

Sticks Allison Water System

2023 Annual Report

Introduction

This report provides a summary of the Sticks Allison Water Service for 2023 and 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 community of Sticks Allison is a rural residential development located on the north side of Galiano Island in the Southern Gulf Islands Electoral Area which was originally serviced by a private water utility. In 1996 the service converted to the Capital Regional District (CRD). The Sticks Allison water service (Figure 1) is made up of 38 parcels encompassing a total area of approximately 23 hectares. Of the 38 parcels, 37 were customers connected to the water system in 2023.

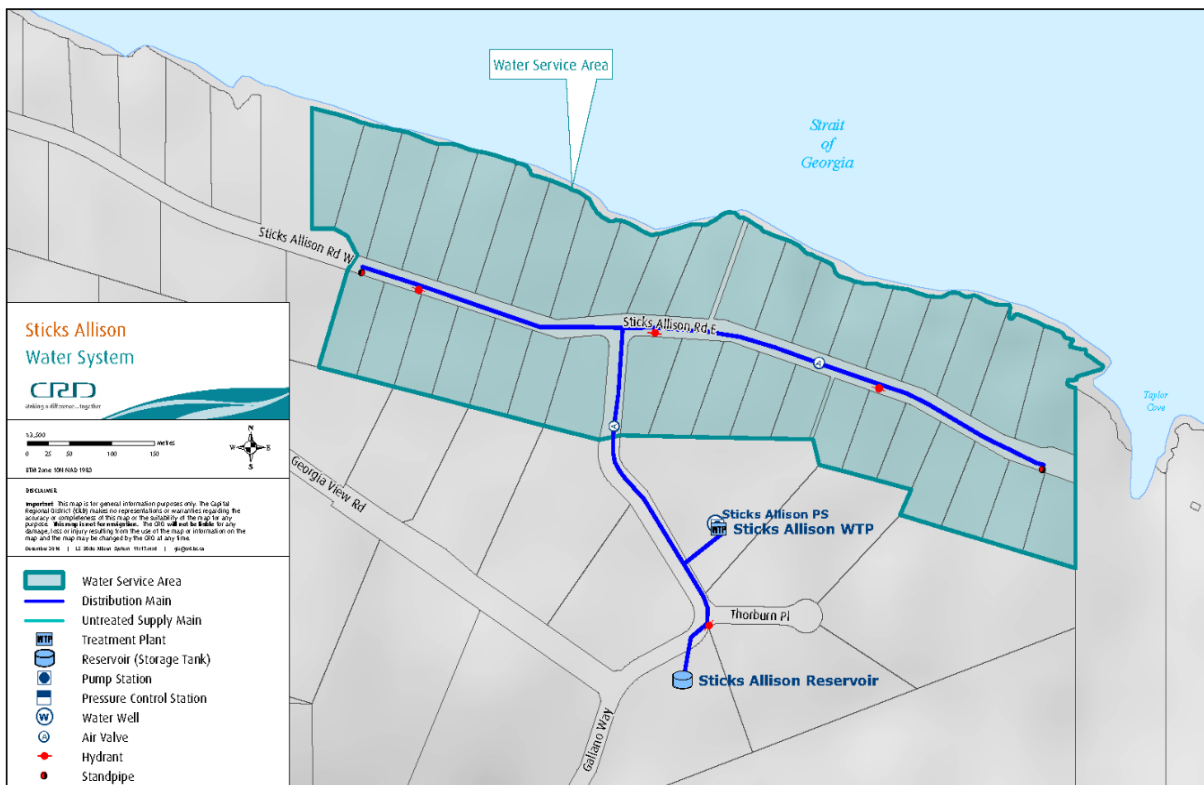


Figure 1: Map of Sticks Allison Water System

The Sticks Allison water system is primarily comprised of:

- One groundwater well, related pumping and control equipment and building.
- Disinfection process equipment (ultraviolet light and chlorine).
- One steel storage tank (total volume is 90 cubic meters).
- Distribution system (approx. 1,400 meters of water mains).
- Other water system assets: service connections and meters, five hydrants, two standpipes, 10 gate valves, Supervisory Control and Data Acquisition (SCADA) system and auxiliary generator.

