



## Public Water System Annual Report 2023

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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Date prepared: March 28, 2024

  
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## **Introduction**

The Cartier Regional Water Co-op (CRWC) owns and operates 2 main water Treatment Facilities, 10 rural Reservoirs, 2 Booster stations, 7 Truck fill stations, and approximately 270 km of water main 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.

We believe 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 15,289 users. 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**

Both the Cartier and Headingley Regional Water Treatment Facilities (WTF) 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 WTF 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 pipe to the WTF. Raw water can be pumped either to the aerated raw water storage ponds or directly to the WTF raw water chamber located beneath the water plant. The normal operational strategy is to pump to the north storage pond, flowing into the south storage pond for pre-settling, and pre-treatment in the summer season when required with aeration and algae 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 build-up. 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 WTF utilizes the existing Headingley Correctional Centre (H.C.C.) River Intake Building that is located on the H.C.C. grounds. The CRWC has a memorandum of understanding (MOU) with Manitoba Transportation and Infrastructure (MTI) 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 to be filled. 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 can operate independently. There is the ability to isolate one storage pond for maintenance and still supply the WTF 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 (RWP) located next to the storage ponds. The RWP also contains a wet well with level control that indicates the level in the raw ponds and provides the controls back to the RWP 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 WTF is producing water.

### **1.3. Water Treatment Process:**

#### **Cartier WTF:**

Raw water flows from the storage pond into the WTF 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 two 20-HP pumps 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 ROs before 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 WTF 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 disinfect 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 the process flow diagram.

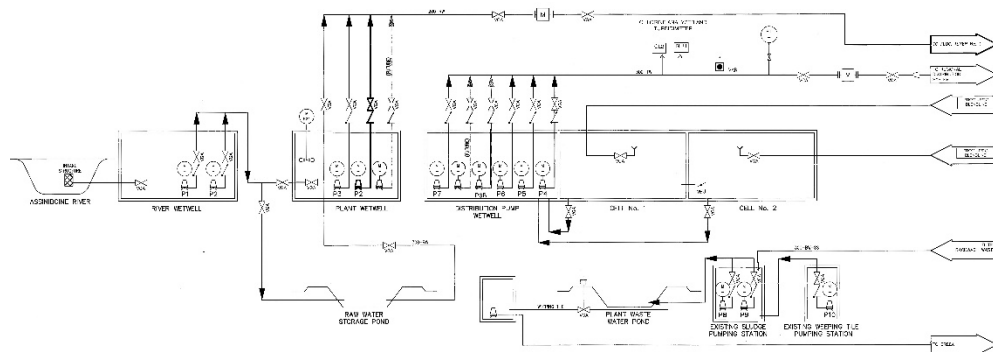


Figure 1 - Cartier WTF Process Flow Diagram 1 of 2

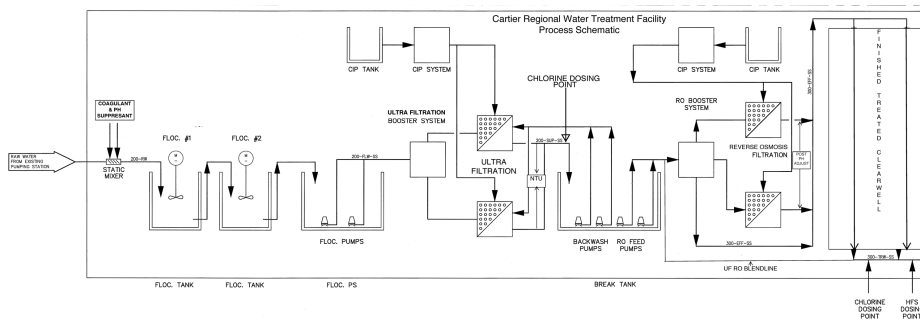


Figure 2 - Cartier WTF Flow Process Diagram 2 of 2

### **Headingley WTF:**

The Headingley WTF operates similarly to the Cartier WTF. They both draw from the same source water, and both utilize the Veolia brand membrane equipment for water treatment. The main difference between the facilities regarding treatment is that the finished treated water is not a blend of UF and RO permeate. Headingley WTF uses Calcite contactors that contain Calcite media to add hardness/minerals back into the finished water. The raw water flows into the facility and passes through 500-micron filters, 2-static mixers, 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 UFs provide 0.04-micron filtration and remove 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. Sodium Bisulfite 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 the Calcite contactors. The Calcite and RO permeate blend to achieve a final water hardness of 40-80 mg/L (CaCO<sub>3</sub>). The final treated water is pH corrected with Sodium Hydroxide and a small dosage of chlorine gas is used to disinfect for pathogenic organisms (bacteria, viruses, etc.) before entering the clear well storage. The water flows through the clear well to achieve contact time between the treated water and the chlorine for sufficient disinfection before reaching the pump chamber. The free chlorine residual in the treated water entering the distribution system is also monitored and recorded on a monthly report. See Figure 3 for a process overview.

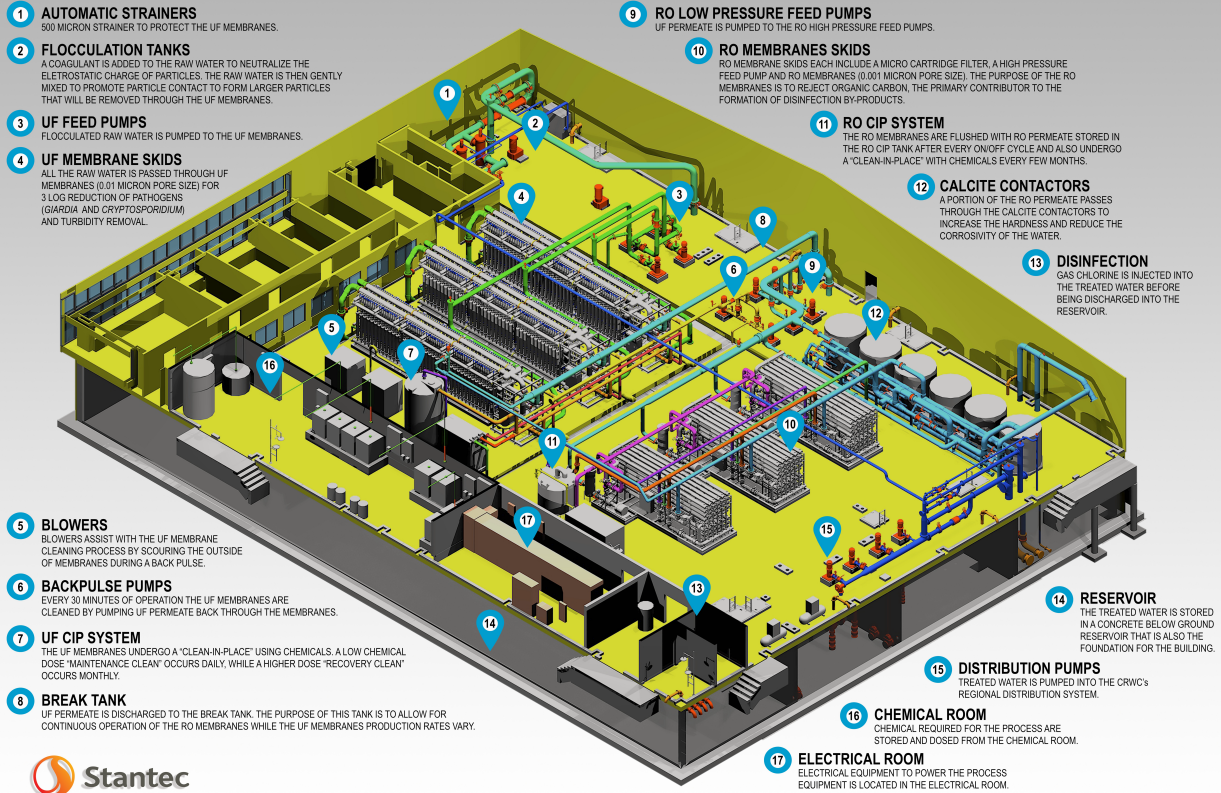
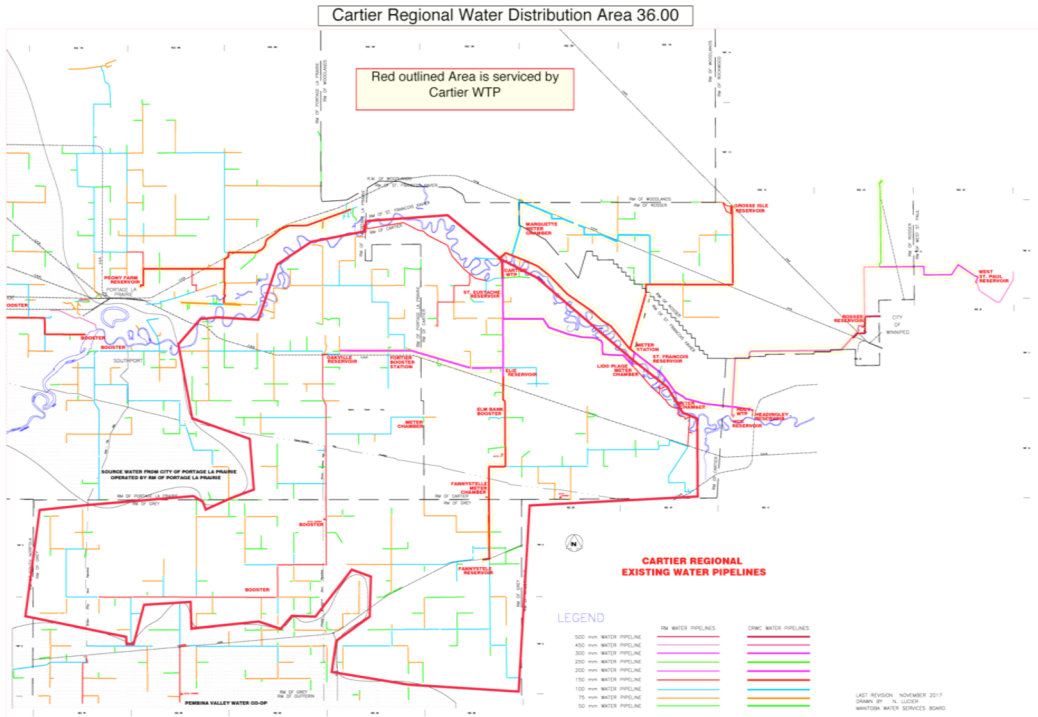


Figure 3 - Headingley WTF Treatment Process Overview

## 1.4. Distribution System:

### Cartier WTF (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, & 1-50 HP stand-by pump. These pumps are controlled by variable frequency drives (VFDs). The CWTF distribution system is partially looped in areas to RM distribution systems and has an overall approximate pipe length of 108 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 Grey. Figure 4 outlines the Cartier WTF service area.



