2023 Annual Drinking Water Report

2023 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.

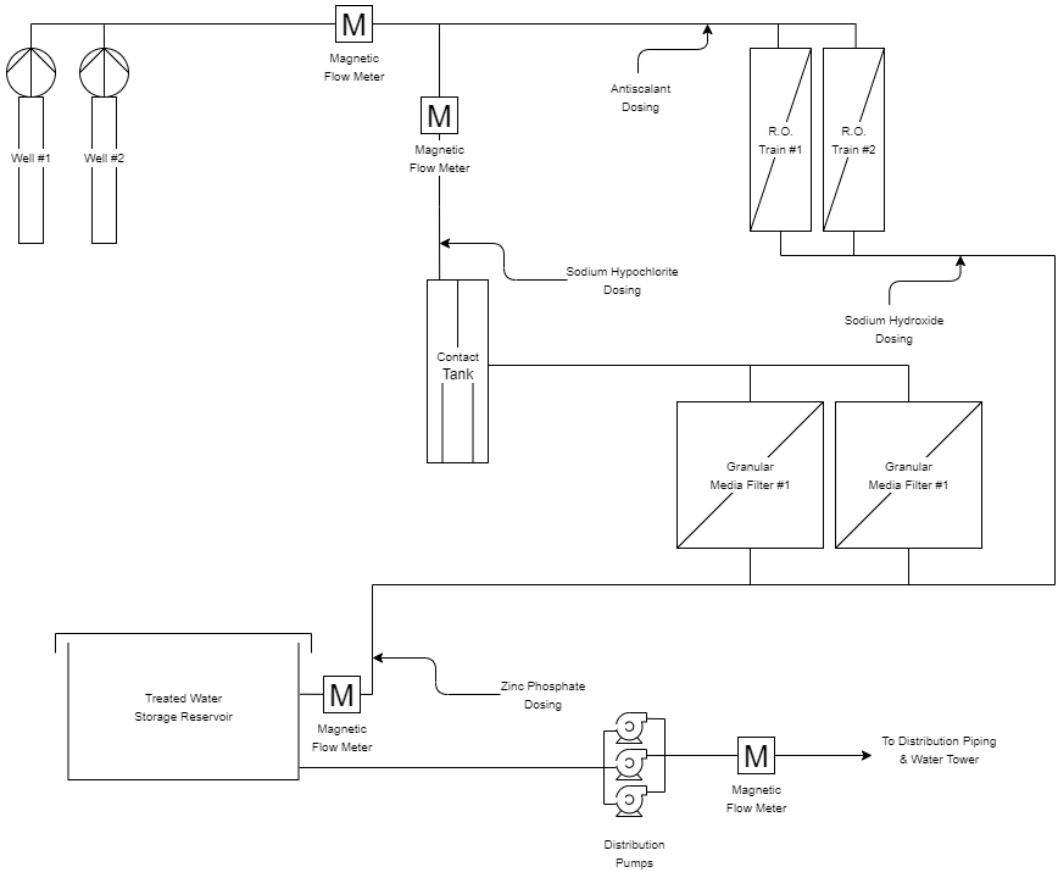
Reverse osmosis is a water treatment process that removes contaminants such as dissolved salts, metal ions, organic compounds and bacteria from water using pressure that forces water molecules through semi-permeable membranes. High pressure pumps force the raw water through the membranes allowing only 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 reservoir is approximately 2000 m^3 of water with an additional 400 m3 of storage available in an elevated water tower that provides the town with additional storage capacity for firefighting capabilities, consistent pressure, and a reserve supply for a combined domestic use storage for two days.

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

In 2023, two repairs of the water distribution system were needed. Notices of potential service disruptions were circulated to residents in the area.

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 and B for water quality testing results.

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 2023 calendar year. As a precautionary measure, residents who could have been potentially been affected during water main repairs were notified. In 2023 there was no compliance audit performed at the Water Treatment Plant by the Office of Drinkng Water.

