Public Water System Annual Report

-2024-

Name of the Public Water System: **South Central District Water Co-op**

Name of the Legal Owner: **South Central District Water Co-operative Inc.**

Contact Person: **Don McLean, Board Chairperson**

Phone: **(204) 242-4699**

Emergency number: **(204) 245-9101**
Name of Lead Operator: **Mr. Keith Klassen**
Name of Second Operator: **Mr. Nevin Checkley**
Name of Back-up Operator: **Mr. Don Deamel**

Phone during business hours: **(204) 825-2115**

Don McLean
Board Chairperson
South Central District Water Co-op Inc.

Date Prepared: March 2025

Table of Contents

1. Introduction:

The 2024 South Central District Water Co-op Annual Report summarizes the water utility's ability to provide safe potable water and comply with provincial regulations.

2. Description of the Water System

The South Central District Water Co-op provides potable drinking water to a population of approximately 1800 residents. No corrective actions or emergency reporting was required. Full results have been attached in Appendix A.

The South Central District Water Co-op water system consists of two wells, raw water supply pipeline, water treatment plant (WTP), and a treated water transmission pipeline to the water storage reservoir in the town of Manitou (located in the R.M. of Pembina).

2.1. Water Supply Source

The South Central District Water Co-op receives its raw water supply from two groundwater wells, located approximately 15 km west of the WTP on SE 30-3-12W. One well can supply the system when one treatment skid is operating, and the second well supplements the supply when both treatment skids are operating.

The system provides treated water to the towns of Pilot Mound and Manitou, and some rural connections along the transmission pipeline.

2.2 Water Treatment Process

The treatment system is comprised of: two parallel RO membrane filtration skids; manganese greensand bypass filter with UV disinfection. The treatment system ensures that the water meets the *Guidelines for Canadian Drinking Water Quality* and the provincial *Drinking Water Safety Act.*

The water treatment process is designed to reduce iron and manganese concentrations, and reduce hardness to an acceptable level. Iron and manganese are metals that cause laundry and plumbing fixture staining problems, and can build up in the distribution pipes and cause reduced flow. Calcium carbonate ($CaCO_3$) causes hardness in water which diminishes the ability of the water to react with soap and form lather. Hardness also forms scale deposits in kettles and hot water tanks which can reduce the life expectancy of these appliances. Since membranes are capable of removing most of the hardness ions, a percentage of the raw water bypasses the membrane system and is filtered through a manganese greensand pressure filter. Water passing through the pressure filter continues through the UV

process and is then blended with membrane permeate to produce the desired finished water hardness.

Potassium Permanganate is injected prior to the green sand filter to oxidize iron and manganese. Iron is precipitated and filtered out, while manganese is removed mostly by adsorption within the green sand layer of the pressure filter.

Antiscalant is injected in the membrane raw water supply to minimize RO membrane fouling by sequestering dissolved metals and minerals during the treatment and concentrate phases. Since membranes remove dissolved minerals, water stabilization through pH adjustment is required to produce a non-corrosive treated water supply.

Chlorine for disinfection is added to maintain an adequate free chlorine residual concentration in the reservoir. Plant operators are required to test the water several times throughout the day at various points within the WTP to ensure break-point chlorination required for water safety is being achieved.

Treated water is stored in a 150,000 Imperial gallon, three-cell reinforced concrete reservoir. The reservoir is equipped with ultrasonic level control and monitored with a SCADA system.

2.3 Classification and Certification

The South Central District Water System is classified as a Level II Water Treatment Facility with a Level I Distribution System under the Manitoba Water and Wastewater Facility operators Regulation 77/2003. Facility classifications are used to determine certification requirements for the water system operators. The lead operator is certified Level II Water Treatment. The second operator is certified Level I Water Treatment working towards Level II. The relief operator is Level I Water Treatment. All operators are certified Level I in Water Distribution.

3. List of Water Quality Standards and Monitoring Requirements

The Province of Manitoba has adopted a number of water quality standards from the Health Canada *Guidelines for Canadian Drinking Water Quality* (see Table 1). The health-based parameters express the maximum acceptable concentrations for drinking water. Concentration values in excess of the guidelines constitute a health-related issue and require corrective actions. All health-based parameters were within the limits in 2024 for the South Central District Water System.