**Figure 4 - 36.00 Cartier Regional Water Distribution System Map**

## Headingley WTF (89.40):

There are (3) distribution pumps that service three main headers that leave the facility into the distribution system. The Centerport distribution line services the Rosser Reservoir for the RM of Rosser. From the Rosser Reservoir, treated water is pumped to the Stony 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 Reservoir, RM of St. Francois Xavier, RM of Rosser and Grosse Isle Reservoir. The H.C.C./W.W.T.F. line services the Headingley Correctional Centre and the RM of Headingley Wastewater Treatment Facility. The HWTF distribution system is partially looped in areas to RM of Rosser distribution systems and has an overall approximate pipe length of 118 kilometers. Piping is comprised of both high-density polyethylene (HDPE) & polyvinylchloride (PVC) pipe.

Figure 5 outlines the Headingley WTF service area.

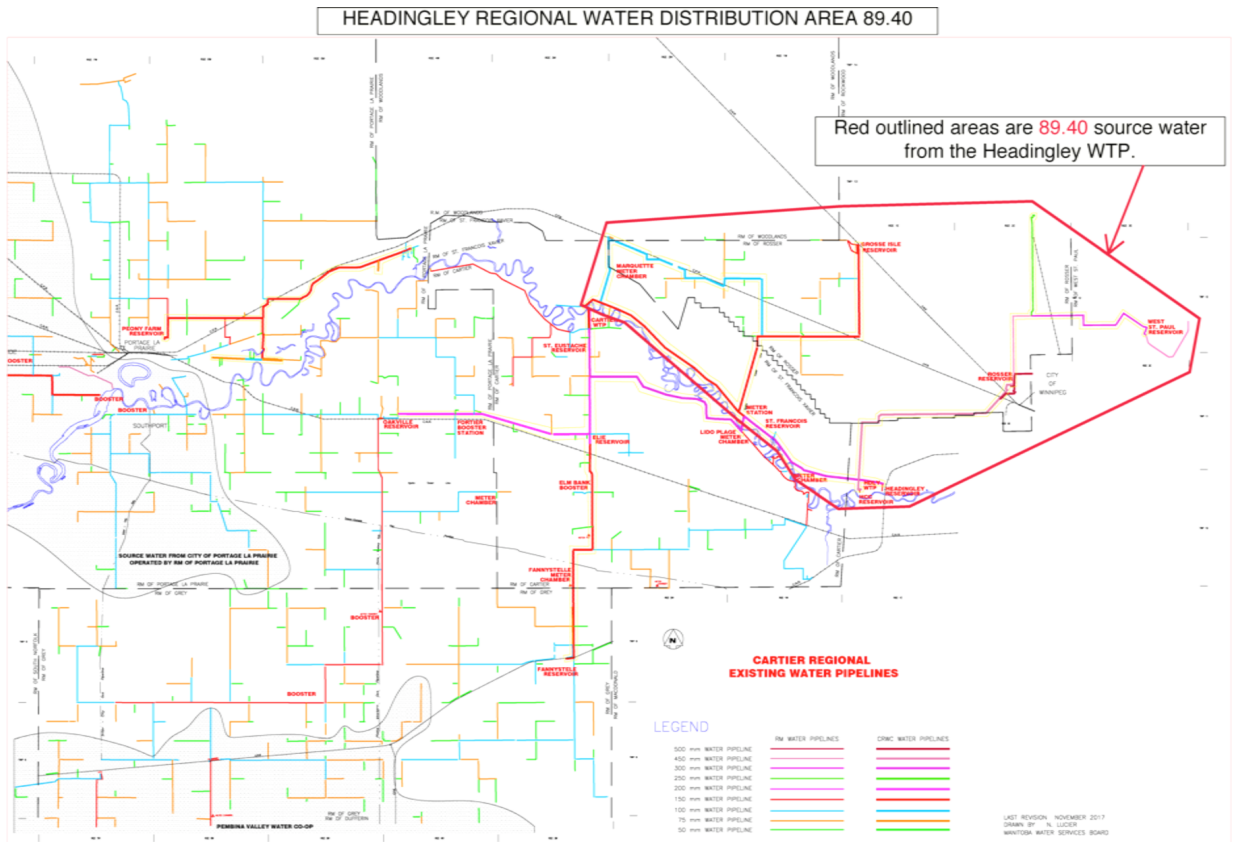
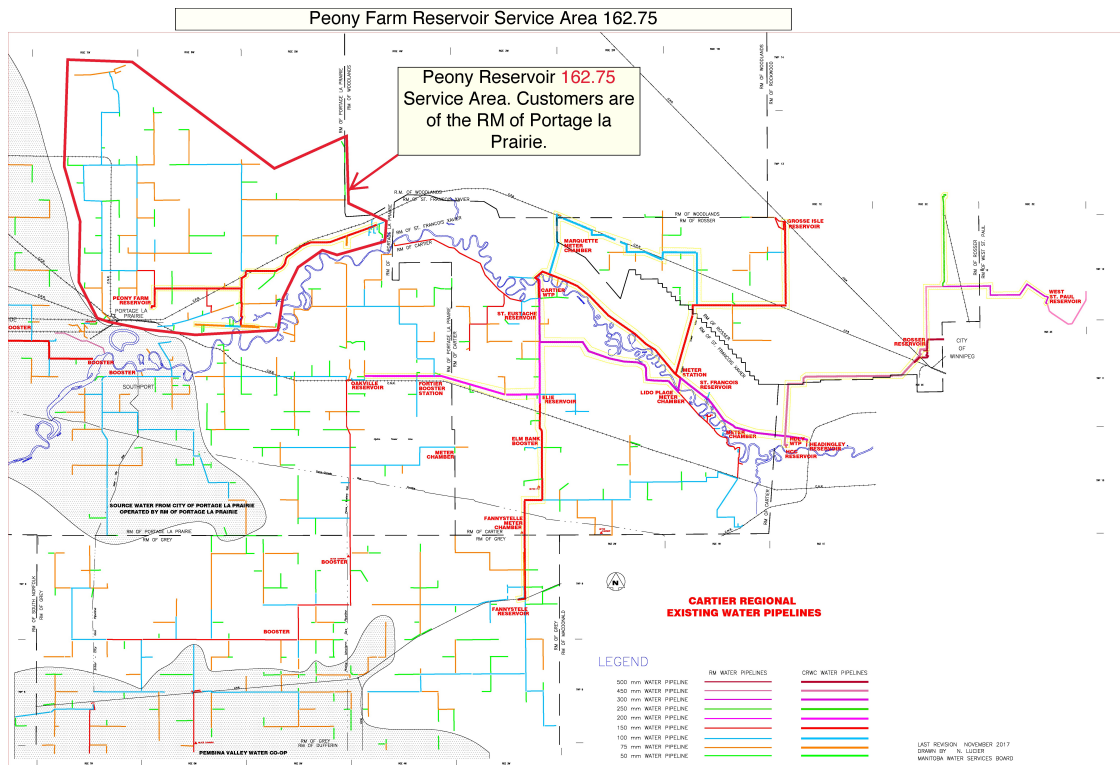


Figure 5 - 89.40 Headingley Regional Water Distribution System Map

**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 residual 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. 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 sampling the bacteriological samples for the RM of SFX under 211.50 and the RM of Headingley under 89.50. A summary of the results can be found in Appendix C and D.

