



Public Water System Annual Report 2020

Name of the Public Water System: **Cartier Regional Water Co-op (CRWC) – 3 Locations**
36.00 – Cartier Regional Water System
89.40 – Headingley Regional Water System &
162.75 – Peony Farm Reservoir Public Water System

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Headingley WTP-89.40: 204-832-2555

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Headingley WTP-89.40: 204-832-2555

Date prepared: **March 17, 2021**

A handwritten signature in black ink, appearing to read 'D Vaillant', is written over a horizontal line.

Danielle Vaillant
Manager CRWC Inc.

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Introduction

The Cartier Regional Water Co-op owns and operates 2 main water treatment facilities, 10 rural reservoirs, 2 booster stations, 7 truck fill stations, and over 230 km of transmission line. The owned reservoir at Peony Farm in Portage la Prairie is supplied with water produced at the city of Portage la Prairie water treatment facility. The CRWC owned and operated water treatment facilities strive to provide high-quality drinking water in sufficient quantity to meet public demand. It is our goal to do so in a safe, cost-effective manner while remaining in compliance with the regulatory requirements governing the provision of drinking water.

It is our belief that the public has a right to easily access information related to the drinking water they consume and the system through which it is provided. To that end, the Cartier Regional Water Co-op has prepared the following report.

1. *Description of the Water System*

The Cartier Regional Water System provides potable drinking water to a population of approximately 13,500 residents. Treated water produced from the Cartier Regional Water Co-op Treatment Facilities (2) meets all health and aesthetic objectives as stated in the Guidelines for Canadian Drinking Water Quality.

1.1. Water source supply

The Cartier Regional Water Treatment Plant (WTP) and Headingley Regional Water Treatment Plant (WTP) receive surface water from the Assiniboine River. The Peony Farm Reservoir location receives its water source from the City of Portage La Prairie Water Treatment Facility. A link to the City of Portage La Prairie annual water system report can be found at [Water & Sewer - City of Portage la Prairie](#).

1.2. Intake structures and storage ponds:

The Cartier WTP has a stainless-steel intake structure that is specially designed to prevent injury to fish. It is located immediately North of the Baie St. Paul Bridge and flows through a 400 mm pipe into a concrete wet well on the East shore of the river. Two submersible pumps are available to pump the raw water through a 300 mm to the WTP. Raw water can be pumped either to the aerated raw water storage ponds or directly to the WTP raw water chamber located beneath the water plant. The normal operational strategy is to pump to the storage north pond, flowing into the south storage pond for pre-settling, and pre-treatment in the summer season when required with aeration and algicide control. The ponds provide a buffer when river water quality may not be optimal. Currently, the intake is flushed using gravity flow and does not provide a sufficient flow of water to adequately flush the intake screens of silt buildup.

When required, clearing of silt and debris from the intake screen is contracted out. The ponds have a common wet well to help identify levels in both storage ponds.

The Headingley WTP utilizes the existing Headingley Correctional Centre River Intake Building that is located on the grounds. The CRWC has a memorandum of understanding (MOU) with Manitoba Infrastructure (MIT) to own, operate and maintain the intake channel, wet well, pumps and gate valves. The intake channel is made of concrete and directs the flow of the river into the pump house passing through bar screens before entering a pumping chamber. Both chambers are equipped with sluice gate valves that stay open during normal operation. The wet well maintains a static water level and there are two 60 hp pumps that operate on a lead/lag operation and pump water when the raw water storage ponds call for them to fill. As the water is being pumped from the wet well into the service line to the ponds, a low dose of algaecide is added to control algae growth and to lower the organic level in the ponds. The river water is pumped through a 400 mm service line into two raw water storage ponds. The raw water storage ponds currently operate in parallel but also has the ability to operate in series. There is the ability to isolate one storage pond for maintenance and still supply the WTP with raw water. Both raw water storage ponds are equipped with aeration lines that are fed from blowers that are housed in the Raw Water Pump House (RWPH) located next to the storage ponds. The RWPH also contains a wet well with level control that indicates the level in the raw ponds and provides the controls back to the RIPH pumps. During normal river conditions, the ponds fill regularly. During high flows and high turbidity in the river, the ability to cease filling of the ponds and have plenty of storage to operate the facility is maintained until normal conditions return to the river. Also contained in the wet well are three 100 hp raw water pumps that are called to operate when the WTP is producing water.

1.3. Water treatment process:

Cartier WTP:

Raw water flows from the storage pond into the WTP raw water chamber by gravity. A control valve operates to maintain an ideal, stable level in the raw water chamber. The Raw water is pumped by one 25 and one 30 hp pump into the raw water process piping to the three-stage flocculation basins. The raw water flows through the process piping where it is injected with a pH suppressant (Sulphuric Acid) and a coagulant to begin the advanced coagulation process. The coagulated water then passes through 2 inline static mixers and an inline magnetic flow meter before it is deposited into the initial flocculation basin. The three-stage flocculation basins provide additional mixing to aid in the coagulation process before the raw water enters the ultra-filtration (UF) process. The three break tanks provide added mixing and coagulation before the raw water enters the ultra-filtration (UF) process. A pre-filter to the UF skids removes bigger floc (debris) created in the three-stage coagulation process. The UF provides 0.04-micron filtration and removes virtually all particulate matter before reaching the reverse osmosis (RO) process. The UF process is equipped with a common raw water turbidimeter and individual permeate turbidimeters for each UF train.

The permeate turbidimeters are set to alarm at 0.1 NTU and shutdown at 0.29 NTU. The turbidity is monitored continuously, and a value is captured every 5 minutes and reported on a monthly report. The UF Permeate is sent to the UF/RO break tank chambers, where the water is used to feed the RO membranes and as backwash water for the UF membranes. The UF permeate is treated with a low dose of chlorine to eliminate the potential for bio growth in the RO feed chambers. The RO feed pumps supply the UF permeate to the RO membranes during operation. Sodium Bisulphite (SBS) is added upstream of the RO trains to neutralize the remaining chlorine residual before entering the RO membranes. RO treated water is so pure that a RO by-pass line feeding UF permeate water is used to add necessary minerals back into the water to achieve the desired hardness of the finished water and to stabilize water chemistry. During the summer months, when the organic content in the raw water is at its highest, adjustments are made to lower the UF permeate blend ratio into the RO water to help reduce organic content in the finished water. A sequestering agent is added downstream of the RO's prior to entering the clear well. This is added to help stabilize the water that enters the distribution system.

Turbidity is a measure of the relative clarity of the water and is a key parameter of all drinking water operating licenses. The operating license requires the treatment facility to continuously monitor the turbidity from the ultra-filtration membranes. The Cartier WTP has 24-hour online monitoring of the UF treated water and final plant effluent going to the distribution system. After the RO process, the water pH is adjusted with sodium hydroxide and a small dosage of chlorine is added to kill pathogenic organisms (bacteria, viruses, etc.). The free chlorine residual in the treated water entering the distribution system is also monitored and recorded continuously. Fluoride is added to a dosage of 0.70 mg/L concentration for dental health purposes. See Figures 1 and 2 for process flow diagram.

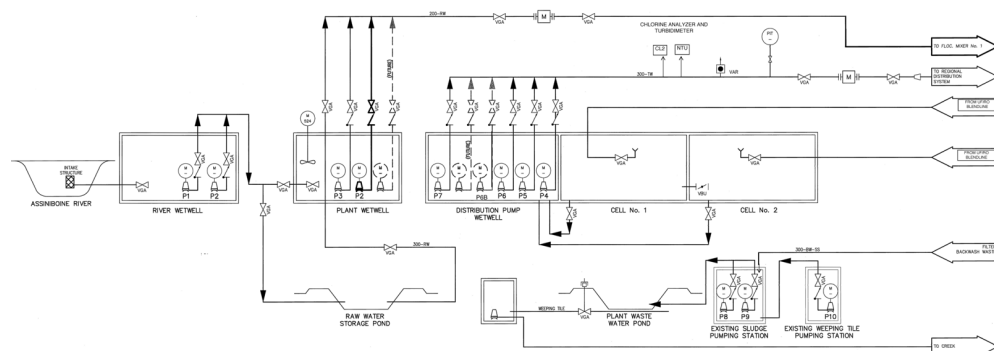


Figure 1 - Cartier WTP Process Flow Diagram 1 of 2

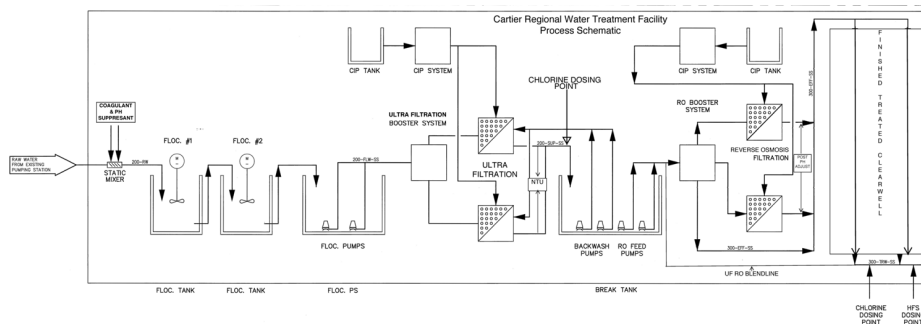


Figure 2 - Cartier WTP Flow Process Diagram 2 of 2

Headingley WTP:

The Headingley WTP operates similarly to the Cartier WTP. They both draw from the same water source and both contain SUEZ membrane equipment for water treatment. The main difference between the facilities in regard to treatment is that the finished treated water is not a blend of UF, and RO permeate. Headingley WTP uses calcite contactors that contain calcite media to add hardness/minerals back into the finished water. The main reason for this is to eliminate reintroducing organics and metals, such as manganese and iron into the finished water, which comes from the UF permeate when blended. The raw water flows into the facility and passes through 500-micron filters, pre-treated with a coagulant and pH depressed with carbon dioxide. It travels through two chambers that contain mixers. The mixers promote the reaction of coagulation; raw water particles bind together to form a pin floc. The pre-treated raw water flows into the UF feed chamber and UF feed pumps send the water to the UF membranes. The UF's provide 0.04-micron filtration and removes virtually all-particulate matter before reaching the RO membranes. Each UF membrane skid is equipped with a raw and permeate turbidimeter. The permeate turbidimeters are set to alarm at 0.1 NTU and production to shut down at 0.29 NTU. The turbidity is monitored continuously, and a value is captured every 5 minutes and reported on

a monthly report. The UF permeate is sent to the UF/RO break tank chambers, where the water is used to feed the RO membranes and as backwash water for the UF membranes. The UF permeate is treated with a low dose of chlorine to eliminate the potential for bio growth in the RO feed chambers. The RO feed pumps supply the RO membranes during operation. SBS is added upstream of the RO membranes to neutralize the chlorine. The RO permeate is produced and pH depressed before 50% of it passes through calcite contactors. The calcite and RO permeate blend to achieve a final water of 40-80 mg/L of hardness (CaCO_3). The Final treated water is pH corrected with sodium hydroxide and disinfected with chlorine before entering the clear well. The water flows through the clear well to achieve contact time between the treated water and the chlorine for sufficient disinfection prior to reaching the pump chamber. See Figure 3 for process overview.