Water Supply

Groundwater supply monthly water levels are highlighted for 2023 in Figure 2. Groundwater levels for the most part during 2023 are within the typical historical range.

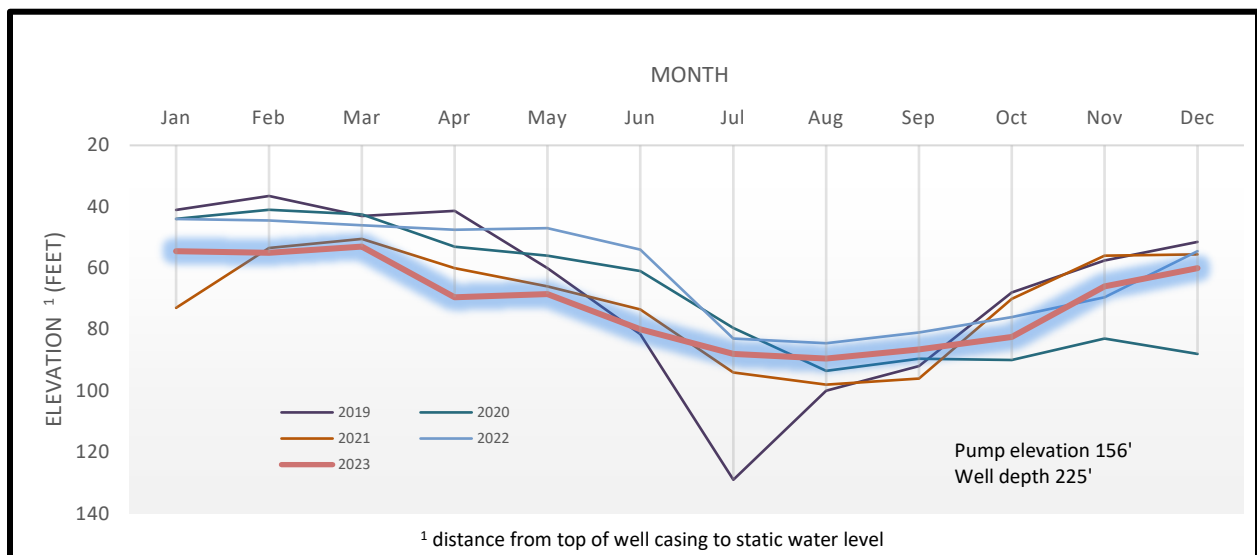


Figure 2: Sticks Allison Monthly Groundwater Water Level

Water Production and Demand

Referring to Figure 3; 6,317, cubic meters of water were extracted (water production) from the ground water source in 2023. This is an 9% decrease from the previous year and a 4% decrease from the five-year average. Water demand (customer water billing) for the service totaled 4,900 cubic meters of water; a 2% increase from the previous year and a 6% decrease from the five-year average.