Table 1: Health-Based Parameters

Table 1: Water Quality/Treatment Standards

Parameter	Quality Standard
Total coliform	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water
E. coli	Less than one *E. coli* bacteria detectable per 100 mL in all treated and distributed water
Ultraviolet Disinfection	95% of water produced per month is disinfected within validated conditions
Chlorine Residual	A free chlorine residual of at least 0.5 mg/L in water entering the distribution system following a minimum contact time of 20 minutes A free chlorine residual of at least 0.1 mg/L at all times at any point in the water distribution system
Arsenic	Less than or equal to 0.01 mg/L
Benzene	Less than or equal to 0.005 mg/L
Ethylbenzene	Less than or equal to 0.14 mg/L
Fluoride	Less than or equal to 1.5 mg/L
Lead	Less than or equal to 0.005 mg/L based on a sample(s) collected at a cold water tap or other appropriate location where water may be used for drinking or food preparation
Manganese	Less than or equal to 0.12 mg/L
Nitrate	Less than or equal to 45 mg/L measured as nitrate (10 mg/L measured as nitrogen)
Nitrite	Less than or equal to 3 mg/L measured as nitrite (1 mg/L measured as nitrogen)
Trichloroethylene	Less than or equal to 0.005 mg/L
Tetrachloroethylene	Less than or equal to 0.01 mg/L
Toluene	Less than or equal to 0.06 mg/L
Total Xylenes	Less than or equal to 0.09 mg/L
Uranium	Less than or equal to 0.02 mg/L

Public water systems are required to monitor chlorine levels and undertake regular bacterial testing. The South Central District system met all requirements 100% for water quality standards and monitoring requirements in 2024, and is fulfilling the requirements of the Operating Licence.

Table 2: Water Quality Monitoring Requirements

Table 2: Monitoring Schedule

Parameter	Monitoring Requirement
Bacteriological (total coliform and *E. coli*)	Biweekly sampling program with each set of samples consisting of one raw, one treated, and a minimum of two distribution samples. Distribution samples are to be taken from the following locations: ▪ Water entering the Manitou reservoir (incoming) ▪ Water leaving the Manitou reservoir (outgoing) Consecutive sample sets to be separated by at least 12 days
Ultraviolet Disinfection	Daily operation verification of continuous UV unit monitoring
Free Chlorine (treated water)	Continuous sampling of water entering the distribution system following at least 20 minutes of contact time A confirmatory sample to be taken daily at the online chlorine analyzer sampling or effluent point at the Pilot Mound reservoir One sample per day of water leaving the Manitou reservoir At the same times and location(s) as bacteriological sampling
Total Chlorine (treated water)	One sample per day of water entering the distribution system following at least 20 minutes of contact time at the Pilot Mount reservoir One sample per day of water leaving the Manitou reservoir At the same times and location(s) as bacteriological sampling
General Chemistry (parameter list provided by Office of Drinking Water)	One raw and one treated water sample once every three years
Total Metals (distribution system)	One sample taken at the same time(s) as general chemistry sampling at a mid-point in the distribution system
Lead	As per the instructions of the drinking water officer
Manganese (System Monitoring)	One raw water sample per day One sample per day from the combined effluent of the greensand filtration Event based monitoring in the distribution as per *ODW-OG-18 Monitoring for Manganese in Drinking Water*
Manganese (Laboratory Analysis)	One raw and one treated water sample every year Two distribution samples taken on a quarterly basis during February, May, August, and November, every three years
Other Parameters	As per the instructions of the drinking water officer

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

   There were no major water system incidents in 2024. There were no corrective actions or emergency reporting required.

5. **Drinking Water Safety Orders, Warnings, and Charges**

   There were no Drinking Water Safety Orders or warnings issued, nor were any charges laid on the system.

6. **Major Expenses Incurred**

   There were no major expenses for the South Central District Water System in 2024.

7. **Future System Expansion**

   The South Central District Water Co-op member municipalities plan to continue expansion of their distribution networks as funding opportunities arise and finances are available.