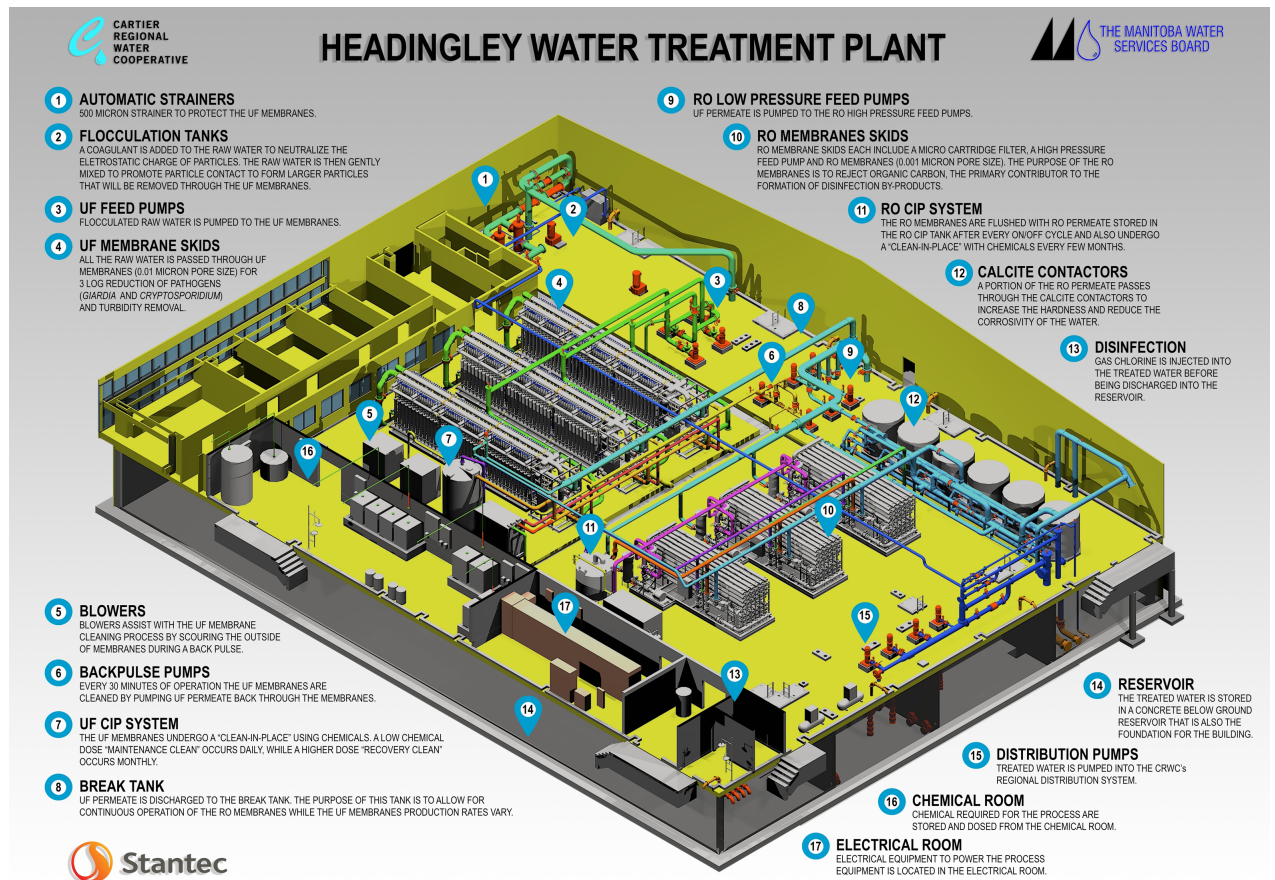


Figure 3 - Headingley WTP Treatment Process Overview

1.4. Distribution system:

Cartier WTP (36.00):

Treated water from the reservoir is pumped throughout the Cartier Regional distribution system via 1-5 horsepower (HP) jockey pump, 2-25 HP duty pumps, 1-30 HP duty pump, & 1-75 HP stand-by pump. These pumps are controlled by variable frequency drives (VFDs). The distribution system is partially looped and has an approximate piped length of 580 kilometers. Piping is comprised of both high-density polyethylene (HDPE) & polyvinylchloride (PVC) pipe. The Cartier Regional Water System services the RM of Cartier, Portage and Fannystelle. Figure 4 outlines the Cartier WTP service area.

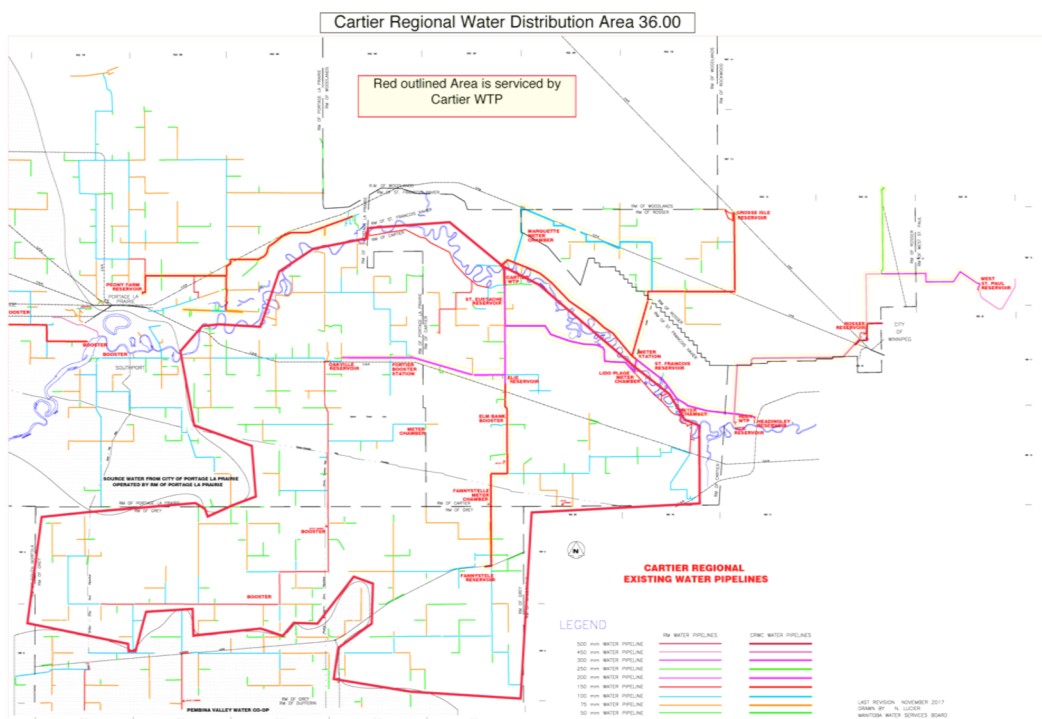


Figure 4 - 36.00 Cartier Regional Water Distribution System Map

Headingley WTP (89.40):

There are (4) distribution pumps that service three main headers that leave the facility into distribution. The Centerport distribution line services the Rosser Reservoir and RM of Rosser. From the Rosser Reservoir, treated water is pumped to the Stoney Mountain Institute and to the West St. Paul Reservoir, which services the RM of WSP. The RM of Headingley line services the Headingley Reservoir, RM of Headingley, St. Francois Xavier, RM of St. Francois Xavier, RM of Rosser and Grosse Isle Reservoir. The HCC/ WWTP lines service the Headingley Correctional Centre and the RM of Headingley Wastewater Treatment Plant. Figure 5 outlines the Headingley WTP service area.

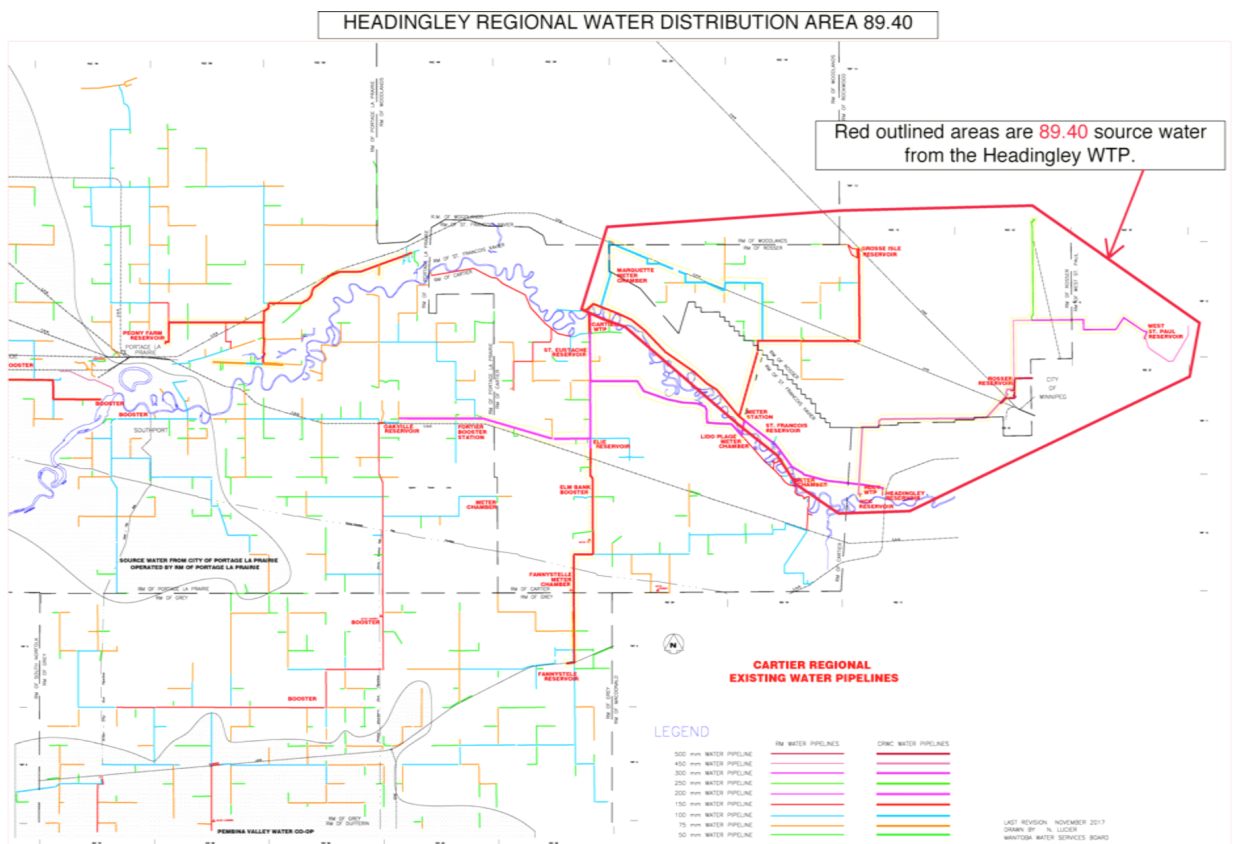


Figure 5 - 89.40 Headingley Regional Water Distribution System Map

Peony Farm (162.75):

The Cartier Regional Water Co-op owns and operates a facility located near the Peony Farm area in the RM of Portage la Prairie. The CRWC purchases treated water from the City of Portage la Prairie to fill the Peony Farm Reservoir. An incoming chlorine analyzer measures the amount of chlorine residual in the receiving water. If necessary, chlorine is added when the reservoir is filling. An outgoing chlorine analyzer measures the chlorine residuals leaving the facility to ensure that all regulations are met. There is a standby Generator that runs the facility in the case of a power event. A program to regularly flush the main lines from the facility to help improve water quality in the system has been implemented. Figure 6 is a map of the service area for the Peony Farm Reservoir (162.75).

