East St. Paul Water System
2014 Annual Report

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Sign-off Sheet

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March 23, 2015

1.0 WATER SYSTEM

1.1 DESCRIPTION OF WATER SYSTEM

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

1.1.1 Groundwater Source

Groundwater is conveyed to the water treatment plant (WTP) using a series wells. Five (5) production wells are located east of the Floodway off Oasis Road in the R.M. of Springfield. Four of these production wells (PW1, PW4, PW5 and PW6) withdraw 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 m^3/yr. at a maximum rate of 11.4 L/s from these four wells.

The fifth 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Two meter chambers measure the groundwater withdrawn from each aquifer. There is also a turbidity meter in each meter chamber to monitor the turbidity of the groundwater.

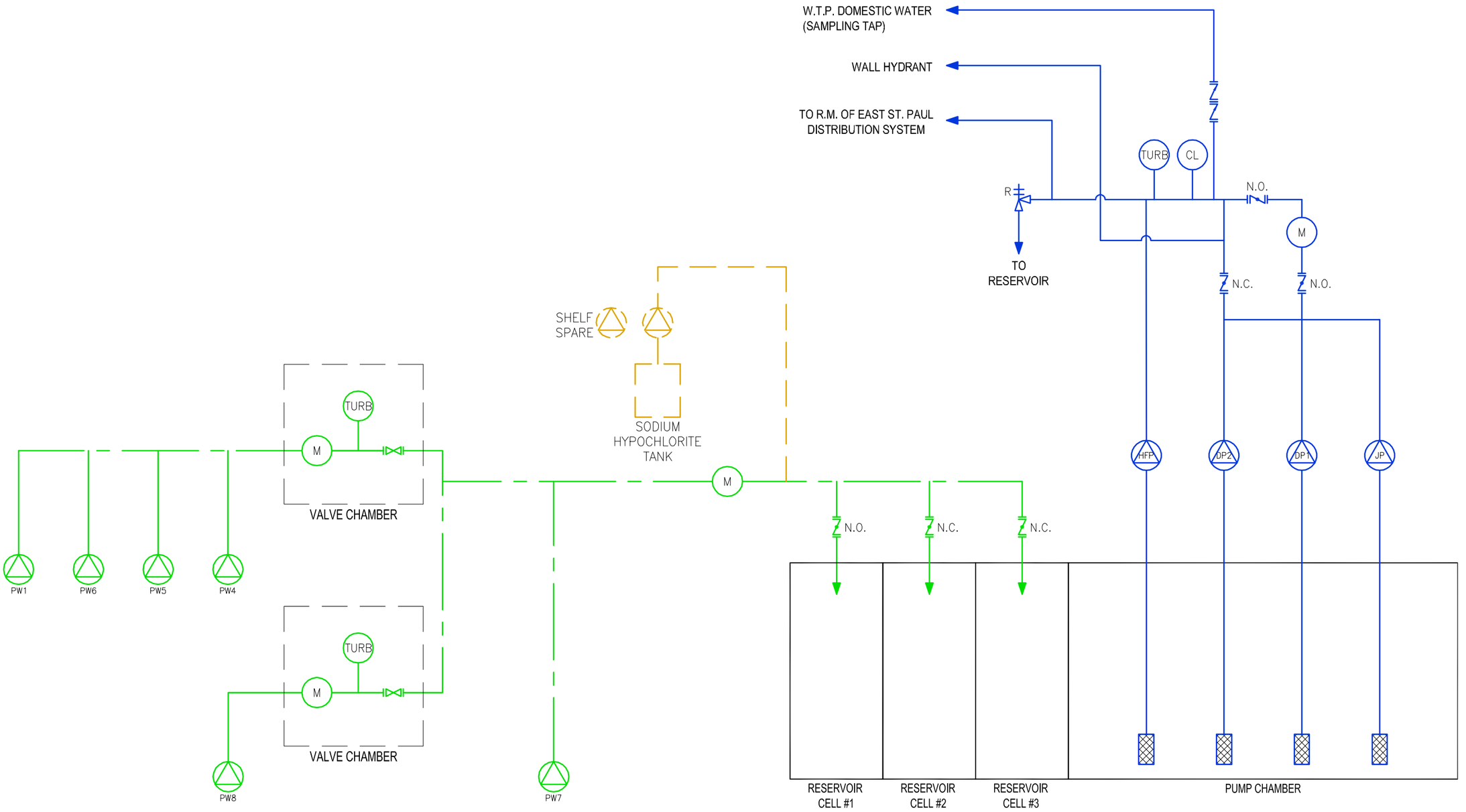
A sixth production well (PW7) is located adjacent the WTP off Wenzel Street in the R.M. of East St. Paul. PW7 withdraws groundwater from the bedrock aquifer and can provide 19 L/s to the WTP. Water Rights License 2009-030 was issued July 16, 2009 and authorizes the withdrawal of 612,000 m^3/yr. at a maximum rate of 19 L/s from this well.