Appendix A

Results of Water Chemistry, Bacterial and Chlorine Residual Analysis

Chlorine Residual and Bacterial (TC/EC) Analyses

Collection Date	Sample Identification	TC	EC	CL2 Free	CL2 Total
2024-01-04	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.70	0.74
2024-01-04	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.83	0.84
2024-01-04	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-01-04	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.80
2024-01-16	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.69	0.77
2024-01-16	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.81	0.94
2024-01-16	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-01-16	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.74	0.82
2024-01-30	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.63	0.78
2024-01-30	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.78	0.82
2024-01-30	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-01-30	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.80
2024-02-13	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.63	0.71
2024-02-13	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.76	0.80
2024-02-13	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-02-13	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.74	0.84
2024-02-27	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.79	0.89
2024-02-27	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.79	0.83
2024-02-27	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-02-27	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.83
2024-03-12	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.71	0.75
2024-03-12	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.93	1.04
2024-03-12	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-03-12	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.83
2024-03-26	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.67	0.76
2024-03-26	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.97	1.02
2024-03-26	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-03-26	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.82
2024-04-09	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.64	0.70
2024-04-09	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.88	0.96
2024-04-09	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-04-09	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.73	0.82
2024-04-23	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.69	0.72
2024-04-23	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.94	0.97
2024-04-23	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	Na
2024-04-23	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.73	0.85

Chlorine Residual and TC/EC Analyses (continued)

Collection Date	Sample Identification	TC	EC	CL2 Free	CL2 Total
2024-05-07	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.70	0.72
2024-05-07	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.93	0.98
2024-05-07	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-05-07	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.70	0.81
2024-05-21	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.66	0.67
2024-05-21	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.76	0.82
2024-05-21	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-05-21	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.75	0.86
2024-06-04	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.63	0.78
2024-06-04	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.75	0.85
2024-06-04	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-06-04	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.73	0.81
2024-06-18	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.65	0.72
2024-06-18	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.88	0.89
2024-06-18	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-06-18	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.71	0.81
2024-07-02	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.70	0.79
2024-07-02	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.86	0.89
2024-07-02	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-07-02	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.71	0.80
2024-07-16	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.63	0.71
2024-07-16	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.71	0.76
2024-07-16	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-07-16	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.74	0.84
2024-07-30	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.66	0.68
2024-07-30	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.84	0.95
2024-07-30	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-07-30	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.71	0.79
2024-08-13	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.60	0.69
2024-08-13	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.80	0.89
2024-08-13	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-08-13	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.81
2024-08-27	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.64	0.72
2024-08-27	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.74	0.76
2024-08-27	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-08-27	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.75	0.85

Chlorine Residual and TC/EC Analyses (continued)

Collection Date	Sample Identification	TC	EC	CL2 Free	CL2 Total
2024-09-10	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.63	0.67
2024-09-10	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.66	0.70
2024-09-10	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-09-10	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.73	0.82
2024-09-24	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.61	0.68
2024-09-24	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.74	0.77
2024-09-24	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-09-24	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.69	0.78
2024-10-08	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.61	0.64
2024-10-08	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.75	0.78
2024-10-08	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-10-08	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.73	0.83
2024-10-22	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.59	0.65
2024-10-22	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.76	0.77
2024-10-22	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-10-22	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.84
2024-11-05	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.61	0.64
2024-11-05	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.72	0.74
2024-11-05	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-11-05	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.73	0.83
2024-11-25	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.60	0.68
2024-11-25	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.76	0.84
2024-11-21	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-11-21	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.70	0.81
2024-12-03	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.60	0.71
2024-12-03	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.79	0.81
2024-12-03	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-12-03	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.72	0.79
2024-12-17	SOUTH CENTRAL REGIONAL - MANITOU INCOMING	<1	<1	0.61	0.67
2024-12-17	SOUTH CENTRAL REGIONAL - MANITOU OUTGOING	<1	<1	0.72	0.79
2024-12-17	SOUTH CENTRAL REGIONAL - PILOT MOUND RAW	<1	<1	na	na
2024-12-17	SOUTH CENTRAL REGIONAL - PILOT MOUND TREATED	<1	<1	0.75	0.84

Notes:

CL2: Reported in units of mg/L

TC/EC: Reported in units of MPN/100 mL

NDSF: No Data - Sample Received Frozen

2024 Treated Water Daily Manganese Test Results mg/L

Date	January	February	March	April
1	0.006	0.005	0.007	0.009
2	0.005	0.007	0.008	0.006
3	0.005	0.004	0.009	0.009
4	0.005	0.005	0.008	0.005
5	0.005	0.004	0.007	0.009
6	0.006	0.006	0.008	0.007
7	0.005	0.007	0.006	0.003
8	0.009	0.005	0.007	0.008
9	0.009	0.005	0.004	0.010
10	0.004	0.005	0.005	0.006
11	0.007	0.006	0.005	0.008
12	0.007	0.005	0.008	0.006
13	0.005	0.008	0.008	0.010
14	0.008	0.006	0.010	0.008
15	0.010	0.006	0.007	0.009
16	0.004	0.006	0.005	0.008
17	0.008	0.008	0.007	0.007
18	0.008	0.004	0.003	0.010
19	0.006	0.007	0.009	0.014
20	0.007	0.004	0.009	0.011
21	0.005	0.010	0.008	0.010
22	0.004	0.005	0.010	0.011
23	0.005	0.004	0.009	0.011
24	0.006	0.006	0.006	0.009
25	0.006	0.006	0.007	0.009
26	0.005	0.005	0.006	0.010
27	0.007	0.005	0.004	0.011
28	0.005	0.006	0.010	0.008
29	0.005	0.008	0.007	0.009
30	0.006		0.006	0.009
31	0.003		0.003	

Manganese Tests (Continued)

Date	May	June	July	August
1	0.012	0.007	0.007	0.009
2	0.009	0.007	0.007	0.010
3	0.014	0.010	0.015	0.009
4	0.008	0.009	0.007	0.010
5	0.009	0.008	0.009	0.010
6	0.011	0.009	0.008	0.011
7	0.011	0.010	0.010	0.008
8	0.010	0.008	0.011	0.011
9	0.012	0.009	0.011	0.011
10	0.013	0.007	0.011	0.009
11	0.008	0.008	0.010	0.009
12	0.008	0.011	0.007	0.013
13	0.009	0.010	0.009	0.010
14	0.008	0.011	0.010	0.010
15	0.013	0.007	0.008	0.009
16	0.009	0.009	0.012	0.008
17	0.010	0.009	0.009	0.008
18	0.009	0.009	0.009	0.009
19	0.010	0.009	0.009	0.010
20	0.007	0.011	0.008	0.012
21	0.008	0.011	0.011	0.012
22	0.010	0.009	0.010	0.010
23	0.010	0.007	0.012	0.010
24	0.011	0.010	0.009	0.010
25	0.008	0.008	0.007	0.011
26	0.009	0.008	0.011	0.014
27	0.012	0.009	0.010	0.011
28	0.013	0.008	0.009	0.012
29	0.011	0.011	0.010	0.011
30	0.010	0.008	0.007	0.011
31	0.007		0.011	0.010

Manganese Tests (Continued)

Date	September	October	November	December
1	0.010	0.009	0.014	0.011
2	0.013	0.009	0.014	0.012
3	0.012	0.012	0.011	0.014
4	0.012	0.012	0.011	0.012
5	0.011	0.012	0.010	0.011
6	0.012	0.010	0.016	0.009
7	0.012	0.006	0.008	0.012
8	0.012	0.013	0.014	0.014
9	0.011	0.009	0.012	0.006
10	0.012	0.010	0.013	0.010
11	0.012	0.012	0.012	0.013
12	0.010	0.012	0.013	0.013
13	0.011	0.013	0.011	0.015
14	0.015	0.012	0.010	0.010
15	0.009	0.012	0.012	0.011
16	0.010	0.010	0.012	0.014
17	0.012	0.011	0.011	0.013
18	0.010	0.010	0.012	0.015
19	0.013	0.007	0.010	0.013
20	0.011	0.011	0.012	0.008
21	0.013	0.010	0.014	0.011
22	0.012	0.016	0.013	0.013
23	0.011	0.008	0.009	0.011
24	0.010	0.008	0.011	0.017
25	0.013	0.010	0.012	0.013
26	0.011	0.011	0.016	0.015
27	0.008	0.009	0.012	0.015
28	0.013	0.010	0.012	0.012
29	0.011	0.016	0.011	0.014
30	0.008	0.016	0.010	0.013
31		0.013		0.014

