

Surfside Water System

2022 Annual Report

Introduction

This report provides a summary of the Surfside Park Estates Water Service for 2022 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 Surfside is a rural residential development located on Mayne Island in the Southern Gulf Islands Electoral Area which was originally serviced by a private water utility. In 2003 the service converted to the Capital Regional District (CRD). The Surfside Water Service (Figure 1) area is made up of 127 parcels of which 105 parcels can be inhabited encompassing a total area of approximately 25 hectares. Of the 105 parcels, 68 were connected to the water system in 2022.

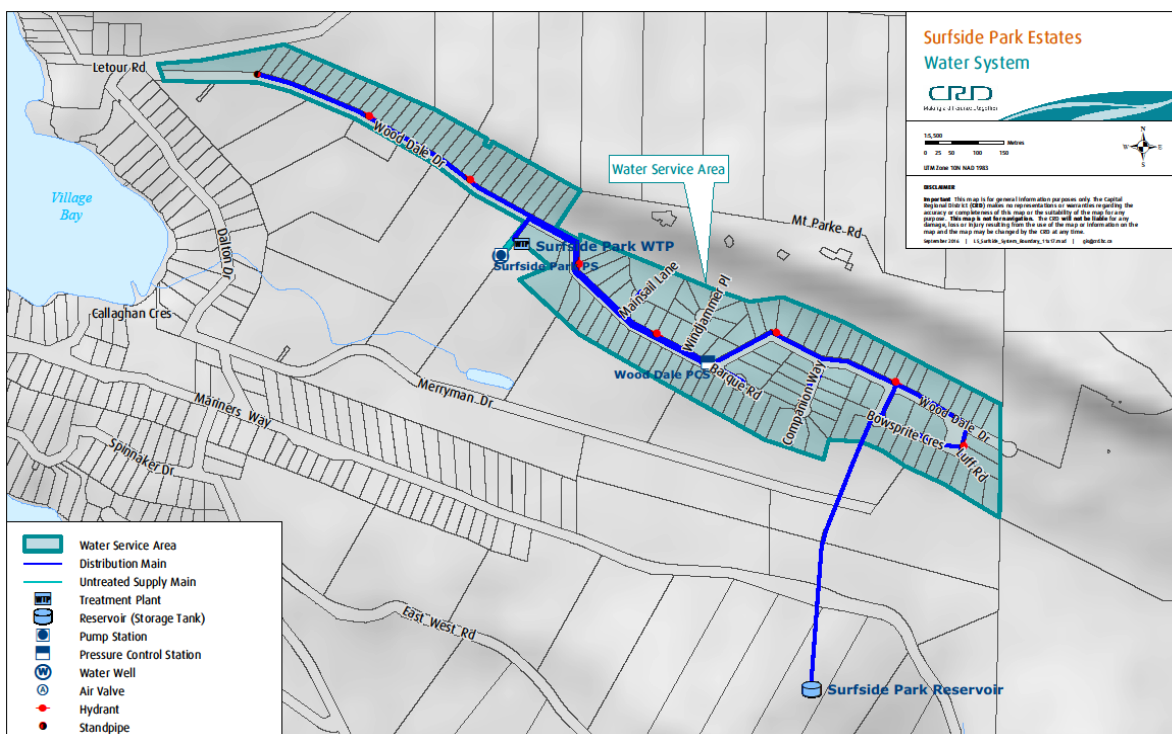


Figure 1: Surfside Park Estates Water Service

The Surfside water system is primarily comprised of:

- One groundwater well, related pumping and control equipment and building.
- Disinfection process equipment (filters, ultraviolet light and chlorine).
- Two steel storage tanks (total volume is 113 cubic meters).
- Distribution system (3,800 meters of water mains).
- Other water system assets: 68 service connections and water meters, five hydrants, three standpipes, 30 gate valves, one air release valve, Supervisory Control and Data Acquisition (SCADA) system and portable generator.

Water Supply

Groundwater supply monthly water levels are highlighted for 2022 in Figure 2. Groundwater levels for 2022 are within typical range and were observed to be 20% to 30% lower for the period of June to October. These lower aquifer levels are likely the result of increasing drought conditions in which the Province declared level 4 drought conditions for the Southern Gulf Islands on July 9 and then increased this to level 5 August 31.

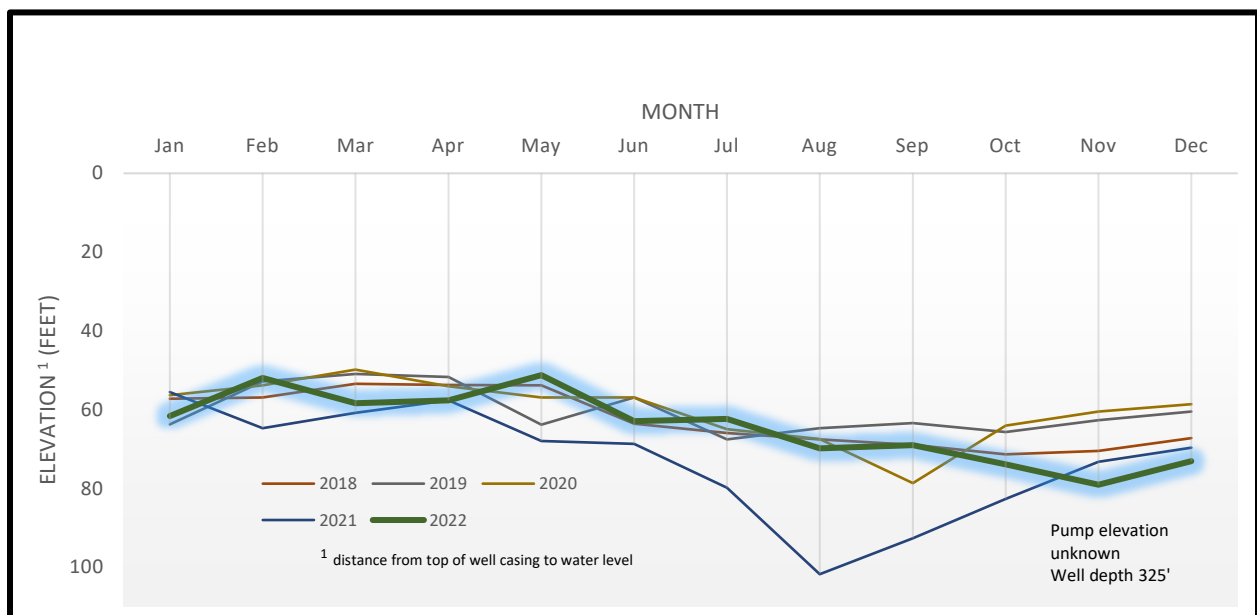


Figure 2: Surfside Park Estates Well #5A Groundwater Supply Monthly Water Level

Water Production and Demand

Referring to Figure 3, 13,301 cubic meters of water was extracted (water production) from the groundwater source (Well #5) in 2022; a 15% increase from the previous year and a 15% increase from the five year average. Water demand (customer water billing) for the service totaled 5,632 cubic meters of water; a 17% decrease from the previous year and a 13% increase from the five year average.

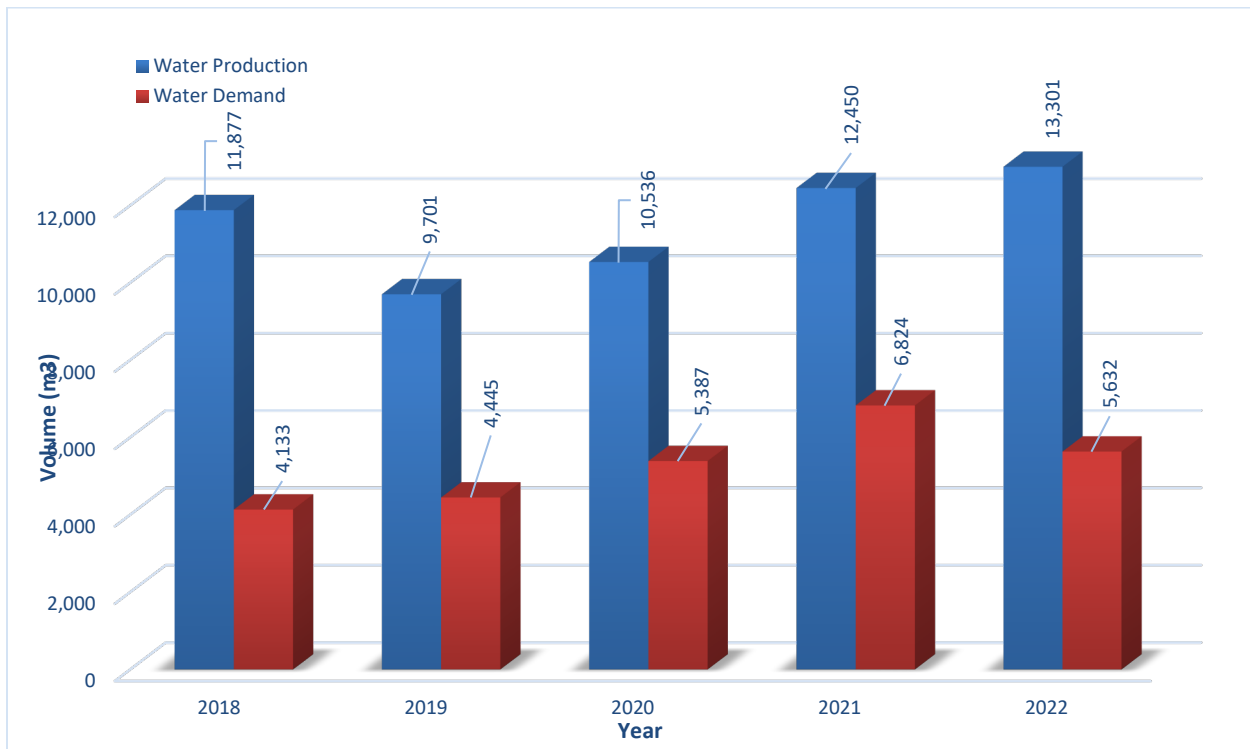


Figure 3: Surfside Park Estates Water Service Annual Water Production and Demand

The difference between annual water production and annual customer 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 2022 non-revenue water (7,669 cubic meters) represents approximately 62% of the total water production for the service area. Approximately 264 cubic meters of water can be attributed to operational use so the remaining amount (56%) of non-revenue water is considered significant for a small water service. It is important to note that leak detection and repair efforts continue to be prioritized for the service. Water system leaks located and repaired in 2022 did not result in a reduction of non-revenue water from the previous year. Leak detection efforts will continue for the service.

Figure 4 below illustrates the monthly water production for 2022 along with the historical water production information for the previous four years. Typically, the monthly water production trend is greatest during the summer period (June to September). However, monthly water production for the most part is consistent throughout the year which indicates limited outdoor water use.

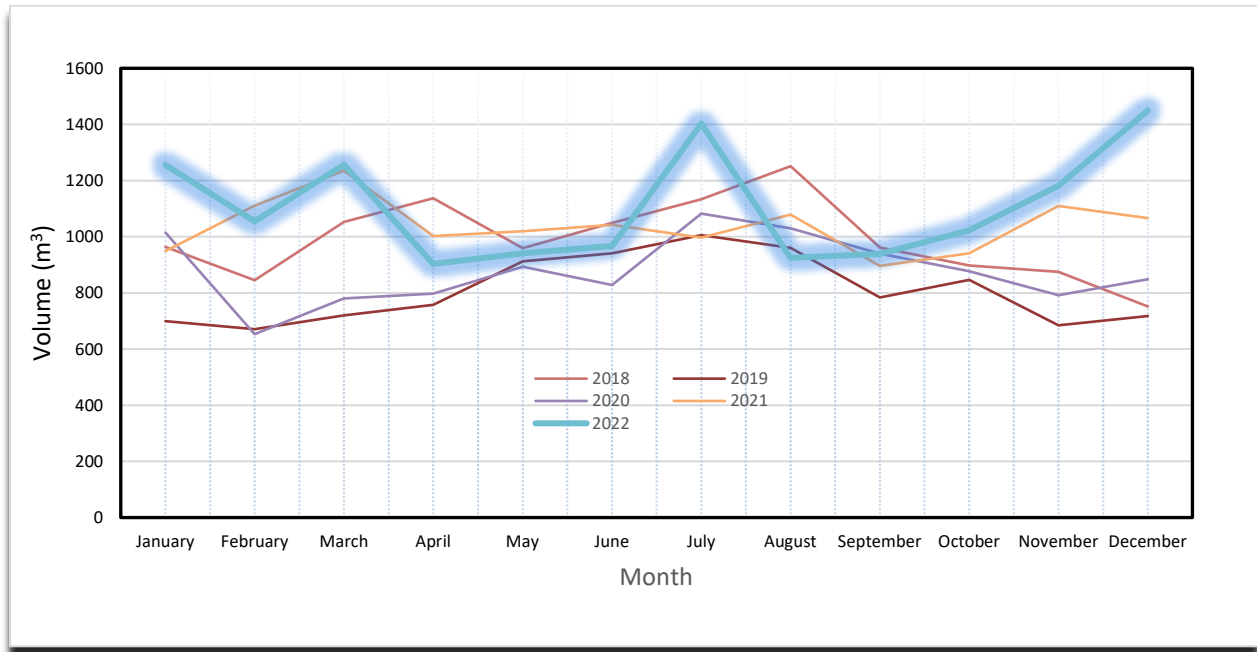


Figure 4: Surfside Park Estates Water Service Monthly Water Production

Drinking Water Quality

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

The water system performed well in 2022 and generally supplied drinking water of good quality to its customers. None of the raw water samples tested positive for *E.coli* or total coliform bacteria in 2022. All treated water samples tested negative for *E.coli* or total coliform bacteria in 2022. The raw water exhibited consistently high arsenic concentrations as well as elevated manganese concentrations. Except for a brief period between December 2 and 13, 2022, when the system was under a public water quality advisory due to elevated arsenic concentrations in the treated water, the existing treatment successfully reduced these concentrations to levels well below the health related and aesthetic limits in the Guidelines for Canadian Drinking Water Quality.

The data below provides a summary of the water quality characteristics in 2022:

Raw Water:

- Results from Well #5, the only water source, indicated that produced water contained no *E.coli* bacteria and no total coliform bacteria.
- The raw water continued to have naturally high concentrations of arsenic and manganese. The arsenic concentration in the raw water ranged from 46.4 to 64.1 µg/L. Manganese had a median concentration of 40.4 µg/L.
- The raw water turbidity was low with a median of 0.55 Nephelometric Turbidity Unit (NTU).
- The raw water was slightly hard (median hardness 37.1 mg/L (CaCO₃). pH was not tested in 2022.

Treated Water:

- The treated water was safe to drink with no E. coli or total coliform bacteria in any sample.
- The treated water turbidity was very low with a median of < 0.14 NTU.
- The arsenic concentration after treatment was generally below the maximum allowable concentration (MAC) of 10 µg/L. The annual median arsenic concentration was 4.66 µg/L. Between December 2nd and 13th, a public water quality advisory was in place due to an arsenic exceedance post filter treatment. The filter media had expired faster than anticipated and led to arsenic concentrations up to 17 µg/L in the distribution system. After a filter media change and extensive flushing, staff in consultation with Island Health concluded on December 13 that no further arsenic related health concerns existed.
- Very low manganese concentrations in the treated water indicate the effectiveness of the filtration system in terms of arsenic and manganese removal. One sample on February 1, 2022, from the system end on Wood Dale Drive exhibited a manganese concentration in excess of the aesthetic limit but below the health limit (31 µg/L) due to accumulation effects. Spot flushing by staff addressed this issue.
- The annual average levels of the disinfection by-product total trihalomethanes (TTHM) were well below the MAC. Haloacetic acids (HAA) were not tested in 2022. Typically, when THM concentrations are low, HAA are also low.
- The free chlorine residual concentrations ranged from 0.19 to 1.43 mg/L in the distribution system indicating good secondary disinfection in most parts of the system except for some dead-end sections with older water age.

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 CRD Integrated Water Services staff:

- Water treatment plant:
 - Communications antenna replacement
 - Space heater replacement
 - Standby generator replacement
- Reservoir supply line leak detection and repairs

Capital Projects Update

The Capital Projects that were in progress or completed in 2022 include:

- System Review Project – Engineering and operations staff commenced high level reviews of options for location and replacement of existing tanks. Due to resource limitations and market escalation, further details on this assessment were deferred until 2023.

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), 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. Debt servicing costs are interest and principal payments on long term debt. 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
 2022 Statement of Operations and Reserve Balances

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

Table 1

Table 1: 2022 Summary of Raw Water Test Results, Surfside Water System										
PARAMETER		2022 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2012-2021 ANALYTICAL RESULTS			
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum Maximum		≤ Less than or equal to	Median	Samples Analyzed	Range Minimum Maximum	
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness as CaCO ₃	mg/L	37.1	4	21.5	50.8	No Guideline Required	41.9	35		18.2
Turbidity	NTU	0.55	12	0.25	0.85		0.35	34		0.12
Water Temperature	deg C	6.5	15	5.5	11.8	15°C AO	6.45	167		5.2
pH	pH units	Not analyzed in 2022				AO pH 7.0 -10.5	8.71	25		7
Total Organic Carbon	mg/L	0.73	2	2.00	2		0.78	21		< 0.5
Metals										
Aluminum	ug/L as Al	19.20	4	7.2	27.8	2900 MAC / 100 OG	14.7	35		7.6
Antimony	ug/L as Sb	< 0.5	4	< 0.5	< 0.5	6 MAC	< 0.5	35		< 0.5
Arsenic	ug/L as As	54.15	12	46.4	64.1	10 MAC	42.2	134		<0.5
Barium	ug/L as Ba	54.20	4	35.8	67.5	1000 MAC	59.8	35		32.9
Beryllium	ug/L as Be	< 0.1	4	< 0.1	< 0.1		< 0.1	35		< 0.1
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	28		< 1
Boron	ug/L as B	1720.00	4	1420	2110	5000 MAC	1700	35		1.25
Cadmium	ug/L as Cd	< 0.01	4	< 0.01	< 0.01	5 MAC	< 0.01	35		< 0.01
Calcium	mg/L as Ca	12.05	4	7.05	16.4	No Guideline Required	13.5	35		5.91
Chromium	ug/L as Cr	< 1	4	< 1	< 1	50 MAC	< 1	34		< 1
Cobalt	ug/L as Co	< 0.2	4	< 0.2	< 0.2		< 0.2	35		< 0.2
Copper	ug/L as Cu	1.12	4	< 0.2	3.47	2000 MAC / ≤ 1000 AO	0.57	35		< 0.2
Iron	ug/L as Fe	24.85	4	19	27.1	≤ 300 AO	25.2	34		< 10
Lead	ug/L as Pb	< 0.2	4	< 0.2	< 0.2	5 MAC	< 0.2	35		< 0.2
Lithium	ug/L as Li	58.25	4	54.9	68.5		62.6	12		50.4
Magnesium	mg/L as Mg	1.70	4	0.942	2.36	No Guideline Required	2	35		0.831
Manganese	ug/L as Mn	40.40	4	32	61.8	120 MAC / ≤ 20 AO	40.9	35		< 4
Molybdenum	ug/L as Mo	< 1	4	< 1	< 1		< 1	35		< 1
Nickel	ug/L as Ni	< 1	4	< 1	< 1		< 1	35		< 1
Potassium	mg/L as K	1.78	4	1.6	1.9		1.88	35		1.58
Selenium	ug/L as Se	< 0.1	4	< 0.1	< 0.1	50 MAC	< 0.1	35		< 0.1
Silicon	ug/L as Si	7305.00	4	6760	7840		7180	35		912
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	35		< 0.02
Sodium	mg/L as Na	122.50	4	116	145	≤ 200 AO	123	35		13.1
Strontium	ug/L as Sr	243.00	4	160	352	7000 MAC	277	35		0.312
Sulfur	mg/L as S	17.30	4	13.6	21.1		16.8	28		11.7
Thallium	ug/L as Tl	< 0.01	4	< 0.01	< 0.01		< 0.01	28		< 0.01
Tin	ug/L as Sn	< 5	4	< 5	< 5		< 5	35		< 5
Titanium	ug/L as Ti	< 5	4	< 5	< 5		< 5	35		< 5
Uranium	ug/L as U	< 0.1	4	< 0.1	< 0.1	20 MAC	< 0.1	28		< 0.1
Vanadium	ug/L as V	< 5	4	< 5	< 5		< 5	35		< 5
Zinc	ug/L as Zn	< 5	4	< 5	7.5	≤ 5000 AO	< 5	35		< 1
Zirconium	ug/L as Zn	< 0.1	4	< 0.1	< 0.1		< 0.1	28		< 0.1
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	< 1	12	< 1	< 1		ND	116		ND - 28
<i>E. coli</i>	CFU/100 mL	< 1	12	< 1	< 1		ND	116		ND
Heterotrophic bacteria, 7 day	CFU/mL	Not analyzed in 2022								
Parasites										
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	Last tested in 2015				Zero detection desirable	ND	7		ND
<i>Giardia</i> , Total cysts	cysts/100 L	Last tested in 2015				Zero detection desirable	ND	7		ND

Table 2

Table 2: 2022 Summary of Treated Water Test Results, Surfside Water System										
PARAMETER		2022 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2012-2021 ANALYTICAL RESULTS			
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum Maximum		≤ = Less than or equal to	Median	Samples Analyzed	Range Minimum Maximum	
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness	mg/L as CaCO3	40.5	8	20.3	47.2		33.95	44	25	55.9
pH	pH units	Not tested in 2022				AO pH 7.0 -10.5	8.5	23	7	8.7
Turbidity	NTU	< 0.14	12	0.1	0.35		< 0.14	34	< 0.14	1.8
Total Organic Carbon	mg/L	0.375	8	< 0.2	0.62		< 0.5	45	< 0.3	1.51
Water Temperature	deg C	6.5	71	0.32	15.6	15°C AO	6.5	1925	4	24.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	< 1	56	< 1	< 1	0 MAC	< 1	407	< 1	1
<i>E. coli</i>	CFU/100 mL	< 1	56	< 1	< 1	0 MAC	< 1	407	< 1	< 1
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2022				No Guideline Required	60	44	<1	940
Disinfectants										
Disinfectants										
Chlorine, Free Residual	mg/L as Cl2	0.65	64	0.19	1.43		0.54	1947	0.12	2.06
Chlorine, Total Residual	mg/L as Cl2	Not tested in 2022					0.61	1608	0.12	2.2
Disinfection By-Products										
Disinfection Byproducts										
Bromodichloromethane	ug/L	2.3	8	< 1	4.9		2.5	48	1.1	18
Bromoform	ug/L	5.4	8	2.4	12.0		4.95	48	< 0.1	12
Chloroform	ug/L	1.6	8	< 1	2.2		1.85	48	< 0.1	10
Chlorodibromomethane	ug/L	5.5	8	2.4	12.0		5.05	38	1.5	14.1
Total Trihalomethanes	ug/L	16.0	8	6.3	27.0	100 MAC	21	47	5.7	50
Haloacetic Acids (HAAs)										
Not tested in 2022										
HAA5	ug/L					80 MAC	< 5	4	< 5	< 5
Metals										
Aluminum	ug/L as Al	5.05	8	< 3	32.2	2900 MAC / 100 OG	4.8	43	< 3	59
Antimony	ug/L as Sb	< 0.5	8	< 0.5	< 0.5	6 MAC	< 0.5	43	< 0.05	< 2.5
Arsenic	ug/L as As	4.66	23	0.11	17.1	10 MAC	4.43	148	< 0.03	31