1.1.2 Chlorination

The groundwater 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.

1.1.3 Treated Water Storage

Treated water is stored in a three cell reservoir. The reservoir buffers the peak instantaneous demands in the distribution system and provides storage for fire protection. The total active storage volume is 2,523 m^3.



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Legend

	RAW WATER
	TREATED WATER
	CHEMICAL FEED

	PUMP
PW	WELL PUMP
JP	JOCKEY PUMP
HFP	HIGH FLOW PUMP
DP	DOMESTIC PUMP

R	RELIEF VALVE
	BUTTERFLY VALVE
	GATE VALVE
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN

M	METER
TURB	TURBIDIMETER
CL	CHLORINE ANALYZER
	BACKFLOW PREVENTER

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

Figure No.
1.0

Title
PROCESS FLOW DIAGRAM

1.1.4 Distribution Pumping

The distribution pumping system is made up of four (4) vertical turbine pumps. Two (2) domestic pumps (DP1 & DP2) each rated at 27 L/s operate based on pressure to meet the varying demands in the distribution system. The jockey pump (JP) rated at 3 L/s is turned on if the distribution system pressure drops below 55 psi, while the high flow pump (HFP) rated at 53 L/s turns on if the pressure drops below 50 psi.

1.1.5 Distribution System

The distribution system is comprised of approximately 36,750 meters of PVC and HDPE pipe on Henderson Highway between Eagle Creek Drive and Dr. Hamilton School north of Hoddinott Road. There are approximately 940 service connection in the distribution system.

1.2 DISINFECTION

Chlorine is used as the primary disinfectant. The Drinking Water Safety Act (DWSA) 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 R.M. continuously measures the chlorine level entering the distribution system using an online analyzer. They also manually measure 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. There were no occurrences where there was no daily chlorine residual sample taken.

Table 1.1 – Disinfection Testing Performance

Description	Requirement	Compliance
Free Chlorine residual entering the distribution system	≥ 0.5 mg/L	100%
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	biweekly	100%
Report Submission	Monthly	100%

1.3 SAMPLING, TESTING AND REPORTING

1.3.1 Bacteriological Sampling

While the R.M. 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 R.M. samples weekly in

an effort to be proactive. Samples are sent to ALS Laboratory Group for Total Coliform and E. Coli testing.

The R.M. recorded positive total coliform readings in the raw water starting on August 13, 2015. No positive total coliforms were however noted in the treated water. Following positive total coliform results in the raw water the R.M. initiated a hydrogeological investigation of the groundwater wells to determine the cause. The R.M. retained Friesen Driller's to complete the investigation and Friesen's determined that the raw water source was likely groundwater under the direct influence (GUDI) of surface water. Friesen noted that PW1, PW4, PW5 and PW6 were most under the influence. The R.M. stopped using these wells in October and switched over to PW 8.

The R.M. subsequently retained Stantec Consulting Ltd. to determine if any modification were required due to the reclassification of the raw water source. Stantec determined that in addition to the disinfection requirements in the existing operating license, 3 log removal for *Giardia* and *Cryptosporidium* and 4 log removal of viruses were now also required. Stantec recommended the installation of UV disinfection on the raw water prior to discharge to the reservoir. A compliance plan is scheduled to be prepared by Stantec and submitted to the ODW for this work in 2015.