### 1.5. Storage Reservoirs:

<u>Location</u>	<u>Storage Reservoir</u>	<u>Capacity</u>
Cartier Regional WTF	Raw Storage Reservoir	120,000 M <sup>3</sup>
Cartier Regional WTF	Treated Reservoir	3000 M <sup>3</sup>
Elie Reservoir		960 M <sup>3</sup>
St. Eustache Reservoir		76 M <sup>3</sup>
Oakville Reservoir		670 M <sup>3</sup>
Fannystelle Reservoir		150 M <sup>3</sup>
Peony Farm Reservoir	Treated Reservoir	230 M <sup>3</sup>
Headingley Regional WTF	Raw Storage Reservoir	135,107 M <sup>3</sup>
Headingley Regional WTF	Treated Reservoir	4400 M <sup>3</sup>
Headingley Reservoir		2400 M <sup>3</sup>
SFX Reservoir		400 M <sup>3</sup>
Grosse Isle Reservoir		400 M <sup>3</sup>
Rosser Reservoir		7600 M <sup>3</sup>
West St. Paul Reservoir		4809 M <sup>3</sup>

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

The Cartier Regional water distribution system is comprised of 5219 service connections (all metered) serving a population of greater than 15,289 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 30 Jun 21)**

<b>All RMs combined</b>	
<b>BY METER SIZE</b>	
5/8"	4967
3/4"	84
1"	95
1.5"	34
2"	333
3"	4
8"	2
<b>TOTAL</b>	<b>5219</b>
<b>ESTIMATED PURPOSE</b>	
Residential	4753
Commercial	386
Industrial	11
Other	69
<b>TOTAL</b>	<b>5219</b>
<b>Over 500 M3/quarter</b>	<b>45</b>
<b>2 YEAR FORECAST</b>	
Residential	653
Commercial	52
Other	13
	<b>718</b>
<b>CONSUMPTION</b>	1922826 cubic meters
<b>ESTIMATED SERVED POP.</b> *	15289
<b>FARMS</b>	
Colonies	14
Crops	40
Cattle all forms	23
Hogs	2
Poultry	3
Market	3
Other	1



\* Also includes H.C.C. 549; S.M.I. 797 (per Wikipedia, rated population)

## 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
Parker Page <i>Operator</i> <i>Cartier Regional Water Treatment Facility</i>	Water Treatment Water Distribution Wastewater Treatment Wastewater Collection	Class 1 Class 1 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
Jordan Taylor <i>Operator</i> <i>Headingley Regional Water Treatment Facility</i>	Water Treatment Water Distribution	O-I-T O-I-T
Paige Jepsen <i>Operator</i> <i>Headingley Regional Water Treatment Facility</i>	Water Treatment Water Distribution	Class 2 Class 2
Travis Reinsch <i>Operator</i> <i>Headingley Regional Water Treatment Facility</i>	Water Treatment Water Distribution	Class 2 Class 2

\*Facility classification and Operator 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 the 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 amount of 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 Water Treatment Facilities disinfect by adding chlorine gas to the treated water via Regal brand gas chlorinator systems. Sodium Hypochlorite can also be added to all the reservoirs if and when required.

### **2.2. Equipment redundancy and monitoring requirements:**

As required by the *Drinking Water Safety Act*, the Cartier and Headingley Regional Water Treatment Facilities ensure that continuous disinfection is maintained at the facilities 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 facilities. At the Cartier WTF, two identical trains of UF and RO membranes are in place, each RO with a capacity of 30 liters per second. At the Headingley WTF, 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 facilities 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 into 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 2023 for monitoring and reporting disinfection residuals leaving the Water Treatment Facilities 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 2023 results for the Cartier and Headingley Regional Water Systems are summarized in the following tables:

**Table 3 - Cartier WTF (36.00) Chemistry Results 2023**

<u>Parameter</u>	<u>Standard</u>	<u>Frequency</u>	<u>Test Results</u>
Bacterial; TC & EC **	0 TC, 0 EC	Weekly	100 % passed
Disinfectant Residual	WTF (> 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	“	“
Aluminum	0.1 mg/L	“	“
Arsenic	0.01 mg/L	“	“
Antimony	0.006 mg/L	“	“
Barium	2 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	0.02 mg/L	“	“
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 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: Haloacetic 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 WTF (89.40) Chemistry Results 2023**

<u>Parameter</u>	<u>Standard</u>	<u>Frequency</u>	<u>Test Results</u>
Bacterial; TC & EC **	0 TC, 0 EC	Biweekly	100 % passed
Disinfectant Residual	WTF (> 0.5 mg/L)	Continuously	100 % compliance

“	Distribution (> 0.1mg/L)	Continuously	100 % compliance
Turbidity	0.10 NTU *	Continuously	100 % compliance
Lead	0.005 mg/L	Annually	See appendix H
Fluoride	1.5 mg/L	“	“
Aluminum	0.1 mg/L	“	“
Arsenic	0.01 mg/L	“	“
Antimony	0.006 mg/L	“	“
Barium	2 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	0.02 mg/L	“	“
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 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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\*\*\*\*HAA: Haloacetic 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
<i>E. coli</i>	Less than one <i>E. coli</i> 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 – Sampled Every 2 Years
Total Haloacetic acids (HAAs)	Less than or equal to 0.08 mg/L as locational annual average of quarterly samples – Sampled Every 2 Years

Total Metals and Manganese (Distribution System)	One sample every two years at a mid-point in the distribution system
Lead	Less than or equal to 0.005 mg/L in the water distribution system – Sampling done upon direction of the DWO

**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 lifetime exposure. The average THM result for 2023 was below the 0.100 mg/L regulations.

### **4. Water System Incidents and Corrective Actions**

There were no major water system incidents in 2023. 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, which is funded by the Manitoba Health, Seniors and Active Living, the Cartier WTF (36.00) collects water samples daily from the treated water reservoir and is 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 2023, no Emergencies, Compliance Issues or Operational Issues occurred for the Cartier (36.00) or Headingley Regional Water System (89.40) or the Peony Farm (162.75)

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

In 2023, no Drinking Water Safety Orders were issued for the Cartier or Headingley Regional Water Systems.

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

In 2023, the Peony Farm Reservoir required a repair on the outgoing distribution line. A BWA was issued due to the line having to be depressurized to complete the repair. The BWA was lifted once all bacteriological samples passed.

## 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 in 2023.

## 10. **Major Expenses Incurred**

### **Upgrades and Repairs**

- SCADA UPGRADES - \$155,131.54

#### **Cartier WTF:**

- River Well Repairs - \$37,138.63
- UF Stainless Piping Repair - \$10,099
- Peony Distribution Header Repair - \$10,347.97
- River Well Repairs -\$29,325.49

#### **Headingley WTF**

- Headingley WTF UF #2 Piping repair and upgrade - \$9239.00
- WSP Pipeline Investigation - \$115,752.60
- Various Facility HVAC Improvements – ~\$8600

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

**Membrane Fouling Study** – WSP Engineering will continue the third phase of the membrane fouling study. A pilot plant has been constructed and pretreatment methods are to be tested.

**Cartier Water Treatment Plant Facilities Upgrade** – Equipment no longer in service will be removed from the Cartier WTF, and a new lunchroom and office facilities are scheduled to be constructed in 2024

**SCADA Upgrade** – CRWC continues with a SCADA and computer upgrade for 2024.

**Headingley WTF** – two sets of UF Membranes purchased in early 2024.

The bulk Truck-fill water rate will increase from \$4.10 per cubic meter in 2023 to \$4.30 per cubic meter as of April 1, 2024.

## Appendix A: Cartier WTF 36.00 2023 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2	Turbidity
3-Jan-23	CARTIER REGIONAL 1 - RAW	21	1	-	-	9.87
3-Jan-23	CARTIER REGIONAL 2 - TREATED	0	0	1.57	1.85	0.041
3-Jan-23	CARTIER REGIONAL 3- DIST @ -----> FORTIER BOOSTER	0	0	1.55	1.71	0.08
3-Jan-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.34	1.51	0.09
3-Jan-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.17	1.34	0.07
3-Jan-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.31	1.48	0.047
3-Jan-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.50	1.68	0.09
17-Jan-23	CARTIER REGIONAL 1 - RAW	3	1	-	-	10.5
17-Jan-23	CARTIER REGIONAL 2 - TREATED	0	0	1.67	1.84	0.038
17-Jan-23	CARTIER REGIONAL 3 - DIST @ OAKVILLE RESERVOIR IN	0	0	1.27	1.48	0.073
17-Jan-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.38	1.58	0.083
17-Jan-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.09	1.26	0.06
17-Jan-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.37	1.67	0.045
17-Jan-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.49	1.64	0.046
31-Jan-23	CARTIER REGIONAL 1 - RAW	2	0	-	-	9.72
31-Jan-23	CARTIER REGIONAL 2 - TREATED	0	0	1.63	1.82	0.08
31-Jan-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.26	1.44	0.06
31-Jan-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.44	1.61	0.06
31-Jan-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.16	1.23	0.06
31-Jan-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.33	1.58	0.13
31-Jan-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.55	1.74	0.06
14-Feb-23	CARTIER REGIONAL 1 - RAW	0	0	-	-	9.81
14-Feb-23	CARTIER REGIONAL 2 - TREATED	0	0	1.60	1.90	0.054
14-Feb-23	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.60	1.76	0.06
14-Feb-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.34	1.57	0.12
14-Feb-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.30	1.42	0.06
14-Feb-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.36	1.54	0.13
14-Feb-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.46	1.71	0.1
28-Feb-23	CARTIER REGIONAL 1 - RAW	0	0	-	-	9.86
28-Feb-23	CARTIER REGIONAL 2 - TREATED	0	0	1.63	1.83	0.031
28-Feb-23	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE RES IN	0	0	1.70	1.91	0.16
28-Feb-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.54	1.71	0.18
28-Feb-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.21	1.36	0.16
28-Feb-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.42	1.56	0.19
28-Feb-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.59	1.78	
14-Mar-23	CARTIER REGIONAL 1 - RAW	6	0	-	-	10.5
14-Mar-23	CARTIER REGIONAL 2 - TREATED	0	0	1.40	1.61	0.066