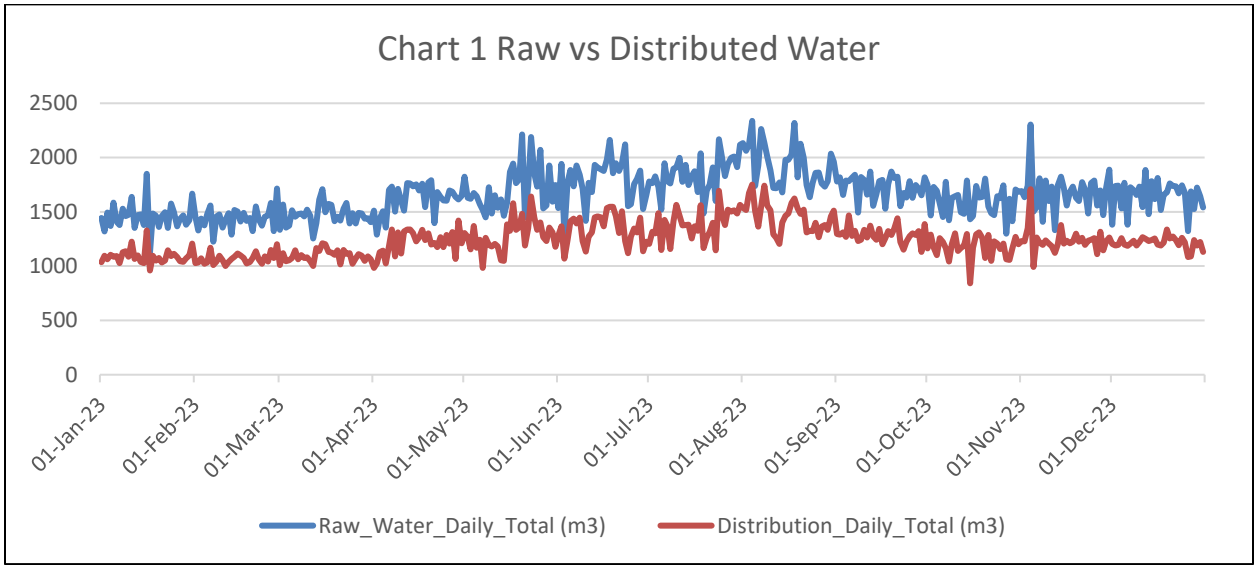
6 Continuing Quality Improvement

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 supply 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 689,344 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 2023 was 606,545m^3 with 82,799 m^3 was pumped via independent pipeline to an industrial user. The total volume of water treated in 2023 was 452,657 m^3. Consumption was highest during the month of August with an average daily use of 1459 m3 and a peak daily consumption of 1740 m3 on August 08/23, notwithstanding a water main leak repair on November 04, 2023.



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 20-25% 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
Distribution System	Class II

These classifications require that the Town employ and operate the system with properly trained and certified operators. Operators are required to have a minimum education and experience level before achieving certification level that match 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 and a minimum level of operating experience is required to recertify.

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, 2024 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	11-01-2023			<1	<1
TREATED	11-01-2023	1.01	1.02	<1	<1
DISTRIBUTION @ LRB	11-01-2023	0.650	0.690	<1	<1
RAW	25-01-2023			<1	<1
TREATED	25-01-2023	1.21	1.32	<1	<1
DISTRIBUTION @ PUBLIC WORKS	25-01-2023	0.860	0.910	<1	<1
RAW	08-02-2023			<1	<1
TREATED	08-02-2023	1.01	1.07	<1	<1
DISTRIBUTION @ COOP MINI MART	08-02-2023	0.790	0.910	<1	<1
RAW	23-02-2023			<1	<1
TREATED	23-02-2023	0.840	1.00	<1	<1
DISTRIBUTION @ PIZZA HUT	23-02-2023	0.490	0.510	<1	<1
RAW	08-03-2023			<1	<1
TREATED	08-03-2023	1.01	1.15	<1	<1
DISTRIBUTION @ LRB	08-03-2023	0.490	0.520	<1	<1
RAW	22-03-2023			<1	<1
TREATED	22-03-2023	0.940	1.04	<1	<1
DISTRIBUTION @ PUBLIC WORKS	22-03-2023	0.560	0.690	<1	<1
RAW	05-04-2023			<1	<1
TREATED	05-04-2023	1.00	1.07	<1	<1
DISTRIBUTION @ PIZZA HUT	05-04-2023	0.93	1.03	<1	<1
RAW	19-04-2023			<1	<1
TREATED	19-04-2023	1.01	1.24	<1	<1
DISTRIBUTION @ Co-op	19-04-2023	0.84	0.91	<1	<1
DISTRIBUTION @ Water Tower Start Up	01-05-2023	0.52	0.55	<1	<1
RAW	03-05-2023			<1	<1
TREATED	03-05-2023	1.09	1.10	<1	<1
DISTRIBUTION @ LRB	03-05-2023	0.69	0.71	<1	<1
RAW	18-05-2023			<1	<1
TREATED	18-05-2023	1.02	1.15	<1	<1
DISTRIBUTION @ Pizza Hut	18-05-2023	0.68	0.75	<1	<1
RAW	31-05-2023			<1	<1
TREATED	31-05-2023	0.98	1.01	<1	<1
DISTRIBUTION @ COOP	31-05-2023	0.82	0.86	<1	<1
RAW	14-06-2023			<1	<1
TREATED	14-06-2023	0.94	0.99	<1	<1
DISTRIBUTION @ Public Work	14-06-2023	0.40	0.47	<1	<1
RAW	28-06-2023			<1	<1
TREATED	28-06-2023	1.18	1.21	<1	<1

