VIRDEN

# 2024 Annual Drinking Water Report

# 2024 Town of Virden Water Supply System
# Annual Report

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# 1 Source Water

The Town of Virden's water treatment plant receives its' water from two secure wells located in the Assiniboine Valley approximately 8.5 km north east of the town. Both wells are approximately 70 feet deep and are equipped with 75HP submersible vertical turbine well pumps in each well. The combined capacity of the wells is rated at 54 L/s. The well site is equipped with a control building that houses a programmable logic controller (PLC) that communicates with the water plant via a fiber optic network connection and a standby diesel generator to ensure continuous operation during prolonged power outages. Raw water is pumped through a pipeline to the water treatment plant located in the Town of Virden.

# 2 Water Treatment Process

The water treatment plant is equipped with a GE Reverse Osmosis (RO) water treatment system as well as an AWI granular media filtration system. The incoming raw water flow is split into two streams, with approximately 2/3 of the flow directed to the reverse osmosis system and 1/3 to the granular media filters.

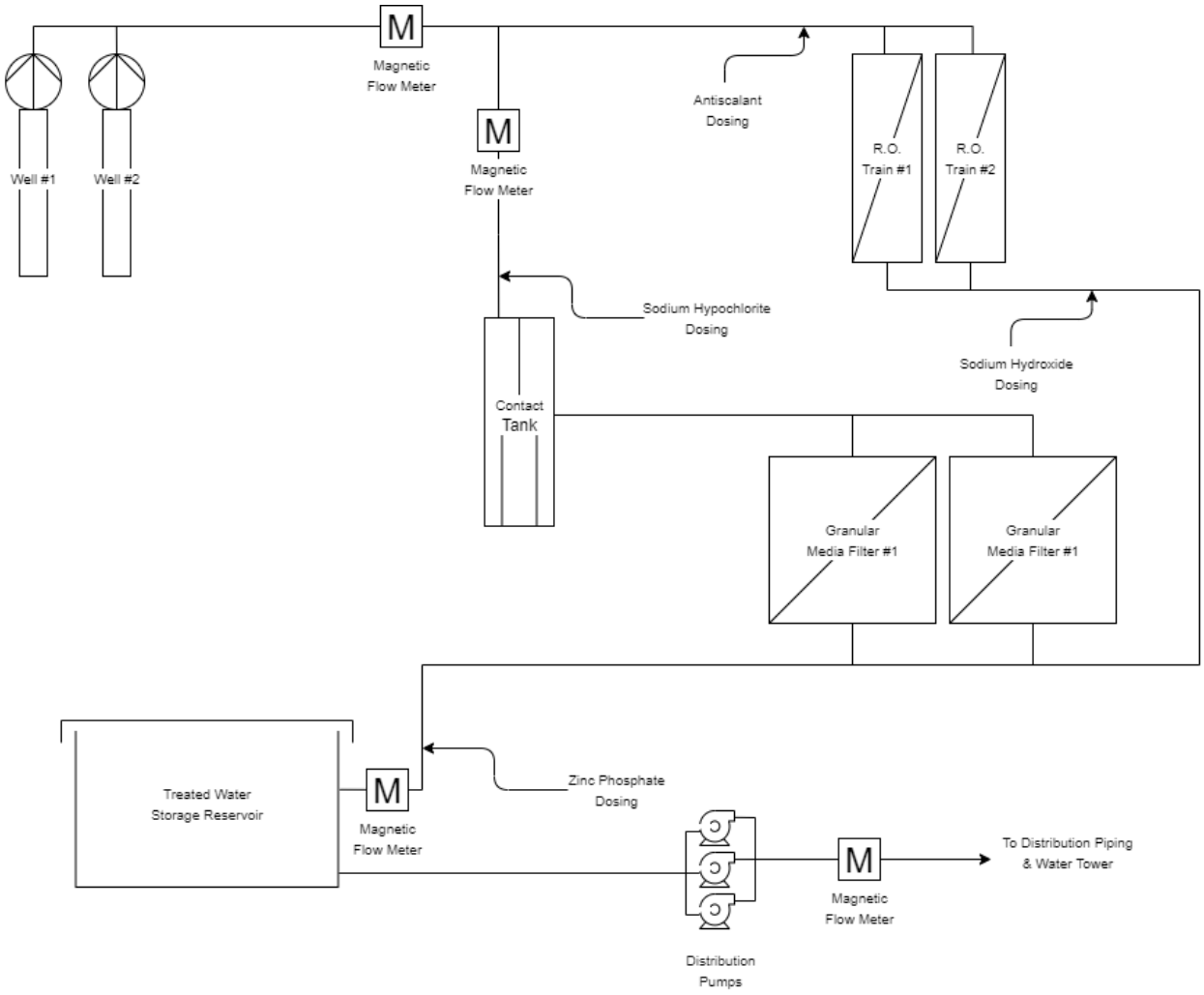
Reverse osmosis is a water treatment process that removes contaminants such as dissolved salts, metal ions, organic compounds and bacteria from water using pressure that forces water molecules through semi-permeable membranes. High pressure pumps force the raw water through the membranes allowing only the purified water through. Impurities that are filtered from the raw water are concentrated into a waste stream that is discharged to drain. An antiscalant is added to the raw water that inhibits the formation and precipitation of crystallized minerals that form scale, prolonging the life cycle of the membranes.