14-Mar-23	CARTIER REGIONAL 3- DIST @ -----> ELM BANK BOOSTER	0	0	1.37	1.54	0.09
14-Mar-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.30	1.45	0.13
14-Mar-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.22	1.43	0.1
14-Mar-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.30	1.49	0.052
14-Mar-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.39	1.62	0.13
28-Mar-23	CARTIER REGIONAL 1 - RAW	5	0	-	-	10.4
28-Mar-23	CARTIER REGIONAL 2 - TREATED	0	0	1.72	1.90	0.057
28-Mar-23	CARTIER REGIONAL 3 - DIST @ OAKVILLE RESERVOIR IN	0	0	1.34	1.56	0.04
28-Mar-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.64	1.67	0.16
28-Mar-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.10	1.29	0.05
28-Mar-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.26	1.54	0.078
28-Mar-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.48	1.67	0.069
11-Apr-23	CARTIER REGIONAL 1 - RAW	12	0	-	-	9.3
11-Apr-23	CARTIER REGIONAL 2 - TREATED	0	0	1.73	1.98	0.039
11-Apr-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.40	1.60	0.15
11-Apr-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.50	1.76	0.09
11-Apr-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.36	1.52	0.13
11-Apr-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.55	1.74	0.1
11-Apr-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.70	1.87	0.13
11-Apr-23	CARTIER REGIONAL 1 - RAW - UF BREAK TANK					
25-Apr-23	CARTIER REGIONAL 1 - RAW	18	0	-	-	15.6
25-Apr-23	CARTIER REGIONAL 2 - TREATED	0	0	1.62	1.80	0.036
25-Apr-23	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.60	1.77	0.062
25-Apr-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.36	1.50	0.056
25-Apr-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.14	1.29	0.083
25-Apr-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.28	1.50	0.029
25-Apr-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.49	1.67	0.068
9-May-23	CARTIER REGIONAL 1 - RAW	31	5	-	-	16.6
9-May-23	CARTIER REGIONAL 2 - TREATED	0	0	1.71	1.96	0.059
9-May-23	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE RES IN	0	0	1.62	1.76	0.058
9-May-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.51	1.64	0.095
9-May-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.27	1.38	0.095
9-May-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.47	1.78	0.092
9-May-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.58	1.78	0.062
23-May-23	CARTIER REGIONAL 1 - RAW	53	16	-	-	11.5
23-May-23	CARTIER REGIONAL 2 - TREATED	0	0	1.51	1.81	0.03
23-May-23	CARTIER REGIONAL 3- DIST @ -----> FORTIER BOOSTER	0	0	1.36	1.61	0.09
23-May-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.33	1.49	0.11
23-May-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.40	1.52	0.12
23-May-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.36	1.52	0.08
23-May-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.44	1.61	0.1



6-Jun-23	CARTIER REGIONAL 1 - RAW	>200	144	-	-	9.73
6-Jun-23	CARTIER REGIONAL 2 - TREATED	0	0	1.69	1.91	0.081
6-Jun-23	CARTIER REGIONAL 3 - DIST @ OAKVILLE RESERVOIR IN	0	0	1.00	1.19	0.065
6-Jun-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.13	1.25	0.086
6-Jun-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.07	1.25	0.082
6-Jun-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	0.96	1.16	0.075
6-Jun-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.51	1.67	0.088
20-Jun-23	CARTIER REGIONAL 1 - RAW	>200	22	-	-	36.4
20-Jun-23	CARTIER REGIONAL 2 - TREATED	0	0	1.40	1.59	0.093
20-Jun-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.20	1.38	0.088
20-Jun-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.14	1.31	0.043
20-Jun-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.20	1.39	0.10
20-Jun-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.16	1.38	0.061
20-Jun-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.33	1.50	0.089
4-Jul-23	CARTIER REGIONAL 1 - RAW	>200	4	-	-	33.5
4-Jul-23	CARTIER REGIONAL 2 - TREATED	0	0	1.81	1.96	0.043
4-Jul-23	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.69	1.82	0.13
4-Jul-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.14	1.33	0.12
4-Jul-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.26	1.47	0.12
4-Jul-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.31	1.49	0.11
4-Jul-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.71	1.94	0.11
18-Jul-23	CARTIER REGIONAL 1 - RAW	>200	27	-	-	20
18-Jul-23	CARTIER REGIONAL 2 - TREATED	0	0	1.86	2.00	0.035
18-Jul-23	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE RES IN	0	0	1.82	2.02	0.04
18-Jul-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.51	1.70	0.063
18-Jul-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.31	1.46	0.071
18-Jul-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.46	1.75	0.054
18-Jul-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.76	1.92	0.029
1-Aug-23	CARTIER REGIONAL 1 - RAW	>200	4	-	-	15.9
1-Aug-23	CARTIER REGIONAL 2 - TREATED	0	0	1.88	2.00	0.05
1-Aug-23	CARTIER REGIONAL 3- DIST @ -----> ELM BANK BOOSTER	0	0	1.49	1.62	0.066
1-Aug-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.39	1.67	0.045
1-Aug-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.28	1.51	0.088
1-Aug-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.39	1.56	0.14
1-Aug-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.80	1.95	0.049
15-Aug-23	CARTIER REGIONAL 1 - RAW	165	5	-	-	13.9
15-Aug-23	CARTIER REGIONAL 2 - TREATED	0	0	1.93	2.00	0.045
15-Aug-23	CARTIER REGIONAL 3 - DIST @ OAKVILLE RESERVOIR IN	0	0	1.53	1.73	0.14
15-Aug-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.37	1.54	0.16
15-Aug-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.20	1.33	0.049
15-Aug-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.54	1.70	0.12

15-Aug-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.71	1.91	0.14
29-Aug-23	CARTIER REGIONAL 1 - RAW	165	3	-	-	9.35
29-Aug-23	CARTIER REGIONAL 2 - TREATED	0	0	1.64	1.91	0.062
29-Aug-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.51	1.70	0.11
29-Aug-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.44	1.64	0.09
29-Aug-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.46	1.64	0.1
29-Aug-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.54	1.91	0.1
29-Aug-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.65	1.82	0.1
12-Sep-23	CARTIER REGIONAL 1 - RAW	>200	24	-	-	7.36
12-Sep-23	CARTIER REGIONAL 2 - TREATED	0	0	1.79	2.00	0.05
12-Sep-23	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.72	1.84	0.05
12-Sep-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.47	1.78	0.097
12-Sep-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.28	1.43	0.11
12-Sep-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.58	1.75	0.099
12-Sep-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.76	1.91	0.1
26-Sep-23	CARTIER REGIONAL 1 - RAW	200	70	-	-	0.13
26-Sep-23	CARTIER REGIONAL 2 - TREATED	0	0	1.42	1.61	0.046
26-Sep-23	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE RES IN	0	0	1.41	1.58	0.13
26-Sep-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.25	1.33	0.14
26-Sep-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.11	1.27	0.073
26-Sep-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.25	1.47	0.15
26-Sep-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.37	1.50	0.14
10-Oct-23	CARTIER REGIONAL 1 - RAW	53	6	-	-	3.02
10-Oct-23	CARTIER REGIONAL 2 - TREATED	0	0	1.63	1.82	0.073
10-Oct-23	CARTIER REGIONAL 3- DIST @ -----> FORTIER BOOSTER	0	0	1.30	1.44	0.089
10-Oct-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.35	1.67	0.081
10-Oct-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	0.92	1.06	0.091
10-Oct-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.22	1.42	0.052
10-Oct-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.62	1.71	0.061
24-Oct-23	CARTIER REGIONAL 1 - RAW	66	3	-	-	3.8
24-Oct-23	CARTIER REGIONAL 2 - TREATED	0	0	1.68	1.89	0.047
24-Oct-23	CARTIER REGIONAL 3 - DIST @ OAKVILLE RESERVOIR IN	0	0	1.36	1.54	0.096
24-Oct-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.29	1.48	0.09
24-Oct-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.21	1.41	0.14
24-Oct-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.40	1.57	0.069
24-Oct-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.37	1.58	0.082
7-Nov-23	CARTIER REGIONAL 1 - RAW	22	2	-	-	3.900
7-Nov-23	CARTIER REGIONAL 2 - TREATED	0	0	1.52	1.80	0.031
7-Nov-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE RES IN	0	0	1.42	1.60	0.080
7-Nov-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.46	1.64	0.120
7-Nov-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.24	1.39	0.100
7-Nov-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.28	1.39	0.090

7-Nov-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.48	1.70	0.110
7-Nov-23	CARTIER REGIONAL 1 - RAW - UF BREAK TANK	0	0	0.00	0.00	-
21-Nov-23	CARTIER REGIONAL 1 - RAW	19	5	-	-	4.050
21-Nov-23	CARTIER REGIONAL 2 - TREATED	0	0	1.63	1.87	0.034
21-Nov-23	CARTIER REGIONAL 3 - DIST - ELIE RES IN	0	0	1.68	1.92	0.080
21-Nov-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.49	1.76	0.060
21-Nov-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.18	1.36	0.076
21-Nov-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.44	1.64	0.083
21-Nov-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.60	1.92	0.080
5-Dec-23	CARTIER REGIONAL 1 - RAW	2	0	-	-	4.390
5-Dec-23	CARTIER REGIONAL 2 - TREATED	0	0	1.58	1.85	0.032
5-Dec-23	CARTIER REGIONAL 3 - DIST @ ST. EUSTACHE RES IN	0	0	1.58	1.67	0.072
5-Dec-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.34	1.50	0.051
5-Dec-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.27	1.45	0.045
5-Dec-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.30	1.45	0.054
5-Dec-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.50	1.65	0.054
5-Dec-23	CARTIER REGIONAL 1 - RAW	5	1	-	-	0.000
19-Dec-23	CARTIER REGIONAL 2 - TREATED	0	0	1.55	1.80	0.055
19-Dec-23	CARTIER REGIONAL 3- DIST @ -----> ELM BANK BOOSTER	0	0	1.34	1.60	0.100
19-Dec-23	CARTIER REGIONAL 3 - DIST - ELIE OUT	0	0	1.34	1.61	0.100
19-Dec-23	CARTIER REGIONAL 3 - DIST - FANNYSTELLE OUT	0	0	1.11	1.38	0.070
19-Dec-23	CARTIER REGIONAL 3 - DIST - OAKVILLE OUT	0	0	1.34	1.67	0.080
19-Dec-23	CARTIER REGIONAL 3 - DIST - ST. EUSTACHE OUT	0	0	1.56	1.82	0.080

