

# Skana Water System

## 2021 Annual Report

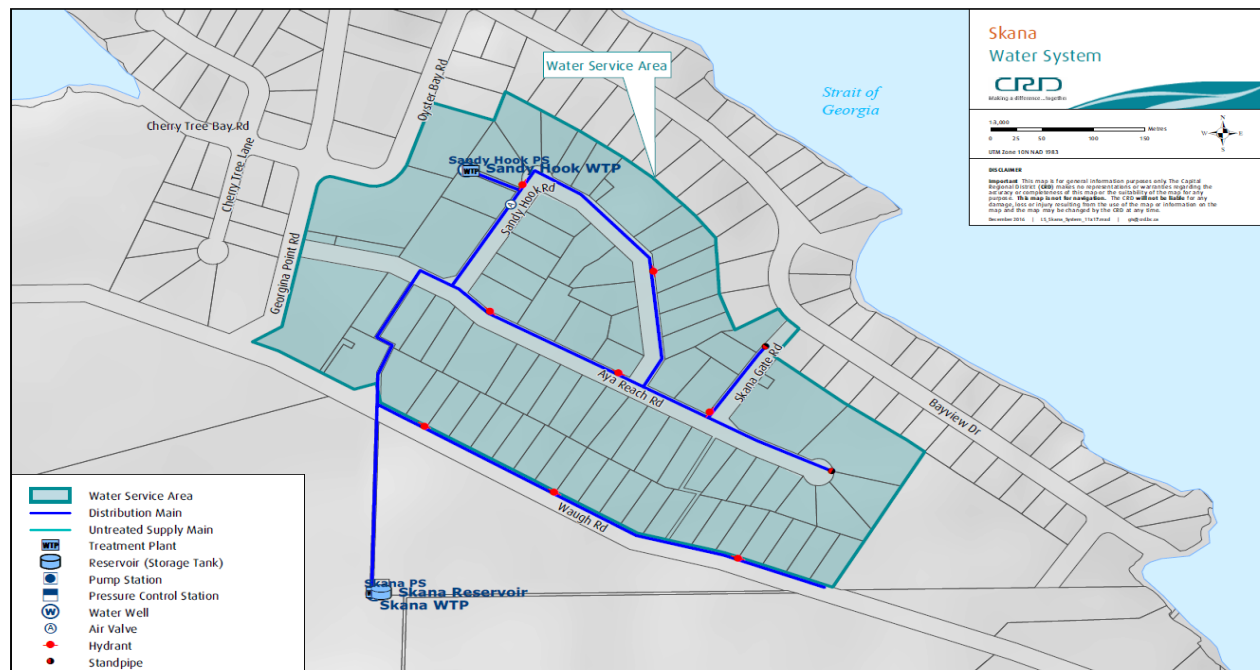


### Introduction

This report provides a summary of the Skana Water Service for 2021 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 Skana is a rural residential development located on the north side of Mayne Island in the Southern Gulf Islands Electoral Area, originally serviced by a private water utility. In 2003, the service converted to the Capital Regional District (CRD). The Skana Water Service (Figure 1) is made up of 73 parcels encompassing a total area of approximately 19 hectares. Of the 73 parcels, 48 were customers of the water system in 2021.



