

Fulford Water Service

2021 Annual Report



INTRODUCTION

This report provides a summary of the Fulford Water Service for 2021. 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 108 parcels of land with 95 single family equivalents (SFE) as the use on some parcels represent 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.

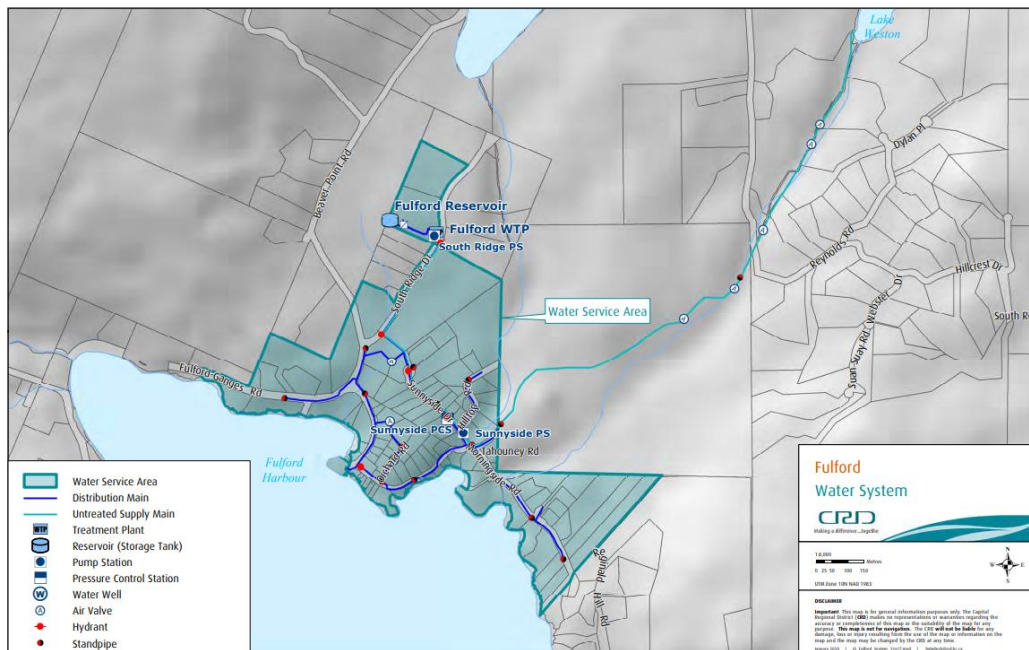


Figure 1: Fulford Water Service

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 on commercial properties only;
- 1 pressure regulating station (PCS) on Sunnyside Drive near Hilltop Road.

WATER PRODUCTION AND DEMAND

Annual water production since 2016 is shown in Figure 2. A total of 29,248 m³ of water was extracted from Lake Weston in 2021. This is a 4% decrease from the previous year and a 1% increase from the 5 year rolling average.