In the granular media filter sodium hypochlorite (liquid chlorine) is injected into the raw water which acts as an oxidant, as well as a disinfectant of the raw water. The raw water is then filtered slowly through a granular media bed to remove suspended solids and other contaminants such as soluble iron, manganese and arsenic to name a few.

The partially treated water from the reverse osmosis and granular media filters is then combined, treated with sodium hydroxide (caustic soda) for pH control and zinc sulphate that provides a coating on the interior walls of the distribution piping to prevent corrosion. The fully treated water then enters the storage reservoir located at the water treatment plant, and is pumped into the distribution system for user consumption.

The water treatment plant is equipped with a standby diesel generator to ensure continuous operation during prolonged power outages.

**Figure 1 – Water Treatment Process Flow Diagram**




# 3 Distribution System

The capacity of the water treatment plant potable water storage reservoir is approximately 2000 $m^3$ with an additional 400 m3 of storage available in an elevated water tower that provides the town with additional storage capacity for firefighting capabilities, assists with consistent distribution system pressure, and a reserve supply for domestic use.

Virden's water distribution system consists mainly of 150 mm diameter cast iron water mains, with newer sections of PVC which services approximately 3,300 residents through approximately 1,500 connections.

In 2024, fours repairs of the water distribution system were needed. Notices of potential service disruptions were circulated to any users who would be affected.

# 4 Water Quality Testing

The Town of Virden Utility Operations Staff analyze water samples daily to ensure safe and reliable supply of water for consumers use. Samples are also regularly sent to an independent laboratory for analysis. See appendix A for bacteriological and chlorine residuals

*Bacteriological Analysis:* Raw and treated water samples are submitted bi-weekly to an accredited environmental laboratory to be analyzed for total coliform and Escherichia coli (E-coli) bacteria. These tests are necessary to ensure the system is free of any pathogens (disease causing bacteria) which ensures a safe drinking water source for the consumer.

*Disinfection Residuals*: Tests are completed daily at the water treatment plant and bi-weekly at designated locations throughout the distribution system to ensure a minimum free chlorine residual of 0.5 mg/L at the water plant and a minimum of 0.1 mg/l in the distribution system is maintained.

*Chemical Analysis:* As per the Towns Operating Licence, a complete chemical analysis of the raw and treated water is required once every three years. The 2024 water quality results indicated the raw water was of good quality with only total dissolved solids and manganese exceeding the aesthetic objective of the Guidelines for Canadian Drinking Water Quality while the treated water quality indicates no exceedances.

