

Fulford Water Service

2022 Annual Report



INTRODUCTION

This report provides a summary of the Fulford Water Service for 2022. It includes a description of the service, summary of the water supply, demand, and production, drinking water quality, operations highlights, capital project updates and financial report.

SERVICE DESCRIPTION

The Fulford Water Utility is a semi-rural residential community located on Salt Spring Island. It services the Fulford Elementary School and a small commercial component, including the BC Ferries Terminal. The service was created in 1968 as the Fulford Water Improvement District and became a CRD service in 2004. The Fulford Water Utility (Figure 1) is comprised of 102 parcels of land with 95 single-family equivalents (SFE) as the use on some parcels represents more than one dwelling.

The utility obtains its drinking water from Lake Weston, a small lake that lies within an uncontrolled multi-use watershed outside and northeast of the service area. The Capital Regional District (CRD) holds two licenses to divert a total of up to 291.6 cubic metres per day and store up to 49,339 cubic metres. Lake Weston is estimated to have a total volume of 1,090,000 cubic metres. Lake Weston is subject to seasonal water quality changes and is affected by periodic algae blooms.

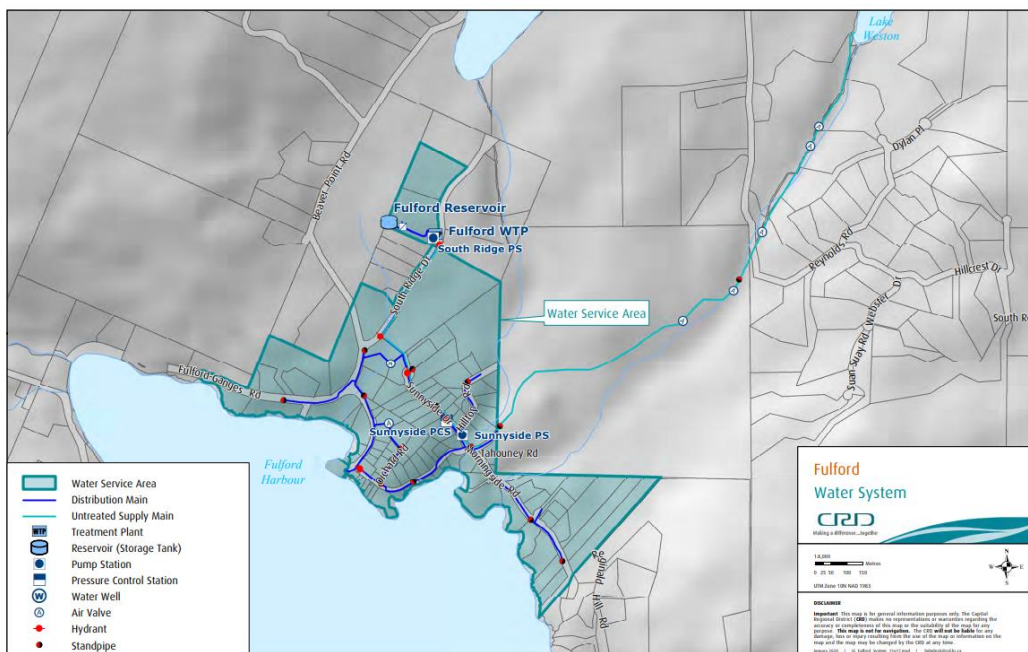


Figure 1: Fulford Water Service

The Fulford water system is primarily comprised of:

- a water treatment plant (WTP) that draws water from Lake Weston and treats it at a location on South Ridge Drive, adjacent to the Fulford Elementary School. The water is treated using

a rapid mix system, flocculation, dissolved air floatation (DAF) and filters, ultraviolet disinfection, then chlorination prior to being pumped, via the distribution system to a reservoir. The water treatment plant (WTP) design flow rate is 4.5 litres/sec (60 lpm);

- one raw water pump station on Sunnyside Drive near Hilltop Road (flow rate of two pumps running is 2.3 litres/sec (30 lpm);
- approximately 4,500 m of water distribution pipe;
- 1 water reservoir – 360 m³ (80,000 l);
- fire hydrants, standpipes, and gate valves;
- water service connections complete with water meters to commercial properties only;
- 1 pressure regulating station (PCS) on Sunnyside Drive near Hilltop Road.