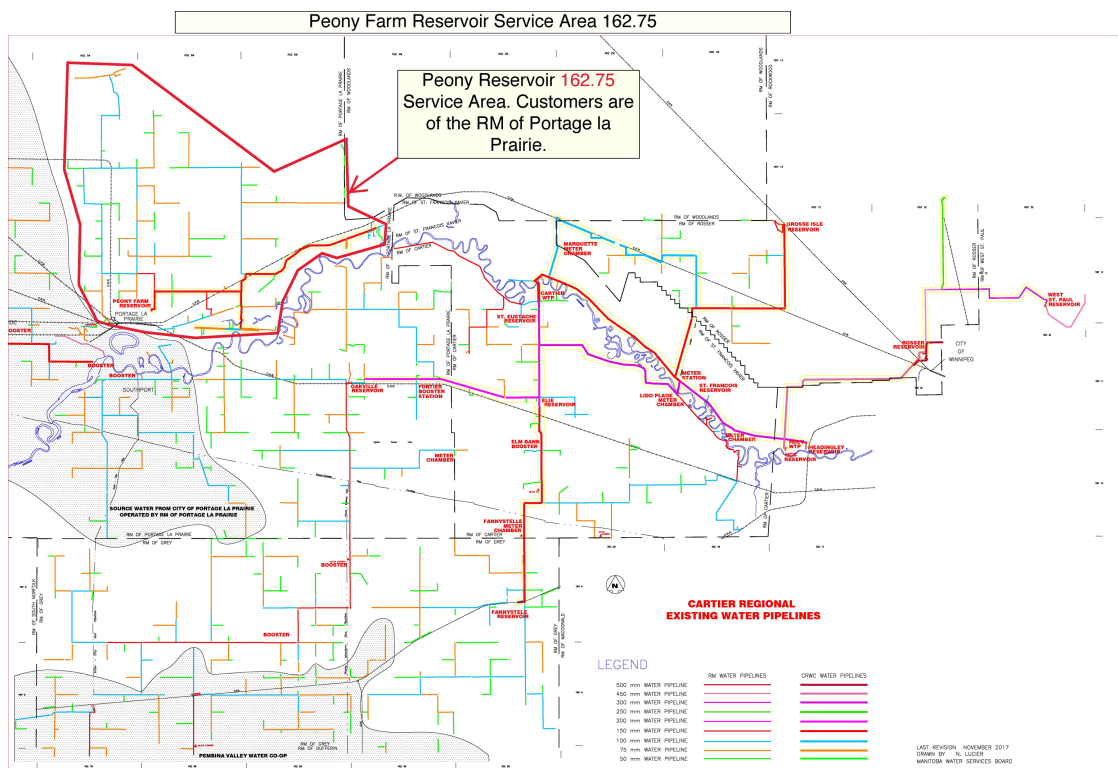


Figure 6 – 162.75 Peony Farm Service Area Map

The CRWC has an agreement for taking in the bacteriological samples for the RM of SFX under 211.50 and RM of Headingley under 89.50. A summary of the results can be found in Appendix D and E.

1.5. Storage reservoirs:

Cartier Regional WTP:	Raw Storage Reservoir Capacity:	60,000 M ³
Cartier Regional WTP:	Treated Reservoir Capacity:	3000 M ³
Elie Reservoir:	Treated Reservoir Capacity:	230 M ³
St. Eustache Reservoir:	Treated Reservoir Capacity:	76 M ³
Oakville Reservoir:	Treated Reservoir Capacity:	670 M ³
Fannystelle Reservoir:	Treated Reservoir Capacity:	150 M ³
Peony Farm Reservoir:	Treated Reservoir Capacity:	230 M ³
Headingley Regional WTP:	Raw Storage Reservoir Capacity	135,107 M ³
Headingley Regional WTP:	Treated Reservoir Capacity:	4400 M ³
Headingley Reservoir:	Treated Reservoir Capacity:	2400 M ³
SFX Reservoir:	Treated Reservoir Capacity:	400 M ³
Grosse Isle Reservoir:	Treated Reservoir Capacity:	400 M ³
Rosser Reservoir:	Treated Reservoir Capacity:	7600 M ³
West St. Paul Reservoir:	Treated Reservoir Capacity:	4809 M ³

1.6. Number of connections, population served and types of water users:

The Cartier Regional distribution system is comprised of 4477 service connections (all metered) serving a population of greater than 13,100 people in 8 different rural municipalities; the RM of Cartier, RM of Portage la Prairie, RM of St. François Xavier, RM of Headingley, RM of Grey, R.M. of Rockwood, and the RM of Rosser and RM of West St. Paul.

Table 1 - CRWC Population Served (as of 1 Dec 16)

	RM Residential	CRWC Residential	RM Comm/Institute	CRWC Comm/Institute
Portage la Prairie	1647	504	35	
Cartier	559	42	61	
Grey	229		23	
SFX	284	86	3	1
Headingley	957	6	83	
Rosser (includes Woodlands)	96	23	8	2
Rockwood	44			
TOTAL	3816	661	213	3
Total Residential	4477			
Total Comm/Institute	216			RM = municipal line
				CRWC = regional line
Population Served				
Residential	12312	4477 x 2.75		
Truck Fill	447	Estimate: 670,000 gallons sold in Nov @ 50 gal per person		
2 x prisons	350	Estimate: 300 at HCC, 50 at women's prison		
	13,100			

1.7 Classification and certification:

Table 2 - Classification and Certification for CRWC Facilities and Operators

Cartier Water Treatment Facility	Water Treatment Water Distribution	Class 4 Class 2
Headingley Water Treatment Facility	Water Treatment Water Distribution	Class 3 Class 2
Danielle Vaillant <i>Manager</i> <i>Cartier Regional Water Co-op</i>	Water Treatment Water Distribution Wastewater Treatment Wastewater Collection	Class 4 Class 2 Class 2 Class 2
Grant McGorman <i>Lead Operator</i> <i>Cartier Regional Water Treatment Facility</i>	Water Treatment Water Distribution Wastewater Treatment Wastewater Collection	Class 4 Class 2 Class 2 Class 2
Jason Tanguay <i>Operator</i> <i>Cartier Regional Water Treatment Facility</i>	Water Treatment Water Distribution Wastewater Treatment Wastewater Collection	Class 3 Class 2 Class 1 Class 1
Travis Reinsch <i>Operator</i> <i>Cartier Regional Water Treatment Facility</i>	Water Treatment Water Distribution	Class 1 Class 1
David Epler <i>Lead Operator</i> <i>Headingley Regional Water Treatment Facility</i>	Water Treatment Water Distribution Wastewater Treatment Wastewater Collection	Class 4 Class 2 Class 2 Class 2
Colter Milne <i>Operator</i> <i>Headingley Regional Water Treatment Facility</i>	Water Treatment Water Distribution	Class 3 Class 2
Nathan Benevides-Harris <i>Operator</i> <i>Headingley Regional Water Treatment Facility</i>	Water Treatment Water Distribution	Class 1 Class 1
Paige Jepsen <i>Safety and Technical Assistant</i> <i>Cartier Regional Water Co-op</i>	Water Treatment Water Distribution	Class 1 Class 1

*Operator and facility classification and certification falls under The Environment Act's Water and Wastewater Facility Operators Regulation.

2. *Disinfection System in Use:*

The final step in the treatment of safe water is disinfection. Disinfection is the selective destruction or inactivation of potential disease-causing organisms in water. As per the license issued under the *Drinking Water Safety Act*, the Cartier regional water Co-op must ensure that the water has a measurable free chlorine residual of at least:

- 0.5 mg/L in water entering the distribution system following a minimum contact time of 20 minutes
- 0.1 mg/L at all times at any point in the water distribution system

2.1. Type of disinfection system used:

The Cartier and Headingley Regional WTP's disinfects by adding chlorine gas to the treated water via Regal gas chlorinator systems. Sodium hypochlorite can also be added at all of the reservoirs if required.

2.2. Equipment redundancy and monitoring requirements:

As required by the *Drinking Water Safety Act*, the Cartier and Headingley Regional WTP ensures continuous disinfection is maintained at the plant by keeping in stock all spare parts required for the chlorination systems. As an additional backup, a complete spare chlorinator is also kept at the plants. At the Cartier WTP, two identical trains of UF and RO membranes are in place, each RO with a capacity of 30 liters per second. At the Headingley WTP, 3 identical trains of UF and RO membranes are in place, each RO with a capacity of 50 liters per second.

Disinfectant residuals are monitored continuously, capturing readings every 5 minutes at the water treatment plants and at the reservoirs. Residuals are also monitored on a regular basis when water samples are taken for bacterial analysis in the distribution system and recorded on the appropriate monitoring forms. Monthly chlorination report forms are sent to the regional Drinking Water Officer at the end of each month.

2.3. Disinfectant residual overall performance / results:

The Cartier Regional Water System has met all regulatory requirements in 2020 for monitoring and reporting disinfection residuals leaving the water treatment plants and in the distribution system.