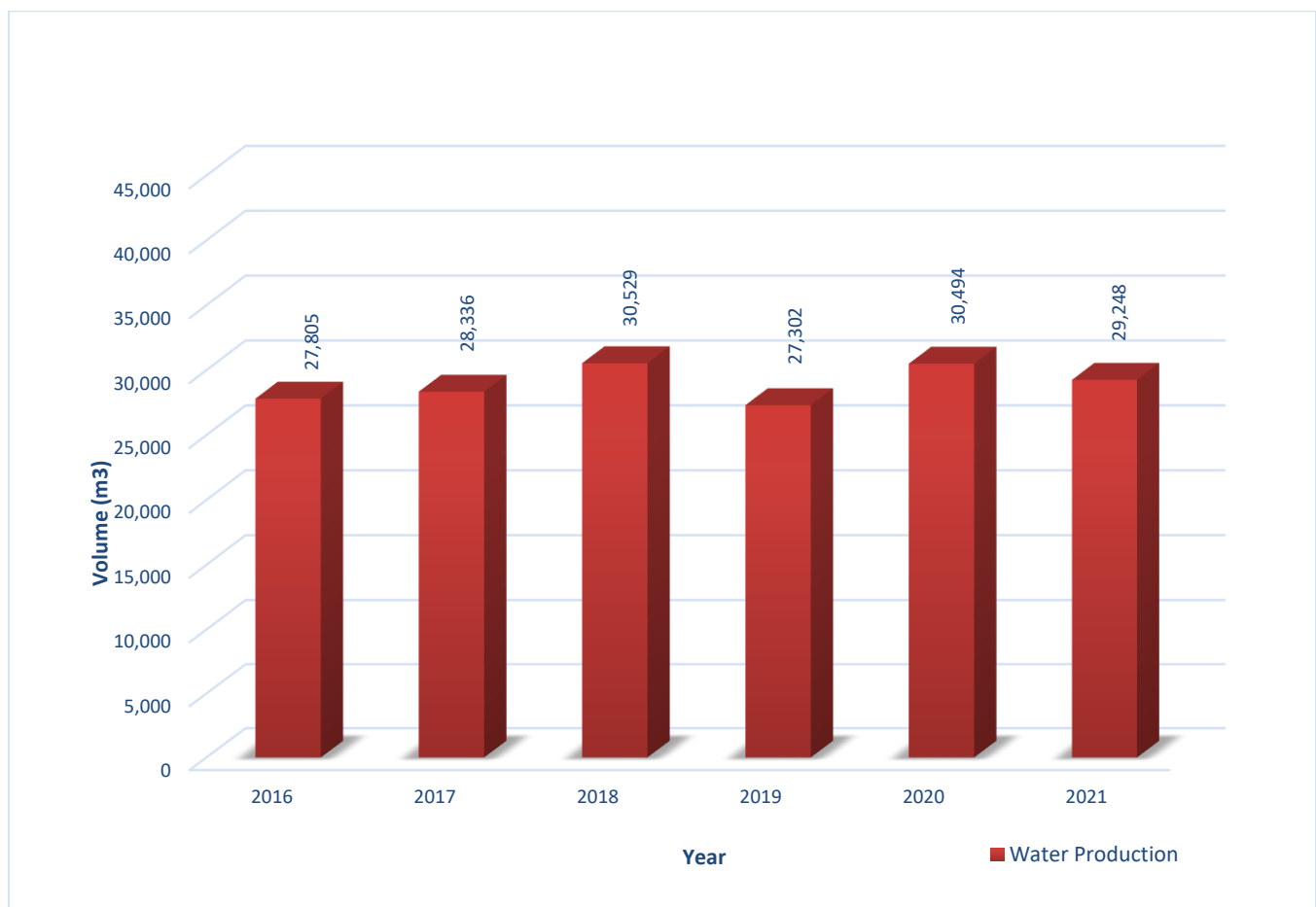


Figure 2: Fulford Water Service Annual Water Production

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 during September to November 2020 was higher due to two water system leaks that were difficult to locate.