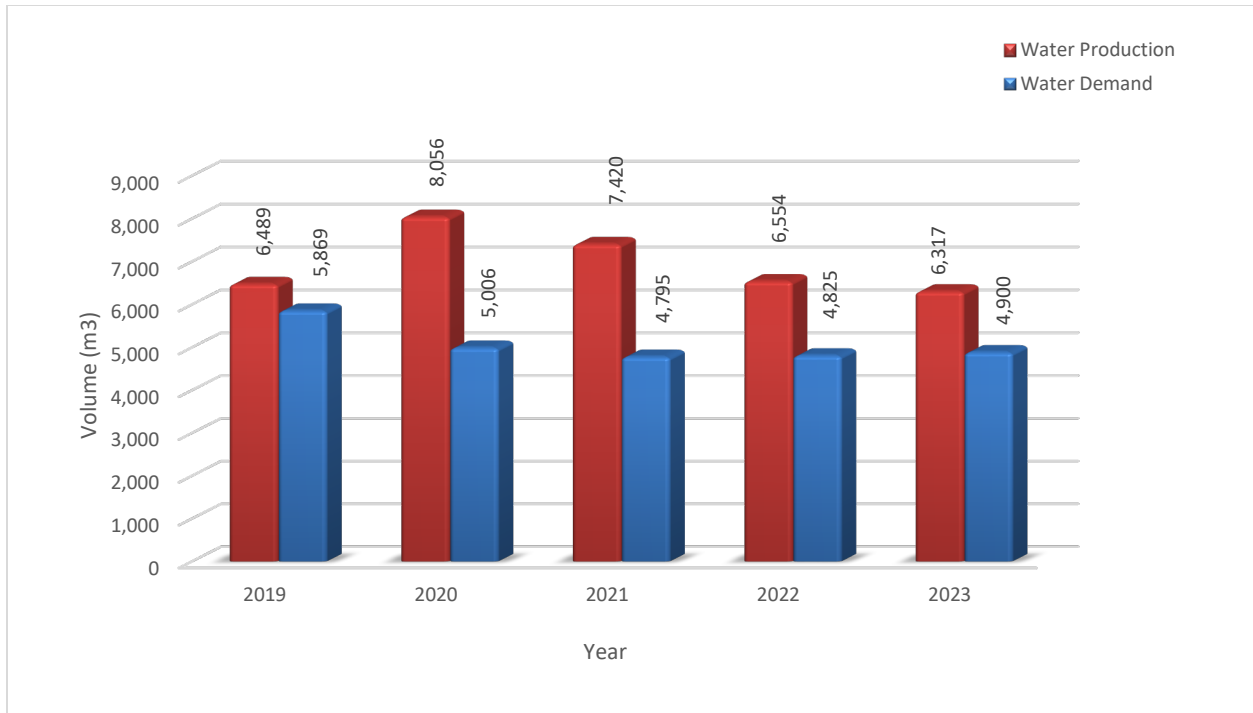


Figure 3: Sticks Allison Water Service Annual Water Production and Demand

The difference between annual water production and annual water demand is referred to as non-revenue water and can include water system leaks, water system maintenance and operational use (e.g. water main flushing, filter system backwashing), potential unauthorized use and fire-fighting use.

The 2023 non-revenue water (1,417 cubic meters) represents approximately 22% of the total water production for the service area. However, approximately 80 cubic meters can be attributed to operational use resulting in a non-revenue water of approximately 21%. Historically, non-revenue water for the service has been about 8%-10%. The higher percentage of non-revenue water for 2023 continues to suggest there is likely ongoing water system leak or leaks that require further investigation.

Figure 4 below illustrates the monthly water production for 2023 along with the historical water production information. The monthly water production trends are typical for small water systems such as the Sticks Allison water system.