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
				Client sampling date / time	05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit	WP2331892-001	WP2331892-002	WP2331892-003	-------	-------
					Result	Result	Result	---	---
Physical Tests									
Absorbance, UV (@ 254nm)	---	E404/WP	0.0050	AU/cm	0.0220	0.0060	---	---	---
Alkalinity, bicarbonate (as CaCO3)	---	E290/WP	1.0	mg/L	235	86.9	---	---	---
Alkalinity, carbonate (as CaCO3)	---	E290/WP	1.0	mg/L	Not Detected	Not Detected	---	---	---
Alkalinity, hydroxide (as CaCO3)	---	E290/WP	1.0	mg/L	Not Detected	Not Detected	---	---	---
Alkalinity, total (as CaCO3)	---	E290/WP	1.0	mg/L	235	86.9	---	---	---
Colour, true	---	E329/WP	5.0	CU	Not Detected	Not Detected	---	---	---
Conductivity	---	E100/WP	2.0	µS/cm	534	208	---	---	---
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/WP	0.50	mg/L	265	78.9	---	---	---
Langelier index (@ 4°C)	---	EC105A/WP	0.010	-	0.314	-0.356	---	---	---
Langelier index (@ 60°C)	---	EC105A/WP	0.010	-	1.08	0.417	---	---	---
pH	---	E108/WP	0.10	pH units	7.78	7.99	---	---	---
Solids, total dissolved [TDS]	---	E162-L/WP	3.0	mg/L	322	108	---	---	---
Turbidity	---	E121/WP	0.10	NTU	1.35	0.12	---	---	---
pH, saturation (@ 4°C)	---	EC105A/WP	0.010	pH units	7.47	8.35	---	---	---
Transmittance, UV (@ 254nm)	---	E404/WP	1.0	% T/cm	95.1	98.6	---	---	---
pH, saturation (@ 60°C)	---	EC105A/WP	0.010	pH units	6.70	7.57	---	---	---
Anions and Nutrients									
Bromide	24959-67-9	E235 Br-L/WP	0.050	mg/L	Not Detected	Not Detected	---	---	---
Chloride	16887-00-6	E235 Cl-L/WP	0.10	mg/L	3.76	2.39	---	---	---
Fluoride	16984-48-8	E235 F/WP	0.020	mg/L	0.095	0.029	---	---	---
Nitrate (as N)	14797-55-8	E235 NO3-L/WP	0.0050	mg/L	Not Detected	0.0026	---	---	---
Nitrite (as N)	14797-65-0	E235 NO2-L/WP	0.0010	mg/L	Not Detected	Not Detected	---	---	---
Sulfate (as SO4)	14808-79-8	E235 SO4/WP	0.30	mg/L	57.6	16.9	---	---	---
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	---	E358-L/WP	0.50	mg/L	1.73	0.96	---	---	---

Water Chemistry (continued):

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
				Client sampling date / time	05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit	WP2331892-001	WP2331892-002	WP2331892-003	---	---
					Result	Result	Result	---	---
Organic / Inorganic Carbon									
Carbon, total organic [TOC]	---	E355-L/WP	0.50	mg/L	2.02	0.77	---	---	---
Ion Balance									
Anion sum	---	EC101A/WP	0.10	meq/L	6.01	2.16	---	---	---
Cation sum (total)	---	EC101A/WP	0.10	meq/L	5.90	2.17	---	---	---
Ion balance (cations/anions)	---	EC101A/WP	0.01	%	98.2	100	---	---	---
Ion balance (APHA)	---	EC101A/WP	0.010	%	-0.924	0.231	---	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/WP	3.0	µg/L	<3.0	<3.0	5.6	---	---
Antimony, total	7440-36-0	E420/WP	0.10	µg/L	<0.10	<0.10	<0.10	---	---
Arsenic, total	7440-38-2	E420/WP	0.10	µg/L	1.57	0.33	0.31	---	---
Barium, total	7440-39-3	E420/WP	0.10	µg/L	97.0	24.1	23.4	---	---
Beryllium, total	7440-41-7	E420/WP	0.020	µg/L	<0.020	<0.020	<0.020	---	---
Bismuth, total	7440-69-9	E420/WP	0.050	µg/L	<0.050	<0.050	<0.050	---	---
Boron, total	7440-42-8	E420/WP	10	µg/L	66	45	35	---	---
Cadmium, total	7440-43-9	E420/WP	0.0050	µg/L	<0.0050	<0.0050	<0.0050	---	---
Calcium, total	7440-70-2	E420/WP	50	µg/L	69200	20800	20000	---	---
Cesium, total	7440-46-2	E420/WP	0.010	µg/L	<0.010	<0.010	<0.010	---	---
Chromium, total	7440-47-3	E420/WP	0.50	µg/L	<0.50	<0.50	<0.50	---	---
Cobalt, total	7440-48-4	E420/WP	0.10	µg/L	0.16	<0.10	<0.10	---	---
Copper, total	7440-50-8	E420/WP	0.50	µg/L	<0.50	3.31	6.00	---	---
Iron, total	7439-89-6	E420/WP	10	µg/L	209	<10	<10	---	---
Lead, total	7439-92-1	E420/WP	0.050	µg/L	<0.050	<0.050	0.084	---	---
Lithium, total	7439-93-2	E420/WP	1.0	µg/L	19.2	5.9	5.4	---	---
Magnesium, total	7439-95-4	E420/WP	5.0	µg/L	22300	6540	5990	---	---
Manganese, total	7439-96-5	E420/WP	0.10	µg/L	447	1.49	1.46	---	---
Molybdenum, total	7439-98-7	E420/WP	0.050	µg/L	1.07	0.269	0.249	---	---
Nickel, total	7440-02-0	E420/WP	0.50	µg/L	<0.50	<0.50	<0.50	---	---