3. List of Water Quality Standards:

The Province of Manitoba has adopted a number of water quality standards from the *Guidelines for Canadian Drinking Water Quality* developed by Health Canada. The health-based parameters express the maximum acceptable concentration. Concentration values in excess constitute a health-related issue and require corrective actions. The 2020 results for the Cartier and Headingley Regional Water System are summarized in the following tables:

Table 3 - Cartier WTP Chemistry Results – Spring 2020

Parameter	Standard	Frequency	Test Results
Bacterial; TC & EC **	0 TC, 0 EC	Weekly	100 % passed
Disinfectant Residual	WTP (> 0.5 mg/L)	Continuously	100 % compliance
“ “	Distribution (> 0.1 mg/L)	Continuously	100 % compliance
Turbidity	0.10 NTU *	Continuously	100 % compliance
Lead	0.005 mg/L	Annually	See appendix G
Fluoride	1.5 mg/L	“	“
Arsenic	0.01 mg/L	“	“
Antimony	0.006 mg/L	“	“
Barium	2 mg/L	“	“
Cadmium	0.005 mg/L	“	“
Chromium	0.05 mg/L	“	“
Copper	1 mg/L	“	“
Iron	0.30 mg/L	Regularly	“
Manganese	0.02 mg/L	Regularly	“
Nitrate	As Nitrogen; 10 mg/L	“	“
Nitrite	As Nitrogen; 1 mg/L	“	“
Selenium	0.05 mg/L	“	“
Uranium	0.02 mg/L	“	“
Trihalomethanes (THM) ***	0.100 mg/L	Quarterly	See appendix F
Halo acetic Acids (HAA's)****	0.08 mg/L	Quarterly	See appendix F

* NTU (Nephelometric turbidity unit)

** Bacterial testing: The raw water (untreated surface water), the treated water (leaving the water treatment facility) and the water in the distribution system is tested weekly (bi-weekly) for the presence of Total Coliform (TC) and *E. coli* (EC) bacteria. If these bacteria are present in the water, it is an indication that disease-causing organisms may also be present. Please see Appendix A, B, C, D, & E for a summary of the results.

*** THM: Trihalomethanes are formed when chlorine reacts with naturally occurring organic matter in the water. Studies have shown a link between high levels of THM's and cancer. For that reason, the province has set a health-based standard for THM's of 0.100 mg/L. The THM standard is based on an average of four samples per year. THM levels in four locations in the distribution system are tested on a quarterly basis every year. Please

see Appendix F for a summary of the results.

****HAA: Halo acetic Acids are formed when chlorine reacts with naturally occurring organic matter in the water. Studies have shown a link between high levels of HAA's and cancer. For that reason, the province has set a health-based standard for HAA's of 0.08 mg/L. The HAA standard is based on an average of four samples per year. HAA levels in four locations in the distribution system are tested on a quarterly basis every year. Please see Appendix F for a summary of the results.

A copy of the annual lab results can be found on our website at [Cartier WTP Chemistry](#)

Table 4 – Headingley WTP Chemistry Results – Fall 2019

Parameter	Standard	Frequency	Test Results
Bacterial; TC & EC **	0 TC, 0 EC	Biweekly	100 % passed
Disinfectant Residual	WTP (> 0.5 mg/L)	Continuously	100 % compliance
“ “	Distribution (> 0.1 mg/L)	Continuously	100 % compliance
Turbidity	0.30 NTU *	Continuously	100 % compliance
Lead	0.01 mg/L	Annually	See appendix H
Fluoride	1.5 mg/L	“	“
Arsenic	0.01 mg/L	“	“
Antimony	0.006 mg/L	“	“
Barium	1 mg/L	“	“
Boron	5 mg/L	“	“
Cadmium	0.005 mg/L	“	“
Chromium	0.05 mg/L	“	“
Copper	1 mg/L	“	“
Iron	0.30 mg/L	Regularly	“
Manganese	0.05 mg/L	Regularly	“
Nitrate	As Nitrogen; 10 mg/L	“	“
Selenium	0.05 mg/L	“	“
Uranium	0.02 mg/L	“	“
Trihalomethane (THM) ***	0.100 mg/L	Quarterly	See appendix F
Haloacetic Acids (HAA's) ****	0.08 mg/L	Quarterly	See appendix F

* NTU (Nephelometric turbidity unit)

** Bacterial testing: The raw water (untreated surface water), the treated water (leaving the water treatment facility) and the water in the distribution system is tested weekly (bi-weekly) for the presence of Total Coliform (TC) and *E. coli* (EC) bacteria. If these bacteria are present in the water, it is an indication that disease-causing organisms may also be present. Please see Appendix A, B, C, D, & E for a summary of the results.

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see Appendix F for a summary of the results.

****HAA: Halo acetic Acids are formed when chlorine reacts with naturally occurring organic matter in the water. Studies have shown a link between high levels of HAA's and cancer. For that reason, the province has set a health-based standard for HAA's of 0.08 mg/L. The HAA standard is based on an average of four samples per year. HAA levels in four locations in the distribution system are tested on a quarterly basis every year. Please see Appendix F for a summary of the results.

A copy of the annual lab results can be found on our website at [Headingley WTP Chemistry](#)

Table 5 – Water Quality and Treatment Standards – Peony Farm Reservoir (PWS 162.75)

Parameter	Quality Standard
Total Coliform	Less than one total coliform bacteria detectable per 100 mL in all distributed water
E. coli	Less than one E. coli bacteria detectable per 100 mL in all distributed water
Chlorine residual	A free chlorine residual of at least 0.10 mg/L at all times at any point in the distribution system
Total trihalomethanes (THMs)	Less than or equal to 0.10 mg/L as locational annual average of quarterly samples
Total haloacetic acids (HAAs)	Less than or equal to 0.08 mg/L as locational annual average of quarterly samples
Lead	Less than or equal to 0.01 mg/L in the water distribution system

A summary of the analysis for each of these parameters can be found on the annual water system report for the city of Portage la Prairie. A link to the City of Portage La Prairie annual water system report can be found at [Water & Sewer - City of Portage la Prairie](#)

3.1 Result improvement

The Cartier Regional Water Co-op has been monitoring Trihalomethanes (THM) for the past several years and has met the Provincial and Federal guidelines. The THM standard of 0.1 mg/L is based on a running average of quarterly samples and the health risks associated with elevated THM's are based on a lifetime exposure. The average THM result for 2020 was below the 0.100 mg/L regulation with the exception of 162.75 Peony Farm location.

4. Water System Incidents and Corrective Actions

There were no major water system incidents in 2020. Corrective actions were taken and reported as required for normal minor variations during the course of routine operations.

5. *Additional records required*

As part of Manitoba Health's fluoridation program, that is funded by the Manitoba Health, Seniors and Active Living, the Cartier WTP (36.00) collects water samples on a daily basis from the treated water reservoir and tested on site. Daily fluoride results are recorded, and a 14-day composite sample is submitted bi-weekly for analysis. The recommended level of fluoride in drinking water is 0.70 mg/L and the operating range set by Manitoba Health is 0.50-0.90 mg/L.

6. *Emergencies, Compliance Issues and Operational Issues*

In 2020, no Emergencies, Compliance Issues or Operational Issues occurred for the Cartier (36.00) and Headingley Regional Water System (89.40). Non-compliance incident for Peony Farm (162.75) for average THM levels failing to meet standard of less than or equal to 0.1 mg/L. This was discussed with the drinking water officer. It is suggested that the sample location be changed.

7. *Drinking Water Safety Orders on your System and Actions Taken in Response*

In 2020, no Drinking Water Safety Orders were issued for the Cartier and Headingley Regional Water System.

8. *Boil Water Advisories Issued and Actions Taken in Response*

In 2020, no Boil Water Advisories were issued for the Cartier and Headingley Regional Water System

9. *Warnings Issued or Charges Laid on the System in Accordance with The Drinking Water Safety Act:*

In accordance with the Drinking Water Safety Act, no warnings or charges were issued for the Cartier and Headingley Regional Water System

10. *Major Expenses Incurred*

Security - The CRWC has continued to implement higher security infrastructure for their facilities. Security improvements include cybersecurity and physical security. The updates will take several years, and we intend to exercise due diligence to make sure we are fully secure from any potential threats.

Drought Study - CRWC initiated a Drought Study to be completed by an engineer to assess risks associated with risks and steps to mitigate those risks. Completion is due to be done in early 2021.

Membrane Fouling Study - The CRWC has engaged an outside engineer to review the membrane equipment at both facilities to determine what may be causing the high-rate of fouling that we are seeing on the membranes. We are waiting for the university labs to reopen so we can move forward with the study.

Internet Upgrades - The CRWC underwent upgrade to their internet services in the locations where towers and equipment could be updated. These upgrades allow for more reliable internet and remote connection to our facilities.

Pump Upgrades - The CRWC upgraded the pump controls at the Rosser Reservoir location for the West St. Paul and Stoney Mountain line to include variable frequency drives. Various pump repairs were completed throughout the year. Failures were due to age and typical wear. As a preventative measure, a company was hired to do an overall inspection of our process and distribution pumps at each facility.

Membrane Purchase - The CRWC purchased new ultra-filtration membranes for the Cartier WTP location. They were installed in late fall/early winter.

GIS System - The CRWC continue to work towards completing their GIS system. Information has been gathered and review the work is underway. This will allow the CRWC to have a database of information for all CRWC infrastructure in the distribution system.

Elie Reservoir – Final review of specifications and design were completed for tender in early 2021.

Headingley Storage Ponds Rip Rap - the project to rip rap the Headingley Water Treatment Plant raw water storage pond was completed, although substantial completion remains to be declared.

WSP Supply Line Repairs –The CRWC has contracted out several repairs to the West St. Paul main supply line.

11. *Future System Expansion and/or Increased Production*

In 2020, a new Elie Reservoir will be built and commissioned. This facility is built to satisfy RM development and fire protection needs. A by-pass will be also tendered to bypass distribution water around the town of Elie to the town of Fannystelle.

The bulk water rate will increase from \$3.65 per cubic meter to \$3.72 per cubic meter as of April 1, 2021.