WATER PRODUCTION AND DEMAND

Annual water production since 2017 is shown in Figure 2. A total of 33,970 m³ of water was extracted from Lake Weston in 2022. This is a 16% increase from the previous year and a 16% increase from the 5-year rolling average.

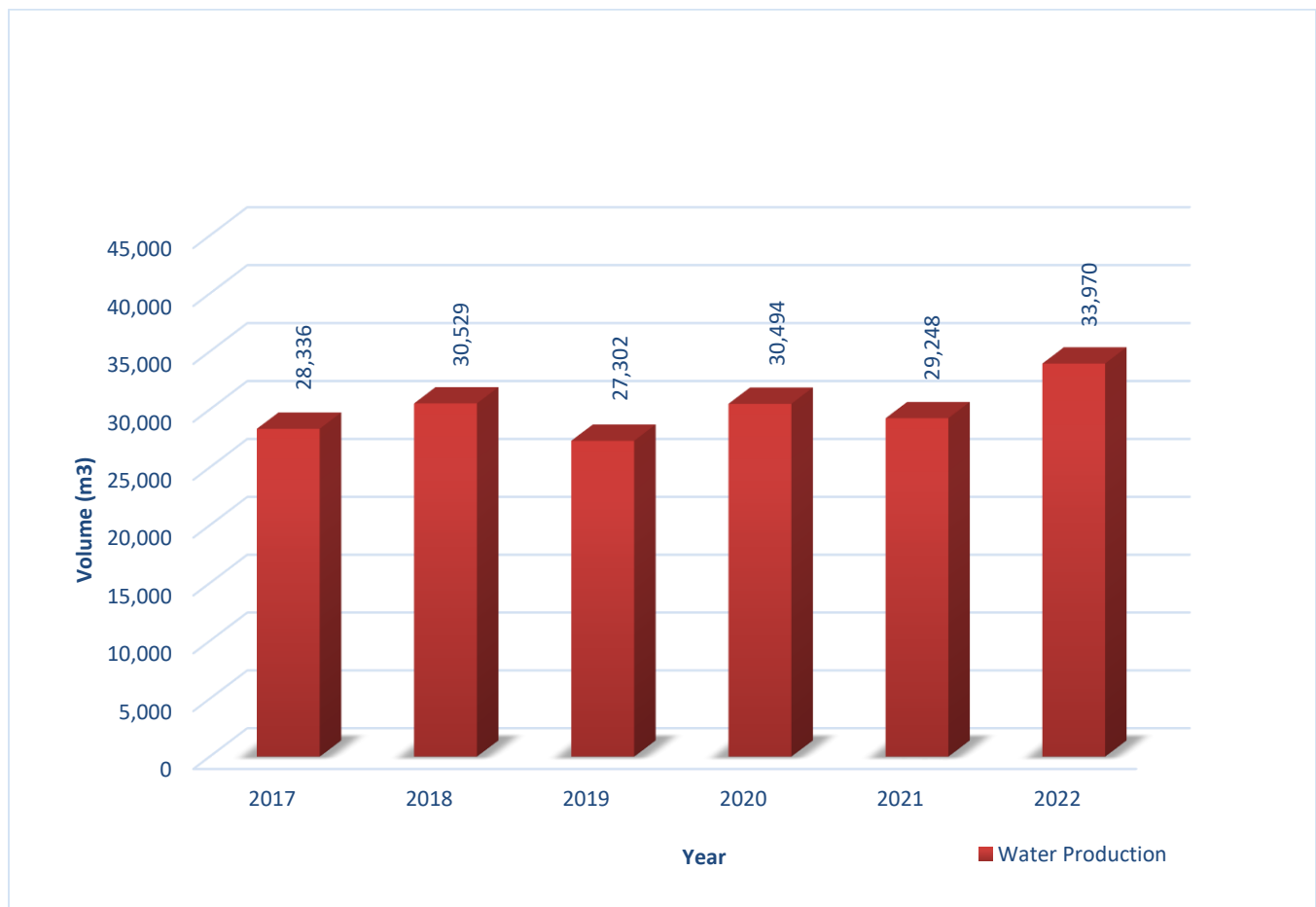


Figure 2: Fulford Water Service Annual Water Production

Water production by month for the past five years is shown in Figure 3. The monthly water production trends are typical for small water systems such as the Fulford water system. Water production from September to November 2022 was higher due to two water system leaks that were difficult to locate.

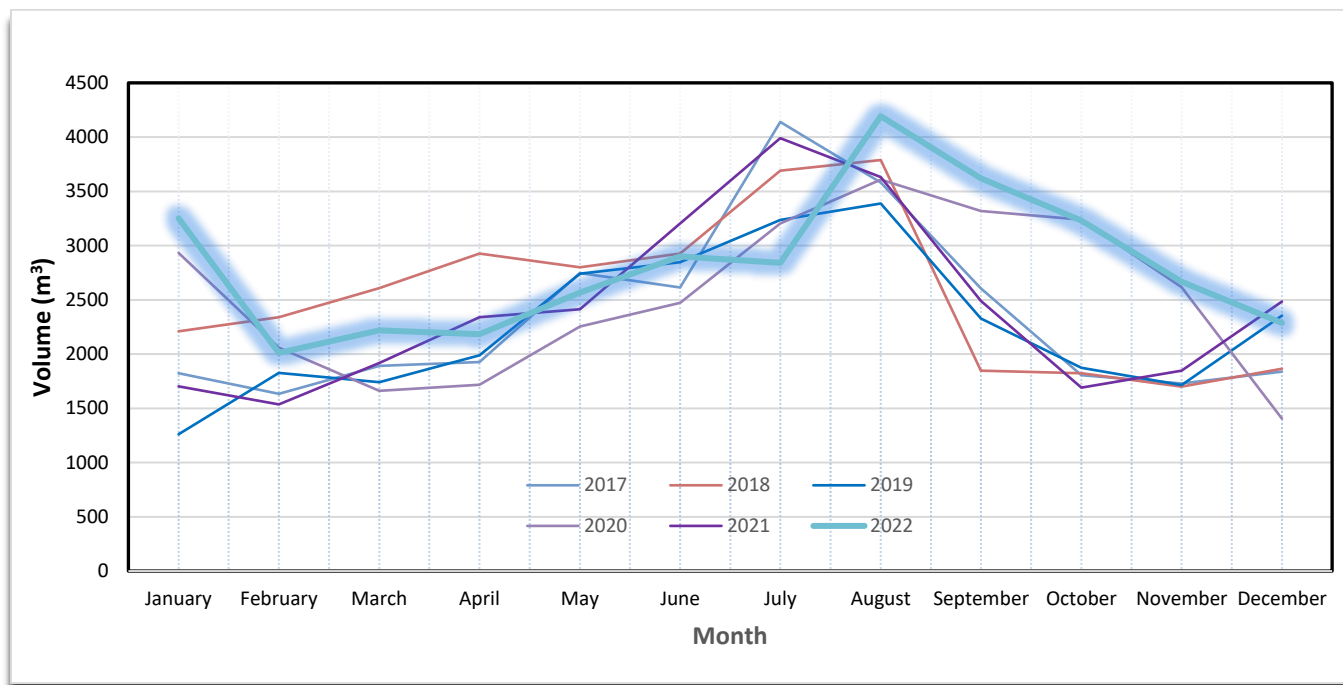


Figure 3: Fulford Water Service Monthly Water Production

The Fulford Water System does not have residential water meters and therefore the average per single-family equivalent (SFE) is simply a calculated value. Utilizing 95 SFE and deducting an allowance of 20% for non-revenue water such as water system leaks, fire hydrant usage and water system maintenance and operational use (water main flushing, filter system backwashing), the average SFE is 286m³ per year for 2022. This is a 16% increase from the previous year. However, this increase is likely the result of the non-revenue water component (i.e. system leaks) and not an indicator of higher actual SFE water consumption.