### Appendix B: Headingley WTF 89.40 2023 Bacteriological Result

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2	Turbidity
10-Jan-23	HEADINGLEY REGIONAL 1 - RAW	95	4	0.00	0.00	12.3
10-Jan-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.32	1.40	0.07
9-Jan-23	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX RES IN	0	0	1.37	1.44	0.09
9-Jan-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.80	0.95	0.08
10-Jan-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.45	1.47	0.06
9-Jan-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.52	1.59	0.07
10-Jan-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.46	1.54	0.05
10-Jan-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.36	1.50	0.09
24-Jan-23	HEADINGLEY REGIONAL 1 - RAW	12	1	0.00	0.00	8.08
24-Jan-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.26	1.36	0.07
24-Jan-23	HEADINGLEY REGIONAL 3 - DIST @ -----> G.I. RES IN	0	0	1.01	1.15	0.08
24-Jan-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.73	0.82	0.07
24-Jan-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.24	1.30	0.07
23-Jan-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.26	1.40	0.08

23-Jan-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.35	1.43	0.08
24-Jan-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.26	1.33	0.12
7-Feb-23	HEADINGLEY REGIONAL 1 - RAW	24	3	0.00	0.00	13.2
7-Feb-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.23	1.31	0.07
7-Feb-23	HEADINGLEY REGIONAL 3 - DIST @ -----> H.C.C. IN	0	0	1.32	1.37	0.09
7-Feb-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.71	0.81	0.17
7-Feb-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.27	1.40	0.07
6-Feb-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.38	1.44	0.13
7-Feb-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.34	1.42	0.08
7-Feb-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.33	1.35	0.15
21-Feb-23	HEADINGLEY REGIONAL 1 - RAW	16	0	0.00	0.00	11.1
21-Feb-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.48	1.55	0.08
21-Feb-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY W.W.T.P.	0	0	1.30	1.37	0.07
20-Feb-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.80	0.93	0.10
20-Feb-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.18	1.37	0.08
21-Feb-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.33	1.40	0.07
21-Feb-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.51	1.60	0.08
20-Feb-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.28	1.34	0.09
7-Mar-23	HEADINGLEY REGIONAL 1 - RAW	14	1	0.00	0.00	13.2
7-Mar-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.42	1.50	0.07
6-Mar-23	HEADINGLEY REGIONAL 3 - DIST @ -----> COOP GAS BAR	0	0	1.36	1.39	0.12
7-Mar-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.68	0.91	0.10
7-Mar-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.41	1.53	0.09
6-Mar-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.45	1.49	0.10
6-Mar-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.37	1.44	0.11
7-Mar-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.38	1.47	0.11
21-Mar-23	HEADINGLEY REGIONAL 1 - RAW	38	0	0.00	0.00	11.9
21-Mar-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.47	1.52	0.09
21-Mar-23	HEADINGLEY REGIONAL 3 - DIST @ -----> W.S.P. RES. IN	0	0	1.54	1.58	0.10
21-Mar-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.80	0.91	0.10
21-Mar-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.44	1.51	0.10
20-Mar-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.48	1.56	0.09
20-Mar-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.58	1.68	0.09
21-Mar-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.38	1.43	0.10
4-Apr-23	HEADINGLEY REGIONAL 1 - RAW	15	<1	0.00	0.00	12.70
4-Apr-23	HEADINGLEY REGIONAL 2 - TREATED	<1	<1	1.46	1.51	0.08
3-Apr-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY IN	<1	<1	1.43	1.54	0.09
4-Apr-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	<1	<1	0.79	0.90	0.11
4-Apr-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	<1	<1	1.56	1.61	0.10

3-Apr-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	<1	<1	1.46	1.50	0.09
3-Apr-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	<1	<1	1.55	1.59	0.08
4-Apr-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	<1	<1	1.41	1.48	0.10
18-Apr-23	HEADINGLEY REGIONAL 1 - RAW	>200	10	0.00	0.00	26.6
18-Apr-23	HEADINGLEY REGIONAL 2 - TREATED	<1	<1	1.47	1.53	0.08
18-Apr-23	HEADINGLEY REGIONAL 3 - DIST @ -----> ROSSER IN	<1	<1	1.50	1.57	0.09
18-Apr-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	<1	<1	0.82	0.96	0.09
18-Apr-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	<1	<1	1.38	1.51	0.09
17-Apr-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	<1	<1	1.43	1.50	0.12
17-Apr-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	<1	<1	1.54	1.62	0.10
18-Apr-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	<1	<1	1.42	1.47	0.10
2-May-23	HEADINGLEY REGIONAL 1 - RAW	78	70	0.00	0.00	27.3
2-May-23	HEADINGLEY REGIONAL 2 - TREATED	<1	<1	1.39	1.50	0.09
1-May-23	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX RES IN	<1	<1	1.47	1.52	0.09
2-May-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	<1	<1	0.92	1.02	0.10
2-May-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	<1	<1	1.48	1.60	0.09
1-May-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	<1	<1	1.46	1.52	0.11
2-May-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	<1	<1	1.43	1.52	0.10
2-May-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	<1	<1	1.49	1.57	0.10
16-May-23	HEADINGLEY REGIONAL 1 - RAW	>200	3	0.00	0.00	65.0
16-May-23	HEADINGLEY REGIONAL 2 - TREATED	<1	<1	1.38	1.42	0.08
16-May-23	HEADINGLEY REGIONAL 3 - DIST @ -----> G.I. RES IN	<1	<1	1.17	1.27	0.05
16-May-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	<1	<1	0.90	1.01	0.08
16-May-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	<1	<1	1.37	1.43	0.09
15-May-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	<1	<1	1.42	1.49	0.10
15-May-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	<1	<1	1.35	1.40	0.11
16-May-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	<1	<1	1.48	1.59	0.12
30-May-23	HEADINGLEY REGIONAL 1 - RAW	88	6	0.00	0.00	40.7
30-May-23	HEADINGLEY REGIONAL 2 - TREATED	<1	<1	1.37	1.43	0.09
30-May-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HCC IN	<1	<1	1.31	1.36	0.16
30-May-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	<1	<1	0.87	1.00	0.09
30-May-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	<1	<1	1.35	1.40	0.13
29-May-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	<1	<1	1.39	1.44	0.17
29-May-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	<1	<1	1.45	1.48	0.13
30-May-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	<1	<1	1.37	1.40	0.12
13-Jun-23	HEADINGLEY REGIONAL 1 - RAW	200	18	0.00	0.00	41.0
13-Jun-23	HEADINGLEY REGIONAL 2 - TREATED	<1	<1	1.43	1.45	0.13
13-Jun-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY W.W.T.P.	<1	<1	1.21	1.28	0.17
13-Jun-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	<1	<1	0.82	0.89	0.11
13-Jun-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	<1	<1	1.12	1.18	0.20

12-Jun-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	<1	<1	1.32	1.33	0.16
12-Jun-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	<1	<1	1.41	1.54	0.17
13-Jun-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	<1	<1	1.27	1.33	0.16
27-Jun-23	HEADINGLEY REGIONAL 1 - RAW	1046	4			35.4
27-Jun-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.37	1.43	0.10
26-Jun-23	HEADINGLEY REGIONAL 3 - DIST @ -----> AIRFAB	0	0	1.42	1.47	0.10
27-Jun-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.89	0.95	0.12
27-Jun-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.35	1.42	0.20
26-Jun-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.32	1.36	0.19
26-Jun-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.48	1.52	0.15
27-Jun-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.23	1.32	0.24
11-Jul-23	HEADINGLEY REGIONAL 1 - RAW	1120	0	0.00	0.00	41.8
11-Jul-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.42	1.49	0.14
11-Jul-23	HEADINGLEY REGIONAL 3 - DIST @ -----> WSP IN	0	0	1.40	1.50	0.17
11-Jul-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.81	0.91	0.11
11-Jul-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.36	1.42	0.16
10-Jul-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.37	1.52	0.15
10-Jul-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.52	1.57	0.14
11-Jul-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.46	1.54	0.20
25-Jul-23	HEADINGLEY REGIONAL 1 - RAW	>2420	21	0.00	0.00	22.1
25-Jul-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.42	1.48	0.13
24-Jul-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY IN	0	0	1.57	1.63	0.16
25-Jul-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.93	1.02	0.09
25-Jul-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.31	1.34	0.16
24-Jul-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.32	1.36	0.12
24-Jul-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.52	1.57	0.15
25-Jul-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.30	1.38	0.19
8-Aug-23	HEADINGLEY REGIONAL 1 - RAW	187	10	0.00	0.00	21.9
8-Aug-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.27	1.32	0.14
7-Aug-23	HEADINGLEY REGIONAL 3 - DIST @ -----> ROSSER IN	0	0	1.37	1.43	0.12
7-Aug-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.88	1.01	0.16
7-Aug-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.25	1.30	0.17
8-Aug-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.34	1.38	0.11
8-Aug-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.33	1.36	0.13
7-Aug-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.34	1.39	0.20
22-Aug-23	HEADINGLEY REGIONAL 1 - RAW	770	86	0.00	0.00	21.1
22-Aug-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.56	1.61	0.11
21-Aug-23	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX RES IN	0	0	1.52	1.61	0.14
22-Aug-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.91	1.02	0.11
22-Aug-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.39	1.45	0.12
21-Aug-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.52	1.58	0.11