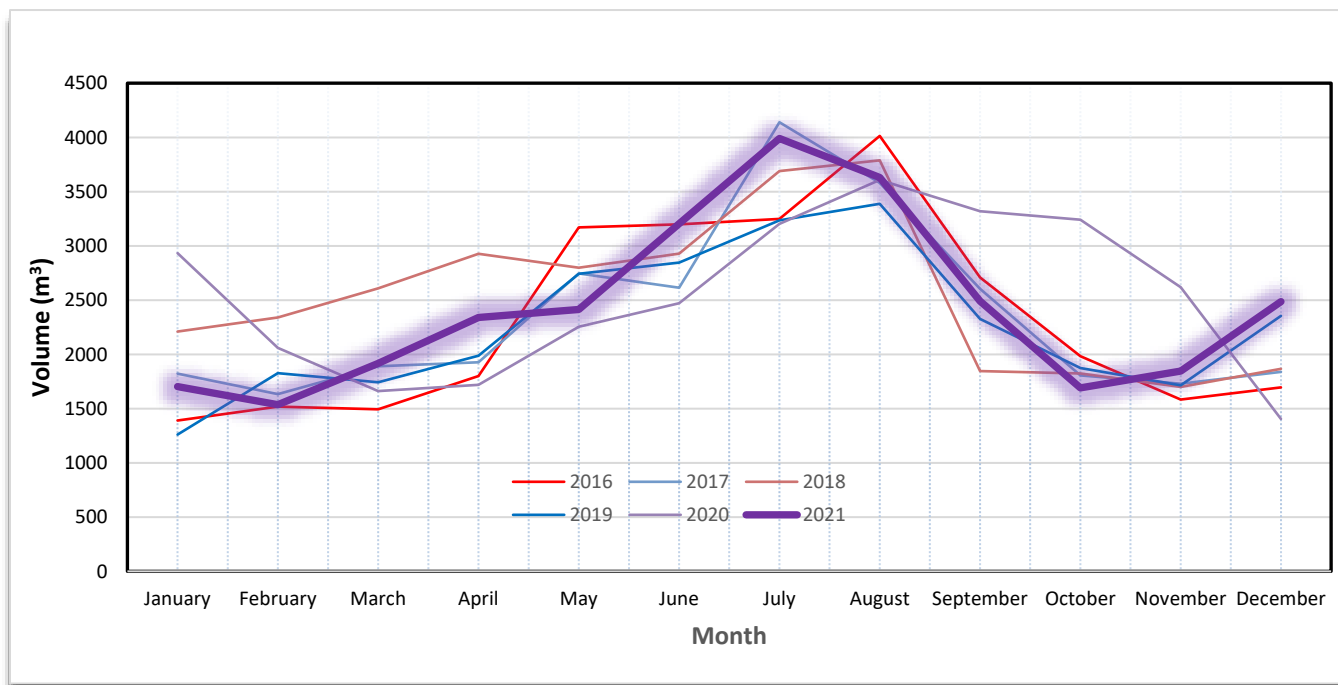


Figure 3: Fulford Water Service Monthly Water Production

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 246m³ per year for 2021. This is a 1% increase from the 5 year rolling average.

WATER QUALITY

In general, the Fulford Water System provided good quality drinking water to its customers in 2021. A number of samples for a variety of water quality parameters were collected and analysed throughout the year and confirmed that the DAF and disinfection treatment stages were effective in treating raw water from Lake Weston. A water main break and subsequent depressurization of parts of the Fulford system necessitated a boil water advisory for the affected area between November 16 and 21, 2021.

Typical Fulford drinking water quality characteristics for 2021 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 with slightly higher concentrations in the summer.

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

Raw water from the lake was slightly hard (annual median 34.2 mg/L CaCO₃).

A total organic carbon (TOC) concentration range from 5.25 to 5.50 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 late summer and fall 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 consistently very low with the highest values slightly over 1 nephelometric turbidity units (NTU) during the fall and winter months.

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 except for November 18, 2021 when the turbidity rose to 1.1 NTU, likely caused by the extreme rainfall and runoff into Weston Lake on November 14/15 (atmospheric river). Supervisory Control and Data Acquisition (SCADA) records do not clearly confirm this turbidity exceedance; overall the risk to public health during this event was very low.

TOC (median 2.05 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 57.5 µg/L and 40.8 µg/L respectively.

The water temperature was in exceedance of the aesthetic objective of 15°C from July to end of September, 2021. There is no mitigation for this.

The free chlorine residual concentrations in the distribution system were within the desired range (0.27 – 2.13 mg/L) and indicate an effective secondary disinfection process.

Table 1 and 2 below provide a summary of the 2021 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 2021 reporting period:

- Water system leak repairs:
 - 112 Beaver Point Road
 - 215 Morningside (resulted in a boil water advisory)
- Water treatment plant corrective maintenance:
 - Air saturator mechanical repairs
 - UV system repairs
 - SCADA system repairs

CAPITAL IMPROVEMENTS

The following is a summary of the major capital improvements including year ending spending for 2021: Weston Creek 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. On – going.

Project	Spending
Budget	\$99,100
Project Management	(\$44,678)
Contract	(\$34,042)
Balance Remaining	\$20,380

Safe Work Procedures (CE.699.4504): The work scope includes reviewing and developing safe work procedures for operational and maintenance tasks.