WATER QUALITY

In general, the Fulford Water System provided good quality drinking water to its customers in 2022. Numerous samples for a variety of water quality parameters were collected and analysed throughout the year. The results confirmed that the DAF and disinfection treatment stages were effective in treating raw water from Lake Weston.

Typical Fulford drinking water quality characteristics for 2022 are summarized as follows:

Raw Water:

Lake Weston exhibited low concentrations of total coliform bacteria (TC) throughout most parts of the year with higher concentrations during the summer months. *E.coli* bacteria were only found in very low concentrations in the summer.

No parasitic cysts (*Giardia*) and no of parasitic oocysts (*Cryptosporidium*) were detected in the raw source water from the lake.

Raw water from the lake was slightly hard (annual median 34.25 mg/L CaCO₃).

A total organic carbon (TOC) concentration range from 5.1 to 5.4 mg/L indicates a mesotrophic (semi-productive) lake status. This has been consistent with historic data.

Four metal test results showed moderately low iron and manganese concentrations in the raw water. Manganese concentrations in the raw water during February were slightly higher than the aesthetic objective in the Guidelines for Canadian Drinking Water Quality (GCDWQ). Either of these metals in exceedance of the aesthetic objectives can cause, if untreated, aesthetic issues such as water discolouration. The raw water colour was consistently elevated which may be a result of tannin and lignin, all natural components found in local lakes.

The raw water turbidity (cloudiness) was often below 1 NTU, only in the winter and spring it was regularly higher with a peak of 4.9 NTU in April. Higher turbidity during the wet season is often related to rainfall and runoff events.

Treated Water:

Treated water was bacteriologically safe to drink; no indicator bacteria were found in any sample throughout the year.

Treated water turbidity was well below the GCDWQ limit of 1 NTU for the entire year.

TOC (median 2.2 mg/L) in the treated water was consistent with historic trends. As TOC is a precursor for disinfection by-products, concentrations consistently much higher than 2 mg/L can lead to exceedances with these substances.

Regulated disinfection by-products such as trihalomethanes (THM) and haloacetic acids (HAA) were well below the GCDWQ limits (100 µg/L and 80 µg/L) with annual averages of 53.25 µg/L and 40.75 µg/L respectively.

The water temperature was in exceedance of the aesthetic objective of 15°C from the end of June to October, 2022. There is no mitigation for this.

The free chlorine residual concentrations in the distribution system were within the desired range (0.27 – 2.10 mg/L) and indicate an effective secondary disinfection process.

Table 1 and 2 below provide a summary of the 2022 raw and treated water test results.

Water Quality data collected from this drinking water system can be reviewed on the CRD website:

<https://www.crd.bc.ca/about/data/drinking-water-quality-reports/>

OPERATIONAL HIGHLIGHTS

The following is a summary of the major operational issues that were addressed by during the 2022 reporting period:

- Raw water intake inspection and reinstatement of the intake float system.
- Water system leak repairs:
 - 117 Hilltop Road
 - 215 Morningside
- Water treatment plant corrective maintenance:
 - Valve and valve actuator replacement
 - Air saturator trouble shooting and repairs
 - Turbidity meter troubleshooting and repairs

- SCADA system communications failure and repairs
- Replacement of electronic hand/off/auto switches of various components

CAPITAL IMPROVEMENTS

The following is a summary of the major capital improvements including year-ending spending for 2022:

Weston Creek Watermain Crossing on Morningside Road (CE.507.4601): The water main along Morningside Road is exposed and spans Weston Creek making it susceptible to damage by people, vehicles, rocks or stream debris. Due to a wet year in 2019 and high stream water level, this project was deferred until the next dry season. Detailed design is complete with construction scheduled for 2023.

Project	Spending
Budget	\$169,100
Project Management	(\$32,471)
Contract	(\$57,724)
Emergency Repair	(\$15,125)
Balance Remaining	\$63,780

Safe Work Procedures (CE.699.4504): The work scope includes reviewing and developing safe work procedures for operational and maintenance tasks. On-going as capital improvements necessitate.

Project	Spending
Budget	\$11,000
Project Management	(\$296)
Contract	(\$2,292)
Supplies/Materials	(\$209)
Total Project	\$8,203

Power Generation Equipment Study (CE.735.4504): Preliminary investigation of electrical requirements for new onsite back-up power.

Project	Spending
Budget	\$10,000
Project Management	\$0
Balance Remaining	\$10,000

Fulford WTP Security Fencing (CE.791.2000): Security fencing for the Fulford Water Treatment Plant. Note that CRD Risk Management contributed one half of the construction contract amount in the amount of \$8,715. This work was executed and completed early in 2022.

Project	Spending
Budget	\$28,715
Contract	(\$17,430)
Project Management	(\$2,405)
Project Closed Balance Returned to CRF	\$8,880

Replacement of AC Water Pipelines – Study and Design (CE.794.6001): Investigation, analysis, criticality assessment and option review to replace the asbestos cement water supply and distribution lines for the Fulford water system.

Project	Spending
Budget	\$90,000
Project Management	(\$11,099)
Contract	\$0

Balance Remaining	\$78,901
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Installation of Turbidity Meter on Influent Line (CE.794.1601): Supply and install a turbidity meter on the influent line to improve water quality monitoring and process operation.

Project	Spending
Budget	\$500
Project Management	\$0
Equipment	\$0
Balance Remaining	\$500

2022 FINANCIAL REPORT

Please refer to the attached 2022 Statement of Operations and Reserve Balances.

Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), water sales (Sale-Water), interest on savings (Interest earnings), transfers from the Operating Reserve Fund, and miscellaneous revenue such as late payment charges (Other revenue).

Expenses includes all costs of providing the service. General Government Services includes budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs includes CRD staff time as well as the costs of equipment, tools, and vehicles. Debt servicing costs are interest and principal payments on long term debt. Other Expenses includes all other costs to administer and operate the water system, including insurance, supplies, water testing, and electricity.

The difference between Revenue and Expenses is reported as Net revenue (expenses). Any transfers to or from capital or reserve funds for the service (Transfers to own funds) are deducted from this amount and it is then added to any surplus or deficit carry forward from the prior year, yielding an Accumulated Surplus (or deficit). In alignment with Local Government Act Section 374 (11), any deficit must be carried forward and included in the next year's financial plan.

WATER SYSTEM PROBLEMS - WHO TO CALL:

To report any event or to leave a message regarding the Fulford water system, call either:

CRD water system *emergency call* centre: **1-855-822-4426 (toll free)**

1-250-474-9630 (toll)

CRD water system *general enquiries* (toll free): **1-800-663-4425**

When phoning with respect to an emergency, please specify to the operator, the service area in which the emergency has occurred.

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Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

Attachment: [2022 Statement of Operations and Reserve Balances](#)

For questions related to this Annual Report please email saltspring@crd.bc.ca

Table 1: 2022 Summary of Raw Water Test Results, Fulford Water System										
PARAMETER		2022 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2012 - 2021 ANALYTICAL RESULTS			
Parameter	Units of	Annual	Samples	Range		≤ = Less than or equal to		Samples	Range	
Name	Measure	Median	Analyzed	Minimum	Maximum		Median	Analyzed	Minimum	Maximum
ND means Not Detected by analytical method used										
Physical Parameters/Biological										
Chlorophyll a	ug/L	Not tested in 2022				≤ 15 AO	0.289	15	< 0.27	56.3
Colour, True	TCU	22	11	< 2	34		22.5	32	14	34
Conductivity @ 25C	uS/cm	Last analyzed in 2011				No Guideline Required				
Hardness as CaCO ₃	mg/L	34.25	4	30	34.8		34.7	26	28.9	61.3
pH	pH Units	6.5	1	6.5	6.5	7.0-10.5 AO	7.185	34	6.2	7.59
Carbon, total organic	mg/L	5.3	4	5.1	5.4		5.325	28	3.92	7
Turbidity	NTU	0.575	12	0.2	4.9		0.52	33	0.2	1.7
Water Temperature	Degrees C	8.25	18	5.5	19		13.6	97	5.5	19.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	11.5	12	< 1	410		79	20	1	3200
<i>E. coli</i>	CFU/100 mL	< 1	12	< 1	2		< 1	35	< 1	< 10
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2022					376	16	124	1504
Parasites						No MAC Established				
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	<1	2	<1	<1	Zero detection desirable	< 1	21	< 1	2.8
<i>Giardia</i> , Total cysts	cysts/100 L	<1	2	<1	<1	Zero detection desirable	< 1	21	< 1	1.74
Algal Toxins										
Total Microcystins	ug/L	Last analyzed in 2011				1.5 MAC				
Metals										
Aluminum	ug/L as Al	21.65	4	7.1	86.4	2900 MAC / 100 OG	24.7	26	5.5	4600
Antimony	ug/L as Sb	< 0.5	4	< 0.5	< 0.5	6 MAC	< 0.5	26	< 0.5	0.602
Arsenic	ug/L as As	0.275	4	0.21	0.28	10 MAC	0.255	26	0.2	0.82
Barium	ug/L as Ba	6.45	4	6.1	6.8	100 MAC	6.6	26	5.5	< 9
Beryllium	ug/L as Be	< 0.1	4	< 0.1	< 0.1		< 0.1	26	< 0.1	< 3
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	20	< 1	< 1
Boron	ug/L as B	< 50	4	< 50	< 50	5000 MAC	< 50	26	< 50	648
Cadmium	ug/L as Cd	< 0.01	4	< 0.01	< 0.01	5 MAC	< 0.01	26	< 0.01	0.2
Calcium	mg/L as Ca	10.95	4	9.51	11.2	No Guideline Required	11.2	26	9.2	17.5
Chromium	ug/L as Cr	< 1	4	< 1	< 1	50 MAC	< 1	26	< 1	< 10
Cobalt	ug/L as Co	< 0.2	4	< 0.2	< 0.2		< 0.2	26	< 0.2	< 20
Copper	ug/L as Cu	8.325	4	8.13	12.6	2000 MAC / ≤ 1000 AO	< 8	26	5.92	55
Iron	ug/L as Fe	120.5	4	83.6	285	≤ 300 AO	65.25	26	< 10	157
Lead	ug/L as Pb	0.355	4	0.28	0.51	5 MAC	0.28	1	0.28	0.28
Lithium	ug/L as Li	< 2	4	< 2	< 2		< 2	1	< 2	< 2
Magnesium	mg/L as Mg	1.655	4	1.53	1.71	No Guideline Required	1.645	26	1.44	4.28
Manganese	ug/L as Mn	12.6	4	7.5	25.7	120 MAC / ≤ 20 AO	5.65	26	1.1	48.4
Molybdenum	ug/L as Mo	< 1	4	< 1	< 1		< 1	26	< 1	28
Nickel	ug/L as Ni	2.05	4	< 1	4.2		< 1	26	< 1	< 50
Potassium	mg/L as K	0.5735	4	0.497	0.652		0.5565	26	0.032	0.709
Selenium	ug/L as Se	< 0.1	4	< 0.1	< 0.1	50 MAC	< 0.1	25	< 0.1	< 500
Silicon	ug/L as Si	2700	4	1670	3670		2015	26	2.48	10800
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	26	< 0.02	< 10
Sodium	mg/L as Na	5.08	4	4.72	5.44	≤ 200 AO	5.425	26	3.98	9.66
Sulphur	mg/L as S	< 3	4	< 3	< 3		< 3	20	< 3	< 3
Strontium	ug/L as Sr	29.65	4	26.5	33.2	7000 MAC	31.75	26	25	57
Tin	ug/L as Sn	< 5	4	< 5	< 5		< 5	25	< 5	< 20
Thallium	ug/L as Tl	< 0.01	4	< 0.01	< 0.01		< 0.01	20	< 0.01	< 0.05
Titanium	ug/L as Ti	< 5	4	< 5	< 5		< 5	26	< 5	< 10
Uranium	ug/L as U	< 0.1	4	< 0.1	< 0.1	20 MAC	< 0.1	20	< 0.1	< 0.1
Vanadium	ug/L as V	< 5	4	< 5	< 5		< 5	26	< 5	< 10
Zinc	ug/L as Zn	14.45	4	13.6	15.2	≤ 5000 AO	13.5	26	< 1	297
Zirconium	ug/L as Zr	0.115	4	< 0.1	0.17		< 0.1	20	< 0.1	< 0.5