21-Aug-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.57	1.65	0.15
22-Aug-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.29	1.32	0.16
5-Sep-23	HEADINGLEY REGIONAL 1 - RAW	517	104	0.00	0.00	10.4
5-Sep-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.48	1.53	0.13
4-Sep-23	HEADINGLEY REGIONAL 3 - DIST @ -----> G.I. RES IN	0	0	1.39	1.50	0.06
4-Sep-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.92	1.00	0.12
4-Sep-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.48	1.55	0.16
5-Sep-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.46	1.50	0.16
5-Sep-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.49	1.55	0.15
4-Sep-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.47	1.49	0.15
19-Sep-23	HEADINGLEY REGIONAL 1 - RAW	>2420	308			4.99
19-Sep-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.33	1.40	0.12
18-Sep-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HCC IN	0	0	1.47	1.64	0.17
19-Sep-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.89	1.00	0.14
19-Sep-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.52	1.59	0.17
18-Sep-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.51	1.57	0.16
18-Sep-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.62	1.68	0.17
19-Sep-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.40	1.45	0.17
3-Oct-23	HEADINGLEY REGIONAL 1 - RAW	>2420	866			5.28
3-Oct-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.40	1.43	0.15
3-Oct-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY W.W.T.P.	0	0	1.43	1.54	0.14
2-Oct-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.79	0.95	0.29
2-Oct-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.22	1.29	0.21
3-Oct-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.27	1.33	0.18
3-Oct-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.33	1.40	0.24
2-Oct-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.24	1.36	0.17
17-Oct-23	HEADINGLEY REGIONAL 1 - RAW	649	206			6.19
17-Oct-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.43	1.53	0.12
16-Oct-23	HEADINGLEY REGIONAL 3 - DIST @ -----> BAYER CROP	0	0	1.46	1.50	0.12
17-Oct-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.63	0.74	0.12
17-Oct-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.09	1.17	0.19
16-Oct-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.20	1.28	0.20
16-Oct-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.43	1.52	0.16
17-Oct-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.00	1.05	0.22
31-Oct-23	HEADINGLEY REGIONAL 1 - RAW	63	20			4.66
31-Oct-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.46	1.57	0.13
31-Oct-23	HEADINGLEY REGIONAL 3 - DIST @ -----> W.S.P. RES. IN	0	0	1.22	1.31	0.17
31-Oct-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.72	0.77	0.15
31-Oct-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.20	1.27	0.16

30-Oct-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.28	1.35	0.14
30-Oct-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.48	1.57	0.13
31-Oct-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.04	1.09	0.17
14-Nov-23	HEADINGLEY REGIONAL 1 - RAW	91	18			7.29
14-Nov-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.59	1.67	0.07
14-Nov-23	HEADINGLEY REGIONAL 3 - DIST @ -----> HDLY IN	0	0	1.68	1.78	0.09
13-Nov-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.77	0.88	0.13
13-Nov-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.21	1.28	0.10
14-Nov-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.28	1.39	0.08
14-Nov-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.55	1.59	0.09
13-Nov-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.12	1.14	0.11
28-Nov-23	HEADINGLEY REGIONAL 1 - RAW	8	4			8.50
28-Nov-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.57	1.71	0.07
28-Nov-23	HEADINGLEY REGIONAL 3 - DIST @ -----> ROSSER IN	0	0	1.66	1.75	0.09
28-Nov-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.78	0.88	0.14
28-Nov-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.49	1.56	0.10
27-Nov-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.53	1.59	0.08
27-Nov-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.64	1.74	0.06
28-Nov-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.22	1.29	0.12
12-Dec-23	HEADINGLEY REGIONAL 1 - RAW	6	3			9.06
12-Dec-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.63	1.73	0.09
11-Dec-23	HEADINGLEY REGIONAL 3 - DIST @ -----> SFX IN	0	0	1.34	1.4	0.06
12-Dec-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.88	1.39	0.09
12-Dec-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.32	1.42	0.07
11-Dec-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.46	1.54	0.07
11-Dec-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.39	1.44	0.12
12-Dec-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.39	1.49	0.11
28-Dec-23	HEADINGLEY REGIONAL 1 - RAW	4	1			7.11
28-Dec-23	HEADINGLEY REGIONAL 2 - TREATED	0	0	1.39	1.44	0.08
27-Dec-23	HEADINGLEY REGIONAL 3 - DIST @ -----> GI IN	0	0	1.08	1.23	0.08
27-Dec-23	HEADINGLEY REGIONAL 3 - DIST - GI OUT	0	0	0.97	1.13	0.07
27-Dec-23	HEADINGLEY REGIONAL 3 - DIST - ROSSER OUT	0	0	1.26	1.35	0.20
28-Dec-23	HEADINGLEY REGIONAL 3 - DIST - ST. FX OUT	0	0	1.16	1.22	0.05
28-Dec-23	HEADINGLEY REGIONAL 3 - DIST - HDLY OUT	0	0	1.42	1.45	0.09
27-Dec-23	HEADINGLEY REGIONAL 3 - DIST - WSP OUT	0	0	1.41	1.47	0.08



### Appendix C: RM of Headingley 89.50 2023 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
9-Jan-23	HEADINGLEY 3 - DIST @ --> A&W Restaurant	0	0	1.26	1.32
23-Jan-23	HEADINGLEY 3 - DIST @ --> Headingley Sport Shop	0	0	1.35	1.42
6-Feb-23	HEADINGLEY 3 - DIST @ --> Headingley Library	0	0	1.39	1.48
21-Feb-23	HEADINGLEY 3 - DIST @ --> Columbia Insurance	0	0	1.48	1.54
7-Mar-23	HEADINGLEY 3 - DIST @ --> Motel 6	0	0	1.34	1.42
20-Mar-23	HEADINGLEY 3 - DIST @ --> Matix Lumber	0	0	1.55	1.61
3-Apr-23	HEADINGLEY 3 - DIST @ --> Access Credit Union	<1	<1	1.41	1.47
17-Apr-23	HEADINGLEY 3 - DIST @ --> Flying J	<1	<1	1.41	1.43
1-May-23	HEADINGLEY 3 - DIST @ --> Motel 6	<1	<1	1.40	1.46
15-May-23	HEADINGLEY 3 - DIST @ --> Headingley Sport Shop	<1	<1	1.43	1.50
29-May-23	HEADINGLEY 3 - DIST @ --> Headingley Library	<1	<1	1.44	1.51
12-Jun-23	HEADINGLEY 3 - DIST @ --> Phoenix School	<1	<1	1.11	1.15
26-Jun-23	HEADINGLEY 3 - DIST @ --> Columbia Insurance	0	0	1.40	1.45
10-Jul-23	HEADINGLEY 3 - DIST @ --> Matix Lumber	0	0	1.43	1.48
24-Jul-23	HEADINGLEY 3 - DIST @ --> Motel 6	0	0	1.44	1.48
8-Aug-23	HEADINGLEY 3 - DIST @ --> Flying J	0	0	1.01	1.05
21-Aug-23	HEADINGLEY 3 - DIST @ --> Headingley Sport Shop	0	0	1.64	1.68
5-Sep-23	HEADINGLEY 3 - DIST @ --> Headingley Library	0	0	1.46	1.50
18-Sep-23	HEADINGLEY 3 - DIST @ --> Phoenix School	0	0	1.35	1.42
3-Oct-23	HEADINGLEY 3 - DIST @ --> Columbia Insurance	0	0	1.32	1.37
16-Oct-23	HEADINGLEY 3 - DIST @ --> Matix Lumber	0	0	1.38	1.49
30-Oct-23	HEADINGLEY 3 - DIST @ --> Motel 6	0	0	1.32	1.34
14-Nov-23	HEADINGLEY 3 - DIST @ --> Best Western Plus Hotel	0	0	1.49	1.66
27-Nov-23	HEADINGLEY 3 - DIST @ --> Headingley Sport Shop	0	0	1.14	1.19
11-Dec-23	HEADINGLEY 3 - DIST @ --> Headingley Library	0	0	1.22	1.56
28-Dec-23	HEADINGLEY 3 - DIST @ --> Flying J	0	0	0.78	0.80

### Appendix D: RM of St. Francois Xavier 211.50 2023 Bacteriological Results

Date Sampled	Sample Identification	TC	E C	Free Cl2	Total Cl2
9-Jan-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	0	0	1.54	1.66
23-Jan-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> VET CLINIC	0	0	1.30	1.36
6-Feb-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.35	1.42
21-Feb-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> CAISSE CREDIT UNION	0	0	1.31	1.38
6-Mar-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	0	0	1.26	1.32
20-Mar-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.52	1.59

3-Apr-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	<1	<1	1.43	1.50
17-Apr-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	<1	<1	1.46	1.55
1-May-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> VET CLINIC	<1	<1	1.38	1.51
15-May-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	<1	<1	1.42	1.49
29-May-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	<1	<1	1.40	1.43
12-Jun-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	<1	<1	1.05	1.11
26-Jun-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.34	1.40
10-Jul-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	0	0	1.43	1.49
24-Jul-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> VET CLINIC	0	0	1.46	1.48
7-Aug-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.34	1.40
21-Aug-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.49	1.55
5-Sep-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.48	1.57
18-Sep-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	0	0	1.37	1.47
3-Oct-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY KIDS LEARNING CENTER	649	0	1.23	1.33
16-Oct-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.04	1.10
30-Oct-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> RM OFFICE	0	0	1.24	1.32
14-Nov-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> COUNTRY STORE	0	0	1.18	1.29
27-Nov-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> VET CLINIC	0	0	1.39	1.44
11-Dec-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> SFX ELEMENTARY SCHOOL	0	0	1.39	1.45
28-Dec-23	ST. FRANCOIS XAVIER 3 - DIST @ ---> ESSO	0	0	1.09	1.11