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

Back-up Power Design (CE.735.4504): Complete electrical designs for new onsite back up power. On hold. Commission has indicated not to proceed with this project at this time.

Project	Spending
Budget	\$10,000
Project Management	(\$97)
Balance Remaining	\$9,903

Fulford WTP Security Fencing (CE.791.2000): Security fencing for the Fulford Water Treatment Plant. Note that CRD Risk Management will contribute one half of the construction contract amount up to a maximum of \$10,000. This work will be executed and completed early in 2022.

Project	Spending
Budget	\$30,000
Project Management	(\$2,230)
Balance Remaining	\$27,770

2021 FINANCIAL REPORT

Please refer to the attached 2021 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), a transfer 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) that is carried forward to the following year.

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 <i>emergency call centre</i>:	1-855-822-4426 (toll free)
	1-250-474-9630 (toll)
CRD water system <i>general enquiries</i> (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.

Submitted by:	Matthew McCrank, MSc., P.Eng, Senior Manager, Wastewater Infrastructure Operations
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Attachment: [2021 Statement of Operations and Reserve Balances](#)

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

Table 1: 2021 Summary of Raw Water Test Results, Fulford Water System

PARAMETER		2021 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2011 - 2020 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range		≤ = Less than or equal to	Median	Samples Analyzed	Range
				Minimum	Maximum				Minimum-Maximum
ND means Not Detected by analytical method used									
Physical Parameters/Biological									
Chlorophyll a	ug/L	ND	11	ND	56.3		1.21	53	ND - 28.5
Colour, True	TCU	24	11	14	34	≤ 15 AO	20.7	69	1.20 - 29.4
Conductivity @ 25C	uS/cm	Last analyzed in 2011							
Hardness as CaCO ₃	mg/L	34.2	4	31.9	34.8	No Guideline Required	35.15	18	28.9 - 61.3
pH	pH Units	7.2	6	7.0	7.5	7.0-10.5 AO	7.17	23	6.84 - 7.5
Carbon, total organic	mg/L	5.35	4	5.2	5.5		5.33	24	3.92 - 7
Turbidity	NTU	0.65	11	0.25	1.7		0.64	109	0.20 - 4.92
Water Temperature	Degrees C	13	16	7.2	19		12.0	547	2.5 - 20