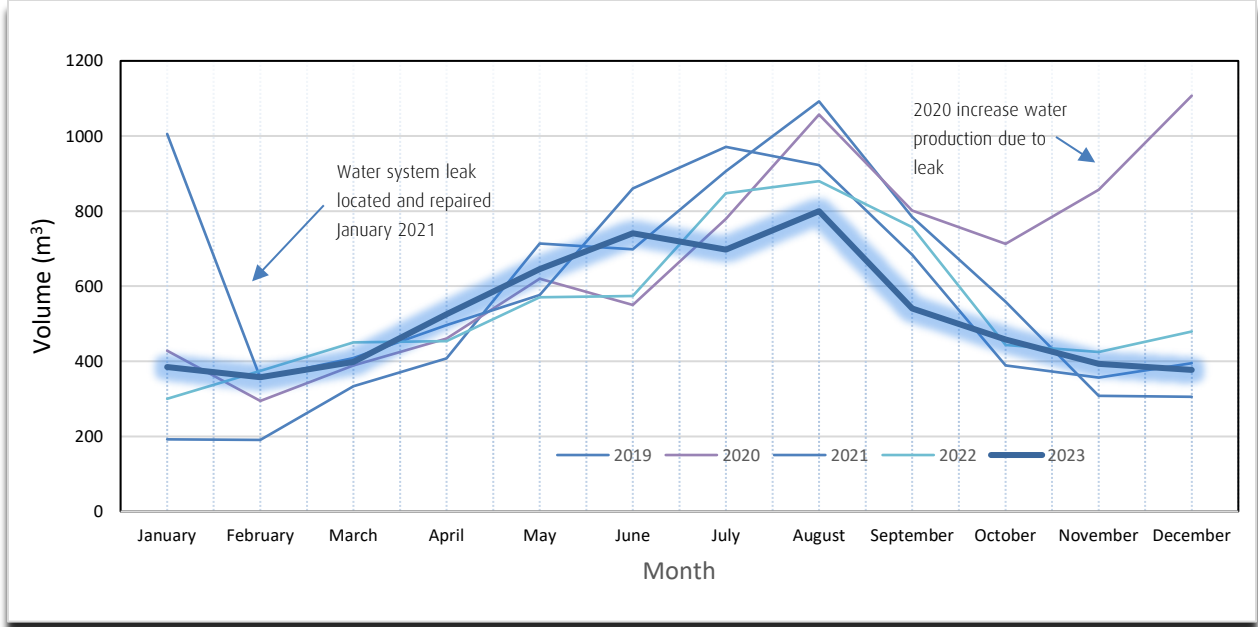


Figure 4: Sticks Allison Water Service Monthly Water Production.

Drinking Water Quality

Staff completed the water quality monitoring program at Sticks Allison based on the regulatory requirements and system specific risks. Samples were collected at regular frequencies from the raw water as well as from a number of sampling stations at the treatment plant and in the distribution system. The samples were shipped for various analyses to the CRD’s Water Quality Lab or to external laboratories for special analyses, including disinfection by-products or metals.

The water system performed well in 2023 and consistently supplied safe drinking water to its customers. The groundwater well produced generally good quality source water. It contained low levels of iron but slightly elevated manganese concentrations. Accumulation effects at the end of the system have occasionally exacerbated these manganese concentrations. Manganese concentrations improved at the east end of Sticks Allison Road with additional flushing efforts. Manganese and or iron exceedances can lead to brown/yellow water discoloration. Monthly spot flushes at the system ends were performed as mitigation to prevent these metals from accumulating in higher concentrations that would potentially exceed the maximum acceptable concentration, and/or lead to water customer complaints. The well water was free of indicator bacteria in 2023.

The data below provides a summary of the water quality characteristics in 2023:

Raw Water:

- The Sticks Allison well water was free of the indicator bacteria *E.coli* and total coliforms.
- The raw water had a median manganese concentration of 12.1 µg/L which is consistent with previous years. It was also below the aesthetic objectives in the GCDWQ. Iron concentrations were also low and well below the aesthetic objective.
- The raw well water had a median hardness of 32.9 mg/L (CaCO₃). pH was not tested in 2023 but is typically between 7.5 and 8.0.
- The raw water turbidity was consistently under 1 Nephelometric Turbidity Unit (NTU) with an annual median of 0.2 NTU.

Treated Water:

- The treated water was safe to drink and free of *E.coli* and total coliform bacteria.
- The treated water turbidity was consistently below 1 NTU with an annual median of 0.38 NTU.
- The manganese concentrations in the distribution system only exceeded the aesthetic limits in the GCDWQ at the east end of Sticks Allison Road in August. This is a significant improvement over previous years and a result of additional flushing efforts to remove old, stale water with accumulated manganese containing pipe sediment. While the manganese concentrations exceeded the aesthetic limit in August, they never reached the health limit. Iron concentrations were also elevated through accumulation effects but remained well below the aesthetic limit. It is expected that the west end of Sticks Allison Road experienced similar effects, but this was not tested. No customer complaints were received. Regular spot flushes were carried out by the operators.
- The annual average levels of the disinfection by-product total trihalomethanes (TTHM) were well below the maximum allowable concentration. Haloacetic acids (HAA) were not tested in 2023 but are typically low when TTHM are low.
- The free chlorine residual concentrations in the distribution system ranged from 0 to 1.26 mg/L with a median of 0.23 mg/L indicating that on occasion the secondary disinfection could be insufficient at the ends of the system. Staff will try to balance the need for proper secondary disinfection and the risk of disinfection by-product formation through higher chlorine levels.