### Appendix E: Peony Farm Reservoir 162.75 2023 Bacteriological Results

Date Sampled	Sample Identification	TC	EC	Free Cl2	Total Cl2
10-Jan-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.13	1.27
10-Jan-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.13	0.26
23-Jan-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.22	1.80
23-Jan-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.18	0.40
6-Feb-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.30	1.69
6-Feb-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.20	0.34
21-Feb-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.36	1.82
21-Feb-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.23	0.29
7-Mar-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.30	1.64
7-Mar-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.12	0.30
20-Mar-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.31	1.73
20-Mar-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.14	0.30
3-Apr-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.30	1.67
3-Apr-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	1.01	1.28
17-Apr-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.82	1.57
17-Apr-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.19	0.59

1-May-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.47	1.90
1-May-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.34	0.63
15-May-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.65	1.93
15-May-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.39	0.68
29-May-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.33	1.78
29-May-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.76	1.11
12-Jun-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.52	1.93
12-Jun-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.79	1.09
26-Jun-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.43	1.77
26-Jun-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	1.04	1.60
10-Jul-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.46	1.90
10-Jul-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.62	0.97
24-Jul-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	0.70	1.07
24-Jul-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.85	1.10
8-Aug-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.39	1.70
8-Aug-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	1.35	1.65
21-Aug-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.30	1.74
21-Aug-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.35	0.52
5-Sep-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.57	1.96
5-Sep-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.55	0.90
18-Sep-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.29	1.65
18-Sep-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.64	0.86
2-Oct-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.17	1.54
2-Oct-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.70	0.78
16-Oct-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.61	1.87
16-Oct-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.45	0.75
30-Oct-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.20	1.69
30-Oct-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.31	0.56
14-Nov-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.35	1.47
14-Nov-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.19	0.32
27-Nov-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.31	1.89
27-Nov-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.17	0.29
11-Dec-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.56	1.84
11-Dec-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.23	0.45
19-Dec-23	PEONY FARM 3 - DIST - PF OUTGOING	0	0	1.31	1.87
19-Dec-23	PEONY FARM 3 - DIST - PP @ RINK	0	0	0.25	0.56

## 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: **2023**      Operator -in-charge (Print): **Danielle Vaillant/Grant McGorman**

<b>Total Trihalomethanes (THMs) [mg/L]</b>	
Quality Standard: Less than or equal to 0.10 mg/L as locational running annual average of quarterly samples	
<b>Sampling Location #1:      Oakville In</b>	
1st Quarter	0.0392
2nd Quarter	0.0433
3rd Quarter	0.0906
4th Quarter	0.0301
<b>Yearly Average (mg/L)</b>	<b>0.40604</b>
Yearly Average (ug/L)	40.60
<b>Sampling Location #2:      Fannystelle In</b>	
1st Quarter	0.0493
2nd Quarter	0.0396
3rd Quarter	0.0888
4th Quarter	0.0472
<b>Yearly Average (mg/L)</b>	<b>0.0450</b>
Yearly Average (ug/L)	45.0

<b>Total Halo Acetic Acids (HAAs) [mg/L]</b>	
Quality Standard: Less than or equal to 0.08 mg/L as locational running annual average of quarterly samples	
<b>Sampling Location #1:      Fortier Booster</b>	
1st Quarter	0.0209
2nd Quarter	0.0190
3rd Quarter	0.0336
4th Quarter	0.0158
<b>Yearly Average (mg/L)</b>	<b>0.0223</b>
Yearly Average (ug/L)	22.33
<b>Sampling Location #2:      Elm Bank Booster</b>	
1st Quarter	0.0209
2nd Quarter	0.0216
3rd Quarter	0.0383
4th Quarter	0.0199
<b>Yearly Average (mg/L)</b>	<b>0.0252</b>
Yearly Average (ug/L)	25.18

## Disinfection By-product Report - THMs and HAAs

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

**Year: 2023**

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

### Total Trihalomethanes (THMs)

**[mg/L]**

**Quality Standard:** Less than or equal to 0.1 mg/L as

Locational running average of quarterly samples

**Sampling Location #1: GROSSE ISLE IN**

1st Quarter	0.0760
2nd Quarter	0.0444
3rd Quarter	0.0814
4th Quarter	0.0488
<b>Yearly Average (mg/L)</b>	<b>0.0627</b>
Yearly Average (ug/L)	62.70

**Sampling Location #2: WEST ST. PAUL IN**

1st Quarter	0.0095
2nd Quarter	0.0143
3rd Quarter	0.0384
4th Quarter	0.0148
<b>Yearly Average (mg/L)</b>	<b>0.0193</b>
Yearly Average (ug/L)	19.30

### Total Halo Acetic Acids (HAAs)

**[mg/L]**

**Quality Standard:** Less than or equal to 0.08 mg/L as

Locational running average of quarterly samples

**Sampling Location #1: SFX IN**

1st Quarter	0.0018	*
2nd Quarter	0.0019	
3rd Quarter	0.0050	*
4th Quarter	0.0050	*
<b>Yearly Average (mg/L)</b>	<b>0.0034</b>	
Yearly Average (ug/L)	4.0	

\*< than

**Sampling Location #2: ROSSER IN**

1st Quarter	0.0018	*
2nd Quarter	0.0018	*
3rd Quarter	0.0050	*
4th Quarter	0.0050	*
<b>Yearly Average (mg/L)</b>	<b>0.0034</b>	
Yearly Average (ug/L)	3.4	

\*< than

## Appendix G: Cartier Water Treatment Facility Annual Lab Results

### Results Summary L2750507

<b>Job Reference</b>	36.00 CARTIER REGIONAL
<b>Report To</b>	GRANT MCGORMAN, LEAD OPERATOR - CRWC, Manitoba Water Services Board - Peony Reservoir
<b>Date Received</b>	9-May-2023 13:56
<b>Report Date</b>	8-Mar-2024 13:55
<b>Report Version</b>	3

Client Sample ID			CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 TREATED	CARTIER REGIONAL 3 DISTRIBUTION
Date Sampled			9-May-2023	9-May-2023	9-May-2023
Time Sampled			9:30	9:30	9:30
ALS Sample ID			L2750507-1	L2750507-2	L2750507-3
Parameter	Lowest Detection Limit	Units	Water	Water	Water

#### Physical Tests (Water)

Colour, True	5.0	CU	18.0	<5.0	
Conductivity	1.0	umhos/cm	790	238	
Hardness (as CaCO3)	0.20	mg/L	322	51.6	
Langelier Index (4 C)		-	0.86	-0.53	
Langelier Index (60 C)		-	1.6	0.24	
pH	0.10	pH units	8.42	8.19	
Total Dissolved Solids	20	mg/L	504	125	
Transmittance, UV (254 nm)	1.0	%T/cm	60.4	96.2	
Turbidity	0.10	NTU	11.7	<0.10	

#### Anions and Nutrients (Water)

Alkalinity, Total (as CaCO3)	1.0	mg/L	223	71.7	
Ammonia, Total (as N)	0.010	mg/L	0.016	<0.010	
Bicarbonate (HCO3)	1.2	mg/L	256	87.5	
Bromide (Br)	0.010	mg/L	0.058	<0.010	
Carbonate (CO3)	0.60	mg/L	7.8	<0.60	
Chloride (Cl)	0.10	mg/L	20.2	7.74	
Fluoride (F)	0.020	mg/L	0.137	0.304	
Hydroxide (OH)	0.34	mg/L	<0.34	<0.34	
Nitrate (as N)	0.0050	mg/L	0.737	0.384	
Nitrite (as N)	0.0010	mg/L	0.0091	<0.0010	
Sulfate (SO4)	0.30	mg/L	176	32.6	

#### Organic / Inorganic Carbon (Water)

Dissolved Organic Carbon	0.50	mg/L	10.1	1.88	
Total Organic Carbon	0.50	mg/L	9.46	1.89	

#### Total Metals (Water)

Aluminum (Al)-Total	0.0030	mg/L	0.240	0.0045	<0.0030
Antimony (Sb)-Total	0.00010	mg/L	0.00014	<0.00010	<0.00010
Arsenic (As)-Total	0.00010	mg/L	0.00305	0.00046	0.00046
Barium (Ba)-Total	0.00010	mg/L	0.0658	0.00931	0.0104
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	0.086	0.075	0.080
Cadmium (Cd)-Total	0.0000050	mg/L	0.0000186	<0.0000050	<0.0000050
Calcium (Ca)-Total	0.050	mg/L	67.0	10.7	11.7
Cesium (Cs)-Total	0.000010	mg/L	0.000035	<0.000010	<0.000010
Chromium (Cr)-Total	0.00010	mg/L	0.00040	<0.00010	<0.00010