**Figure 1: Map of Skana Water System**

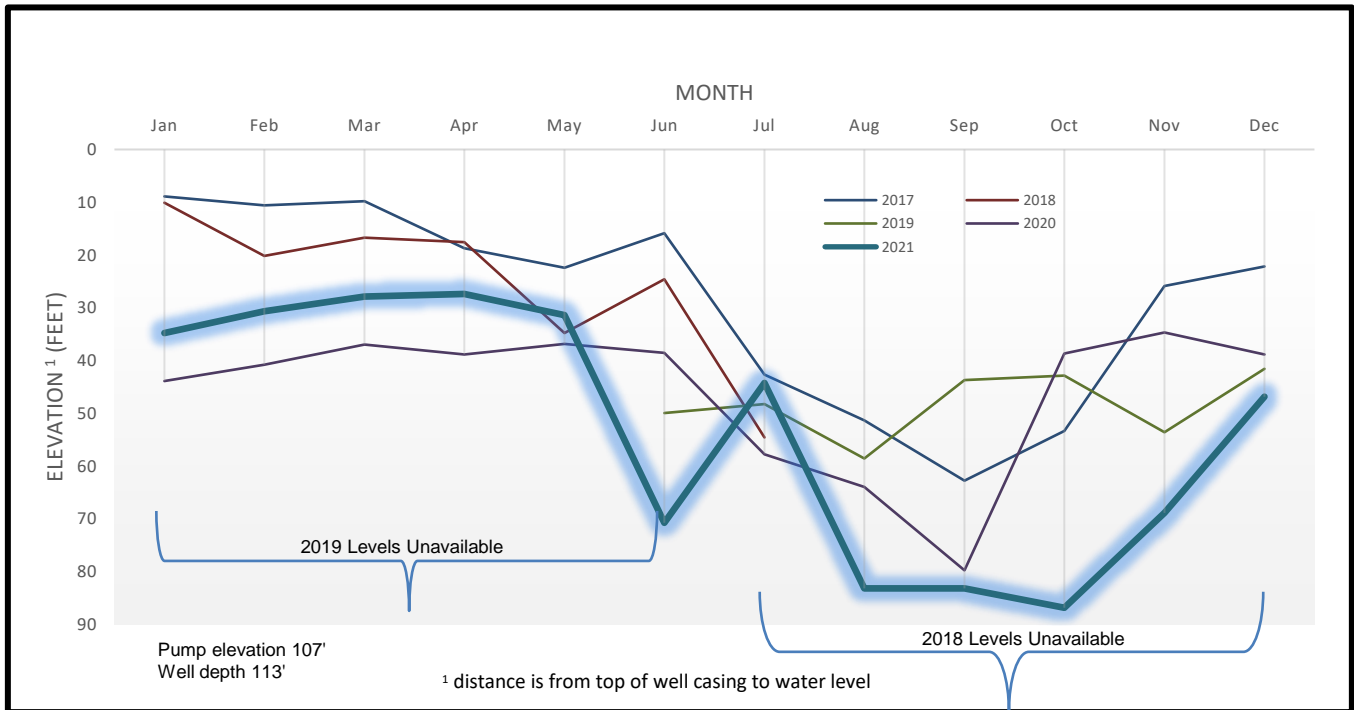
The Skana water system is primarily comprised of:

- Two groundwater wells, related pumping and control equipment and buildings (Production Wells #8 and Well #13).
- Disinfection process equipment (ultraviolet light and chlorine at each well).
- Two steel storage tanks (total volume is 91 cubic meters).
- Distribution system (1,977 meters of water mains).

- Other water system assets: 48 service connections and meters, eight flushing hydrants, three flushing standpipes, 15 gate valves, one air release valve, Supervisory Control and Data Acquisition (SCADA) system and auxiliary generator.

### Water Supply

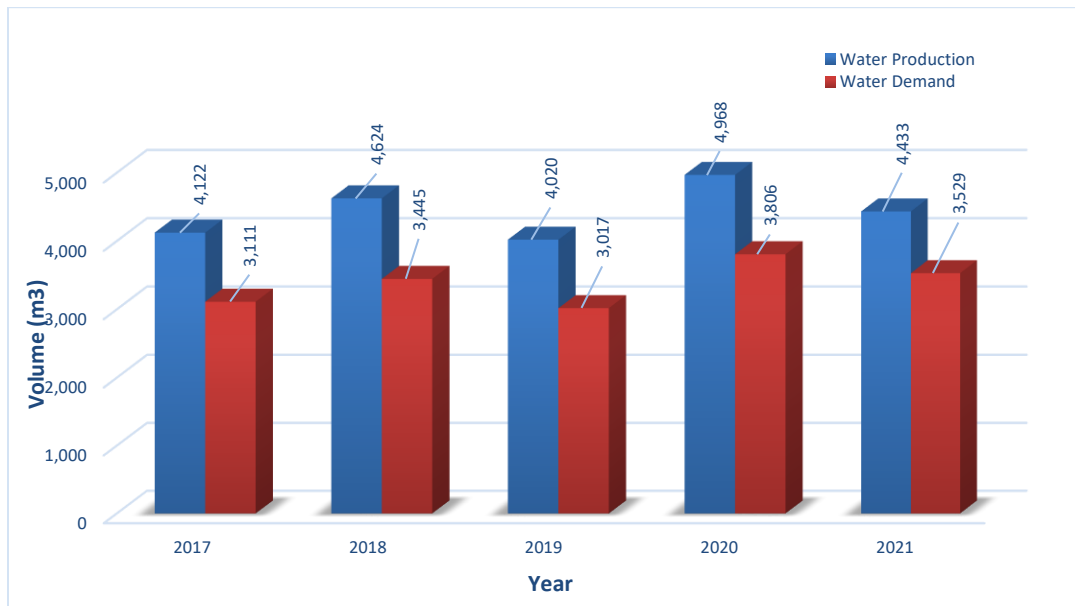
Groundwater supply monthly water levels are highlighted for 2021 in Figure 2. Resource water levels in 2021 ranged from 20% to 50% lower than the historical three year average readings. July 2021 water level reading is anomalous as a result of the service switching to Well #8 for a period while Well #13 was off.



**Figure 2: Skana Well #13 Groundwater Supply Monthly Water Level**

### Water Production and Demand

Referring to Figure 3, 4,433 cubic meters of water was extracted (water production) from the groundwater source (Well #13) in 2021; an 11% decrease from the previous year and a 4% increase from the five year average. Water demand (customer water billing) for the service totaled 3,529 cubic meters of water; a 7% decrease from the previous year and a 9% increase from the five year average.

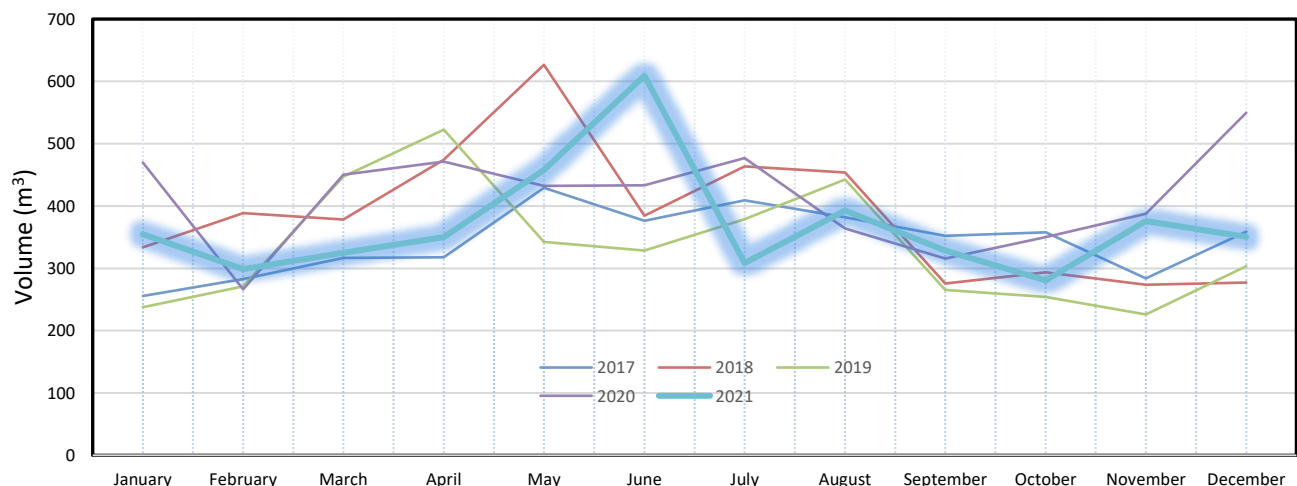


**Figure 3: Skana Water Service Annual Water Production and Demand**

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 2021 non-revenue water (904 cubic meters) represents approximately 20% of the total water production for the service area. However, approximately 600 cubic meters is attributed to operational use resulting in a non-revenue water volume of approximately 7%. This is considered to be acceptable for a small water system.

Figure 4 below illustrates the monthly water production for 2021 along with the historical water production information. The monthly water production trends are typical for small water systems such as the Skana water system. June 2021 water production is much higher than previous years and is likely attributed to the extreme heat weather event (heat dome) that occurred near the end of June.



**Figure 4: Skana Water Service Monthly Water Production.**

## Drinking Water Quality

Staff completed the water quality monitoring program at Skana based on regulatory requirements and system specific risks. Samples were collected at regular frequencies from the raw water, at the treatment plant as well as from a number of sampling stations 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 such as disinfection by-products or metals.

The water system had challenges in 2021 to consistently supply drinking water of good quality to its customers. The main source Well #13 ran dry during the peak of summer and backup Well #8 had to be used with its more turbid raw water. As a result, the Skana water system was put under a boil water advisory between July 16 and August 20, 2021. Once Well #13 became usable again, the raw water quality improved despite the occasional episode of indicator bacteria presence and elevated turbidity especially following the severe rain event on November 14 and 15, 2021. The presence of total coliform and even *E.coli* bacteria, and a turbidity – rainfall response, are common seasonal phenomena during the wet season. This indicates that Well #13 is still under surface water influence during the rainy season. The raw water also experienced periods with elevated iron concentrations; in particular during the fall aquifer recharge season. Iron then accumulates and concentrates in dead end portions of the distribution system, such as the end of Skana Gate Road, and can lead to water discoloration issues. The treated water supplied to the customers was generally of good quality and safe to drink.

During the latter part of the year, disinfection by-product concentrations in the distribution system started to exceed the maximum acceptable concentration (MAC) listed in the Guidelines for Canadian Drinking Water Quality (GCDWQ). One treated water sample from Waugh Road collected on November 15 tested positive for *E.coli* bacteria. This triggered the CRD emergency response procedures and an immediate investigation concluded that this bacteria hit was caused by poor sampling conditions during the severe rainstorm and overland flooding that day. The results from the resampling/retesting confirmed this conclusion on November 17.

The data below provides a summary of the water quality characteristics in 2021:

### Raw Water:

- Well #13, the primary source, supplied raw water free of indicator bacteria except for the months of January, July and November when total coliform and *E.coli* bacteria were detected.
  - Samples from Well #8 were collected between June and August. Low concentrations of total coliform bacteria were found in one sample from August 10. Water from Well #8 had consistently elevated turbidity from 1.4 to 70 Nephelometric Turbidity Unit (NTU), which is fairly typical for this well.
- The median raw water turbidity was 0.7 NTU. This is higher than in previous years due to the longer use of Well #8 during the summer drought.
- The raw water was hard (hardness 73.1 mg/L CaCO<sub>3</sub>).
- The total organic carbon (TOC) concentration in the raw water ranged from 1.4 to 4.9 mg/L with the higher concentrations recorded in the fall and winter during rainy periods. Episodes of high TOC have the potential for high disinfection by-product concentrations.

### Treated Water:

- The treated water was bacteriologically safe to drink with no confirmed *E. coli* or total coliform bacteria. One sample on November 15 tested positive for total coliform and *E.coli* bacteria. Immediate investigations and resamples confirmed that no actual drinking water contamination occurred.

- The median treated water turbidity was 0.6 NTU.
- The annual average levels of the disinfection by-products total trihalomethanes (TTHM) were slightly above the maximum acceptable concentration of 100 µg/L at the 223 Skana Gate Road sampling location (109.5 µg/L) and lower at the 537/539 Waugh Road sampling location (88.5 µg/L). Haloacetic acids (HAA), another regulated disinfection by-product, were also above the MAC of 80 µg/L at 223 Skana Gate Road (91 µg/L).
- During the extreme rain event on November 15, the iron concentrations in the treated water from Well #13 and in the distribution system on Skana Gate Road were above the aesthetic limit in the GCDWQ. However no customer complaints about discolored water were received.
- The free chlorine residual concentrations ranged from 0.16 to 1.66 mg/L with a median of 0.88 mg/L in the distribution system indicating satisfactory secondary disinfection.