Table 1 and 2 below provide a summary of the 2023 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

- Water Treatment Plant (WTP) driveway maintenance in December.
- Arbutus tree removed that was hanging over WTP in December.

Capital Projects Updates

No capital works were planned or completed in 2023. In alignment with the approved capital plan, funds were held for replacement of failed/leaking service lines, which did not end up being utilized.

Financial Report

Please refer to the attached 2023 Statement of Operations and Reserve Balances.

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

Expenses include all costs of providing the service. General Government Services include budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs include CRD staff time as well as the costs of equipment, tools, and vehicles. Other Expenses include 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 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.

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Attachments: Table 1
 Table 2
 2023 Statement of Operations and Reserve Balances

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

Table 1

Table 1: 2023 Summary of Raw Water Test Results, Sticks Allison Water System										
PARAMETER		2023 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2013-2022 RESULTS			
Parameter	Units of	Annual	Samples	Range		≤ = Less than or equal to	Median	Samples	Range	
Name	Measure	Median	Analyzed	Minimum	Maximum		Median	Analyzed	Minimum	Maximum
ND means Not Detected by analytical method used										
Physical Parameters										
Carbon, Total Organic	mg/L	Not tested in 2023					5.2	1	5.2	5.2
Hardness as CaCO ₃	mg/L	32.9	4	28.8	34.7	No Guideline Required	29.2	21	26.2	41.3
pH	pH units	Not tested in 2023				7.0 - 10.5 AO	7.94	13	7.4	8.42
Turbidity	NTU	0.2	12	0.1	0.25		0.25	61	0.12	0.95
Water Temperature	°C	Not tested in 2023					10.5	69	9.5	12
Metals										
Aluminum	ug/L as Al	5.05	4	3.7	5.2	2900 MAC / 100 OG	5.5	21	3.4	< 65
Antimony	ug/L as Sb	< 0.5	4	< 0.5	< 0.5	6 MAC	< 0.5	21	< 0.5	< 0.6
Arsenic	ug/L as As	0.505	4	0.49	0.54	10 MAC	0.53	21	0.45	1.29
Barium	ug/L as Ba	< 1	4	< 1	< 1	1000 MAC	< 1	21	< 1	11
Beryllium	ug/L as Be	< 0.1	4	< 0.1	< 0.1		< 0.1	21	< 0.1	< 3
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	18	< 1	< 1
Boron	ug/L as B	379	4	350	404	5000 MAC	355	21	< 50	400
Cadmium	ug/L as Cd	< 0.01	4	< 0.01	< 0.01	7 MAC	< 0.01	21	< 0.01	< 0.1
Calcium	mg/L as Ca	11.25	4	9.86	12	No Guideline Required	9.93	21	8.69	15.5
Chromium	ug/L as Cr	< 1	4	< 1	< 1	50 MAC	< 1	21	< 1	< 10
Cobalt	ug/L as Co	< 0.2	4	< 0.2	< 0.2		< 0.2	21	< 0.2	< 20
Copper	ug/L as Cu	1.745	4	1.53	2.8	2000 MAC / ≤ 1000 AO	1.48	21	0.65	10.9
Iron	ug/L as Fe	17.1	4	13.7	23.5	≤ 300 AO	64.1	21	12.5	395
Lead	ug/L as Pb	0.225	4	< 0.2	0.28	5 MAC	0.23	21	< 0.2	0.64
Lithium	ug/L as Li	12.5	4	12.3	13		12.3	11	11.6	13.9
Magnesium	mg/L as Mg	1.14	4	1.02	1.22	No Guideline Required	1.07	21	0.635	1.28
Manganese	ug/L as Mn	12.1	4	7.6	14	120 MAC / ≤ 20 AO	21.8	21	7.4	84.7
Molybdenum	ug/L as Mo	3.95	4	3.5	4.5		4.3	21	3.7	< 20
Nickel	ug/L as Ni	1.25	4	< 1	1.8		< 1	21	< 1	< 50
Potassium	mg/L as K	0.2735	4	0.265	0.281		0.291	21	0.264	0.587
Selenium	ug/L as Se	< 0.1	4	< 0.1	< 0.1	50 MAC	< 0.1	21	< 0.1	< 0.5
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	21	< 0.02	< 10
Sodium	mg/L as Na	83.5	4	82.4	87.1	≤ 200 AO	84.5	21	75.2	101
Strontium	ug/L as Sr	47.2	4	40.9	49	7000 MAC	42.5	21	32	65.1
Sulphur	mg/L as S	9	4	7.9	9.5		9.05	18	7.3	10.9
Tin	ug/L as Sn	< 5	4	< 5	< 5		< 5	21	< 5	< 20
Titanium	ug/L as Ti	< 5	4	< 5	< 5		< 5	21	< 5	< 10
Thallium	ug/L as Tl	< 0.01	4	< 0.01	< 0.01		< 0.01	18	< 0.01	< 0.01
Uranium	ug/L as U	< 0.1	4	< 0.1	< 0.1	20 MAC	< 0.1	18	< 0.1	0.22
Vanadium	ug/L as V	< 5	4	< 5	< 5		< 5	21	< 5	< 10
Zinc	ug/L as Zn	7.15	4	5.1	9.7	≤ 5000 AO	9.1	21	< 5	39
Zirconium	ug/L as Zr	< 0.1	4	< 0.1	< 0.1		< 0.1	18	< 0.1	0.16
Non-Metallic Inorganic Chemicals										
Silicon	mg/L as Si	7240	4	6640	7920		6590	21	4.19	11500
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	< 1	12	< 1	< 1		< 1	119	< 1	15
<i>E. coli</i>	CFU/100 mL	< 1	12	< 1	< 1		< 1	118	< 1	2
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2022								
Parasites										
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	Not analyzed in 2022				Zero detection desirable	0.5	2	< 1	< 1
<i>Giardia</i> , Total cysts	cysts/100 L	Not analyzed in 2022				Zero detection desirable	0.5	2	< 1	< 1

Table 2

Table 2: 2023 Summary of Treated Water Test Results, Sticks Allison Water System											
PARAMETER		2023 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2013-2022 ANALYTICAL RESULTS				
Parameter	Units of Measure	Annual Median	Samples Analyzed	Range		≤ = Less than or equal to	Median	Samples Analyzed	Range		
Name	Measure	Median	Analyzed	Minimum	Maximum		Median	Analyzed	Minimum	Maximum	
ND means Not Detected by analytical method used											
Physical Parameters											
Carbon, Total Organic	mg/L as C	2.25	4	2	2.9		2.63	26	1.08	7.73	
Hardness as CaCO3	mg/L	36.65	4	31.4	39.9		33.15	20	29.7	38.7	
pH	No Units	Not tested in 2023					7.89	18	7.6	8.3	
Turbidity	NTU	0.375	12	0.25	0.6	>1 MAC	0.335	98	0.2	4.8	
Water Temperature	°C	9	84	3	15	≥15 AO	10.5	2325	0.45	22	
Microbial Parameters											
Indicator Bacteria											
Coliform, Total	CFU/100 mL	< 1	48	< 1	< 1	0 MAC	< 1	322	< 1	64	
<i>E. coli</i>	CFU/100 mL	< 1	48	< 1	< 1	0 MAC	< 1	321	< 1	< 1	
Hetero. Plate Count, 7 day	CFU/1 mL	90	9	20	800	No Guideline Required	80	65	< 10	11000	
Disinfectants											
Disinfectants											
Chlorine, Free Residual	mg/L as Cl2	0.23	84	0	1.26	3.0 MAC	0.36	2350	0	1.88	
Chlorine, Total Residual	mg/L as Cl2	0.255	84	0.04	1.27		0.4	2353	0	1.98	
Disinfection By-Products											
Trihalomethanes (THMs)											
Bromodichloromethane	ug/L	12.5	4	8.1	18		15	28	6.4	19.3	
Bromoform	ug/L	< 1	4	< 1	1.6		< 1	28	< 0.1	1.3	
Chloroform	ug/L	18	4	14	20		19	28	7.4	33	
Chlorodibromomethane	ug/L	5.7	4	2.8	13		5.8	28	2.5	11.3	
Total Trihalomethanes	ug/L	36.5	4	25	53	100 MAC	39.7	27	18	59.3	
Haloacetic Acids (HAAs)											
HAA5											
HAA5	ug/L	Not tested in 2022				80 MAC					
Metals											
Aluminum	ug/L as Al	8.05	4	6.2	9.6	2900 MAC / 100 OG	17.25	20	5	39.4	
Antimony	ug/L as Sb	< 0.5	4	< 0.5	< 0.5	6 MAC	< 0.5	20	< 0.5	< 0.5	