Cobalt (Co)-Total	0.00010	mg/L	0.00027	<0.00010	<0.00010
Copper (Cu)-Total	0.00050	mg/L	0.0398	0.0389	0.00754
Iron (Fe)-Total	0.010	mg/L	0.345	<0.010	<0.010
Lead (Pb)-Total	0.000050	mg/L	0.000224	<0.000050	0.000072
Lithium (Li)-Total	0.0010	mg/L	0.0425	0.0119	0.0121
Magnesium (Mg)-Total	0.0050	mg/L	37.5	6.02	6.14
Manganese (Mn)-Total	0.00010	mg/L	0.0272	0.00070	0.00074
Molybdenum (Mo)-Total	0.000050	mg/L	0.00218	0.000332	0.000369
Nickel (Ni)-Total	0.00050	mg/L	0.00328	<0.00050	<0.00050
Phosphorus (P)-Total	0.030	mg/L	0.150	0.400	0.370
Potassium (K)-Total	0.050	mg/L	10.7	2.88	2.49
Rubidium (Rb)-Total	0.00020	mg/L	0.00231	0.00054	0.00059
Selenium (Se)-Total	0.000050	mg/L	0.000441	0.000094	0.000079
Silicon (Si)-Total	0.10	mg/L	7.60	2.15	2.02
Silver (Ag)-Total	0.000010	mg/L	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	0.050	mg/L	45.2	29.5	27.9
Strontium (Sr)-Total	0.00020	mg/L	0.263	0.0439	0.0452
Sulfur (S)-Total	0.50	mg/L	62.8	11.6	12.8
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	0.00725	<0.00030	<0.00030
Tungsten (W)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	0.000010	mg/L	0.00268	0.000865	0.000380
Vanadium (V)-Total	0.00050	mg/L	0.00200	<0.00050	<0.00050
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total	0.00020	mg/L	0.00044	<0.00020	<0.00020

#### Qualifier Legend

HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
RRV	Reported Result Verified By Repeat Analysis

## Results Summary WP2321097

<b>Project</b>	CARTIER REGIONAL - PWS 36.00
<b>Report To</b>	Marc Balcaen, Manitoba Conservation & Climate
<b>Date Received</b>	28-Aug-2023 13:51
<b>Issue Date</b>	07-Sep-2023 11:43
<b>Amendment</b>	0

Client Sample ID	CARTIER REGIONAL 1 - RAW		
Date Sampled	28-Aug-2023		
Time Sampled	12:30		
ALS Sample ID	WP2321097-001		
Analyte	Lowest Detection Limit	Units	Sub-Matrix: Water

#### Organic Parameters (Matrix: Water)

Microcystin	0.20	µg/L	<0.20
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## Appendix H: Headingley Water Treatment Facility Annual Lab Results

### Results Summary L2750680

**Job Reference** HEADINGLEY REGIONAL - PWS 89.40  
**Report To** DAVID EPLER, Cartier Regional Water Co-op - Headingley Regional - PWS  
**Date Received** 16-May-2023 14:21  
**Report Date** 9-Jun-2023 12:54  
**Report Version** 2

**Guideline: [Suite] - CA\_CDWQ MAC and AO (includes "interim" MACs) - Federal Guidelines for Canadian Drinking Water Quality (MAR, 2021)**

**Category:**

Client Sample ID	HEADINGLEY REGIONAL 1 - RAW	HEADINGLEY REGIONAL 2 - TREATED	HEADINGLEY REGIONAL 3 - DISTRIBUTION - SFX RES. INCOMING
Date Sampled	16-May-2023	16-May-2023	16-May-2023
Time Sampled	10:30	9:30	13:50
ALS Sample ID	L2750680-1	L2750680-2	L2750680-3
Parameter	Guideline Limit	Lowest Detection Limit	Units
			Water
			Water
			Water

#### Physical Tests (Water)

Parameter	Guideline Limit	Lowest Detection Limit	Units	Water	Water	Water
Colour, True	5.0		CU	45.3	<5.0	
Conductivity	1.0		umhos/cm	848	234	
Hardness (as CaCO3)	0.20		mg/L	384	85.6	
Langelier Index (4 C)			-	0.91	-0.4	
Langelier Index (60 C)			-	1.7	0.37	
pH	0.10		pH units	8.43	7.96	
Total Dissolved Solids	20		mg/L	516	117	
Transmittance, UV (254 nm)	1.0		%T/cm	44.7	97.7	
Turbidity	0.10		NTU	200	0.15	

#### Anions and Nutrients (Water)

Parameter	Guideline Limit	Lowest Detection Limit	Units	Water	Water	Water
Alkalinity, Total (as CaCO3)	1.0		mg/L	219	54.1	
Ammonia, Total (as N)	0.010		mg/L	0.045	0.012	
Bicarbonate (HCO3)	1.2		mg/L	253	66	
Bromide (Br)	0.010		mg/L	0.059	<0.010	
Carbonate (CO3)	0.60		mg/L	7.08	<0.60	
Chloride (Cl)	0.10		mg/L	22.7	3.13	
Fluoride (F)	0.020		mg/L	0.144	<0.020	
Hydroxide (OH)	0.34		mg/L	<0.34	<0.34	
Nitrate (as N)	0.0050		mg/L	0.338	0.243	
Nitrite (as N)	0.0010		mg/L	0.0011	<0.0010	
Sulfate (SO4)	0.30		mg/L	205	51.1	

#### Organic / Inorganic Carbon (Water)

Parameter	Guideline Limit	Lowest Detection Limit	Units	Water	Water	Water
Dissolved Organic Carbon	0.50		mg/L	11.4	<0.50	
Total Organic Carbon	0.50		mg/L	11.0	<0.50	

#### Total Metals (Water)

Parameter	Guideline Limit	Lowest Detection Limit	Units	Water	Water	Water
Aluminum (Al)-Total	0.0030		mg/L	3.88	0.0048	<0.0030
Antimony (Sb)-Total	0.00010		mg/L	0.00035	<0.00010	<0.00010
Arsenic (As)-Total	0.00010		mg/L	0.00780	<0.00010	<0.00010
Barium (Ba)-Total	0.00010		mg/L	0.155	0.00114	0.00110
Beryllium (Be)-Total	0.00010		mg/L	0.00027	<0.00010	<0.00010



Bismuth (Bi)-Total	0.000050	mg/L	0.000081	<0.000050	<0.000050
Boron (B)-Total	0.010	mg/L	0.111	0.081	0.079
Cadmium (Cd)-Total	0.000050	mg/L	0.000143	<0.000050	<0.000050
Calcium (Ca)-Total	0.050	mg/L	77.4	33.4	38.1
Cesium (Cs)-Total	0.000010	mg/L	0.000687	<0.000010	<0.000010
Chromium (Cr)-Total	0.00010	mg/L	0.00622	<0.00010	<0.00010
Cobalt (Co)-Total	0.00010	mg/L	0.00395	<0.00010	<0.00010
Copper (Cu)-Total	0.00050	mg/L	0.0105	0.0207	0.00163
Iron (Fe)-Total	0.010	mg/L	7.29	<0.010	<0.010
Lead (Pb)-Total	0.000050	mg/L	0.00427	<0.000050	<0.000050
Lithium (Li)-Total	0.0010	mg/L	0.0572	0.0048	0.0049
Magnesium (Mg)-Total	0.0050	mg/L	46.3	0.546	0.599
Manganese (Mn)-Total	0.00010	mg/L	0.513	0.00842	0.00411
Molybdenum (Mo)-Total	0.000050	mg/L	0.00308	<0.000050	<0.000050
Nickel (Ni)-Total	0.00050	mg/L	0.0132	<0.00050	<0.00050
Phosphorus (P)-Total	0.030	mg/L	0.400	<0.050	<0.030
Potassium (K)-Total	0.050	mg/L	17.3	1.21	1.27
Rubidium (Rb)-Total	0.00020	mg/L	0.0106	0.00025	0.00024
Selenium (Se)-Total	0.000050	mg/L	0.000826	<0.000050	<0.000050
Silicon (Si)-Total	0.10	mg/L	16.1	0.69	0.78
Silver (Ag)-Total	0.000010	mg/L	0.000036	<0.000010	<0.000010
Sodium (Na)-Total	0.050	mg/L	54.3	11.9	9.46
Strontium (Sr)-Total	0.00020	mg/L	0.293	0.0350	0.0395
Sulfur (S)-Total	0.50	mg/L			16.7
Tellurium (Te)-Total	0.00020	mg/L	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	0.000010	mg/L	0.000104	<0.000010	<0.000010
Thorium (Th)-Total	0.00010	mg/L	0.00074	<0.00010	<0.00010
Tin (Sn)-Total	0.00010	mg/L	0.00011	<0.00010	<0.00010
Titanium (Ti)-Total	0.00030	mg/L	0.0725	<0.00030	<0.00030
Tungsten (W)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	0.000010	mg/L	0.00389	0.000028	0.000028
Vanadium (V)-Total	0.00050	mg/L	0.0159	<0.00050	<0.00050
Zinc (Zn)-Total	0.0030	mg/L	0.0305	0.0053	<0.0030
Zirconium (Zr)-Total	0.00020	mg/L	0.00133	<0.00020	<0.00020

#### Qualifier Legend

HTC

Exceeds Guideline Limit

Detection Limit Exceeds Guideline

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

## Results Summary WP2320363

**Project** Headingley Regional - PWS 89.40  
**Report To** Marc Balcaen, Manitoba Conservation & Climate  
**Date Received** 22-Aug-2023 12:08  
**Issue Date** 30-Aug-2023 09:40  
**Amendment** 0

Client Sample ID  
Date Sampled

HEADINGLEY  
REGIONAL 1 RAW  
21-Aug-2023

Time Sampled			13:20
ALS Sample ID			WP2320363-001
Analyte	Lowest Detection Limit	Units	Sub-Matrix: Water
<b>Organic Parameters (Matrix: Water)</b>			
Microcystin	0.20	µg/L	<0.20

## Appendix I: Cartier Regional Water Audits 2023

In 2022 the Office of Drinking discontinued providing system Audit reports to facilities.

For all previous year CRWC DWO Audits please follow this 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 Facility** (204-353-4055) or email [cartierwtp@crwc.ca](mailto:cartierwtp@crwc.ca)

**Headingley Water Treatment Facility** (204-832-2555) or email [headingleywtp@crwc.ca](mailto:headingleywtp@crwc.ca)