# 5 Water Outages, Boil Water Advisories, Water Quality Advisories/Notices, and Compliance Audits

No BWA's (Boil Water Advisories) or water quality advisories occurred during the 2024 calendar year however maintenance advisories were issued to residents affected prior to undertaking water system repairs. In 2024 there was no compliance audit performed at the Water Treatment Plant by the Office of Drinkng Water.

# 6 Continuing Quality Improvement

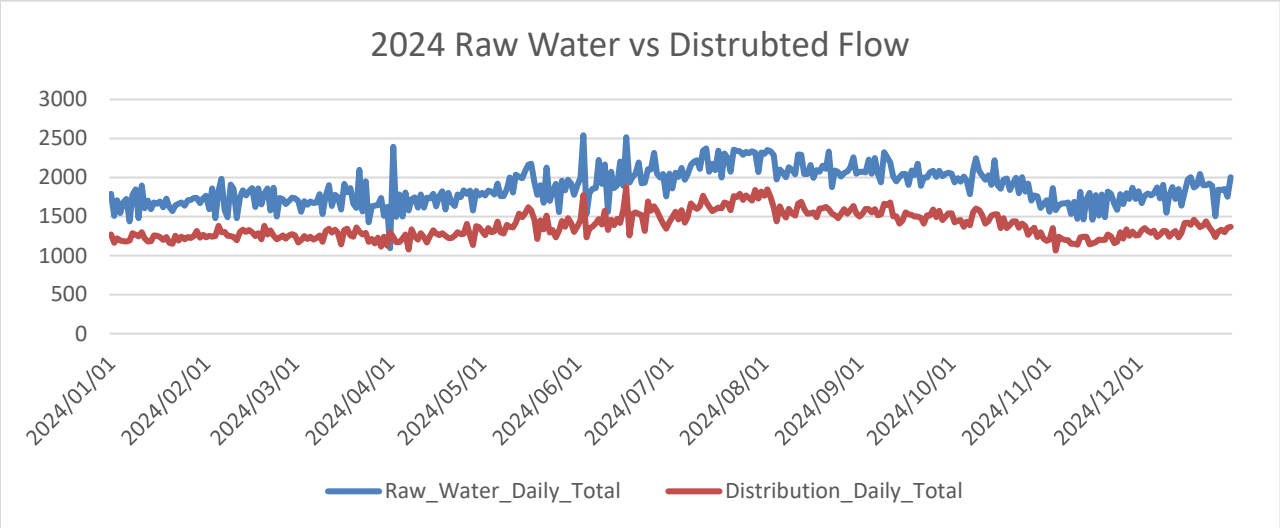
The Town completed installation and commissioning of two new source water wells, 7 km of raw water pipeline and various upgrades to the water treatment system in 2021 at a cost of approximately $3 million dollars. The raw water source for the Town was changed to the new wells on July 27, 2021. The raw water quality has improved considerably from the previous water source which has resulted in better quality treated water and reduced operating costs for the waterworks system. The original wells remain in service and are used as a source of untreated water for an industrial customer.

# 7 Review of Water Usage

The quantity of water used is regularly reviewed so the utility can monitor performance of the water treatment and distribution systems. These values are also used in calculating the amount of non-revenue water consumed. Non-revenue water includes water consumed during water main flushing, fire-fighting, pipeline leaks, or any other water not metered and billed. A total volume of

741,533 $m^3$ of raw water was withdrawn from the 4 operating wells owned and operated by the Town.