Arsenic	ug/L as As	0.49	4	0.46	0.54	10 MAC	0.58	20	0.51	0.89	
Barium	ug/L as Ba	< 1	4	< 1	1	1000 MAC	1.3	20	< 1	2.2	
Beryllium	ug/L as Be	< 0.1	4	< 0.1	< 0.1		< 0.1	20	< 0.1	< 0.1	
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	20	< 1	< 1	
Boron	ug/L as B	385.5	4	360	416	5000 MAC	367	20	319	400	
Cadmium	ug/L as Cd	< 0.01	4	< 0.01	< 0.01	7 MAC	< 0.01	20	< 0.01	< 0.01	
Calcium	mg/L as Ca	13.15	4	11.1	14.4	No Guideline Required	11.75	20	10.7	14.1	
Chromium	ug/L as Cr	< 1	4	< 1	< 1	50 MAC	< 1	20	< 1	< 1	
Cobalt	ug/L as Co	< 0.2	4	< 0.2	< 0.2		< 0.2	20	< 0.2	< 0.5	
Copper	ug/L as Cu	22.9	4	9.66	49	2000 MAC / ≤ 1000 AO	12.5	20	0.87	46.2	
Iron	ug/L as Fe	52.1	4	21.5	99.8	≤ 300 AO	173.5	20	47.8	747	
Lead	ug/L as Pb	0.86	4	0.36	1.8	5 MAC	0.765	20	0.22	2.32	
Lithium	ug/L as Li	12.4	4	12.2	13		12.5	12	11.5	13.3	
Magnesium	mg/L as Mg	0.911	4	0.866	0.96	No Guideline Required	0.84	20	0.476	1.3	
Manganese	ug/L as Mn	14.25	4	6.8	20.4	120 MAC / ≤ 20 AO	70.8	20	26.5	200	
Molybdenum	ug/L as Mo	3.65	4	3.6	3.8		3.3	20	1	5.6	
Nickel	ug/L as Ni	< 1	4	< 1	< 1		< 1	20	< 1	< 1	
Potassium	mg/L as K	0.279	4	0.275	0.29		0.3	20	0.27	0.351	
Selenium	ug/L as Se	< 0.1	4	< 0.1	< 0.1	50 MAC	< 0.1	20	< 0.1	0.11	
Silicon	ug/L as Si	7260	4	6850	7950		6910	20	6340	7740	
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	20	< 0.02	< 0.02	
Sodium	mg/L as Na	83.25	4	82.4	86.2	≤ 200 AO	84.35	20	79.6	92	
Sulphur	ug/L as S	8.2	4	6.7	9.5		9.25	20	7	11.6	
Strontium	ug/L as Sr	55.45	4	47.5	58.6	7000 MAC	51.65	20	46.3	60.3	
Tin	ug/L as Sn	< 5	4	< 5	< 5		< 5	20	< 5	< 5	
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	20	< 5	< 5	
Uranium	ug/L as U	< 0.1	4	< 0.1	0.1	20 MAC	< 0.1	20	< 0.1	0.16	
Vanadium	ug/L as V	< 5	4	< 5	< 5		< 5	20	< 5	< 5	
Zinc	ug/L as Zn	12.35	4	9	14.3	≤ 5000 AO	16.35	20	5.9	34.1	
Zirconium	ug/L as Zr	< 0.1	4	< 0.1	< 0.1		0.17	20	< 0.1	< 0.5	