No.
 1.0
 Title
 PROCESS FLOW DIAGRAM

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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 m³.

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 1,236 service connections in the distribution system as of December 2020.

1.2 DISINFECTION

The raw water source is deemed surface 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 contact 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/cm² 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.



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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 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	99.96% ¹
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 Occasions where the distribution system chlorine analyzer reported lower than 0.5 mg/L were a result of analyzer sensor maintenance or a power outage.

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 raw water entering the WTP, treated water leaving the WTP or the distribution samples collected weekly in 2020. Sampling results for the treated water are summarized in **Table 1.2** as follows:



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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 September 23, 2020. 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 2020 Relevant to the DWSA

Parameter	Raw	Treated	[MAC] / AO
Total Alkalinity (mg/L as CaCO ₃)	232	235	N/A
pH	8.23	8.24	7.0 ~ 10.0
Colour (TCU)	< 5.0	< 5.0	≤ 15
Conductivity	548	558	N/A
Hardness (mg/L as CaCO ₃)	286	282	N/A
TDS (mg/L)	308	314	≤ 500
Turbidity (NTU)	0.12	0.51	≤ 1
Arsenic (mg/L)	0.00024	0.00024	[0.01]
Fluoride (mg/L)	0.159	0.141	[1.5]
Lead (mg/L)	< 0.000050	0.000136	[0.01]
Nitrate-N (mg/L)	0.0728	0.0820	[10]
Uranium (mg/L)	0.00219	0.00219	[0.02]
Iron (mg/L)	< 0.010	< 0.010	0.3
Manganese (mg/L)	0.00167	0.00083	[0.12]/≤ 0.02
Lead (mg/L)	< 0.000050	0.000136	[0.005]
Sodium (mg/L)	8.71	9.42	≤ 200



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Parameter	Raw	Treated	[MAC] / AO
Zinc (mg/L)	< 0.0030	0.0060	≤ 5.0
Chloride (mg/L)	22.3	23.6	250
Fluoride (mg/L)	0.159	0.141	[1.5]
Sulphate (mg/L)	41.7	42.3	≤ 500
Dissolved Organic Carbon (DOC)	0.81	0.64	N/A
Total Organic Carbon (TOC)	0.91	0.65	N/A
UVT (%/cm) at 254 nm	96.4	97.7	N/A

Since 2016 the RM has been required to take quarterly samples from the distribution system (February, May, August and November) that are to be analyzed for total trihalomethanes (TTHMs) and haloacetic acids (HAAs) every second year. The RM took four (4) samples in 2020 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 18	June 24	September 23	December 13	Average	MAC
Total Trihalomethanes (TTHMs)	0.0151	0.0091	0.0088	0.0126	0.0114	0.10
Total Haloacetic Acids (HAAs)	< 0.0054	< 0.0022	< 0.0054	< 0.0054	< 0.0046	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 sampling. Based on the reported daily readings for 2020, the raw water turbidity was below the aesthetic objective of 1 NTU in all samples.

1.4.2 Microbial Parameters

The RM's operating license requires:

- 3 log reduction for *Giardia* and *Cryptosporidium*
- 4 log reduction of viruses



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- 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 2020 and the RM was notified of the results via a letter dated March 11, 2021. ODW noted that the RM met all requirements related to the Treatment Standards and the Operating Licence. 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 2020.

1.7 BOIL WATER ADVISORIES

There were no boil water advisories issued to the RM in 2020.

1.8 MAJOR EXPENSES INCURRED

Work to develop a new well (PW 10) at the Oasis well field site has been on going.

1.9 UPCOMING EXPENSES

The RM is anticipating the upcoming expenses related to the following infrastructure upgrades:

- The RM is starting a project to implement a major PLC and communications upgrade to the water treatment plant and well site.
- Proposed watermain extension from the WTP to make a new loop and twinning it. An RFP for Engineering is in progress.
- Watermain loop extension from Raleigh Street north of the perimeter to Saddleridge Lane south of the perimeter. This project is part of a Manitoba Water Services Board (MWSB) grant.
- An Engineering RFP is being developed the to study the feasibility of one addition well on Bray Road.



APPENDIX A
ODW AUDIT REPORT