DISTRIBUTION @ LRB	28-06-2023	0.53	0.54	<1	<1
RAW	12-07-2023			<1	<1
TREATED	12-07-2023	1.03	1.06	<1	<1
DISTRIBUTION @ PIZZA HUT	12-07-2023	0.47	0.66	<1	<1
DISTRIBUTION @ VIRDEN AUTO GLASS/POST FLUSH	12-07-2023	0.31	0.32	<1	<1
RAW	26-07-2023			<1	<1
TREATED	26-07-2023	0.97	1.01	<1	<1
DISTRIBUTION @ Coop Gas Bar	26-07-2023	0.72	0.73	<1	<1
RAW	09-08-2023			<1	<1
TREATED	09-08-2023	1.17	1.20	<1	<1
DISTRIBUTION @ PIZZA HUT	09-08-2023	0.60	0.64	<1	<1
RAW	23-08-2023			<1	<1
TREATED	23-08-2023	0.91	0.95	<1	<1
DISTRIBUTION @ PUBLIC WORKS	23-08-2023	0.42	0.52	<1	<1
RAW	06-09-2023			<1	<1
TREATED	06-09-2023	0.98	1.03	<1	<1
DISTRIBUTION @ LRB Electric	06-09-2023	0.50	0.50	<1	<1
RAW	20-09-2023			<1	<1
TREATED	20-09-2023	1.04	1.05	<1	<1
DISTRIBUTION @ CO-OP GAS BAR	20-09-2023	0.77	0.86	<1	<1
RAW	04-10-2023			<1	<1
TREATED	04-10-2023	0.97	1.00	<1	<1
DISTRIBUTION @ PUBLIC WORKS	04-10-2023	0.50	0.64	<1	<1
RAW	18-10-2023			<1	<1
TREATED	18-10-2023	0.99	1.01	<1	<1
DISTRIBUTION @ LRB	18-10-2023	0.51	0.61	<1	<1
RAW	06-11-2023			<1	<1
TREATED @ WTP	06-11-2023	0.85	0.88	<1	<1
DISTRIBUTION @ CO-OP	06-11-2023	0.64	0.68	<1	<1
RAW	15-11-2023			<1	<1
TREATED	15-11-2023	0.89	0.92	<1	<1
DISTRIBUTION @ Pizza Hut	15-11-2023	0.23	0.29	<1	<1
RAW	29-11-2023			<1	<1
TREATED WTP	29-11-2023	1.22	1.25	<1	<1
DISTRIBUTION @ LRB	29-11-2023	0.49	0.59	<1	<1
RAW	13-12-2023			<1	<1
TREATED	13-12-2023	1.02	1.05	<1	<1
DISTRIBUTION @ CO-OP GAS BAR	13-12-2023	0.71	0.84	<1	<1
Raw	28-12-2023			<1	<1
TREATED	28-12-2023	0.98	1.14	<1	<1
DISTRIBUTION @ Public Works	28-12-2023	0.49	0.57	<1	<1