Sampling results for the treated water are summarized as follows:

Table 1.2 – Bacteriological Testing Performance

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

1.4 CHEMICAL AND RADIOLOGICAL PARAMETERS

The R.M. is required to sample and test for chemical and radiological parameters once every three years. In 2013, the R.M. tested each raw water production well for the chemical and radiological parameters. The sampling 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 Water Quality Data Relevant to the DWSA

Parameter	PW 1 (mg/L)	PW 4 (mg/L)	PW 5 (mg/L)	PW 6 (mg/L)	PW 7 (mg/L)	PW 8 (mg/L)	[MAC] / AO (mg/L)
Arsenic	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	[0.01]
Fluoride	0.16	0.16	0.17	0.16	0.16	0.16	[1.5]
Lead	0.0019	< 0.001	0.0033	< 0.001	0.0058	0.0089	[0.01]
Nitrate-N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	[10]
Uranium	0.00177	0.00191	0.00205	0.00186	0.00291	0.00172	[0.02]
Iron	< 0.1	< 0.1	0.28	< 0.1	0.14	<0.1	0.3
Manganese	0.018	0.0149	0.0091	0.0294	0.0013	0.0168	0.05
Hardness	274	260	262	257	310	256	200/500
TDS	288	276	277	273	332	270	500

While not a requirement for a groundwater source not under the direct influence of surface water, the R.M. undertook quarterly disinfection byproduct testing at the WTP and in the distribution system in 2014. Total trihalomethane (TTHM) and bromo-dichloromethane (BDCM) results were less than the DWSA maximum acceptable concentration. When the R.M.'s operating license is revised to reclassy the groundwater source as GUDI, the R.M. will be required to sample for disinfection byproducts. The average sampling results at the WTP and at a location in the distribution system are summarized in Table 1.4.

Table 1.4 – Average Disinfection Byproduct Sampling Results

Parameter	WTP (mg/L)	Distribution System (mg/L)	DWSA MAC (mg/L)
Bromo-dichloromethane (BDCM)	0.0027	0.0027	0.016
Total Trihalomethanes (TTHM)	0.0099	0.0125	0.1

1.4.1 Physical Parameters

There are no physical limits specified in the R.M's operating license.

1.4.2 Microbial Parameters

The current operating license only requires the R.M. to meet the DWSA minimum chlorine contact time of 20 minutes. The "Assessment of Water Supply Infrastructure and Water Supply

Sources for the R.M. of East St. Paul Public Water System" (Stantec, 2011) identified that the reservoir provided sufficient contact time.

As noted in Section 1.3.1, when the R.M. is classified as using a GUDI source, they will also be required to provide 3 log reduction for *Giardia* and *Cryptosporidium* and 4 log reduction for viruses. Stantec has recommended UV disinfection and a compliance plan will be submitted to the ODW in 2015.

1.5 RECORD KEEPING

The R.M. retains all the testing data and stores one copy at the WTP. Copies of the chlorination data are submitted to the ODW on a monthly basis. Bacteriological testing results are also copied to the regional drinking water officer.

1.6 DRINKING WATER SAFETY ORDERS

There were no drinking water safety orders issued to the R.M. in 2014.

1.7 BOIL WATER ADVISORIES

There were no boil water advisories issued to the R.M. in 2014.

1.8 MAJOR EXPENSES INCURRED

The R.M. completed the following water system related projects in 2014:

Distribution System Expansion

The R.M. added approximately 1,750 meters of watermain in the By-the Park subdivision to service 40 new lots in the development. None of the services are connected to houses yet.

Planning

The R.M. received funding for a small reservoir expansion and pumphouse upgrade to increase the storage capacity and upgrade the R.M.'s fire flow pumping system. Detailed design is anticipated to start in 2015.

The R.M. retained Stantec to undertake a compliance plan, design brief, detailed design and contract administration for the installation of UV disinfection on the raw water supply to resolve the compliance issue with the groundwater source being reclassified as GUDI. This project is anticipated to be completed in the late spring / early summer of 2015.