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	97.5	12	26	280		20	107	ND - 5500
<i>E. coli</i>	CFU/100 mL	ND	12	ND	7		ND	110	ND
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2021					1110	39	90 - 3960
Parasites						No MAC Established			
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	0.04	2	ND	0.04	Zero detection desirable	ND	16	ND - 2.8
<i>Giardia</i> , Total cysts	cysts/100 L	ND	2	ND	ND	Zero detection desirable	ND	16	ND - 0.55
Algal Toxins									
Total Microcystins	ug/L	Last analyzed in 2011				1.5 MAC			
Metals									
Aluminum	ug/L as Al	53.8	4	11.8	78.6	2900 MAC / 100 OG	17.5	18	5.5 - 4600
Antimony	ug/L as Sb	ND	4	ND	ND	6 MAC	ND	18	ND
Arsenic	ug/L as As	0.23	4	0.21	0.28	10 MAC	0.25	18	0.20 - 0.82
Barium	ug/L as Ba	6.6	4	5.9	7.6	100 MAC	6.3	18	5.5 - ND
Beryllium	ug/L as Be	ND	4	ND	ND		ND	18	ND
Bismuth	ug/L as Bi	ND	4	ND	ND		ND	16	ND
Boron	ug/L as B	ND	4	ND	ND	5000 MAC	ND	18	ND - 139
Cadmium	ug/L as Cd	ND	4	ND	ND	5 MAC	ND	18	ND
Calcium	mg/L as Ca	11.05	4	10.2	11.4	No Guideline Required	11.3	18	9.2 - 17.5
Chromium	ug/L as Cr	ND	4	ND	1.2	50 MAC	ND	18	ND
Cobalt	ug/L as Co	ND	4	ND	ND		ND	18	ND
Copper	ug/L as Cu	9.32	4	7.38	10.8	2000 MAC / ≤ 1000 AO	7.48	18	5.92 - 55
Iron	ug/L as Fe	98.35	4	42.1	157	≤ 300 AO	62.25	18	12.0 - 156.0
Lead	ug/L as Pb	0.41	4	0.3	0.46	5 MAC	0.38	18	ND - 1.08
Lithium	ug/L as Li	ND	4	ND	ND		ND	7	ND
Magnesium	mg/L as Mg	1.59	4	1.56	1.61	No Guideline Required	1.68	18	1.44 - 4.28
Manganese	ug/L as Mn	14.65	4	3.8	48.4	120 MAC / ≤ 20 AO	5	18	1.1 - 48
Molybdenum	ug/L as Mo	ND	4	ND	ND		ND	18	ND
Nickel	ug/L as Ni	ND	4	ND	ND		ND	18	ND
Potassium	mg/L as K	0.56	4	0.55	0.64		0.55	18	0.03 - 0.67
Selenium	ug/L as Se	ND	4	ND	ND	50 MAC	ND	17	ND
Silicon	ug/L as Si	2795	4	1740	3380		1930	18	2.48 - 10800
Silver	ug/L as Ag	ND	4	ND	ND	No Guideline Required	ND	18	ND
Sodium	mg/L as Na	5.04	4	4.94	5.23	≤ 200 AO	5.63	18	3.98 - 9.66
Sulphur	mg/L as S	ND	4	ND	ND		ND	16	ND
Strontium	ug/L as Sr	30.15	4	29.2	32.3	7000 MAC	32.55	18	26.3 - 57
Tin	ug/L as Sn	ND	4	ND	ND		ND	17	ND
Thallium	ug/L as Tl	ND	4	ND	ND		ND	16	ND
Titanium	ug/L as Ti	ND	4	ND	ND		ND	18	ND
Uranium	ug/L as U	ND	4	ND	ND	20 MAC	ND	16	ND
Vanadium	ug/L as V	ND	4	ND	ND		ND	18	ND
Zinc	ug/L as Zn	17.7	4	10.8	19	≤ 5000 AO	13.65	18	7.3 - 297
Zirconium	ug/L as Zr	0.11	4	ND	0.19		ND	16	ND