Barium	ug/L as Ba	45.95	8	34.1	60.2	1000 MAC	46.2	43	3.2	69.9
Beryllium	ug/L as Be	< 0.1	8	< 0.1	< 0.1		< 0.1	43	< 0.1	< 3
Bismuth	ug/L as Bi	< 1	8	< 1	< 1		< 1	41	< 1	< 5
Boron	ug/L as B	1665	8	1520	2040	5000 MAC	1760	43	1200	2240
Cadmium	ug/L as Cd	< 0.01	8	< 0.01	< 0.01	5 MAC	< 0.01	43	< 0.01	< 0.1
Calcium	mg/L as Ca	12.65	8	6.22	15.1	No Guideline Required	10.4	44	7.62	18
Chromium	ug/L as Cr	< 1	8	< 1	< 1	50 MAC	< 1	43	< 1	< 10
Cobalt	ug/L as Co	< 0.2	8	< 0.2	< 0.2		< 0.2	43	< 0.2	24
Copper	ug/L as Cu	2.185	8	0.91	5.91	2000 MAC / ≤ 1000 AO	3.51	43	1.68	21.8
Iron	ug/L as Fe	< 5	8	< 5	63.1	≤ 300 AO	7	43	< 5	54.7
Lead	ug/L as Pb	< 0.2	8	< 0.2	0.66	5 MAC	0.3	43	< 0.2	1.09
Lithium	ug/L as Li	58.1	8	54.9	62.7		61.3	19	54.3	71.1
Magnesium	mg/L as Mg	2.125	8	1.16	2.46	No Guideline Required	1.99	44	1.04	3.05
Manganese	ug/L as Mn	< 1	8	< 1	31	120 MAC / ≤ 20 AO	< 1	43	< 1	25
Molybdenum	ug/L as Mo	< 1	8	< 1	< 1		< 1	43	< 1	< 20
Nickel	ug/L as Ni	< 1	8	< 1	< 1		< 1	43	< 1	< 50
Potassium	mg/L as K	1.83	8	1.66	1.9		1.8	44	1.47	2.35
Selenium	ug/L as Se	< 0.1	8	< 0.1	< 0.1	50 MAC	< 0.1	43	< 0.1	< 0.5
Silicon	ug/L as Si	7195	8	7070	7760		6910	43	2350	8950
Silver	ug/L as Ag	< 0.02	8	< 0.02	< 0.02	No Guideline Required	< 0.02	43	< 0.02	< 10
Sodium	mg/L as Na	120.5	8	117	133	≤ 200 AO	125.5	44	102	142
Strontium	ug/L as Sr	297	8	176	355	7000 MAC	286	43	171	399
Sulphur	mg/L as S	16.15	8	14.6	18.7		18.05	42	13.8	22.4
Thallium	ug/L as Tl	< 0.01	8	< 0.01	< 0.01		< 0.01	41	< 0.01	< 0.05
Tin	ug/L as Sn	< 5	8	< 5	< 5		< 5	43	< 5	< 25
Titanium	ug/L as Ti	< 5	8	< 5	< 5		< 5	43	< 5	< 25
Uranium	ug/L as U	< 0.1	8	< 0.1	< 0.1	20 MAC	< 0.1	41	< 0.1	< 0.5
Vanadium	ug/L as V	< 5	8	< 5	< 5		< 5	43	< 5	< 25
Zinc	ug/L as Zn	< 5	8	< 5	10.8	≤ 5000 AO	7.8	43	< 5	167
Zirconium	ug/L	< 0.1	8	< 0.1	< 0.1		< 0.1	41	< 0.1	< 0.5