Water Chemistry (continued)

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
					Client sampling date / time	05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
						WP2331892-001	WP2331892-002	WP2331892-003	---	---
						Result	Result	Result	---	---
Total Metals										
Phosphorus, total	7723-14-0	E420/WP	50	µg/L		<50	<50	662	---	---
Potassium, total	7440-09-7	E420/WP	50	µg/L		2810	1050	1000	---	---
Rubidium, total	7440-17-7	E420/WP	0.20	µg/L		1.48	0.56	0.52	---	---
Selenium, total	7782-49-2	E420/WP	0.050	µg/L		<0.050	<0.050	<0.050	---	---
Silicon, total	7440-21-3	E420/WP	100	µg/L		13300	4040	3630	---	---
Silver, total	7440-22-4	E420/WP	0.010	µg/L		<0.010	<0.010	<0.010	---	---
Sodium, total	7440-23-5	E420/WP	50	µg/L		12000	13100	12300	---	---
Strontium, total	7440-24-6	E420/WP	0.20	µg/L		208	62.0	59.6	---	---
Sulfur, total	7704-34-9	E420/WP	500	µg/L		21200	6180	5540	---	---
Tellurium, total	13494-80-9	E420/WP	0.20	µg/L		<0.20	<0.20	<0.20	---	---
Thallium, total	7440-28-0	E420/WP	0.010	µg/L		<0.010	<0.010	<0.010	---	---
Thorium, total	7440-29-1	E420/WP	0.10	µg/L		<0.10	<0.10	<0.10	---	---
Tin, total	7440-31-5	E420/WP	0.10	µg/L		<0.10	<0.10	<0.10	---	---
Titanium, total	7440-32-6	E420/WP	0.30	µg/L		<0.30	<0.30	<0.30	---	---
Tungsten, total	7440-33-7	E420/WP	0.10	µg/L		<0.10	<0.10	<0.10	---	---
Uranium, total	7440-61-1	E420/WP	0.010	µg/L		1.44	0.442	0.449	---	---
Vanadium, total	7440-62-2	E420/WP	0.50	µg/L		<0.50	<0.50	<0.50	---	---
Zinc, total	7440-66-6	E420/WP	3.0	µg/L		<3.0	<3.0	<3.0	---	---
Zirconium, total	7440-67-7	E420/WP	0.20	µg/L		<0.20	<0.20	<0.20	---	---
Volatile Organic Compounds										
Benzene	71-43-2	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Bromodichloromethane	75-27-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Bromoform	75-25-2	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Chloroform	67-66-3	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Dibromochloromethane	124-48-1	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Dichloromethane	75-09-2	E611D/WP	0.0010	mg/L		<0.0010	---	---	---	---
Ethylbenzene	100-41-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---

Water Chemistry (continued)

Page	6 of 6
Work Order	WP2331892
Client	Manitoba Conservation & Climate
Project	SOUTH CENTRAL REGIONAL - PWS 203.75