Table 2: 2021 Summary of Treated Water Test Results, Fulford Water System

PARAMETER		2021 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2011 - 2020 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Min. Max.		≤ = Less than or equal to	Median	Samples Analyzed	Range Min. -Max.
ND means Not Detected by analytical method used									
Physical Parameters									
Carbon, Total Organic Colour, True	mg/L as C TCU	2.05 ND	4 11	1.8 ND	2.4 34	≤ 15 AO	2.36 1.35	34 3	0.23 - 4.6 0.7 - ND
Hardness as CaCO ₃	mg/L	32.9	4	32	34.3	No Guideline Required	33.65	12	28.8 - 46.7
pH	pH units	6.85	4	6.6	7	7.0-10.5 AO	6.9	26	6.1 - 7.53
Turbidity	NTU	ND	30	ND	1.1	1 MAC and ≤ 5 AO	0.16	128	0.06 - 6.44
Water Temperature	Degress C	10.75	78	5	20		11.5	2252	2.0 - 22.0
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	ND	78	ND	ND	0 MAC	ND	485	ND - 9
<i>E. coli</i>	CFU/100 mL	ND	78	ND	ND	0 MAC	ND	485	ND
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2020				No Guideline Required	ND	40	ND - 110
Algal Toxins									
Total Microcystins	ug/L	Last analyzed in 2011				1.5 MAC	ND	1	ND
Disinfectants									
Disinfectants									
Chlorine, Free Residual	mg/L as Cl ₂	0.20	329	0.27	2.13	No Guideline Required	0.65	2472	0.16 - 2.43
Chlorine, Total Residual	mg/L as Cl ₂	0.90	318	0.36	2.2	No Guideline Required	0.78	2316	0.2 - ND
Disinfection By-Products									
Trihalomethanes (THMs)									
Bromodichloromethane	ug/L	11	4	8.5	13		13	33	8.76 - 24
Bromoform	ug/L	ND	4	ND	ND		ND	33	ND
Chloroform	ug/L	45	4	35	54		52	33	27.0 - 130.0
Chlorodibromomethane	ug/L	1.65	4	1.0	2.1		1.75	33	ND - 5.46
Total Trihalomethanes	ug/L	58	4	45	69	100 MAC	67	33	38.8 - 160.0
HAA5	ug/L	43	4	33	44		24.3	5	5.10 - 28.6
Metals									
Aluminum	ug/L as Al	12.05	4	10.3	13.6	2900 MAC / 100 OG	11.4	13	7.3 - 228
Antimony	ug/L as Sb	ND	4	ND	ND	6 MAC	ND	12	ND
Arsenic	ug/L as As	0.11	4	ND	0.18	10 MAC	0.18	12	ND - 0.84
Barium	ug/L as Ba	6	4	5.7	6.7	100 MAC	6.2	12	5.2 - ND
Beryllium	ug/L as Be	ND	4	ND	ND		ND	12	ND
Bismuth	ug/L as Bi	ND	4	ND	ND		ND	8	ND
Boron	ug/L as B	ND	4	ND	ND	5000 MAC	ND	12	ND - 161
Cadmium	ug/L as Cd	ND	4	ND	ND	5 MAC	ND	12	ND
Calcium	mg/L as Ca	10.5	4	10.2	11.0	No Guideline Required	10.95	12	9.2 - 15.6
Chromium	ug/L as Cr	ND	4	ND	ND	50 MAC	ND	12	ND
Cobalt	ug/L as Co	ND	4	ND	0.37		ND	12	ND
Copper	ug/L as Cu	20.8	4	9.55	35.8	2000 MAC / ≤ 1000 AO	13.95	12	ND - 130
Iron	ug/L as Fe	ND	4	ND	ND	≤ 300 AO	5.05	12	ND - 47.0
Lead	ug/L as Pb	0.50	4	0.23	0.72	5 MAC	ND	12	0.27 - 2.43
Lithium	ug/L as Li	ND	4	ND	ND		ND	1	ND
Magnesium	mg/L as Mg	1.61	4	1.57	1.64	No Guideline Required	1.56	12	0.89 - 1.85
Manganese	ug/L as Mn	ND	4	ND	2.5	120 MAC / ≤ 20 AO	ND	12	ND
Molybdenum	ug/L as Mo	ND	4	ND	ND		ND	12	ND
Nickel	ug/L as Ni	ND	4	ND	ND		ND	11	ND
Potassium	mg/L as K	0.56	4	0.55	0.61		0.53	12	ND - 0.62
Selenium	ug/L as Se	ND	4	ND	ND	50 MAC	ND	11	ND
Silicon	ug/L as Si	2620	4	1560	3250		1780	12	3.17 - 2760
Silver	ug/L as Ag	ND	4	ND	ND	No Guideline Required	ND	12	ND
Sodium	mg/L as Na	7.17	4	6.94	7.47	≤ 200 AO	6.99	12	4.56 - 7.64
Sulphur	mg/L as S	ND	4	ND	ND		ND	8	ND
Strontium	ug/L as Sr	29.95	4	28.7	31.3	7000 MAC	31.4	11	26.0 - 39.0
Tin	ug/L as Sn	ND	4	ND	ND		ND	11	ND
Thallium	ug/L as Tl	ND	4	ND	ND		ND	8	ND
Titanium	ug/L as Ti	ND	4	ND	ND		ND	12	ND
Uranium	ug/L as U	ND	4	ND	ND	20 MAC	ND	8	ND
Vanadium	ug/L as V	ND	4	ND	ND		ND	12	ND
Zinc	ug/L as Zn	23.45	4	15.6	47.8	≤ 5000 AO	16.75	12	ND - 186
Zirconium	ug/L as Zr	ND	4	ND	ND		ND	8	ND