Appendix A: Cartier WTP 36.00 2020 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
08-Jan-20	CARTIER REGIONAL 1 - RAW	21	0	-	-
08-Jan-20	CARTIER REGIONAL 2 - TREATED	0	0	1.82	2.10
21-Jan-20	CARTIER REGIONAL 3 - DIST FANNYSTELLE RES IN	0	0	1.20	1.36
07-Jan-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.60	1.80
07-Jan-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.50	1.70
07-Jan-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.99	1.24
06-Jan-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	1	1.20	1.68
21-Jan-20	CARTIER REGIONAL 1 - RAW	10	1	-	-
21-Jan-20	CARTIER REGIONAL 2 - TREATED	0	0	1.81	2.20
21-Jan-20	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.60	1.90
21-Jan-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.40	1.60
21-Jan-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.50	1.70
20-Jan-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.20	1.36
22-Jan-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.39	1.62
04-Feb-20	CARTIER REGIONAL 1 - RAW	4	0	-	-
04-Feb-20	CARTIER REGIONAL 2 - TREATED	0	0	1.46	1.64
03-Feb-20	CARTIER REGIONAL 3 - DIST @ St. EUSTACHE RESERVOIR IN	0	0	1.40	1.60
03-Feb-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.40	1.60
03-Feb-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.20	1.40
05-Feb-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.89	1.13
04-Feb-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.38	1.48
18-Feb-20	CARTIER REGIONAL 1 - RAW	24	2	-	-
18-Feb-20	CARTIER REGIONAL 2 - TREATED	0	0	1.75	1.96
18-Feb-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.60	1.80
18-Feb-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.60	1.80
19-Feb-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.97	1.13
19-Feb-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.50	1.65
18-Feb-20	CARTIER REGIONAL 3- DIST @ -----> ELM BANK BOOSTER	0	0	1.55	1.78
03-Mar-20	CARTIER REGIONAL 1 - RAW	11	0	-	-
03-Mar-20	CARTIER REGIONAL 2 - TREATED	0	0	1.69	1.89
03-Mar-20	CARTIER REGIONAL 3 - DIST @OAKVILLE RESERVOIR IN	0	0	1.52	1.80
02-Mar-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.50	1.70
02-Mar-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.50	1.70
03-Mar-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.16	1.13

03-Mar-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.51	1.69
03-Mar-20	CARTIER REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.29	0.77
17-Mar-20	CARTIER REGIONAL 1 - RAW	12	0	-	-
17-Mar-20	CARTIER REGIONAL 2 - TREATED	0	0	1.63	1.83
05-Mar-20	CARTIER REGIONAL 3 - DIST FANNYSTELLE RES IN	0	0	1.29	1.41
16-Mar-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.50	1.60
16-Mar-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.70	1.80
16-Mar-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.10	1.34
16-Mar-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.20	1.41
31-Mar-20	CARTIER REGIONAL 1 - RAW	70	0	-	-
31-Mar-20	CARTIER REGIONAL 2 - TREATED	0	0	1.68	1.86
31-Mar-20	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.74	1.95
31-Mar-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.55	1.76
31-Mar-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.58	1.77
31-Mar-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.24	1.45
31-Mar-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.49	1.68
14-Apr-20	CARTIER REGIONAL 1 - RAW	16	1	-	-
14-Apr-20	CARTIER REGIONAL 2 - TREATED	0	0	1.46	1.73
14-Apr-20	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE IN	0	0	1.52	1.71
14-Apr-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.40	1.57
14-Apr-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.42	1.57
14-Apr-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.10	1.27
14-Apr-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.38	1.59
28-Apr-20	CARTIER REGIONAL 1 - RAW	5	0	-	-
28-Apr-20	CARTIER REGIONAL 2 - TREATED	0	0	1.48	1.65
28-Apr-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.40	1.55
28-Apr-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.46	1.64
28-Apr-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.14	1.30
28-Apr-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.28	1.46
28-Apr-20	CARTIER REGIONAL 3- DIST @ -----> FORTIER BOOSTER	0	0	1.41	1.63
12-May-20	CARTIER REGIONAL 1 - RAW	4	1	-	-
12-May-20	CARTIER REGIONAL 2 - TREATED	0	0	1.48	1.62
12-May-20	CARTIER REGIONAL 3 - DIST @ OAKVILLE RES IN	0	0	1.28	1.47
11-May-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.31	1.46
11-May-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.30	1.43
12-May-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.06	1.20
12-May-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.14	1.30
12-May-20	CARTIER REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.36	0.64
26-May-20	CARTIER REGIONAL 1 - RAW	11	5	-	-
26-May-20	CARTIER REGIONAL 2 - TREATED	0	0	1.11	1.25

26-May-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.03	1.16
26-May-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.18	1.34
26-May-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.17	1.35
26-May-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.69	0.78
26-May-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.17	1.32
09-Jun-20	CARTIER REGIONAL 1 - RAW	74	12	-	-
09-Jun-20	CARTIER REGIONAL 2 - TREATED	0	0	1.29	1.40
08-Jun-20	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.20	1.40
08-Jun-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.20	1.40
08-Jun-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.10	1.30
08-Jun-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.05	1.22
10-Jun-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.01	1.13
23-Jun-20	CARTIER REGIONAL 1 - RAW	>200	9	-	-
23-Jun-20	CARTIER REGIONAL 2 - TREATED	0	0	1.78	1.92
22-Jun-20	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE IN	0	0	1.60	1.80
22-Jun-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.50	1.70
22-Jun-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.40	1.60
24-Jun-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.12	1.32
23-Jun-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.41	1.51
07-Jul-20	CARTIER REGIONAL 1 - RAW	>200	14	-	-
07-Jul-20	CARTIER REGIONAL 2 - TREATED	0	0	1.33	1.44
06-Jul-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.20	1.30
06-Jul-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.10	1.30
06-Jul-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.02	1.16
07-Jul-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	0.98	1.14
07-Jul-20	CARTIER REGIONAL 3- DIST @ -----> ELM BANK BOOSTER	0	0	1.18	1.31
21-Jul-20	CARTIER REGIONAL 1 - RAW	>200	4	-	-
21-Jul-20	CARTIER REGIONAL 2 - TREATED	0	0	1.23	1.34
21-Jul-20	CARTIER REGIONAL 3 - DIST @ OAKVILLE RES IN	0	0	1.24	1.61
20-Jul-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.10	1.30
20-Jul-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.10	1.20
20-Jul-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.98	1.10
21-Jul-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.24	1.60
21-Jul-20	CARTIER REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.05	0.67
04-Aug-20	CARTIER REGIONAL 1 - RAW	200	3	-	-
04-Aug-20	CARTIER REGIONAL 2 - TREATED	0	0	1.27	1.42
04-Aug-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	0.99	1.12
04-Aug-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.30	1.50
04-Aug-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.20	1.40
04-Aug-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.02	1.17

04-Aug-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.14	1.34
18-Aug-20	CARTIER REGIONAL 1 - RAW	>200	15	-	-
18-Aug-20	CARTIER REGIONAL 2 - TREATED	0	0	1.30	1.44
18-Aug-20	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.16	1.31
18-Aug-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.13	1.25
18-Aug-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.10	1.25
19-Aug-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.98	1.06
17-Aug-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.31	1.76
01-Sep-20	CARTIER REGIONAL 1 - RAW	>200	5	-	-
01-Sep-20	CARTIER REGIONAL 2 - TREATED	0	0	1.66	1.85
31-Aug-20	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE IN	0	0	1.30	1.50
31-Aug-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.30	1.50
31-Aug-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.20	1.40
31-Aug-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.98	1.12
31-Aug-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.27	1.41
14-Sep-20	CARTIER REGIONAL 1 - RAW	145	16	-	-
14-Sep-20	CARTIER REGIONAL 2 - TREATED	0	0	1.73	1.89
14-Sep-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.50	1.70
14-Sep-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.50	1.70
09-Sep-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.29	1.34
14-Sep-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.04	1.27
14-Sep-20	CARTIER REGIONAL 3- DIST @ -----> FORTIER BOOSTER	0	0	1.57	1.76
29-Sep-20	CARTIER REGIONAL 1 - RAW	145	5	-	-
29-Sep-20	CARTIER REGIONAL 2 - TREATED	0	0	1.56	1.76
28-Sep-20	CARTIER REGIONAL 3 - DIST @ OAKVILLE RES IN	0	0	1.24	1.37
28-Sep-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.30	1.50
28-Sep-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.30	1.50
28-Sep-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.08	1.17
28-Sep-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.16	1.34
28-Sep-20	CARTIER REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.40	0.90
13-Oct-20	CARTIER REGIONAL 1 - RAW	50	50	-	-
13-Oct-20	CARTIER REGIONAL 2 - TREATED	0	0	1.44	1.65
13-Oct-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.32	1.51
13-Oct-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.30	1.50
13-Oct-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.30	1.50
13-Oct-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.12	1.31
13-Oct-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.25	1.38
27-Oct-20	CARTIER REGIONAL 1 - RAW	12	12	-	-
27-Oct-20	CARTIER REGIONAL 2 - TREATED	0	0	1.37	1.58
26-Oct-20	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.30	1.50

26-Oct-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.20	1.40
26-Oct-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.30	1.50
27-Oct-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.97	1.17
26-Oct-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.36	1.64
10-Nov-20	CARTIER REGIONAL 1 - RAW	6	0	-	-
10-Nov-20	CARTIER REGIONAL 2 - TREATED	0	0	1.26	1.49
09-Nov-20	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE IN	0	0	1.30	1.50
09-Nov-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.10	1.30
09-Nov-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.10	1.30
09-Nov-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.86	0.98
10-Nov-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.16	1.39
24-Nov-20	CARTIER REGIONAL 1 - RAW	3	1	-	-
24-Nov-20	CARTIER REGIONAL 2 - TREATED	0	0	1.58	1.79
23-Nov-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.30	1.50
23-Nov-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.30	1.50
24-Nov-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.99	1.14
23-Nov-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.22	1.46
24-Nov-20	CARTIER REGIONAL 3 - DIST @ -----> FORTIER	0	0	1.36	1.55
08-Dec-20	CARTIER REGIONAL 1 - RAW	1	0	0	0
08-Dec-20	CARTIER REGIONAL 2 - TREATED	0	0	1.44	1.63
07-Dec-20	CARTIER REGIONAL 3 - DIST @ OAKVILLE RES IN	0	0	1.52	2.08
07-Dec-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.40	1.60
07-Dec-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.20	1.40
07-Dec-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.12	1.31
07-Dec-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.28	1.55
08-Dec-20	CARTIER REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.1	0.53
22-Dec-20	CARTIER REGIONAL 1 - RAW	4	0	0	0
22-Dec-20	CARTIER REGIONAL 2 - TREATED	0	0	1.38	1.58
21-Dec-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.14	1.34
22-Dec-20	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.3	1.5
22-Dec-20	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.4	1.6
21-Dec-20	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.11	1.22
21-Dec-20	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.21	1.44

Appendix B: Headingley WTP 89.40 2020 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
31-Dec-21	HEADINGLEY REGIONAL 1 - RAW	38	3	-	-
31-Dec-21	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.31	1.50
31-Dec-21	HEADINGLEY REGIONAL 3 - DIST @ -----> GI RES IN	0	0	0.52	0.70
31-Dec-21	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.30	1.45
31-Dec-21	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.20	1.24
31-Dec-21	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.25	1.32
31-Dec-21	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.75	0.91
30-Dec-21	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	0.78	0.89
14-Jan-20	HEADINGLEY REGIONAL 1 - RAW	41	3	-	-
14-Jan-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.24	1.49
14-Jan-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.31	1.38
14-Jan-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.17	1.22
14-Jan-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.20	1.27
14-Jan-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.70	0.87
14-Jan-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HCC IN	0	0	1.31	1.38
14-Jan-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	0.88	0.97
11-Feb-20	HEADINGLEY REGIONAL 1 - RAW	50	2	-	-
11-Feb-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.21	1.28
11-Feb-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.31	1.37
11-Feb-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.22	1.27
11-Feb-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.29	1.32
11-Feb-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.71	0.85
11-Feb-20	HEADINGLEY REGIONAL 3 - DIST @ -----> Fast Enterprises	0	0	1.29	1.35
11-Feb-20	HEADINGLEY REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.14	0.73
11-Feb-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	0.95	1.11
25-Feb-20	HEADINGLEY REGIONAL 1 - RAW	101	5	-	-
25-Feb-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.18	1.24
25-Feb-20	HEADINGLEY REGIONAL 3 - DIST @ -----> W.S.P. RES. IN	0	0	1.22	1.29
25-Feb-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.18	1.31
24-Feb-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.23	1.27
25-Feb-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.08	1.25
24-Feb-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.68	0.83
25-Feb-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.10	1.20