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: VIRDEN 1 - RAW @ NORTHWELL	VIRDEN 1 - RAW @ SOUTHWELL	VIRDEN 2 - TREATED	VIRDEN 3 - DISTRIBUTION @ PUBLIC WORKS	VIRDEN 3 - DISTRIBUTION @ LRB	----	----
				Sampling date/time: 07-Feb-2024 08:30	07-Feb-2024 14:00	07-Feb-2024 09:00	07-Feb-2024 08:30	07-Feb-2024 09:00	----	----
				Sub-Matrix: Water	Water	Water	Water	Water	----	----
				WP2403199-001	WP2403199-002	WP2403199-003	WP2403199-004	WP2403199-005	--------	--------
Physical Tests										
Absorbance, UV (@ 254nm)	----	E404/WP	AU/cm	0.0260	0.0200	0.0060	----	----	----	----
Alkalinity, bicarbonate (as CaCO3)	----	E290/WP	mg/L	288	226	104	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/WP	mg/L	<1.0	<1.0	<1.0	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/WP	mg/L	<1.0	<1.0	<1.0	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/WP	mg/L	288	226	104	----	----	----	----
Colour, true	----	E329/WP	CU	<5.0	<5.0	<5.0	----	----	----	----
Conductivity	----	E100/WP	µS/cm	951	720	354	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/WP	mg/L	366	360	130	----	----	----	----
Langelier index (@ 4°C)	----	EC105A/WP	-	0.306	0.203	-0.822	----	----	----	----
Langelier index (@ 60°C)	----	EC105A/WP	-	1.06	0.963	-0.051	----	----	----	----
pH	----	E108/WP	pH units	7.61	7.61	7.28	----	----	----	----
Solids, total dissolved [TDS]	----	E162-L/WP	mg/L	621	567	225	----	----	----	----
Turbidity	----	E121/WP	NTU	<0.10	<0.10	<0.10	----	----	----	----
Transmittance, UV (@ 254nm)	----	E404/WP	% T/cm	94.2	95.5	98.6	----	----	----	----
Anions and Nutrients										
Bromide	24959-67-9	E235.Br-L/WP	mg/L	<0.100 DLM	0.063	Not Detected	----	----	----	----
Chloride	16887-00-6	E235.Cl-L/WP	mg/L	37.8	25.1	12.4	----	----	----	----
Fluoride	16984-48-8	E235.F/WP	mg/L	0.172	0.175	0.060	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/WP	mg/L	1.42	0.595	0.383	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/WP	mg/L	0.0028	0.0057	<0.0010	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WP	mg/L	173	160	58.3	----	----	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/WP	mg/L	1.72	1.76	1.02	----	----	----	----
Carbon, total organic [TOC]	----	E355-L/WP	mg/L	1.97	1.59	1.14	----	----	----	----
Ion Balance										
Anion sum	----	EC101A/WP	meq/L	10.5	8.61	3.67	----	----	----	----

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	VIRDEN 1 - RAW @ NORTHWELL	VIRDEN 1 - RAW @ SOUTHWELL	VIRDEN 2 - TREATED	VIRDEN 3 - DISTRIBUTION @ PUBLIC WORKS	VIRDEN 3 - DISTRIBUTION @ LRB	----	----
				Sampling date/time	07-Feb-2024 08:30	07-Feb-2024 14:00	07-Feb-2024 09:00	07-Feb-2024 08:30	07-Feb-2024 09:00	----	----
				Sub-Matrix	Water	Water	Water	Water	Water	----	----
					WP2403199-001	WP2403199-002	WP2403199-003	WP2403199-004	WP2403199-005	--------	--------
Ion Balance											
Cation sum (total)	----	EC101A/WP	meq/L		10.2	9.25	3.56	----	----	----	----
Ion balance (cations/anions)	----	EC101A/WP	%		97.1	107	97.0	----	----	----	----
Ion balance (APHA)	----	EC101A/WP	%		-1.45	3.58	-1.52	----	----	----	----
Total Metals											
Aluminum, total	7429-90-5	E420/WP	µg/L		<3.0	<3.0	<3.0	<3.0	----	----	----
Antimony, total	7440-36-0	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Arsenic, total	7440-38-2	E420/WP	µg/L		0.51	0.22	0.16	0.27	----	----	----
Barium, total	7440-39-3	E420/WP	µg/L		37.0	36.8	13.4	13.9	----	----	----
Beryllium, total	7440-41-7	E420/WP	µg/L		<0.020	<0.020	<0.020	<0.020	----	----	----
Bismuth, total	7440-69-9	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Boron, total	7440-42-8	E420/WP	µg/L		118	93	76	74	----	----	----
Cadmium, total	7440-43-9	E420/WP	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	----	----	----
Calcium, total	7440-70-2	E420/WP	µg/L		95200	93600	33700	32500	----	----	----
Cesium, total	7440-46-2	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Chromium, total	7440-47-3	E420/WP	µg/L		Not Detected	Not Detected	<0.50	<0.50	----	----	----
Cobalt, total	7440-48-4	E420/WP	µg/L		<0.10	<0.10	Not Detected	Not Detected	----	----	----
Copper, total	7440-50-8	E420/WP	µg/L		0.67	0.62	<0.50	41.7	----	----	----
Iron, total	7439-89-6	E420/WP	µg/L		<10	Not Detected	Not Detected	14	----	----	----
Lead, total	7439-92-1	E420/WP	µg/L		0.194	0.108	<0.050	0.069	----	----	----
Lithium, total	7439-93-2	E420/WP	µg/L		68.6	63.7	24.5	23.7	----	----	----
Magnesium, total	7439-95-4	E420/WP	µg/L		31200	30800	11100	11100	----	----	----
Manganese, total	7439-96-5	E420/WP	µg/L		3.96	35.9	0.24	0.52	1.04	----	----
Molybdenum, total	7439-98-7	E420/WP	µg/L		1.01	0.990	0.337	0.326	----	----	----
Nickel, total	7440-02-0	E420/WP	µg/L		<0.50	<0.50	<0.50	<0.50	----	----	----
Phosphorus, total	7723-14-0	E420/WP	µg/L		<50	<50	211	194	----	----	----
Potassium, total	7440-09-7	E420/WP	µg/L		6120	5370	2070	2060	----	----	----
Rubidium, total	7440-17-7	E420/WP	µg/L		0.25	0.21	<0.20	<0.20	----	----	----

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	VIRDEN 1 - RAW @ NORTHWELL	VIRDEN 1 - RAW @ SOUTHWELL	VIRDEN 2 - TREATED	VIRDEN 3 - DISTRIBUTION @ PUBLIC WORKS	VIRDEN 3 - DISTRIBUTION @ LRB	----	----
				Sampling date/time	07-Feb-2024 08:30	07-Feb-2024 14:00	07-Feb-2024 09:00	07-Feb-2024 08:30	07-Feb-2024 09:00	----	----
				Sub-Matrix	Water	Water	Water	Water	Water	----	----
					WP2403199-001	WP2403199-002	WP2403199-003	WP2403199-004	WP2403199-005	--------	--------
Total Metals											
Selenium, total	7782-49-2	E420/WP	µg/L		3.86	1.20	0.883	0.977	----	----	----
Silicon, total	7440-21-3	E420/WP	µg/L		12200	12000	4350	4350	----	----	----
Silver, total	7440-22-4	E420/WP	µg/L		Not Detected	Not Detected	<0.010	<0.010	----	----	----
Sodium, total	7440-23-5	E420/WP	µg/L		63200	43800	20800	21400	----	----	----
Strontium, total	7440-24-6	E420/WP	µg/L		356	357	122	123	----	----	----
Sulfur, total	7704-34-9	E420/WP	µg/L		62800	58000	21600	21000	----	----	----
Tellurium, total	13494-80-9	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Thallium, total	7440-28-0	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Thorium, total	7440-29-1	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Tin, total	7440-31-5	E420/WP	µg/L		Not Detected	Not Detected	<0.10	<0.10	----	----	----
Titanium, total	7440-32-6	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Tungsten, total	7440-33-7	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Uranium, total	7440-61-1	E420/WP	µg/L		3.24	3.25	1.19	0.986	----	----	----
Vanadium, total	7440-62-2	E420/WP	µg/L		<0.50	<0.50	<0.50	<0.50	----	----	----
Zinc, total	7440-66-6	E420/WP	µg/L		5.4	7.0	185	206	----	----	----
Zirconium, total	7440-67-7	E420/WP	µg/L		Not Detected	Not Detected	Not Detected	Not Detected	----	----	----
Volatile Organic Compounds											
Benzene	71-43-2	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Bromodichloromethane	75-27-4	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Bromoform	75-25-2	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Chloroform	67-66-3	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Dibromochloromethane	124-48-1	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Dichloromethane	75-09-2	E611D/WP	mg/L		<0.0010	<0.0010	----	----	----	----	----
Ethylbenzene	100-41-4	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Tetrachloroethylene	127-18-4	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Toluene	108-88-3	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	VIRDEN 1 - RAW @ NORTHWELL	VIRDEN 1 - RAW @ SOUTHWELL	VIRDEN 2 - TREATED	VIRDEN 3 - DISTRIBUTION @ PUBLIC WORKS	VIRDEN 3 - DISTRIBUTION @ LRB	----	----
				Sampling date/time	07-Feb-2024 08:30	07-Feb-2024 14:00	07-Feb-2024 09:00	07-Feb-2024 08:30	07-Feb-2024 09:00	----	----
				Sub-Matrix	Water	Water	Water	Water	Water	----	----
					WP2403199-001	WP2403199-002	WP2403199-003	WP2403199-004	WP2403199-005	--------	--------
Volatile Organic Compounds											
Trichloroethane, 1,1,1-	71-55-6	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Trichloroethane, 1,1,2-	79-00-5	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Trichloroethylene	79-01-6	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
Xylene, m+p-	179601-23-1	E611D/WP	mg/L		<0.00040	<0.00040	----	----	----	----	----
Xylene, o-	95-47-6	E611D/WP	mg/L		<0.00030	<0.00030	----	----	----	----	----
Xylenes, total	1330-20-7	E611D/WP	mg/L		<0.00050	<0.00050	----	----	----	----	----
BTEX, total	----	E611D/WP	mg/L		<0.0010	<0.0010	----	----	----	----	----
Volatile Organic Compounds Surrogates											
Bromofluorobenzene, 4-	460-00-4	E611D/WP	%		86.7	87.8	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611D/WP	%		94.0	98.3	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Summary of Guideline Limits

Analyte	CAS Number	Unit	CDWG AO	CDWG MAC	CDWG OG
Physical Tests					
Absorbance, UV (@ 254nm)	----	AU/cm	--	--	--
Alkalinity, bicarbonate (as CaCO3)	----	mg/L	--	--	--
Alkalinity, carbonate (as CaCO3)	----	mg/L	--	--	--
Alkalinity, hydroxide (as CaCO3)	----	mg/L	--	--	--
Alkalinity, total (as CaCO3)	----	mg/L	--	--	--
Colour, true	----	CU	**15 CU**	--	--
Conductivity	----	µS/cm	--	--	--
Hardness (as CaCO3), from total Ca/Mg	----	mg/L	--	--	--
Langelier index (@ 4°C)	----	-	--	--	--
Langelier index (@ 60°C)	----	-	--	--	--
pH	----	pH units	--	--	**7 - 10.5 pH units**
Solids, total dissolved [TDS]	----	mg/L	**500 mg/L**	--	--
Transmittance, UV (@ 254nm)	----	% T/cm	--	--	--
Turbidity	----	NTU	**1 NTU**	--	--
Anions and Nutrients					
Bromide	24959-67-9	mg/L	--	--	--
Chloride	16887-00-6	mg/L	**250 mg/L**	--	--
Fluoride	16984-48-8	mg/L	--	**1.5 mg/L**	--
Nitrate (as N)	14797-55-8	mg/L	--	**10 mg/L**	--
Nitrite (as N)	14797-65-0	mg/L	--	**1 mg/L**	--
Sulfate (as SO4)	14808-79-8	mg/L	**500 mg/L**	--	--
Organic / Inorganic Carbon					
Carbon, dissolved organic [DOC]	----	mg/L	--	--	--
Carbon, total organic [TOC]	----	mg/L	--	--	--
Ion Balance					
Anion sum	----	meq/L	--	--	--
Cation sum (total)	----	meq/L	--	--	--
Ion balance (APHA)	----	%	--	--	--
Ion balance (cations/anions)	----	%	--	--	--
Total Metals					
Aluminum, total	7429-90-5	µg/L	--	**2900 µg/L**	**100 µg/L**
Antimony, total	7440-36-0	µg/L	--	**6 µg/L**	--
Arsenic, total	7440-38-2	µg/L	--	**10 µg/L**	--
Barium, total	7440-39-3	µg/L	--	**2000 µg/L**	--
Beryllium, total	7440-41-7	µg/L	--	--	--
Bismuth, total	7440-69-9	µg/L	--	--	--

Analyte	CAS Number	Unit	CDWG AO	CDWG MAC	CDWG OG
Total Metals - Continued					
Boron, total	7440-42-8	µg/L	--	**5000 µg/L**	--
Cadmium, total	7440-43-9	µg/L	--	**7 µg/L**	--
Calcium, total	7440-70-2	µg/L	--	--	--
Cesium, total	7440-46-2	µg/L	--	--	--
Chromium, total	7440-47-3	µg/L	--	**50 µg/L**	--
Cobalt, total	7440-48-4	µg/L	--	--	--
Copper, total	7440-50-8	µg/L	**1000 µg/L**	**2000 µg/L**	--
Iron, total	7439-89-6	µg/L	**300 µg/L**	--	--
Lead, total	7439-92-1	µg/L	--	**5 µg/L**	--
Lithium, total	7439-93-2	µg/L	--	--	--
Magnesium, total	7439-95-4	µg/L	--	--	--
Manganese, total	7439-96-5	µg/L	**20 µg/L**	**120 µg/L**	--
Molybdenum, total	7439-98-7	µg/L	--	--	--
Nickel, total	7440-02-0	µg/L	--	--	--
Phosphorus, total	7723-14-0	µg/L	--	--	--
Potassium, total	7440-09-7	µg/L	--	--	--
Rubidium, total	7440-17-7	µg/L	--	--	--
Selenium, total	7782-49-2	µg/L	--	**50 µg/L**	--
Silicon, total	7440-21-3	µg/L	--	--	--
Silver, total	7440-22-4	µg/L	--	--	--
Sodium, total	7440-23-5	µg/L	**200000 µg/L**	--	--
Strontium, total	7440-24-6	µg/L	--	**7000 µg/L**	--
Sulfur, total	7704-34-9	µg/L	--	--	--
Tellurium, total	13494-80-9	µg/L	--	--	--
Thallium, total	7440-28-0	µg/L	--	--	--
Thorium, total	7440-29-1	µg/L	--	--	--
Tin, total	7440-31-5	µg/L	--	--	--
Titanium, total	7440-32-6	µg/L	--	--	--
Tungsten, total	7440-33-7	µg/L	--	--	--
Uranium, total	7440-61-1	µg/L	--	**20 µg/L**	--
Vanadium, total	7440-62-2	µg/L	--	--	--
Zinc, total	7440-66-6	µg/L	**5000 µg/L**	--	--
Zirconium, total	7440-67-7	µg/L	--	--	--
Volatile Organic Compounds					
Benzene	71-43-2	mg/L	--	**0.005 mg/L**	--
Bromodichloromethane	75-27-4	mg/L	--	--	--
Bromoform	75-25-2	mg/L	--	--	--
BTEX, total	----	mg/L	--	--	--
Chloroform	67-66-3	mg/L	--	--	--

Analyte	CAS Number	Unit	CDWG AO	CDWG MAC	CDWG OG				
Volatile Organic Compounds - Continued									
Dibromochloromethane	124-48-1	mg/L	--	--	--				
Dichloromethane	75-09-2	mg/L	--	**0.05 mg/L**	--				
Ethylbenzene	100-41-4	mg/L	**0.0016 mg/L**	**0.14 mg/L**	--				
Methyl-tert-butyl ether [MTBE]	1634-04-4	mg/L	**0.015 mg/L**	--	--				
Tetrachloroethylene	127-18-4	mg/L	--	**0.01 mg/L**	--				
Toluene	108-88-3	mg/L	**0.024 mg/L**	**0.06 mg/L**	--				
Trichloroethane, 1,1,1-	71-55-6	mg/L	--	--	--				
Trichloroethane, 1,1,2-	79-00-5	mg/L	--	--	--				
Trichloroethylene	79-01-6	mg/L	--	**0.005 mg/L**	--				
Xylene, m+p-	179601-23-1	mg/L	--	--	--				
Xylene, o-	95-47-6	mg/L	--	--	--				
Xylenes, total	1330-20-7	mg/L	**0.02 mg/L**	**0.09 mg/L**	--				
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	%	--	--	--				
Difluorobenzene, 1,4-	540-36-3	%	--	--	--				

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

CDWG	Canada Guidelines for Canadian Drinking Water Quality (JAN, 2023)
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentrations
OG	Operational Guidance