Table 2: 2022 Summary of Treated Water Test Results, Fulford Water System										
PARAMETER		2022 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2012 - 2021 RESULTS			
Parameter	Units of	Annual	Samples	Range		≤ = Less than or equal to		Samples	Range	
Name	Measure	Median	Analyzed	Min.	Max.		Median	Analyzed	Minimum	Maximum
ND means Not Detected by analytical method used										
Physical Parameters										
Carbon, Total Organic	mg/L as C	2.2	4	1.9	2.4		2.3	39	0.23	4.6
Colour, True	TCU	< 2	11	< 2	3	≤ 15 AO	1.35	14	< 2	23
Hardness as CaCO ₃	mg/L	33.05	4	29.5	34.5	No Guideline Required	33.3	17	28.8	46.7
pH	pH units	6.8	1	6.8	6.8	7.0-10.5 AO	6.9	34	6.1	7.76
Turbidity	NTU	< 0.14	15	0.1	0.2	1 MAC and ≤ 5 AO	< 0.14	163	0.06	4.75
Water Temperature	Degress C	7.5	141	4	19.5		11	2603	0.5	24
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	< 1	75	< 1	< 1	0 MAC	< 1	574	< 1	9
<i>E. coli</i>	CFU/100 mL	< 1	75	< 1	< 1	0 MAC	< 1	574	< 1	< 1
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2022				No Guideline Required	< 10	40	< 10	110
Algal Toxins										
Total Microcystins	ug/L	Last analyzed in 2011				1.5 MAC				
Disinfectants										
Disinfectants										
Chlorine, Free Residual	mg/L as Cl ₂	0.79	141	0.27	2.1	No Guideline Required	0.64	2788	0.16	2.43
Chlorine, Total Residual	mg/L as Cl ₂	0.96	139	0.39	2.204	No Guideline Required	0.77	2608	0.2	2.24
Disinfection By-Products										
Trihalomethanes (THMs)										
Bromodichloromethane	ug/L	11	4	8	12		12.9	38	8.5	24
Bromoform	ug/L	< 1	4	< 1	< 1		< 1	38	< 0.1	< 1
Chloroform	ug/L	43	4	32	46		48.5	38	27	130
Chlorodibromomethane	ug/L	1.5	4	1	1.8		1.5	38	<0.1	5.46
Total Trihalomethanes	ug/L	55.5	4	41	61	100 MAC	66.85	38	38.8	160
HAA5	ug/L	Not tested in 2022					28.6	9	5.1	44
Metals										
Aluminum	ug/L as Al	12.95	4	8.1	15.7	2900 MAC / 100 OG	12.05	18	7.3	228
Antimony	ug/L as Sb	< 0.5	4	< 0.5	< 0.5	6 MAC	< 0.5	17	< 0.5	< 0.5
Arsenic	ug/L as As	0.11	4	< 0.1	0.2	10 MAC	0.17	17	<0.1	0.837
Barium	ug/L as Ba	6.05	4	5.5	6.4	100 MAC	6.3	17	5.2	< 9
Beryllium	ug/L as Be	< 0.1	4	< 0.1	< 0.1		< 0.1	17	< 0.1	< 3
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	12	< 1	< 1
Boron	ug/L as B	< 50	4	< 50	< 50	5000 MAC	< 50	17	< 50	161
Cadmium	ug/L as Cd	< 0.01	4	< 0.01	< 0.01	5 MAC	< 0.01	17	< 0.01	0.352
Calcium	mg/L as Ca	10.55	4	9.34	11.1	No Guideline Required	10.8	17	9.2	15.6
Chromium	ug/L as Cr	< 1	4	< 1	< 1	50 MAC	< 1	17	< 1	< 10
Cobalt	ug/L as Co	< 0.2	4	< 0.2	< 0.2		< 0.2	17	< 0.2	< 0.2
Copper	ug/L as Cu	34.25	4	25.1	37.1	2000 MAC / ≤ 1000 AO	15	17	< 8	130
Iron	ug/L as Fe	< 5	4	< 5	< 5	≤ 300 AO	< 5	17	< 5	47
Lead	ug/L as Pb	1.15	4	1.09	1.45	5 MAC	<0.5	16	0.23	2.43
Lithium	ug/L as Li	< 2	4	< 2	< 2		< 2	5	< 2	< 2
Magnesium	mg/L as Mg	1.615	4	1.51	1.67	No Guideline Required	1.57	17	0.886	1.85
Manganese	ug/L as Mn	< 1	4	< 1	1.4	120 MAC / ≤ 20 AO	< 1	17	< 1	< 4
Molybdenum	ug/L as Mo	< 1	4	< 1	< 1		< 1	17	< 1	< 1
Nickel	ug/L as Ni	< 1	4	< 1	< 1		< 1	17	< 1	< 1
Potassium	mg/L as K	0.57	4	0.493	0.595		0.537	17	< 0.03	0.624
Selenium	ug/L as Se	< 0.1	4	< 0.1	< 0.1	50 MAC	< 0.1	1	< 0.1	< 0.1
Silicon	ug/L as Si	2425	4	1590	3390		986	17	986	986
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	17	< 0.02	< 0.02
Sodium	mg/L as Na	6.945	4	6.32	7.93	≤ 200 AO	6.99	17	4.56	7.64
Sulphur	mg/L as S	< 3	4	< 3	< 3		< 3	12	< 3	< 3
Strontium	ug/L as Sr	28.95	4	26.3	32.8	7000 MAC	30	17	30	30
Tin	ug/L as Sn	< 5	4	< 5	< 5		< 5	16	< 5	< 20
Thallium	ug/L as Tl	< 0.01	4	< 0.01	< 0.01		< 0.01	12	< 0.01	< 0.01
Titanium	ug/L as Ti	< 5	4	< 5	< 5		< 5	17	< 5	< 10
Uranium	ug/L as U	< 0.1	4	< 0.1	< 0.1	20 MAC	< 0.1	12	< 0.1	< 0.1
Vanadium	ug/L as V	< 5	4	< 5	< 5		< 5	17	< 5	< 10
Zinc	ug/L as Zn	41.4	4	30.7	47.9	≤ 5000 AO	21	17	< 1	186
Zirconium	ug/L as Zr	< 0.1	4	< 0.1	< 0.1		< 0.1	12	< 0.1	< 0.1