10-Mar-20	HEADINGLEY REGIONAL 1 - RAW	32	0	-	-
10-Mar-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.25	1.33
09-Mar-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY RES IN	0	0	1.38	1.45
09-Mar-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.39	1.49
10-Mar-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.16	1.23
09-Mar-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.12	1.26
10-Mar-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.81	1.00
10-Mar-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.15	1.25
24-Mar-20	HEADINGLEY REGIONAL 1 - RAW	11	0	-	-
24-Mar-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	0.78	0.83
24-Mar-20	HEADINGLEY REGIONAL 3 - DIST @ -----> ROSSER RES IN	0	0	1.28	1.35
23-Mar-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.12	1.25
24-Mar-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.23	1.31
23-Mar-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.18	1.24
24-Mar-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.73	0.91
24-Mar-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.14	1.26
07-Apr-20	HEADINGLEY REGIONAL 1 - RAW	>200	0	-	-
07-Apr-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.32	1.42
06-Apr-20	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX RES IN	0	0	1.35	1.43
07-Apr-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.40	1.66
07-Apr-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.16	1.24
06-Apr-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.25	1.34
07-Apr-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.75	0.95
07-Apr-20	HEADINGLEY REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.29	0.79
07-Apr-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.07	1.12
21-Apr-20	HEADINGLEY REGIONAL 1 - RAW	27	1	-	-
21-Apr-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.29	1.34
21-Apr-20	HEADINGLEY REGIONAL 3 - DIST @ -----> G.I. RES IN	0	0	1.03	1.20
21-Apr-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.34	1.42
21-Apr-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.30	1.34
21-Apr-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.08	1.15
21-Apr-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.75	0.91
21-Apr-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.08	1.20
05-May-20	HEADINGLEY REGIONAL 1 - RAW	14	4	-	-
05-May-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.27	1.31
05-May-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HCC IN	0	0	1.26	1.34
04-May-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.27	1.35

05-May-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.27	1.32
04-May-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.12	1.19
05-May-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.70	0.87
05-May-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.17	1.19
19-May-20	HEADINGLEY REGIONAL 1 - RAW	15	8	-	-
19-May-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.25	1.31
19-May-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY W.W.T.P.	0	0	1.30	1.39
19-May-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.32	1.48
19-May-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.24	1.31
19-May-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.30	1.37
19-May-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.74	0.90
19-May-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.19	1.20
02-Jun-20	HEADINGLEY REGIONAL 1 - RAW	59	16	-	-
02-Jun-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.17	1.23
02-Jun-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.32	1.42
02-Jun-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.22	1.26
02-Jun-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.13	1.22
02-Jun-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.84	0.97
02-Jun-20	HEADINGLEY REGIONAL 3 - DIST @ -----> FAST Ent.	0	0	1.10	1.19
02-Jun-20	HEADINGLEY REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.05	0.34
02-Jun-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.23	1.25
16-Jun-20	HEADINGLEY REGIONAL 1 - RAW	62	3	-	-
16-Jun-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.17	1.22
16-Jun-20	HEADINGLEY REGIONAL 3 - DIST @ -----> W.S.P. RES. IN	0	0	1.13	1.16
16-Jun-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.23	1.33
16-Jun-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.18	1.25
15-Jun-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.15	1.21
16-Jun-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.70	0.84
16-Jun-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.18	1.21
30-Jun-20	HEADINGLEY REGIONAL 1 - RAW	165	5	-	-
30-Jun-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.21	1.26
29-Jun-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY RES IN	0	0	1.37	1.49
29-Jun-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.30	1.39
30-Jun-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.15	1.20
29-Jun-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.33	1.42
30-Jun-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.75	0.90
02-Jul-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.08	1.09

14-Jul-20	HEADINGLEY REGIONAL 1 - RAW	>200	3	-	-
14-Jul-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.17	1.23
14-Jul-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.30	1.36
14-Jul-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.16	1.20
14-Jul-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.18	1.24
14-Jul-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.83	0.94
14-Jul-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.12	1.19
28-Jul-20	HEADINGLEY REGIONAL 1 - RAW	200	5	-	-
28-Jul-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.25	1.38
28-Jul-20	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX RES IN	0	0	0.92	1.03
28-Jul-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.20	1.35
28-Jul-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.23	1.27
28-Jul-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.19	1.29
28-Jul-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.72	0.85
28-Jul-20	HEADINGLEY REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.05	0.51
28-Jul-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.08	1.12
11-Aug-20	HEADINGLEY REGIONAL 1 - RAW	145	15	-	-
11-Aug-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.25	1.31
11-Aug-20	HEADINGLEY REGIONAL 3 - DIST @ -----> G.I. RES IN	0	0	0.73	0.92
11-Aug-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.35	1.42
11-Aug-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.22	1.27
10-Aug-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.18	1.30
11-Aug-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.65	0.77
11-Aug-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.06	1.15
25-Aug-20	HEADINGLEY REGIONAL 1 - RAW	>200	14	-	-
25-Aug-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.32	1.36
25-Aug-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.35	1.44
25-Aug-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.25	1.35
25-Aug-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.21	1.33
25-Aug-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.72	0.86
25-Aug-20	HEADINGLEY REGIONAL 3 - DIST @ -----> H.C.C.	0	0	1.35	1.36
25-Aug-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.15	1.19
08-Sep-20	HEADINGLEY REGIONAL 1 - RAW	>200	145	-	-
08-Sep-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.38	1.43
08-Sep-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.43	1.50
08-Sep-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.26	1.30
08-Sep-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.22	1.29
08-Sep-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.78	0.90

08-Sep-20	HEADINGLEY REGIONAL 3 - DIST @ -----> WWTP	0	0	1.27	1.48
08-Sep-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.18	1.20
21-Sep-20	HEADINGLEY REGIONAL 1 - RAW	>200	>200	-	-
21-Sep-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.32	1.36
21-Sep-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.49	1.56
22-Sep-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.37	1.41
21-Sep-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.32	1.41
22-Sep-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.93	1.06
21-Sep-20	HEADINGLEY REGIONAL 3 - DIST @ -----> FAST ENT.	0	0	1.38	1.41
21-Sep-20	HEADINGLEY REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.23	0.77
22-Sep-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.15	1.22
05-Oct-20	HEADINGLEY REGIONAL 1 - RAW	>200	>200	-	-
05-Oct-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.19	1.26
06-Oct-20	HEADINGLEY REGIONAL 3 - DIST @ -----> W.S.P. RES. IN	0	0	1.11	1.15
05-Oct-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.16	1.21
06-Oct-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.16	1.22
05-Oct-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.14	1.17
06-Oct-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.83	0.96
06-Oct-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.23	1.30
20-Oct-20	HEADINGLEY REGIONAL 1 - RAW	200	36	-	-
20-Oct-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.38	1.46
20-Oct-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY RES. IN	0	0	1.40	1.61
20-Oct-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.41	1.48
20-Oct-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.06	1.14
20-Oct-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.30	1.42
20-Oct-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.81	0.91
20-Oct-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.00	1.05
02-Nov-20	HEADINGLEY REGIONAL 1 - RAW	118	14	-	-
02-Nov-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.38	1.46
03-Nov-20	HEADINGLEY REGIONAL 3 - DIST @ -----> ROSSER RES IN	0	0	1.44	1.48
02-Nov-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.42	1.53
03-Nov-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.20	1.28
02-Nov-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.33	1.53
03-Nov-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.88	0.97
03-Nov-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	0.94	1.04
17-Nov-20	HEADINGLEY REGIONAL 1 - RAW	9	2	-	-
17-Nov-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.40	1.45

17-Nov-20	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX RES IN	0	0	1.41	1.47
17-Nov-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.44	1.52
17-Nov-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.24	1.30
17-Nov-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.39	1.48
17-Nov-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.98	1.04
17-Nov-20	HEADINGLEY REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.47	0.92
17-Nov-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	0.99	1.04
01-Dec-20	HEADINGLEY REGIONAL 1 - RAW	10	0	-	-
01-Dec-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.38	1.47
01-Dec-20	HEADINGLEY REGIONAL 3 - DIST @ -----> GI RES IN	0	0	1.39	1.44
01-Dec-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.52	1.59
01-Dec-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.33	1.40
01-Dec-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.39	1.49
01-Dec-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	1.06	1.12
01-Dec-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.06	1.10
14-Dec-20	HEADINGLEY REGIONAL 1 - RAW	8	0	-	-
14-Dec-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.41	1.48
14-Dec-20	HEADINGLEY REGIONAL 3 - DIST @ -----> H.C.C.	0	0	1.54	1.58
14-Dec-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.50	1.56
15-Dec-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.38	1.43
14-Dec-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.47	1.52
15-Dec-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	1.11	1.17
15-Dec-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.09	1.14
29-Dec-20	HEADINGLEY REGIONAL 1 - RAW	3	0	-	-
29-Dec-20	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.43	1.48
29-Dec-20	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY W.W.T.P.	0	0	1.46	1.54
29-Dec-20	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.44	1.51
29-Dec-20	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.42	1.47
29-Dec-20	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.31	1.37
29-Dec-20	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	1.14	1.23
30-Dec-20	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.18	1.27