Total volume of raw water pumped to the water treatment plant in 2024 was 687,776$m^3$ with 53,757 $m^3$ pumped via independent pipeline to an industrial user. The total volume of water treated in 2024 was 506,554 $m^3$. Consumption was highest during the month July with an average daily use of 1645 m3 and a peak daily consumption of 1878 m3 on June 17, 2024




The Reverse Osmosis (RO) treatment system used by the Town is an extensive treatment system that requires high pressures, resulting in higher energy consumption. Water losses are expected as a part of the treatment process. The RO system is designed and operates at a 75% recovery of high quality water. As a result on average, there is an approximate water loss of 25% during treatment.

With the installation of new raw water source wells and upgrades to the water treatment plant in 2021, the Town has the ability to increase production capacity by approximately 30%. This will allow the Town to meet peak water demands now and into the future.

The Town has developed an operations plan that details water restriction or rationing protocols and a communications strategy in the event there is a shortage of water due to an emergency situation or other causes.

## 8 Operating Certification

The water treatment plant and water distribution system are classified by the Province under The Environment Act's Water and Wastewater Facility Operators Regulation as the following operating levels:

| | |
|---|---|
| Water Treatment Plant | Class II |
| Water Distribution System | Class II |

These classifications require that the Town employ and operate the system with adequately trained and certified operators. Operators are required to have a minimum education and experience level before achieving the certification level that matches the systems operational classification. In addition, the Town is required to employ an Operator in Charge that carries the same level of certification as the operating facility. To maintain the operator licenses, staff are required to continuously complete training in the water industry that is approved by the province.

# 9 Contact Information

For more information on the Town of Virden's water treatment systems and operation please visit our website at www.virden.ca or contact the Towns office at 204-748-2440. Printed copies of this document are also available upon request.

This document was completed March 28, 2025, by

Michael French
Utilities Manager, for The Town of Virden

Appendix A

| Disinfection and Bacteriological Test Results | | | | | |
|---|---|---|---|---|---|
| Sample Type/location | Sample Date | Free Chlorine (mg/l) | Total Chlorine (mg/l) | Total Coliform (MPN/100ml) | E. Coli (MPN/100ml) |
| RAW | 2024-01-10 | | | <1 | <1 |
| TREATED | 2024-01-10 | 0.95 | 1.03 | <1 | <1 |
| DISTRIBUTION @ Pizza Hut | 2024-01-10 | 0.58 | 0.64 | <1 | <1 |
| RAW | 2024-01-24 | | | <1 | <1 |
| TREATED @ WTP | 2024-01-24 | 1.07 | 1.08 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-01-24 | 0.68 | 0.76 | <1 | <1 |
| RAW | 2024-02-07 | | | <1 | <1 |
| TREATED @ WTP | 2024-02-07 | 0.93 | 1.06 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-02-07 | 0.62 | 0.67 | <1 | <1 |
| RAW | 2024-02-21 | | | <1 | <1 |
| TREATED @ WTP | 2024-02-21 | 0.93 | 1.15 | <1 | <1 |
| DISTRIBUTION @ Coop | 2024-02-21 | 0.06 | 0.02 | <1 | <1 |
| DISTRIBUTION @ 296 QUEEN ST. W. | 2024-02-22 | 0.53 | 0.49 | <1 | <1 |
| DISTRIBUTION @ 1-240 QUEEN ST W. | 2024-02-22 | 0.53 | 0.44 | <1 | <1 |
| DISTRIBUTION @ 271 QUEEN ST W. | 2024-02-22 | 0.44 | 0.43 | <1 | <1 |
| RAW | 2024-03-06 | | | <1 | <1 |
| TREATED @ WTP | 2024-03-06 | 0.89 | 0.97 | <1 | <1 |
| DISTRIBUTION @ Pizza Hut | 2024-03-06 | 0.58 | 0.63 | <1 | <1 |
| RAW | 2024-03-11 | | | <1 | <1 |
| TREATED @ WTP | 2024-03-11 | 1.17 | 1.25 | <1 | <1 |
| DISTRIBUTION @ Pizza Hut | 2024-03-11 | 0.52 | 0.63 | <1 | <1 |
| DISTRIBUTION @ 677 9th Ave | 2024-03-19 | 0.76 | 0.8 | <1 | <1 |
| DISTRIBUTION @ 328 Lyons Ave | 2024-03-19 | 0.69 | 0.79 | <1 | <1 |
| DISTRIBUTION @ 304 Lyons Ave | 2024-03-19 | 0.81 | 0.91 | <1 | <1 |
| RAW | 2024-03-20 | | | <1 | <1 |
| TREATED @ WTP | 2024-03-20 | 0.88 | 1.02 | <1 | <1 |
| DISTRIBUTION @ Pubic Works Shop | 2024-03-20 | 0.66 | 0.76 | <1 | <1 |
| DISTRIBUTION @ 187 Park Street | 2024-04-02 | 0.72 | 0.76 | <1 | <1 |
| RAW | 2024-04-03 | | | <1 | <1 |
| TREATED @ WTP | 2024-04-03 | 1.08 | 1.13 | <1 | <1 |
| DISTRIBUTION @LRB | 2024-04-03 | 0.39 | 0.44 | <1 | <1 |
| RAW | 2024-04-17 | | | <1 | <1 |
| TREATED | 2024-04-17 | 1.11 | 1.14 | <1 | <1 |
| DISTRIBUTION @Coop Admin Office | 2024-04-17 | 0.78 | 0.85 | <1 | <1 |
| RAW | 2024-05-01 | | | <1 | <1 |
| TREATED | 2024-05-01 | 0.93 | 1.02 | <1 | <1 |
| DISTRIBUTION @ Pizza Hut | 2024-05-01 | 0.75 | 0.78 | <1 | <1 |
| RAW | 2024-05-15 | | | <1 | <1 |
| TREATED @ WTP | 2024-05-15 | 1.13 | 1.19 | <1 | <1 |
| DISTRIBUTION @ Public Works Shop | 2024-05-15 | 0.76 | 0.83 | <1 | <1 |
| RAW | 2024-05-29 | | | <1 | <1 |
| TREATED @ WTP | 2024-05-29 | 1.07 | 1.11 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-05-29 | 0.56 | 0.66 | <1 | <1 |
| RAW | 2024-06-12 | | | <1 | <1 |
| TREATED @ WTP | 2024-06-12 | 1.00 | 1.03 | <1 | <1 |
| DISTRIBUTION @ Coop Admin Office | 2024-06-12 | 0.8 | 0.87 | <1 | <1 |
| DISTRIBUTION @677 Kenderdine St | 2024-06-19 | 2.2 | 2.2 | <1 | <1 |
| RAW | 2024-06-26 | | | <1 | <1 |
| TREATED @ WTP | 2024-06-26 | 1.12 | 1.13 | <1 | <1 |
| DISTRIBUTION @ PIZZA HUT | 2024-06-26 | 0.8 | 0.81 | <1 | <1 |
| RAW | 2024-07-10 | | | <1 | <1 |

| | | | | | |
|---|---|---|---|---|---|
| TREATED @ WTP | 2024-07-10 | 1.11 | 1.15 | <1 | <1 |
| DISTRIBUTION @ Public Works Shop | 2024-07-10 | 0.61 | 0.63 | <1 | <1 |
| 10 McMillan Bay | 2024-07-17 | 0.55 | 0.85 | <1 | <1 |
| 1 McMillan Bay | 2024-07-17 | 0.6 | 0.84 | <1 | <1 |
| 528 Queen Street E | 2024-07-17 | 0.85 | 0.91 | *77.1 | *74.9 |
| 528 Queen Street E (Re-sample) | 2024-07-22 | 0.32 | 0.86 | <1 | <1 |
| 590 Wellington St E | 2024-07-22 | 0.44 | 0.66 | <1 | <1 |
| 491 Queen Street E | 2024-07-22 | 0.62 | 0.87 | <1 | <1 |
| RAW | 2024-07-24 | | | <1 | <1 |
| TREATED @ WTP | 2024-07-24 | 1.12 | 1.16 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-07-24 | 0.71 | 1.1 | <1 | <1 |
| RAW | 2024-08-07 | | | <1 | <1 |
| TREATED @ WTP | 2024-08-07 | 1.16 | 1.18 | <1 | <1 |
| DISTRIBUTION @ Coop Admin Office | 2024-08-07 | 1.07 | 1.12 | <1 | <1 |
| RAW | 2024-08-21 | | | <1 | <1 |
| TREATED @ WTP | 2024-08-21 | 1.11 | 1.14 | <1 | <1 |
| DISTRIBUTION @ Pizza Hut | 2024-08-21 | 0.58 | 0.61 | <1 | <1 |
| RAW | 2024-09-04 | | | <1 | <1 |
| TREATED @ WTP | 2024-09-04 | 0.98 | 1.16 | <1 | <1 |
| DISTRIBUTION @ Public Works Shop | 2024-09-04 | 0.54 | 0.6 | <1 | <1 |
| RAW | 2024-09-18 | | | <1 | <1 |
| TREATED @ WTP | 2024-09-18 | 1.07 | 1.16 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-09-18 | 0.61 | 0.64 | <1 | <1 |
| RAW | 2024-10-02 | | | <1 | <1 |
| TREATED @ WTP | 2024-10-02 | 1.01 | 1.12 | <1 | <1 |
| DISTRIBUTION @ Coop Admin Office | 2024-10-02 | 0.82 | 0.94 | <1 | <1 |
| 326 Nelson Street W | 2024-10-16 | 0.65 | 0.7 | <1 | <1 |
| 343 Nelson Street W | 2024-10-16 | 0.6 | 0.64 | <1 | <1 |
| 453 Nelson Street W | 2024-10-16 | 0.55 | 0.61 | <1 | <1 |
| RAW | 2024-10-16 | | | <1 | <1 |
| TREATED WTP | 2024-10-16 | 1.05 | 1.12 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-10-16 | 0.46 | 0.62 | <1 | <1 |
| 232 Nelson Street E | 2024-10-29 | 0.91 | 0.96 | <1 | <1 |
| RAW | 2024-10-30 | | | <1 | <1 |
| TREATED @ WTP | 2024-10-30 | 1.57 | 1.6 | <1 | <1 |
| DISTRIBUTION @ Public Works Shop | 2024-10-30 | 0.46 | 0.53 | <1 | <1 |
| Raw | 2024-11-13 | | | <1 | <1 |
| TREATED @ WTP | 2024-11-13 | 1 | 1.06 | <1 | <1 |
| DISTRIBUTION @ LRB | 2024-11-13 | 0.66 | 0.68 | <1 | <1 |
| RAW | 2024-11-27 | | | <1 | <1 |
| TREATED @ WTP | 2024-11-27 | 1.16 | 1.19 | <1 | <1 |
| DISTRIBUTION @ Coop Admin Office | 2024-11-27 | 0.94 | 0.96 | <1 | <1 |
| RAW | 2024-12-11 | | | <1 | <1 |
| TREATED @ WTP | 2024-12-11 | 1.08 | 1.16 | <1 | <1 |
| DISTRIBUTION @ Pizza Hut | 2024-12-11 | 0.49 | 0.57 | <1 | <1 |
| RAW | 2024-12-18 | | | <1 | <1 |
| TREATED @ WTP | 2024-12-18 | 1.23 | 1.23 | <1 | <1 |
| DISTRIBUTION @ Public Works | 2024-12-18 | 0.83 | 0.9 | <1 | <1 |

* High test results from 528 Queen Street East for the Coliform and E-coli were after a watermain break and due to an aspirator screen not being removed before the water sample was taken. This location was re-sampled, as stated above, 5 days after and produced results within acceptable levels.