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 CRD Integrated Water Services staff:

- Well #8 (back up supply) water quality issues that resulted in a boil water advisory to be issued.
- Well #13 SCADA control investigation and repairs.
- Aya Reach water service line leak repairs.
- 45.5 cubic meters of water delivered from Victoria to supplement water demand during Well #13 low water production.
- Corrective maintenance performed on Well #13 chlorine analyzer and dosing system.

### **Capital Projects Update**

The Capital Projects that were in progress or completed in 2021 include:

- Well Decommissioning – The project, related to unused CRD-owned groundwater wells in the area, was started in 2021. Due to inaccurate well records, staff have been confirming ownership of wells through letters and on site meetings. Work is currently scheduled for September 2022.

### **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), 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 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.

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Attachment: 2021 Statement of Operations and Reserve Balances

For questions related to this Annual Report please email [IWSAdministration@crd.bc.ca](mailto:IWSAdministration@crd.bc.ca)

**Table 1**

<b>Table 1: 2021 Summary of Raw Water Test Results, Skana Water System</b>									
<b>PARAMETER</b>		<b>2021 ANALYTICAL RESULTS</b>				<b>CANADIAN GUIDELINES</b>	<b>2011-2020 RESULTS</b>		
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									
<b>Physical Parameters</b>									
Hardness as CaCO <sub>3</sub>	mg/L	73.1	4	3.8	92.3	No Guideline Required	87.1	24	27.5 - 114
Turbidity	NTU	0.7	19	ND	70.0		0.22	49	ND - 4.56
Water Temperature	deg C	6.5	59	5.1	6.8		10.5	106	5.8 - 21.3
pH	pH units	Not analyzed in 2021				AO pH 7.0 -10.5	7.24	26	6.70 - 8.12
Total Organic Carbon	mg/L	2.85	4	1.20	4.9		2.35	18	1.30 - 6.09
<b>Metals</b>									
Aluminum	ug/L as Al	36.50	4	3.8	95.6	2900 MAC / 100 OG	18.8	25	ND - 110.0
Antimony	ug/L as Sb	ND	4	ND	ND	6 MAC	ND	25	ND
Arsenic	ug/L as As	0.17	4	0.12	0.2	10 MAC	0.2	25	0.15 - 0.99
Barium	ug/L as Ba	2.20	4	1.6	2.4	1000 MAC	2.5	25	ND - 9.00
Beryllium	ug/L as Be	ND	4	ND	ND		ND	25	ND
Bismuth	ug/L as Bi	ND	4	ND	ND		ND	16	ND
Boron	ug/L as B	101	4	73	146.0	5000 MAC	135	25	ND - 360
Cadmium	ug/L as Cd	ND	4	ND	ND	5 MAC	ND	25	ND
Calcium	mg/L as Ca	23.3	4	20.4	29.0	No Guideline Required	27.2	25	10.1 - 36.0
Chromium	ug/L as Cr	ND	4	ND	1.9	50 MAC	ND	25	ND
Cobalt	ug/L as Co	ND	4	ND	ND		ND	25	ND
Copper	ug/L as Cu	7.6	4	4.3	16.7	2000 MAC / ≤ 1000 AO	4.3	22	ND - 39.0
Iron	ug/L as Fe	34.5	4	15.6	464.0	≤ 300 AO	15	25	ND - 266
Lead	ug/L as Pb	0.38	4	0.22	0.6	5 MAC	ND	25	ND - 0.93
Lithium	ug/L as Li	9.4	4	7.30	10.3		12.2	4	10.9 - 15.9
Magnesium	mg/L as Mg	3.75	4	3.5	4.9	No Guideline Required	4.57	25	0.57 - 5.96
Manganese	ug/L as Mn	6.4	4	1.6	13.4	120 MAC / ≤ 20 AO	4.4	25	0.08 - 48.6
Molybdenum	ug/L as Mo	ND	4	ND	ND		ND	25	ND
Nickel	ug/L as Ni	ND	4	ND	ND		ND	25	ND - 0.0
Potassium	mg/L as K	0.21	4	0.17	0.3		0.26	25	0.09 - 0.60
Selenium	ug/L as Se	ND	4	ND	ND	50 MAC	ND	25	ND - 1.07
Silicon	ug/L as Si	8590	4	6750	9120.0		8,220	25	2610 - 12100
Silver	ug/L as Ag	ND	4	ND	ND	No Guideline Required	ND	25	ND
Sodium	mg/L as Na	36.3	4	27.6	47.1	≤ 200 AO	44.6	25	25.7 - 86.5
Strontium	ug/L as Sr	62.7	4	59.3	67.2	7000 MAC	76	25	53.0 - 99.7
Sulfur	mg/L as S	8.0	4	6.50	9.7		8.9	16	3.2 - 12.6
Thallium	ug/L as Tl	0.01	4	ND	0.01		ND	16	ND
Tin	ug/L as Sn	ND	4	ND	ND		ND	25	ND
Titanium	ug/L as Ti	ND	4	ND	ND		ND	25	ND
Uranium	ug/L as U	ND	4	ND	0.2	20 MAC	0.11	16	ND - 0.18
Vanadium	ug/L as V	ND	4	ND	ND		ND	25	ND
Zinc	ug/L as Zn	7.8	4	6	9.2	≤ 5000 AO	6.2	25	ND - 198.0
Zirconium	ug/L as Zn	0.19	4	ND	0.3		ND	16	ND
<b>Microbial Parameters</b>									
<b>Indicator Bacteria</b>									
Coliform, Total	CFU/100 mL	ND	19	ND	17		ND	141	ND - 43
<i>E. coli</i>	CFU/100 mL	ND	19	ND	2		ND	147	ND - 2
Heterotrophic bacteria, 7 day	CFU/mL	Not analyzed in 2021					10	1	10 - 10
<b>Parasites</b>									
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	Last tested in 2015				Zero detection desirable	ND	8	ND
<i>Giardia</i> , Total cysts	cysts/100 L	Last tested in 2015				Zero detection desirable	ND	8	ND

**Table 2**

Table 2: 2021 Summary of Treated Water Test Results, Skana Water System									
PARAMETER		2021 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2011-2020 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum Maximum		≤ Less than or equal to	Median	Samples Analyzed	Range Min.-Max.
ND means Not Detected by analytical method used									
<b>Physical Parameters</b>									
Hardness	mg/L as CaCO3	76.6	8	59.7	90.3		85.6	31	26.8 - 107
pH	pH units	7	5	7	7.04	AO pH 7.0 - 10.5	7.1	8	6.9 - 7.7
Turbidity	NTU	0.6	42	ND	40		0.64	111	ND - 10.7
Total Organic Carbon	mg/L	2.7	8	1.10	5		1.8	23	0.77 - 5.0
Water Temperature	deg C	6.6	213	0.6	6.9		10.2	1495	0.0 - 23.4
<b>Microbial Parameters</b>									
<b>Indicator Bacteria</b>									
Coliform, Total	CFU/100 mL	ND	69	ND	99	0 MAC	ND	300	ND - 10
<i>E. coli</i>	CFU/100 mL	ND	69	ND	10	0 MAC	ND	300	ND
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2021				No Guideline Required	ND	45	ND
<b>Disinfectants</b>									
<b>Disinfectants</b>									
Chlorine, Free Residual	mg/L as Cl2	0.88	218	0.16	1.66		0.72	1554	0.16 - 4.80
Chlorine, Total Residual	mg/L as Cl2	0.91	17	0.37	1.37		0.76	1315	0.18 - 5.90
<b>Disinfection By-Products</b>									
<b>Disinfection Byproducts</b>									
Bromodichloromethane	ug/L	15.5	8	14.0	17.0		20	43	9.2 - 29.0
Bromoform	ug/L	ND	8	ND	ND		ND	43	ND - 1.20
Chloroform	ug/L	89.5	8	22	140		50	43	10.6 - 170
Chlorodibromomethane	ug/L	2.65	8	ND	6.5		2.85	43	0.77 - 73.8
Total Trihalomethanes	ug/L	109.5	8	43	150	100 MAC	72	43	23.1 - 190
<b>Haloacetic Acids (HAAs)</b>									
<b>HAA5</b>									
HAA5	ug/L	102	4	20	140	80 MAC	11.5	3	7.7 - 19.0
<b>Metals</b>									
Aluminum	ug/L as Al	32.9	8	4.2	118	2900 MAC / 100 OG	24.7	31	3.1 - 121
Antimony	ug/L as Sb	ND	8	ND	ND	6 MAC	ND	31	ND
Arsenic	ug/L as As	0.19	8	ND	0.28	10 MAC	0.18	31	0.12 - 0.97
Barium	ug/L as Ba	2.35	8	2.00	2.70	1000 MAC	2.4	31	1.4 - 3.0
Beryllium	ug/L as Be	ND	8	ND	ND		ND	31	ND
Bismuth	ug/L as Bi	ND	8	ND	ND		ND	31	ND
Boron	ug/L as B	94.5	8	57.0	138	5000 MAC	121	31	53.0 - 347
Cadmium	ug/L as Cd	ND	8	ND	ND	5 MAC	ND	31	ND
Calcium	mg/L as Ca	24.5	8	18.4	28.0	No Guideline Required	26.8	31	9.8 - 34.4
Chromium	ug/L as Cr	ND	8	ND	ND	50 MAC	ND	31	ND
Cobalt	ug/L as Co	ND	8	ND	ND		ND	31	ND
Copper	ug/L as Cu	7.73	8	3.48	7.59	2000 MAC / ≤ 1000 AO	6.72	31	3.85 - 24.0
Iron	ug/L as Fe	162.5	8	23.6	607	≤ 300 AO	49	31	14.3 - 303
Lead	ug/L as Pb	0.32	8	ND	0.55	5 MAC	0.33	31	ND - 10.0
Lithium	ug/L as Li	9.7	8	7.4	10.7		11.4	3	7.6 - 11.7
Magnesium	mg/L as Mg	3.7	8	3.4	4.95	No Guideline Required	4.3	31	0.55 - 5.2
Manganese	ug/L as Mn	3	8	ND	13.7	120 MAC / ≤ 20 AO	2.8	31	ND - 42.9
Molybdenum	ug/L as Mo	ND	8	ND	ND		ND	31	ND - 1.10
Nickel	ug/L as Ni	ND	8	ND	ND		ND	31	ND - 9.10
Potassium	mg/L as K	0.21	8	0.17	0.28		0.25	31	0.16 - 0.35
Selenium	ug/L as Se	ND	8	ND	ND	50 MAC	ND	31	ND
Silicon	ug/L as Si	8335	8	6550	9240		8,450.00	31	7090 - 9230
Silver	ug/L as Ag	ND	8	ND	ND	No Guideline Required	ND	31	ND
Sodium	mg/L as Na	38	8	28.6	48.7	≤ 200 AO	43.9	31	28.2 - 87.4
Strontium	ug/L as Sr	67.7	8	55.5	82.6	7000 MAC	76.7	31	53.5 - 89.7
Sulphur	mg/L as S	7.45	8	5.9	9.7		8.7	31	3.1 - 12.8
Thallium	ug/L as Tl	ND	8	ND	ND		ND	31	ND
Tin	ug/L as Sn	ND	8	ND	ND		ND	31	ND
Titanium	ug/L as Ti	ND	8	ND	5.3		ND	31	ND - 5.6
Uranium	ug/L as U	ND	8	ND	0.16	20 MAC	ND	31	ND - 0.18
Vanadium	ug/L as V	ND	8	ND	ND		ND	31	ND
Zinc	ug/L as Zn	9.4	8	ND	27.7	≤ 5000 AO	8.6	31	ND - 34.2
Zirconium	ug/L	0.16	8	ND	0.41		ND	31	ND