Appendix C: RM of Headingley 89.50 2020 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
31-Dec-21	HEADINGLEY 3 - DIST @ --> TAILLIEU CONST.	0	0	1.17	1.23
14-Jan-20	HEADINGLEY 3 - DIST @ --> MOTEL 6	0	0	1.34	1.44
11-Feb-20	HEADINGLEY 3 - DIST @ --> FIRE HALL	0	0	1.11	1.16
25-Feb-20	HEADINGLEY 3 - DIST @ --> NOVENTIS C.U.	0	0	1.23	1.31
10-Mar-20	HEADINGLEY 3 - DIST @ --> HDLY LIBRARY	0	0	1.24	1.32
23-Mar-20	HEADINGLEY 3 - DIST @ --> MOTEL 6	0	0	1.16	1.24
07-Apr-20	HEADINGLEY 3 - DIST @ --> FLYING J	0	0	1.42	1.47
21-Apr-20	HEADINGLEY 3 - DIST @ --> COLUMBIA INSURANCE	0	0	1.29	1.35
05-May-20	HEADINGLEY 3 - DIST @ --> HEADINGLEY GRILL	0	0	1.29	1.40
19-May-20	HEADINGLEY 3 - DIST @ --> TAILLIEU CONST.	0	0	1.00	1.17
02-Jun-20	HEADINGLEY 3 - DIST @ --> MOTEL 6	0	0	1.23	1.30
16-Jun-20	HEADINGLEY 3 - DIST @ --> PHOENIX SCHOOL	0	0	1.03	1.11
29-Jun-20	HEADINGLEY 3 - DIST @ --> HDLY SPORT SHOP	0	0	1.29	1.35
14-Jul-20	HEADINGLEY 3 - DIST @ --> FLYING J	0	0	1.13	1.20
28-Jul-20	HEADINGLEY 3 - DIST @ --> NOVENTIS C.U.	0	0	1.16	1.23
11-Aug-20	HEADINGLEY 3 - DIST @ --> FIRE HALL	0	0	1.06	1.18
25-Aug-20	HEADINGLEY 3 - DIST @ --> PHOENIX SCHOOL	0	0	1.16	1.40
08-Sep-20	HEADINGLEY 3 - DIST @ --> COMMUNITY CENTER	0	0	0.68	0.75
21-Sep-20	HEADINGLEY 3 - DIST @ --> MOTEL 6	0	0	1.38	1.47
05-Oct-20	HEADINGLEY 3 - DIST @ --> HDLY SPORT SHOP	0	0	1.24	1.31
20-Oct-20	HEADINGLEY 3 - DIST @ --> COLUMBIA INSURANCE	0	0	1.27	1.36
02-Nov-20	HEADINGLEY 3 - DIST @ --> GLENAT ENT.	0	0	1.41	1.49
17-Nov-20	HEADINGLEY 3 - DIST @ --> TAILLIEU CONST.	0	0	1.05	1.09
01-Dec-20	HEADINGLEY 3 - DIST @ --> NOVENTIS C.U.	0	0	1.47	1.58
14-Dec-20	HEADINGLEY 3 - DIST @ --> PHOENIX SCHOOL	0	0	1.33	1.39
29-Dec-20	HEADINGLEY 3 - DIST @ --> FLYING J	0	0	1.28	1.32

Appendix D: RM of St Francois Xavier 211.50 2020 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
31-Dec-21	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	0	0	1.28	1.37
14-Jan-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.34	1.42
11-Feb-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.26	1.35
25-Feb-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.04	1.18
09-Mar-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	0	0	1.09	1.25
23-Mar-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.13	1.29
06-Apr-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.25	1.36
21-Apr-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.15	1.27
04-May-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.13	1.45
19-May-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.16	1.29
02-Jun-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.04	1.14
15-Jun-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	0	0	1.03	1.24
29-Jun-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.23	1.34
14-Jul-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	0	0	1.23	1.29
27-Jul-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.17	1.25
10-Aug-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.20	1.28
25-Aug-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	0	0	1.22	1.30
08-Sep-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.11	1.22
21-Sep-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.16	1.46
05-Oct-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> VET	0	0	1.01	1.12
20-Oct-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> CAISSE POPULAIRE	0	0	1.16	1.27
02-Nov-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	0	0	1.36	1.45
17-Nov-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.39	1.50
01-Dec-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.45	1.54
14-Dec-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	0	0	1.29	1.35
29-Dec-20	ST. FRANCOIS XAVIER 3 - DIST @ ---> VET	0	0	1.23	1.52

Appendix E: Peony Farm Reservoir 162.75 2020 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
14-Jan-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.27	1.68
14-Jan-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.35	0.62
27-Jan-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.21	1.55
27-Jan-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.11	0.56
11-Feb-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.89	1.38
11-Feb-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.25	0.49
27-Feb-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.19	1.47
27-Feb-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.43	0.56
11-Mar-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.37	1.65
11-Mar-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.10	0.46
24-Mar-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.71	0.92
24-Mar-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.23	0.65
07-Apr-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.30	1.63
07-Apr-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.29
21-Apr-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.88	1.15
21-Apr-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.38	0.64
28-Apr-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.00	0.00
28-Apr-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.22	0.39
05-May-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.35	1.71
05-May-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.54
19-May-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.05	1.44
19-May-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.26
01-Jun-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.79	1.13
01-Jun-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.19	0.33
16-Jun-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.18	1.54
16-Jun-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.60	0.98
30-Jun-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.94	1.16
30-Jun-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.17	0.31
14-Jul-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.30	1.70
14-Jul-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.81	1.13
27-Jul-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.84	1.13
27-Jul-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.24	0.51
08-Aug-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.48	1.55
08-Aug-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.61	0.77
24-Aug-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.48	1.29
24-Aug-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.48	0.83
10-Sep-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.35	1.68
10-Sep-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.19	0.67

21-Sep-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.18	1.39
21-Sep-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.31
05-Oct-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.24	1.49
05-Oct-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.27
19-Oct-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.09	1.41
19-Oct-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.29
03-Nov-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	2.20	2.30
03-Nov-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.48	0.70
30-Nov-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.99	1.17
30-Nov-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.31
16-Dec-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.32	1.66
16-Dec-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.24	0.68
29-Dec-20	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.13	1.50
29-Dec-20	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.39	0.77

Appendix F: Cartier and Headingley Regional Water System THM and HAA Results

Disinfection By-product Report - THMs and HAAs

Water System Name: **Cartier Regional Water Co-op** Water System Code: **36.00**
 Year: **2020** Operator -in-charge (Print): **Danielle Vaillant/Grant McGorman**

Total Trihalomethanes (THMs) [mg/L]	
Sampling Location #1: Oakville In	
1st Quarter	0.0583
2nd Quarter	0.0669
3rd Quarter	0.1160
4th Quarter	0.0450
Yearly Average (mg/L)	0.0716
Yearly Average (ug/L)	71.55
Sampling Location #2: Fannystelle In	
1st Quarter	0.0647
2nd Quarter	0.0604
3rd Quarter	0.1040
4th Quarter	0.0546
Yearly Average (mg/L)	0.0709
Yearly Average (ug/L)	70.93

Total Halo Acetic Acids (HAAs) [mg/L]	
Sampling Location #1: Fortier Booster	
1st Quarter	0.0492
2nd Quarter	0.0260
3rd Quarter	0.0351
4th Quarter	0.0313
Yearly Average (mg/L)	0.0354
Yearly Average (ug/L)	35.40
Sampling Location #2: Elm Bank Booster	
1st Quarter	0.0565
2nd Quarter	0.0280
3rd Quarter	0.0406
4th Quarter	0.0292
Yearly Average (mg/L)	0.0386
Yearly Average (ug/L)	38.58

Disinfection By-product Report - THMs and HAAs

Water System Name: **Peony Farm** Water System Code: **162.75**
 Year: **2020** Operator -in-charge (Print): **Danielle Vaillant/Grant McGorman**

Total Trihalomethanes (THMs) [mg/L]	
Sampling Location #1: Poplar Point Rink	
1st Quarter	0.134
2nd Quarter	0.0808
3rd Quarter	0.1500
4th Quarter	0.0822
Yearly Average (mg/L)	0.1118
Yearly Average (ug/L)	111.75

Total Halo Acetic Acids (HAAs) [mg/L]	
Sampling Location #1: Highbluff Community Hall	
1st Quarter	0.0352
2nd Quarter	0.0349
3rd Quarter	0.09
4th Quarter	0.0296
Yearly Average (mg/L)	0.0474
Yearly Average (ug/L)	47.43

Disinfection By-product Report - THMs and HAAs

Water System Name: **Headingley Regional Water System** Water System Code: **89.40**

Year: **2020**

Operator -in-charge (Print): **Danielle Vaillant/Dave Epler**

Total Trihalomethanes (THMs) [mg/L]

Sampling Location #1: GROSSE ISLE IN

1st Quarter	0.0767
2nd Quarter	0.0641
3rd Quarter	0.0983
4th Quarter	0.0216
Yearly Average (mg/L)	0.065175
Yearly Average (ug/L)	65.1750

Sampling Location #2: WEST ST. PAUL IN

1st Quarter	0.0108
2nd Quarter	0.0154
3rd Quarter	0.0543
4th Quarter	0.0108
Yearly Average (mg/L)	0.022825
Yearly Average (ug/L)	22.8250

Total Halo Acetic Acids (HAAs) [mg/L]

*lower than (<)

Sampling Location #1: SFX IN

1st Quarter	0.0055	
2nd Quarter	0.0054	*
3rd Quarter	0.0288	
4th Quarter	0.0054	*
Yearly Average (mg/L)	0.011275	
Yearly Average (ug/L)	11.2750	

*lower than (<)

Sampling Location #2: ROSSER IN

1st Quarter	0.0054	*
2nd Quarter	0.0054	*
3rd Quarter	0.0054	*
4th Quarter	0.0054	*
Yearly Average (mg/L)	0.0054	*
Yearly Average (ug/L)	< 5.4	*

Disinfection By-product Report - THMs and HAAs

Water System Name: **Rural Municipality of Headingley** Water System Code: **89.50**

Year: **2020**

Operator-in-charge (Print): **Danielle Vaillant/Dave Epler**

Total Trihalomethanes (THMs) [mg/L]	
Sampling Location #1: TAILLIEU CONST.	
1st Quarter	0.0101
2nd Quarter	0.0215
3rd Quarter	0.0529
4th Quarter	0.0082
Yearly Average (mg/L)	0.023175
Yearly Average (ug/L)	23.175

Total Halo Acetic Acids (HAAs) [mg/L]	
Sampling Location #1: RM FIREHALL	
1st Quarter	0.0054 *
2nd Quarter	0.0054 *
3rd Quarter	0.0054 *
4th Quarter	0.0054 *
Yearly Average (mg/L)	0.0054 *
Yearly Average (ug/L)	> 5.40 *
*lower than (<)	

Disinfection By-product Report - THMs and HAAs

Water System Name: **Rural Municipality of St. Francois Xavier** Water System Code: **211.50**

Year: **2020**

Operator-in-charge (Print): **Danielle Vaillant/Dave Epler**

Total Trihalomethanes (THMs) [mg/L]	
Sampling Location #1: ESSO	
1st Quarter	0.0098
2nd Quarter	0.0298
3rd Quarter	0.0752
4th Quarter	0.0078
Yearly Average (mg/L)	0.03065
Yearly Average (ug/L)	30.65

Total Halo Acetic Acids (HAAs) [mg/L]	
Sampling Location #1: RM OFFICE	
1st Quarter	0.006
2nd Quarter	0.0059
3rd Quarter	0.0026
4th Quarter	0.0054 *
Yearly Average (mg/L)	0.004975
Yearly Average (ug/L)	4.975
*lower than (<)	

Appendix G: Cartier Water Treatment Facility Annual Lab Results

Results Summary L2434775

Job Reference	CARTIER REGIONAL - PWS 36.00
Report To	GRANT MCGORMAN, Manitoba Water Services Board - CRWC
Date Received	7-Apr-2020 10:40
Report Date	15-Apr-2020 11:32
Report Version	1

Client Sample ID			CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED	CARTIER REGIONAL 3 - DISTRIBUTION
Date Sampled			6-Apr-2020	6-Apr-2020	6-Apr-2020
Time Sampled			14:15	14:15	14:25
ALS Sample ID			L2434775-1	L2434775-2	L2434775-3
Parameter	Lowest Detection Limit	Units	Water	Water	Water

Physical Tests (Water)

Colour, True	5.0	CU	14.5	<5.0	
Conductivity	1.0	umhos/cm	1110	316	
Hardness (as CaCO3)	0.20	mg/L	511	99.6	
Langelier Index (4 C)		-	0.84	-1	
Langelier Index (60 C)		-	1.6	-0.24	
pH	0.10	pH units	8.12	7.40	
Total Dissolved Solids	20	mg/L	736	168	
Transmittance, UV (254 nm)	1.0	%T/cm	58.5	92.7	
Turbidity	0.10	NTU	4.94	<0.10	

Anions and Nutrients (Water)

Alkalinity, Total (as CaCO3)	1.0	mg/L	322	84.6	
Ammonia, Total (as N)	0.010	mg/L	0.018	0.022	
Bicarbonate (HCO3)	1.2	mg/L	393	103	
Bromide (Br)	0.010	mg/L	0.115	<0.010	
Carbonate (CO3)	0.60	mg/L	<0.60	<0.60	
Chloride (Cl)	0.10	mg/L	30.8	9.44	
Fluoride (F)	0.020	mg/L	0.168	0.249	
Hydroxide (OH)	0.34	mg/L	<0.34	<0.34	
Nitrate (as N)	0.0050	mg/L	0.753	0.329	
Nitrite (as N)	0.0010	mg/L	0.0033	<0.0010	
Sulfate (SO4)	0.30	mg/L	286	64.8	

Organic / Inorganic Carbon (Water)

Dissolved Organic Carbon	0.50	mg/L	8.29	1.52	
Total Organic Carbon	0.50	mg/L	8.77	1.58	

Total Metals (Water)

Aluminum (Al)-Total	0.0030	mg/L	0.0752	<0.0030	<0.0030
Antimony (Sb)-Total	0.00010	mg/L	0.00017	<0.00010	<0.00010
Arsenic (As)-Total	0.00010	mg/L	0.00419	0.00099	0.00083
Barium (Ba)-Total	0.00010	mg/L	0.104	0.0184	0.0193
Beryllium (Be)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Boron (B)-Total	0.010	mg/L	0.126	0.107	0.098
Cadmium (Cd)-Total	0.0000050	mg/L	0.0000147	<0.0000050	<0.0000050

Calcium (Ca)-Total	0.050	mg/L	97.9	19.9	18.7
Cesium (Cs)-Total	0.000010	mg/L	0.000018	<0.000010	<0.000010
Chromium (Cr)-Total	0.00010	mg/L	0.00017	<0.00010	<0.00010
Cobalt (Co)-Total	0.00010	mg/L	0.00019	<0.00010	<0.00010
Copper (Cu)-Total	0.00050	mg/L	0.0214	0.0458	0.00465
Iron (Fe)-Total	0.010	mg/L	0.178	<0.010	0.021
Lead (Pb)-Total	0.000050	mg/L	0.000114	<0.000050	<0.000050
Lithium (Li)-Total	0.0010	mg/L	0.0669	0.0172	0.0161
Magnesium (Mg)-Total	0.0050	mg/L	64.7	12.1	12.4
Manganese (Mn)-Total	0.00010	mg/L	0.0165	0.00110	0.00036
Molybdenum (Mo)-Total	0.000050	mg/L	0.00292	0.000555	0.000519
Nickel (Ni)-Total	0.00050	mg/L	0.00348	0.00066	0.00067
Phosphorus (P)-Total	0.030	mg/L	0.313	0.404	0.352
Potassium (K)-Total	0.050	mg/L	14.1	3.03	3.09
Rubidium (Rb)-Total	0.00020	mg/L	0.00262	0.00057	0.00056
Selenium (Se)-Total	0.000050	mg/L	0.000539	0.000188	0.000104
Silicon (Si)-Total	0.10	mg/L	10.7	2.61	2.60
Silver (Ag)-Total	0.000010	mg/L	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	0.050	mg/L	87.0	33.1	33.1
Strontium (Sr)-Total	0.00020	mg/L	0.433	0.0860	0.0795
Sulfur (S)-Total	0.50	mg/L	113	23.8	23.9
Tellurium (Te)-Total	0.00020	mg/L	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	0.000010	mg/L	0.000013	<0.000010	<0.000010
Thorium (Th)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	0.00030	mg/L	0.00222	<0.00030	<0.00030
Tungsten (W)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	0.000010	mg/L	0.00431	0.000861	0.000802
Vanadium (V)-Total	0.00050	mg/L	0.00133	<0.00050	<0.00050
Zinc (Zn)-Total	0.0030	mg/L	0.0054	0.0033	<0.0030
Zirconium (Zr)-Total	0.00020	mg/L	0.00030	<0.00020	<0.00020

Appendix H: Headingley Water Treatment Facility Annual Lab Results

Results Summary L2501441

Job Reference	HEADINGLEY REGIONAL - PWS 89.40
Report To	DAVID EPLER, Cartier Regional Water Co-op - Headingley Regional - PWS
Date Received	10-Sep-2020 15:40
Report Date	17-Sep-2020 7:15
Report Version	1

Client Sample ID			HEADINGLEY REGIONAL 1 - RAW	HEADINGLEY REGIONAL 2 - TREATED
Date Sampled			10-Sep-2020	10-Sep-2020
Time Sampled			14:45	14:50
ALS Sample ID			L2501441-1	L2501441-2
Parameter	Lowest Detection Limit	Units	Water	Water

Physical Tests (Water)

Colour, True	5.0	CU	20.7	<5.0
Conductivity	1.0	umhos/cm	886	221
Hardness (as CaCO ₃)	0.20	mg/L	403	80
Langelier Index (4 C)		-	1.3	-0.45
Langelier Index (60 C)		-	2	0.33
pH	0.10	pH units	8.61	7.88
Total Dissolved Solids	13	mg/L	592	130
Transmittance, UV (254 nm)	1.0	%T/cm	50.1	97.9
Turbidity	0.10	NTU	10.2	1.02

Anions and Nutrients (Water)

Alkalinity, Total (as CaCO ₃)	1.0	mg/L	330	63.2
Ammonia, Total (as N)	0.010	mg/L	0.036	<0.010
Bicarbonate (HCO ₃)	1.2	mg/L	366	77.1
Bromide (Br)	0.010	mg/L	0.091	<0.010
Carbonate (CO ₃)	0.60	mg/L	17.9	<0.60
Chloride (Cl)	0.10	mg/L	26.0	3.00
Fluoride (F)	0.020	mg/L	0.176	<0.020
Hydroxide (OH)	0.34	mg/L	<0.34	<0.34
Nitrate (as N)	0.0050	mg/L	0.063	0.0181
Nitrite (as N)	0.0020	mg/L	<0.0020	<0.0050
Sulfate (SO ₄)	0.30	mg/L	202	45.3

Organic / Inorganic Carbon (Water)

Dissolved Organic Carbon	0.50	mg/L	11.0	<0.50
Total Organic Carbon	0.50	mg/L	10.9	<0.50

Total Metals (Water)

Aluminum (Al)-Total	0.0030	mg/L	0.273	0.0038
Antimony (Sb)-Total	0.00010	mg/L	0.00048	<0.00010
Arsenic (As)-Total	0.00010	mg/L	0.00911	<0.00010
Barium (Ba)-Total	0.00010	mg/L	0.0682	0.00106
Beryllium (Be)-Total	0.00010	mg/L	<0.00010	<0.00010
Bismuth (Bi)-Total	0.000050	mg/L	<0.000050	0.000052
Boron (B)-Total	0.010	mg/L	0.134	0.092
Cadmium (Cd)-Total	0.0000050	mg/L	0.0000334	<0.0000050
Calcium (Ca)-Total	0.050	mg/L	79.8	30.6
Cesium (Cs)-Total	0.000010	mg/L	0.000045	<0.000010
Chromium (Cr)-Total	0.00010	mg/L	0.00052	<0.00010
Cobalt (Co)-Total	0.00010	mg/L	0.00041	<0.00010
Copper (Cu)-Total	0.00050	mg/L	0.0950	0.0160
Iron (Fe)-Total	0.010	mg/L	0.452	<0.010
Lead (Pb)-Total	0.000050	mg/L	0.000325	0.00124
Lithium (Li)-Total	0.0010	mg/L	0.0719	0.0056
Magnesium (Mg)-Total	0.0050	mg/L	49.4	0.850
Manganese (Mn)-Total	0.00010	mg/L	0.0658	0.0123
Molybdenum (Mo)-Total	0.000050	mg/L	0.00398	<0.000050
Nickel (Ni)-Total	0.00050	mg/L	0.00416	<0.00050
Phosphorus (P)-Total	0.030	mg/L	0.233	<0.030
Potassium (K)-Total	0.050	mg/L	12.4	0.752
Rubidium (Rb)-Total	0.00020	mg/L	0.00302	<0.00020
Selenium (Se)-Total	0.000050	mg/L	0.000638	<0.000050
Silicon (Si)-Total	0.10	mg/L	9.78	0.66
Silver (Ag)-Total	0.000010	mg/L	<0.000010	<0.000010
Sodium (Na)-Total	0.050	mg/L	55.9	12.5
Strontium (Sr)-Total	0.00020	mg/L	0.333	0.0711
Sulfur (S)-Total	0.50	mg/L	69.6	15.1
Tellurium (Te)-Total	0.00020	mg/L	<0.00020	<0.00020
Thallium (Tl)-Total	0.000010	mg/L	0.000019	<0.000010
Thorium (Th)-Total	0.00010	mg/L	<0.00010	<0.00010
Tin (Sn)-Total	0.00010	mg/L	<0.00010	<0.00010
Titanium (Ti)-Total	0.00030	mg/L	0.00807	<0.00030
Tungsten (W)-Total	0.00010	mg/L	<0.00010	<0.00010
Uranium (U)-Total	0.000010	mg/L	0.00322	0.000013
Vanadium (V)-Total	0.00050	mg/L	0.00578	<0.00050
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	0.0081
Zirconium (Zr)-Total	0.00020	mg/L	0.00045	<0.00020

Appendix I: Cartier Regional Water Audits 2020

For all CRWC DWO Audits please use the following link:

[Annual ODW Audits](#)

Who can we call with questions or concerns regarding our drinking water?

For general questions during regular business hours, contact the:

Cartier Water Treatment Plant (204-353-4055) or email cartierwtp@crwc.ca

Headingley Water Treatment Plant (204-832-2555) or email headingleywtp@crwc.ca

Information is also available on our website at: crwc.ca