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

					Client sample ID	SOUTH CENTRAL REGIONAL 1 - RAW	SOUTH CENTRAL REGIONAL 2 - TREATED	SOUTH CENTRAL REGIONAL 3 - DISTRIBUTION (MID)	---	---
					Client sampling date / time	05-Dec-2023 10:00	05-Dec-2023 10:30	05-Dec-2023 11:00	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit		WP2331892-001	WP2331892-002	WP2331892-003	------	------
						Result	Result	Result	---	---
Volatile Organic Compounds										
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Tetrachloroethylene	127-18-4	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Toluene	108-88-3	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Trichloroethane, 1,1,1-	71-55-6	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Trichloroethane, 1,1,2-	79-00-5	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Trichloroethylene	79-01-6	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
Xylene, m+p-	179601-23-1	E611D/WP	0.00040	mg/L		<0.00040	---	---	---	---
Xylene, o-	95-47-6	E611D/WP	0.00030	mg/L		<0.00030	---	---	---	---
Xylenes, total	1330-20-7	E611D/WP	0.00050	mg/L		<0.00050	---	---	---	---
BTEX, total	---	E611D/WP	0.0010	mg/L		<0.0010	---	---	---	---
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611D/WP	0.0010	%		91.6	---	---	---	---
Difluorobenzene, 1,4-	540-36-3	E611D/WP	0.0010	%		103	---	---	---	---

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

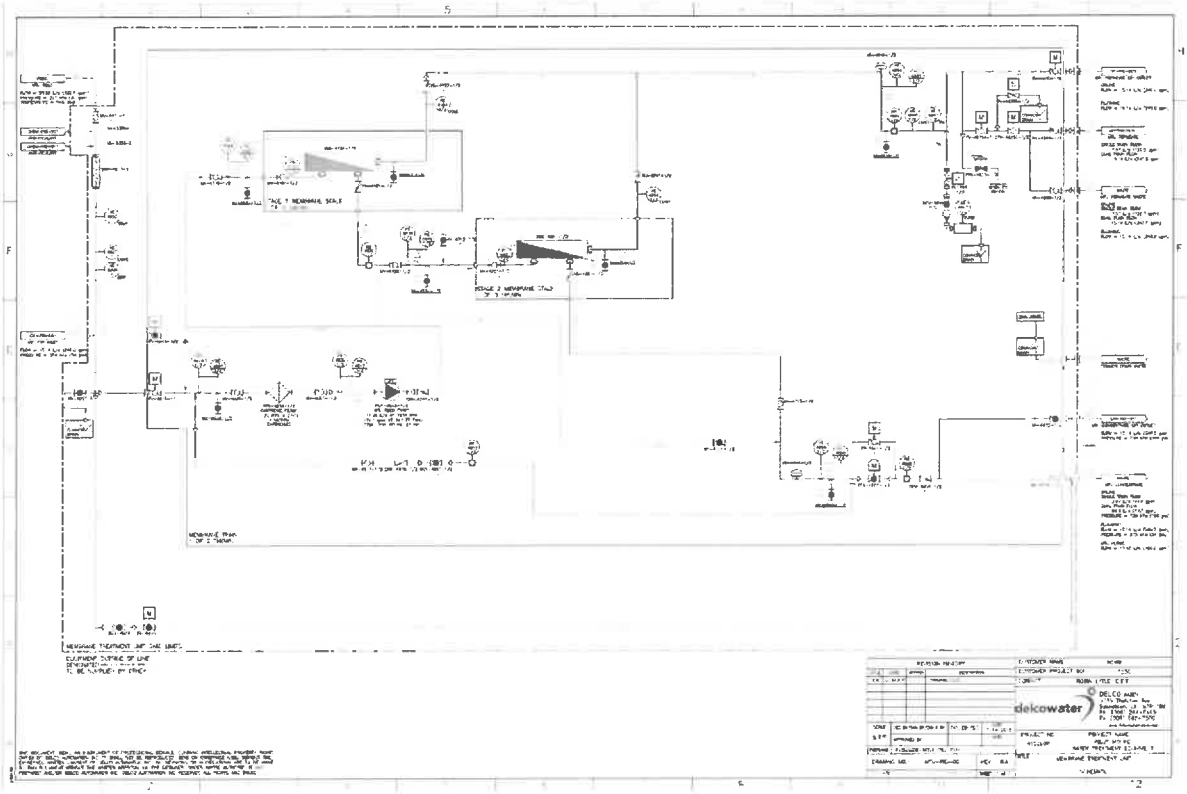
Appendix B

Water Treatment Plant Process Diagram

Process Schematics:

- Membrane Filtration
- Greensand Filtration

MEMBRANE FILTRATION:



GREEN SAND FILTRATION: