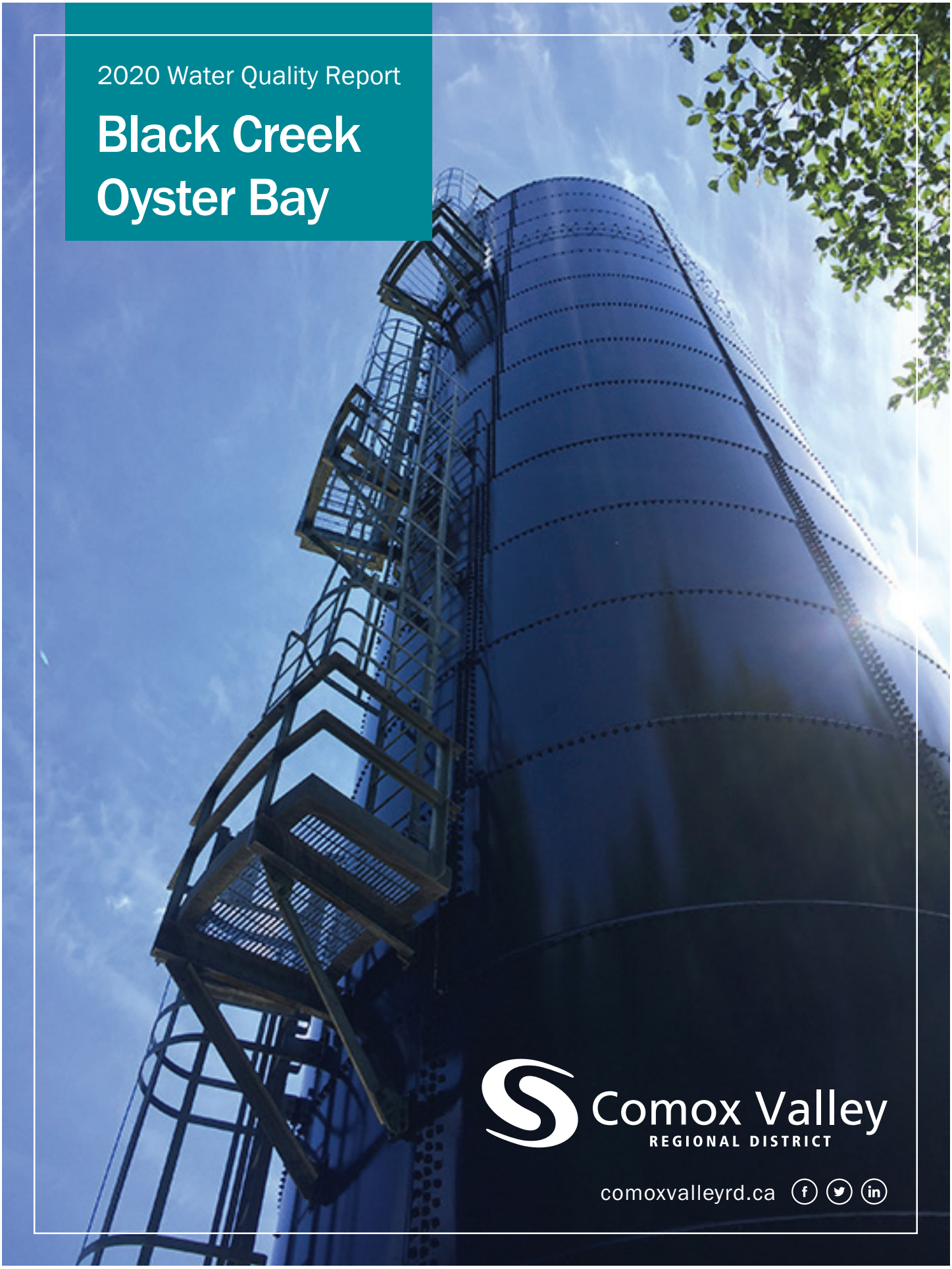
2020 Water Quality Report

Black Creek Oyster Bay



Comox Valley
REGIONAL DISTRICT

comoxvalleyrd.ca

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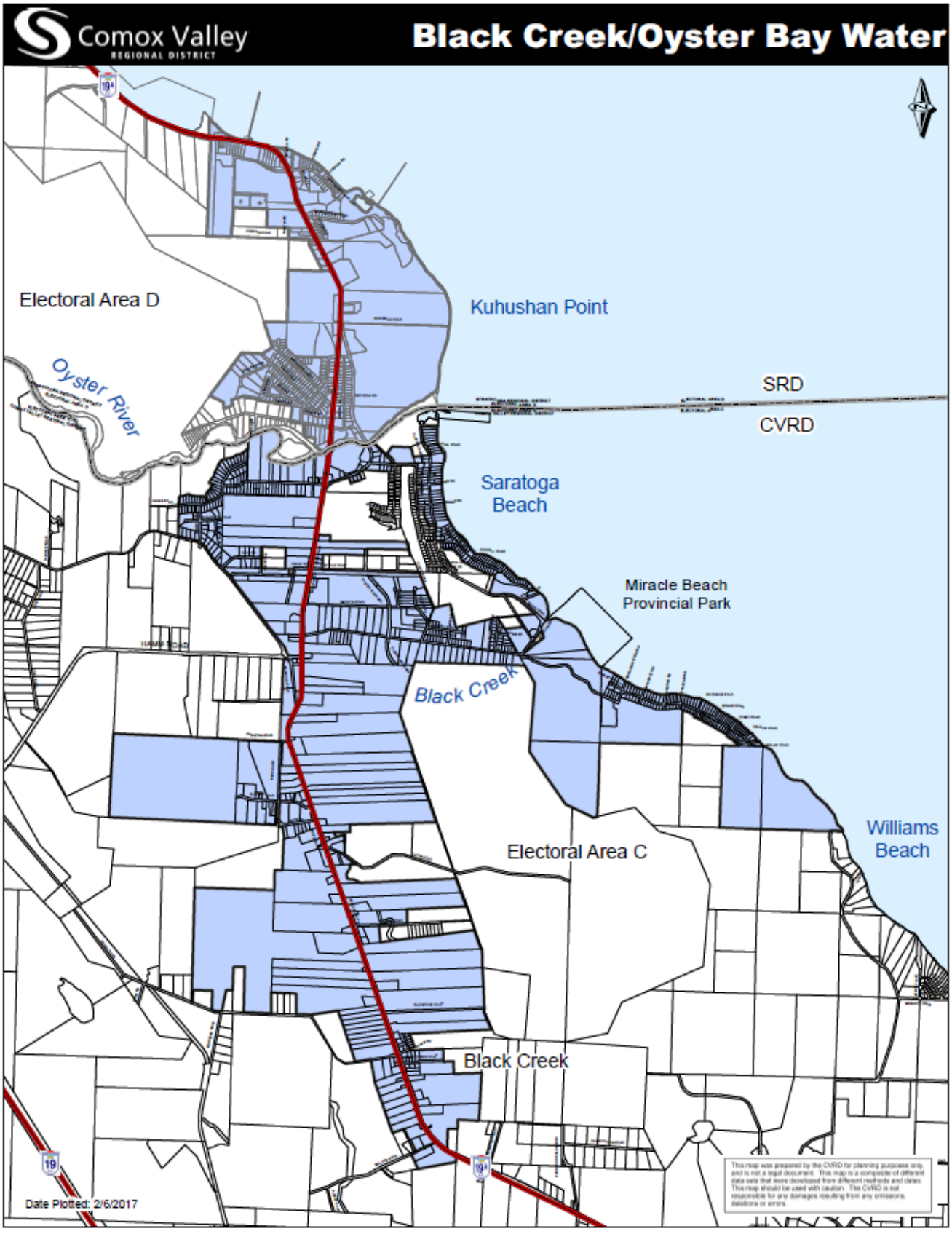
Map of Service Area



Introduction

The Comox Valley Regional District (CVRD) strives to provide high quality drinking water to the Black Creek/Oyster Bay (BCOB) Service Area, through responsible operation, monitoring and management of the water system. The CVRD is regulated by Island Health as part of the Ministry of Health for its activities as a potable water supplier. Under the *Drinking Water Protection Act* (DWP Act), the CVRD is required to report annually on water quality for the BCOB Drinking Water System. This report covers the period from January 1 to December 31, 2020 and includes information on water quality, consumption, maintenance and capital projects.

The BCOB Water Service provides domestic water to approximately 2,100 residents and 30 local businesses located in both the CVRD Puntledge – Black Creek (Electoral Area C) and the Strathcona Regional District Electoral Area D. The service is owned and operated by the CVRD for the benefit of both regional districts and is funded through a combination of frontage tax and user rates.

The service consists of two groundwater supply wells and one surface water infiltration gallery adjacent to the Oyster River. The water treatment facility utilizes chlorination, pH control systems, a chlorine gas scrubber, ultraviolet light (UV) disinfection and emergency backup power. The system also includes one pump station and two reservoirs located on Macaulay and Kelland Road.

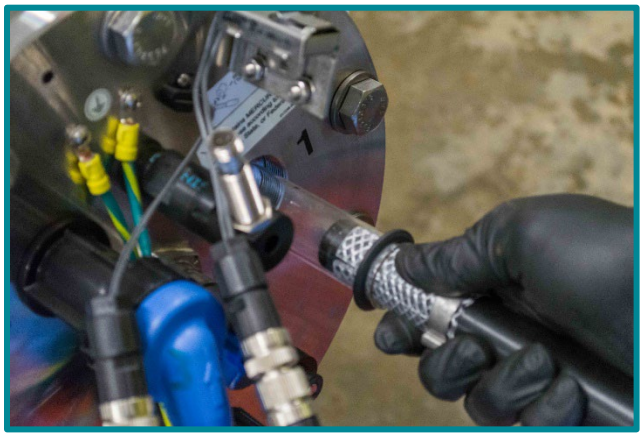


Figure No.1: Cleaning the UV Bulb Sleeves Inside the BCOB Water Treatment Facility.

Operations

Goals

To provide high quality drinking water to all customers through efficient and effective disinfection and distribution operations.

Water Quality Summary

Parameter[1]	2019	2020	Target
Source Water			
Source Water Turbidity (average nephelometric turbidity unit (NTU))	0.03	0.04	<1.0
Source Water Temperature (Celsius)	10.0	11.6	<15
Source Water pH Level	7.17	6.81	Raw*
Water Treatment			
Chlorine Dose (mg/L)	1.15	1.14	<2.0
Distribution Water pH Level (after adjustment)	7.3	7.6	7.0-8.5
Distribution System			
Chlorine Residual-Distribution System (mg/L)	0.91	0.94	>0.20
Total Coliforms (positive samples)	0	0	0
E.Coli (positive samples)	0	0	0
Total Trihalomethanes (mg/L)	0.014	0.007	<0.1

[1]More information for each parameter is available later on in the report.

*source water, cannot change parameters until treatment

The Ministry of Health regulates municipal drinking water quality through the DWP Act and the *Drinking Water Protection Regulation* (the Regulation). The DWP Act and Regulation are administered by regional health authorities, and for the CVRD, the administering authority is Island Health. Both the DWP Act and Regulation set out certain requirements for drinking water operators and suppliers to ensure the provision of safe drinking water to their customers.

In the BCOB Water System, raw water enters the Oyster River treatment facility which utilizes UV and chlorine gas for the disinfection process. When water is drawn from the groundwater wells, caustic soda is used for pH adjustment. Once the raw water is treated it proceeds into the distribution system, which consists of two reservoirs and one booster pump station. The CVRD takes weekly water quality samples of the source water and treated water at four fixed locations within the distribution system to ensure that water is meeting provincial objectives. Quarterly testing for distribution by-products is taken from the Macaulay Road reservoir along with a water chemistry report being completed. A summary of water quality and a description of sampling results can be found below. For detailed water quality results refer to Appendix A.

Disinfection

All water supply systems governed by Island Health that are using surface water are required to adhere to provincial 4-3-2-1-0 surface water treatment objectives to ensure that the water treatment process is effectively killing disease causing viruses, bacteria and parasites. The 4-3-2-1-0 specifications are as follows:

- 4-log (99.99 per cent) removal/inactivation of viruses;
- 3-log (99.9 per cent) removal/inactivation of giardia cysts and cryptosporidium oocysts;
- 2 treatment processes, usually filtration and disinfection;
- 1 NTU turbidity (maximum) in finished water;
- No detectable E.Coli, fecal coliforms and total coliforms in treated water.

Figure No.2: Closing Valve within BCOB Treatment Facility

The system is fully compliant with Island Health's surface water treatment objectives and has obtained a filtration deferral permit for use of the Oyster River infiltration gallery. Water drawn from the river utilizes a two-step disinfection process for surface water, UV disinfection followed by chlorination. When water is being drawn out of groundwater wells caustic is also used to help raise the pH of the water.

By dosing the water with chlorine at the treatment plant a free chlorine residual is established throughout the distribution network to help prevent water from bacteriological regrowth. The free chlorine residual is an indicator of the effectiveness of disinfection within the distribution system. The CVRD strives to maintain a free chlorine residual above 0.2mg/L at the end of the system. The CVRD regularly monitors the chlorine residual throughout the distribution network at four fixed locations. Figure No.3 below provides the average chlorine residual at the four new sampling kiosks.

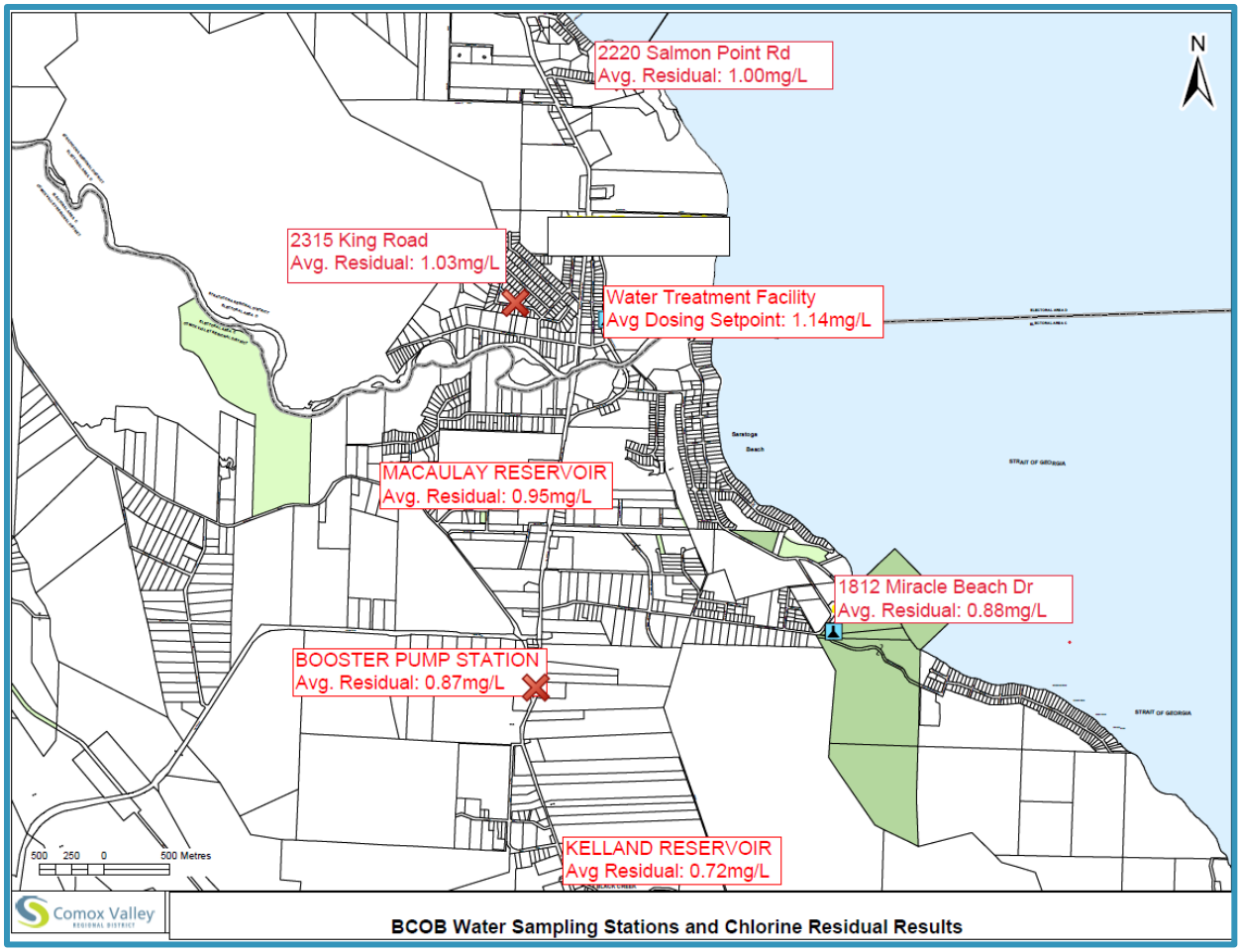


Figure No.3: Average Chlorine Residual at the BCOB Sampling Locations

A by-product of chlorination can be Trihalomethanes (THM). There are four types of THM's that contribute to total THM's. Chloroform is the most common THM and is formed when natural organic matter reacts with chlorine and/or bromine in disinfected water. The guidelines require that the total THM's for drinking water must be less than 0.1mg/L. Samples for THM's are taken annually at the Macaulay Road reservoir Table No.1 below shows the average THM's at the Macaulay reservoir.

Table No.1: **Total THM Concentration at the Macaulay Road Reservoir**

Trihalomethanes	Macaulay Reservoir
Chloroform	0.003
Bromodichloromethane	0.002
Chlorodibromomethane	0.002
Bromoform	<0.001
Average Total THMs (mg/L)	**0.007**

Bacteria

E.Coli and total coliform bacteria are microorganisms that if present in water samples indicate possible contamination with sewage or animal waste. Chlorination helps to remove harmful pathogens within the water supply network. Table No.2 below, shows that within the BCOB water distribution system for 2020, there were zero positive results found for E.Coli and total coliforms.

Table No.2: Bacteriological Standards and Sampling Results

Results	E.Coli		Total Coliform Bacteria	
	Exceedances[1]	# of Samples	Exceedances[2]	# of Samples
January	0	11	0	11
February	0	10	0	10
March	0	10	0	10
April	0	11	0	11
May	0	10	0	10
June	0	9	0	9
July	0	6	0	6
August	0	9	0	9
September	0	10	0	10
October	0	7	0	7
November	0	10	0	10
December	0	11	0	11
Totals	**0 exceedances per 114 samples**		**0 exceedances per 114 samples**	

[1]Standard-No detectable E.Coli per 100mL

[2]Standard-At least 90 per cent of samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml

Canadian Drinking Water Guidelines

Health Canada develops the *Canadian Drinking Water Guidelines*. These are guidelines for limits on microbial, chemical, physical and radiological substances in drinking water. In the guidelines, there are health-based limits on a substance maximum allowable concentration. The guidelines also assign aesthetic objectives to substances that do not cause risk to human health, but will influence consumer acceptance of the water based on factors such as taste, odour and colour. Samples are taken tri-annually at the Macaulay Road reservoir, Table No.3 shows the average concentration for multiple parameters compared to the guideline concentrations. In 2020, the system was below all maximum allowable concentrations.

More information on the parameters listed below, including common sources and health considerations, can be found on the Health Canada website.

Table No.3: Chemical and Physical Parameters at Macaulay Reservoir Compared to Guideline Concentrations

Parameter	Macaulay Reservoir (mg/L)	Guideline Concentration (mg/L)
Aluminum	<0.003	≤0.1
Arsenic	<0.0001	≤0.01
Barium	0.0013	≤1.0
Boron	<0.05	≤5.0
Chloride	9	250
Chromium	<0.001	≤0.05
Colour	<5 (TCU)	<15(TCU)
Copper	0.00139	1
Fluoride	<0.050	≤1.5
Iron	0.00162	≤0.30
Lead	<0.0002	≤0.01
Manganese	<0.001	≤0.05
Nitrite (as N)	<0.0050	10
Selenium	0.0001	≤0.05
Sodium	30.6	≤200
Zinc	<0.005	≤5

Turbidity

The *Canadian Drinking Water Guidelines* also require the turbidity to be below 1 NTU. Turbidity is the measure of relative clarity of a liquid. Clarity is important when producing drinking water for human consumption. The average source water turbidity was 0.04 NTU.

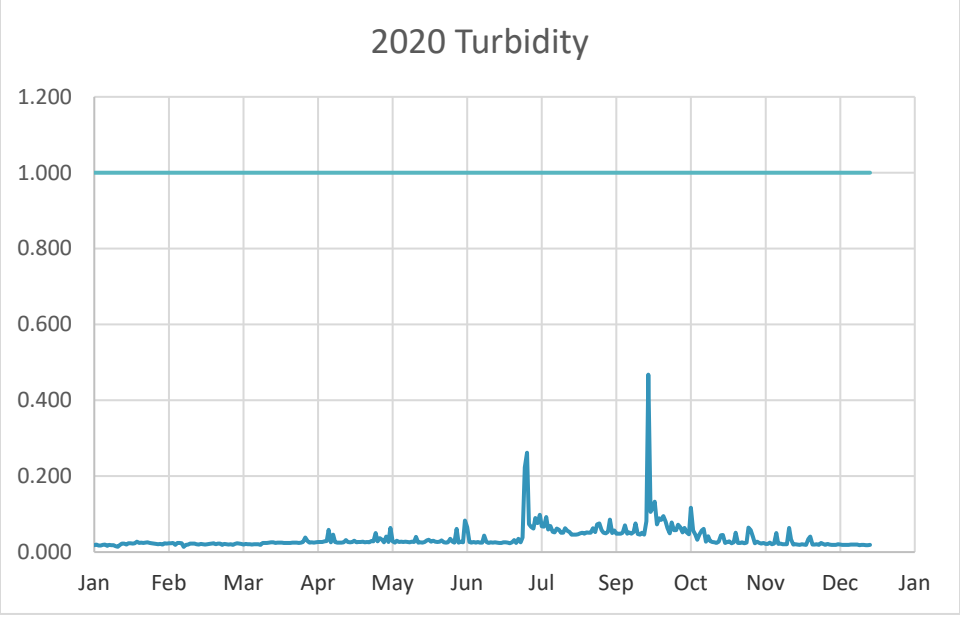


Figure No.4: Source Water Turbidity

Temperature
Temperature is described as an aesthetic objective (a parameter that may impair the taste, smell or colour of water) and physical characteristic of water. Gradual variations in water temperature occur throughout the seasons, however signifcant changes in water temperature can upset chlorination and chemical water treatment processess. The guidelines recommend water temperature to be less than 15°Celsius. The average temperature for the incoming source water was 10.0º Celsius and within the distribution was 13.8º Celsius.

pH
The pH of water is a measure of water acidity. pH has minimal impact for water consumers and varies greatly depending on the water source. However, pH is very important for many operational water quality parameters. The *Canadian Drinking Water Guidelines* recommend the finished water pH ranging between 7 to 10.5. In 2020, the average pH of the source water was 6.81 and the average pH within the distribution system was 7.3.

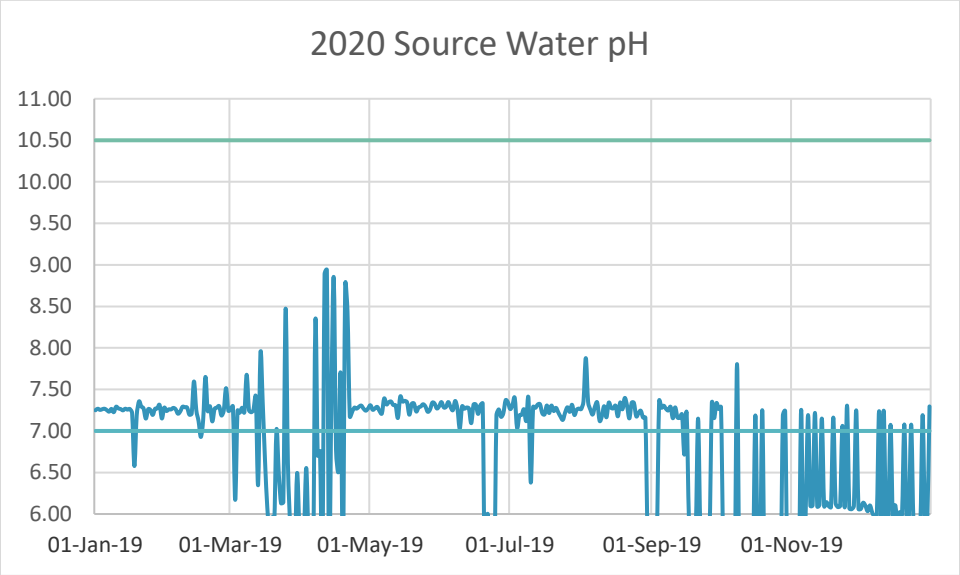


Figure No.5: Source Water pH

Planning

Goals
To ensure effective long-term planning and management programs are in place to meet the needs of all users groups while minimizing operation and infrastructure costs.

Consumption
In 2020, the CVRD treated a total of 339,239 m^3 of water. The average daily water consumption for the system is 927m^3/day. For the BCOB Water System, surface water and groundwater sources are typically rotated seasonally depending on turbidity and system demand. A water conservation bylaw was adopted for the BCOB Water System in April 2018. The purpose of the bylaw is to help reduce water use in the summer months when water consumption increases and water availability decreases, since adoption of the bylaw in 2018 a seven per cent reduction in the maximum day demand occurred. There are a number of factors that contribute to system demands and further review of future years will be required to determine the effectiveness of watering restrictions. The maximum day demand was 1,901m^3 and occurred on July 21, 2020. Stage 1 water restrictions take effect yearly

on May 1st and Stage 2 restrictions take effect yearly on July 1st. However it can be seen that during the summer months water consumption is increasing approximately two fold from the average day demand, as shown in the Figure No.6 below.

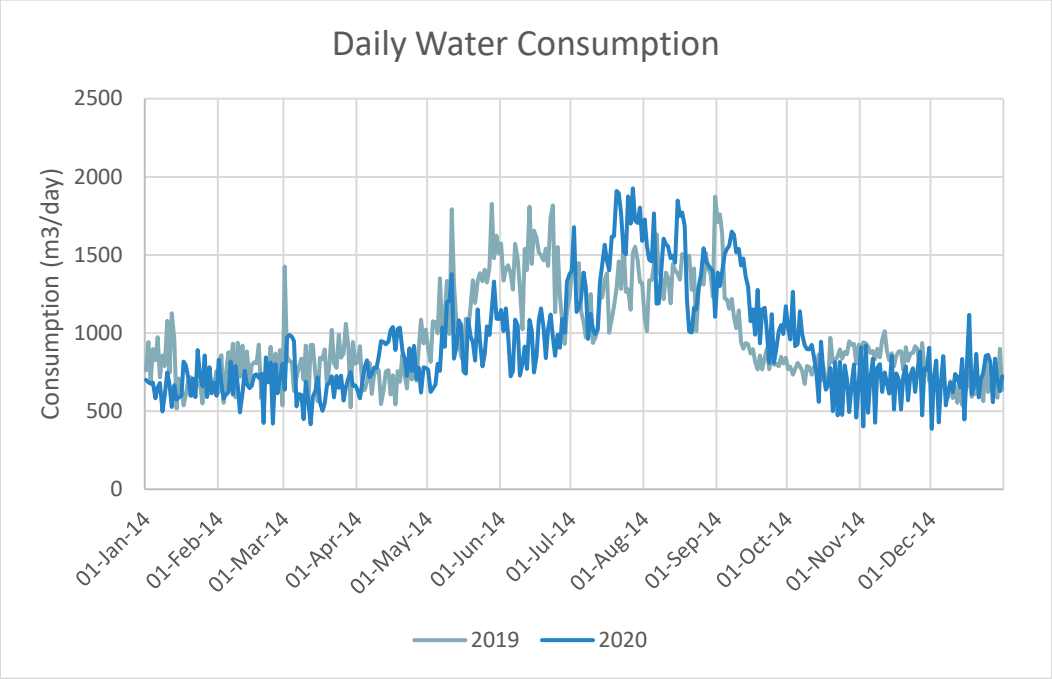


Figure No.6: Daily Water Consumption in BCOB for 2019 and 2020

Maintenance

The BCOB Water System is owned and operated by the CVRD. The water services staff consists of eight operators with varying ranges of certification. Each operator is registered with the Environmental Operator's Certification Program within BC and is required to remain in good standing by taking yearly continuing education courses.

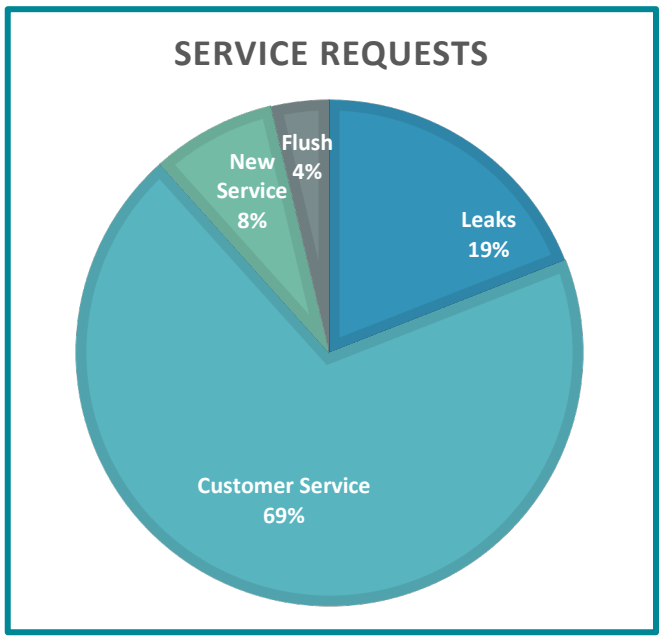


Figure No.7: Service Requests by Category

The CVRD carries out regular and routine maintenance of the entire BCOB Water System, to ensure continued operation and supply of safe and clean water to all users. The treatment facility, wells, distribution lines and reservoirs are regularly inspected and maintained.

A total of 189 service requests within the system were investigated by CVRD Waterworks Operations Staff. Figure No.7 identifies the various types of service requests received by waterworks staff.

Financial

On May 12, 2020 the board adopted a COVID-19 renewal plan for the review of service levels and all necessary, critical and functional projects slated for the next five years. At the August 10, 2020 BCOB Services Committee meeting, recommended actions for the plan were brought forward and the following actions were approved:

- Defer asset management driven rate increases to 2022 to avoid adding additional cost pressures on the community as it recovers from the COVID-19 crisis.
- Participation in an inter-regional Mutual Aid Agreement (MAA) with neighboring regional districts and municipalities, and a separate local Comox Valley MAA with smaller water and sewer purveyors to ensure the Comox Valley Water System and Comox Valley Sewer System are covered in case staffing falls below emergency levels, and that we are doing our part to provide the same comfort to smaller purveyors in the Comox Valley.

Revenues for the BCOB WLSA are derived from a combination of frontage tax and user rates. A five per cent user rate increase was approved in 2019 and took effect April 2020 as an interim measure whilst a comprehensive rate review is completed based on the recently completed asset management planning work for the service.

The water master planning process is long overdue for this service, and is required to provide a roadmap to guide upgrades to the service moving forward. The BCOB Water Master Plan (WMP) will complement the asset management plan recently completed for the service by informing the sizing of infrastructure replaced at the end of its life, and likely drive some asset replacement before end of life to satisfy growth demands.

The primary driver for capital spending for the BCOB WLSA is the need for increased capacity for the system. The BCOB WLSA has seen a consistent decline in source water capacity over the past few years. Development of a new source will help to ensure sufficient water is available in dry years to come. Exploratory drilling for a new production well for the system began in 2017 and final approval for drilling of the production well from the SRD was secured in December 2020. Drilling of the new production well was completed in fall 2020 and following approval from SRD in December construction for the remaining water infrastructure to connect the well to the system is anticipated to be completed ahead of the March 31, 2021 deadline for grant funding.

2020 Accomplishments

- ✓ Finalized Right of Way Agreement with Strathcona Regional District for infrastructure in the Oyster River Nature Park.
- ✓ Completed the drilling of the new production well (kiosk and piping completed by March 2021).
- ✓ Completed highway residential water meter replacements (Approximately 180 units).
- ✓ Completed ROV inspections of Kelland and Macaulay Reservoirs.

2021 Objectives

- Complete the new production well kiosk and piping and have well commissioned by April.
- Complete a Water Master Plan for the BCOB Water System.
- Continue to investigate additional water sources.
- Continue with residential water meter replacement program.
- Construct the Shultz/Paulson Road water main connection.
- Switch the system from chlorine gas to sodium hypo-chlorite disinfection.

Appendix A

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
01-Jan	635	0.02	7.25	1.11													
02-Jan	700	0.02	7.27	1.10													
03-Jan	678	0.02	7.25	1.07													
04-Jan	673	0.02	7.26	1.19													
05-Jan	675	0.02	7.27	1.04													
06-Jan	579	0.02	7.25	1.15			0.85	1.09		<1	<1			<1	<1		
07-Jan	652	0.02	7.23	1.09													
08-Jan	691	0.02	7.27	1.13													
09-Jan	492	0.02	7.23	0.98													
10-Jan	595	0.02	7.29	1.03													
11-Jan	740	0.02	7.27	1.13													
12-Jan	664	0.01	7.26	1.02													
13-Jan	526	0.02	7.25	1.12		0.93			1.03			<1	<1			<1	<1
14-Jan	670	0.02	7.27	1.03													
15-Jan	563	0.02	7.26	1.10													
16-Jan	593	0.02	7.26	1.02													
17-Jan	593	0.02	7.22	1.06													
18-Jan	806	0.02	6.58	1.08													
19-Jan	781	0.02	7.18	1.05													
20-Jan	710	0.02	7.36	0.83	0.90		0.94	1.08		<1	<1			<1	<1		
21-Jan	594	0.03	7.29	1.15													
22-Jan	710	0.02	7.27	1.06													
23-Jan	587	0.02	7.15	1.06													
24-Jan	893	0.02	7.26	1.09													
25-Jan	743	0.03	7.25	1.06													
26-Jan	653	0.03	7.19	1.09													
27-Jan	851	0.02	7.27	1.08		0.66			1.02			<1	<1			<1	<1
28-Jan	581	0.02	7.27	1.06													
29-Jan	784	0.02	7.31	1.10													
30-Jan	608	0.02	7.15	1.09													
31-Jan	683	0.02	7.28	1.01													
01-Feb	602	0.02	7.24	1.05													
02-Feb	816	0.02	7.26	1.06													
03-Feb	682	0.02	7.26	1.05			1.05	0.6		<1	<1			<1	<1		

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
04-Feb	576	0.02	7.28	1.06													
05-Feb	601	0.02	7.26	1.07													
06-Feb	602	0.02	7.21	1.10													
07-Feb	808	0.02	7.23	1.10													
08-Feb	605	0.02	7.29	1.09													
09-Feb	793	0.02	7.29	1.07													
10-Feb	671	0.02	7.28	1.08		0.92			1.07			<1	<1			<1	<1
11-Feb	489	0.02	7.19	1.09													
12-Feb	602	0.01	7.21	1.06													
13-Feb	754	0.02	7.60	1.05													
14-Feb	660	0.02	7.25	1.06													
15-Feb	638	0.02	7.12	1.12													
16-Feb	653	0.02	6.93	1.02													
17-Feb	717	0.02	7.13	0.98													
18-Feb	719	0.02	7.65	0.99			1.02	0.93		<1	<1			<1	<1		
19-Feb	707	0.02	7.24	1.08													
20-Feb	734	0.02	7.30	1.00													
21-Feb	400	0.02	7.11	1.02													
22-Feb	843	0.02	7.27	1.09													
23-Feb	681	0.02	7.28	1.02													
24-Feb	804	0.02	7.30	1.10		0.92			0.98			<1	<1			<1	<1
25-Feb	423	0.02	7.19	1.10													
26-Feb	800	0.02	7.25	1.04													
27-Feb	613	0.02	7.52	1.03													
28-Feb	710	0.02	7.24	1.65													
29-Feb	791	0.02	7.26	1.12													
01-Mar	903	0.02	7.30	1.02													
02-Mar	622	0.02	6.17	1.11			0.85	1.03		<1	<1			<1	<1		
03-Mar	974	0.02	7.25	1.07													
04-Mar	968	0.02	7.22	1.09													
05-Mar	977	0.02	7.28	1.16													
06-Mar	957	0.02	7.22	1.09													
07-Mar	538	0.02	7.68	1.10													
08-Mar	610	0.02	7.25	1.86													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
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09-Mar	608	0.02	7.23	1.11		0.94			1.07			<1	<1			<1	<1
10-Mar	453	0.02	7.26	1.18													
11-Mar	687	0.02	7.41	1.25													
12-Mar	557	0.02	6.35	1.06													
13-Mar	405	0.02	7.93	1.08													
14-Mar	579	0.02	7.34	2.02													
15-Mar	623	0.02	6.65	1.04													
16-Mar	715	0.02	6.08	1.04			0.96	1.1		<1	<1			<1	<1		
17-Mar	567	0.02	5.79	1.00													
18-Mar	501	0.02	5.96	1.14													
19-Mar	550	0.02	5.86	1.10													
20-Mar	663	0.02	7.01	1.71													
21-Mar	672	0.02	6.49	1.24													
22-Mar	717	0.02	6.13	1.05													
23-Mar	579	0.03	6.14	1.14		0.99			1.1			<1	<1			<1	<1
24-Mar	716	0.03	8.47	1.23													
25-Mar	644	0.03	6.61	1.04													
26-Mar	727	0.02	5.87	1.16													
27-Mar	561	0.02	5.53	1.02													
28-Mar	645	0.02	5.48	1.12													
29-Mar	707	0.03	6.49	1.38													
30-Mar	744	0.02	5.87	1.26													
31-Mar	665	0.02	5.84	1.19													
01-Apr	669	0.02	5.78	1.26													
02-Apr	627	0.02	6.55	1.03													
03-Apr	582	0.02	5.71	1.14													
04-Apr	682	0.02	5.63	1.07													
05-Apr	781	0.03	5.43	1.25													
06-Apr	831	0.02	8.34	1.01			0.82	0.9		<1	<1			<1	<1		
07-Apr	715	0.03	6.70	1.13													
08-Apr	736	0.03	6.76	1.16													
09-Apr	771	0.04	5.39	1.05													
10-Apr	773	0.03	8.89	1.16													
11-Apr	853	0.02	8.94	1.13													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
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12-Apr	948	0.03	5.38	1.04													
13-Apr	935	0.03	7.46	1.12													
14-Apr	928	0.03	8.85	1.10		0.74			1			<1	<1			<1	<1
15-Apr	938	0.03	6.77	1.04													
16-Apr	1013	0.03	6.51	1.10													
17-Apr	1028	0.03	7.69	1.11													
18-Apr	873	0.03	5.50	1.12													
19-Apr	1040	0.03	8.76	1.05													
20-Apr	1013	0.06	8.44	1.10			0.89	0.97		<1	<1			<1	<1		
21-Apr	884	0.03	7.17	1.01													
22-Apr	831	0.05	7.23	1.12													
23-Apr	728	0.03	7.28	1.02													
24-Apr	880	0.03	7.27	0.97													
25-Apr	748	0.03	7.29	1.09													
26-Apr	910	0.03	7.31	1.04													
27-Apr	701	0.03	7.27	1.69		0.88			0.99			<1	<1			<1	<1
28-Apr	765	0.03	7.24	1.13													
29-Apr	612	0.03	7.27	1.09													
30-Apr	765	0.03	7.31	1.14													
01-May	774	0.03	7.25	1.12													
02-May	766	0.03	7.27	1.14													
03-May	619	0.03	7.29	1.13													
04-May	639	0.03	7.24	1.12			0.86	0.97		<1	<1			<1	<1		
05-May	664	0.03	7.21	1.13													
06-May	799	0.03	7.39	1.14													
07-May	769	0.03	7.32	1.14													
08-May	1040	0.03	7.35	1.05													
09-May	910	0.03	7.35	1.08													
10-May	1189	0.03	7.31	1.12													
11-May	1195	0.03	7.31	1.12		0.85			1			<1	<1			<1	<1
12-May	1382	0.05	7.16	1.12													
13-May	833	0.03	7.41	1.14													
14-May	915	0.04	7.35	1.14													
15-May	1082	0.03	7.36	1.14													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
16-May	1059	0.03	7.34	1.11													
17-May	752	0.04	7.19	1.12													
18-May	737	0.03	7.32	1.13													
19-May	1080	0.06	7.33	1.09			0.84	1.02		<1	<1			<1	<1		
20-May	976	0.03	7.23	1.09													
21-May	929	0.03	7.28	1.05													
22-May	805	0.03	7.30	1.14													
23-May	1138	0.03	7.32	1.06													
24-May	954	0.03	7.29	1.14													
25-May	781	0.03	7.23	1.11		0.92			1.02			<1	<1			<1	<1
26-May	866	0.03	7.26	1.10													
27-May	1042	0.03	7.34	1.09													
28-May	978	0.03	7.33	1.10													
29-May	1140	0.03	7.27	1.11													
30-May	1337	0.03	7.30	1.09													
31-May	1084	0.04	7.35	1.13													
01-Jun	1090	0.03	7.28	1.09			0.91	1.08		<1	<1			<1	<1		
02-Jun	1145	0.03	7.29	1.11													
03-Jun	1011	0.03	7.35	1.13													
04-Jun	1139	0.03	7.29	1.10													
05-Jun	986	0.03	7.25	1.11													
06-Jun	720	0.03	7.36	1.10													
07-Jun	752	0.03	7.26	1.07													
08-Jun	1085	0.03	7.03	1.03		0.82			1.01			<1	<1			<1	<1
09-Jun	1039	0.03	7.30	1.08													
10-Jun	697	0.03	7.27	1.11													
11-Jun	788	0.03	7.28	1.11													
12-Jun	909	0.03	7.27	1.10													
13-Jun	767	0.03	7.09	1.11													
14-Jun	1082	0.02	7.32	1.12													
15-Jun	1017	0.03	7.32	1.11				0.97			<1				<1		
16-Jun	753	0.03	7.20	1.12													
17-Jun	857	0.03	7.31	1.12													
18-Jun	1074	0.03	7.33	1.08													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
19-Jun	1162	0.06	5.09	1.11													
20-Jun	1047	0.03	5.99	1.08													
21-Jun	833	0.03	5.71	1.07													
22-Jun	1027	0.03	5.68	1.11		0.9			1.05			<1	<1			<1	<1
23-Jun	1112	0.08	5.14	1.12													
24-Jun	964	0.07	7.19	1.08													
25-Jun	837	0.03	7.26	1.02													
26-Jun	1000	0.03	7.17	1.10													
27-Jun	887	0.03	7.21	1.15													
28-Jun	1094	0.03	7.37	1.10													
29-Jun	1016	0.03	7.35	1.08													
30-Jun	1345	0.02	7.26	1.10													
01-Jul	1374	0.03	7.31	1.11													
02-Jul	1391	0.04	7.40	1.11													
03-Jul	1669	0.03	7.04	1.08													
04-Jul	1140	0.02	7.19	1.11													
05-Jul	1180	0.03	7.19	1.13													
06-Jul	1227	0.03	7.26	1.14			1.02	1.23		<1	<1			<1	<1		
07-Jul	1405	0.03	7.12	1.08													
08-Jul	1286	0.02	7.39	1.07													
09-Jul	966	0.02	6.38	1.13													
10-Jul	1126	0.02	7.29	1.13													
11-Jul	1021	0.03	7.28	1.14													
12-Jul	997	0.03	7.32	1.06													
13-Jul	1040	0.03	7.32	1.12		0.97			1.11			<1	<1			<1	<1
14-Jul	1327	0.02	7.21	1.09													
15-Jul	1425	0.03	7.20	1.12													
16-Jul	1558	0.03	7.31	1.09	0.99												
17-Jul	1462	0.02	7.22	1.09													
18-Jul	1403	0.03	7.31	1.12													
19-Jul	1611	0.03	7.24	1.13													
20-Jul	1619	0.04	7.28	1.13			0.84	1.04		<1	<1			<1	<1		
21-Jul	1901	0.22	7.22	1.29													
22-Jul	1895	0.26	7.17	1.29													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
23-Jul	1764	0.07	7.13	1.27													
24-Jul	1520	0.07	7.22	1.32													
25-Jul	1498	0.06	7.29	1.30													
26-Jul	1882	0.09	7.23	1.29													
27-Jul	1715	0.08	7.32	1.29		1.09			1.45			<1	<1			<1	<1
28-Jul	1933	0.10	7.19	2.06													
29-Jul	1716	0.07	7.25	1.33													
30-Jul	1711	0.07	7.27	1.33													
31-Jul	1803	0.09	7.26	1.32													
01-Aug	1596	0.06	7.36	1.34													
02-Aug	1728	0.07	7.88	1.15													
03-Aug	1558	0.05	7.35	1.34													
04-Aug	1475	0.05	7.26	1.33			0.65	1.05		<1	<1			<1	<1		
05-Aug	1463	0.06	7.20	1.31													
06-Aug	1767	0.06	7.29	1.33													
07-Aug	1192	0.05	7.34	1.34													
08-Aug	1190	0.05	7.12	1.33													
09-Aug	1379	0.06	7.18	1.28													
10-Aug	1608	0.06	7.30	1.30		0.76			0.93			<1	<1			<1	<1
11-Aug	1569	0.05	7.16	1.29													
12-Aug	1551	0.05	7.34	1.31													
13-Aug	1481	0.05	7.28	1.29													
14-Aug	1505	0.05	7.27	1.30													
15-Aug	1458	0.05	7.30	1.33													
16-Aug	1856	0.05	7.18	1.31													
17-Aug	1762	0.05	7.34	1.30				0.8			<1				<1		
18-Aug	1781	0.05	7.26	1.29													
19-Aug	1692	0.05	7.40	1.00													
20-Aug	1209	0.05	7.30	1.32													
21-Aug	1002	0.05	7.15	1.22													
22-Aug	1001	0.06	7.34	1.17													
23-Aug	1167	0.05	7.34	1.13													
24-Aug	1146	0.07	7.18	0.43		0.63			0.82			<1	<1			<1	<1
25-Aug	1300	0.08	7.22	0.55													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
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	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
26-Aug	1357	0.06	7.24	1.31													
27-Aug	1549	0.05	7.16	1.31													
28-Aug	1462	0.05	7.16	1.30													
29-Aug	1437	0.05	5.73	1.33													
30-Aug	1409	0.09	5.74	1.31													
31-Aug	1403	0.05	5.76	1.31													
01-Sep	1103	0.06	5.76	1.29													
02-Sep	1390	0.05	5.75	1.26													
03-Sep	1303	0.05	7.36	1.33													
04-Sep	1390	0.05	7.28	1.31													
05-Sep	1501	0.05	7.30	1.32													
06-Sep	1543	0.07	7.27	1.31													
07-Sep	1562	0.05	7.25	1.31													
08-Sep	1652	0.05	7.29	1.32			0.75	1.08		<1	<1			<1	<1		
09-Sep	1629	0.05	7.15	1.31													
10-Sep	1523	0.05	7.28	1.31													
11-Sep	1533	0.08	7.16	1.32													
12-Sep	1432	0.05	7.16	1.30													
13-Sep	1477	0.05	7.20	0.82													
14-Sep	1358	0.05	6.71	1.30		0.81			1.1			<1	<1			<1	<1
15-Sep	1292	0.05	7.22	1.19													
16-Sep	1075	0.08	5.95	0.84													
17-Sep	1151	0.47	5.80	1.17													
18-Sep	988	0.11	5.81	1.15													
19-Sep	1262	0.12	5.82	1.01													
20-Sep	931	0.13	7.15	1.22													
21-Sep	1139	0.07	5.80	1.08			0.46	1.04		<1	<1			<1	<1		
22-Sep	1157	0.09	5.73	1.12													
23-Sep	1001	0.09	5.73	1.11													
24-Sep	800	0.09	5.83	1.07													
25-Sep	1120	0.08	5.78	1.01													
26-Sep	802	0.06	7.33	1.01													
27-Sep	901	0.05	7.15	1.01													
28-Sep	1012	0.08	7.34	1.00		0.81			0.88			<1	<1			<1	<1

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
				Chlorine Residuals (mg/L)						E.Coli				Total Coliforms				
	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
29-Sep	1049	0.06	7.26	0.99													
30-Sep	987	0.06	7.29	0.99													
01-Oct	1173	0.07	5.60	0.94													
02-Oct	1018	0.07	5.59	1.04													
03-Oct	947	0.05	5.62	1.00													
04-Oct	1249	0.06	5.55	1.02													
05-Oct	913	0.05	5.58	1.04		0.93			0.96			<1	<1			<1	<1
06-Oct	920	0.05	5.30	1.19													
07-Oct	1129	0.12	7.81	1.21													
08-Oct	980	0.06	5.30	1.15													
09-Oct	910	0.05	5.31	1.15													
10-Oct	888	0.03	5.33	1.14													
11-Oct	883	0.05	5.30	1.22													
12-Oct	910	0.06	5.31	1.15													
13-Oct	835	0.06	5.33	1.14			0.98	0.82		<1	<1			<1	<1		
14-Oct	737	0.03	5.46	1.20													
15-Oct	559	0.04	7.19	1.20													
16-Oct	939	0.03	5.54	1.20													
17-Oct	749	0.03	5.24	1.20													
18-Oct	644	0.03	7.25	1.20													
19-Oct	664	0.02	5.23	1.20			1.04	1.04		<1	<1			<1	<1		
20-Oct	771	0.03	5.30	1.20													
21-Oct	498	0.04	5.25	1.20													
22-Oct	804	0.04	5.30	1.20													
23-Oct	475	0.02	5.25	1.20													
24-Oct	818	0.03	5.27	1.14													
25-Oct	475	0.03	5.23	1.15													
26-Oct	785	0.02	5.16	1.15		0.86			1.11			<1	<1			<1	<1
27-Oct	707	0.03	7.18	1.21													
28-Oct	491	0.05	7.24	1.21													
29-Oct	684	0.02	5.21	1.19													
30-Oct	801	0.02	5.25	1.12													
31-Oct	455	0.03	5.25	1.14													
01-Nov	681	0.02	5.20	1.12													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
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	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
02-Nov	904	0.02	5.26	1.10			0.99	1.09		<1	<1			<1	<1		
03-Nov	399	0.06	5.28	1.14													
04-Nov	914	0.06	7.25	1.21													
05-Nov	489	0.04	5.23	1.09													
06-Nov	703	0.02	6.07	1.11													
07-Nov	828	0.03	7.19	1.21													
08-Nov	425	0.02	6.10	1.47													
09-Nov	775	0.02	6.11	1.11		0.94			1.1			<1	<1			<1	<1
10-Nov	802	0.02	7.22	1.20													
11-Nov	619	0.02	6.09	1.15													
12-Nov	742	0.02	6.12	1.14													
13-Nov	685	0.03	7.15	1.20													
14-Nov	612	0.02	6.09	1.17													
15-Nov	855	0.02	6.14	1.17													
16-Nov	508	0.05	6.10	1.17			0.85	1.03		<1	<1			<1	<1		
17-Nov	743	0.02	6.08	1.15													
18-Nov	702	0.02	7.16	1.21													
19-Nov	516	0.02	6.13	1.18													
20-Nov	725	0.02	6.08	1.15													
21-Nov	788	0.02	6.10	1.14													
22-Nov	571	0.06	7.06	1.22													
23-Nov	732	0.03	6.08	1.15		0.95			1.04			<1	<1			<1	<1
24-Nov	764	0.02	7.31	1.19													
25-Nov	627	0.02	6.07	1.15													
26-Nov	758	0.02	6.06	1.13													
27-Nov	871	0.02	6.10	0.78													
28-Nov	468	0.02	7.25	1.20													
29-Nov	781	0.02	6.06	1.14													
30-Nov	755	0.02	6.06	1.14													
01-Dec	902	0.03	6.14	1.15													
02-Dec	385	0.04	6.10	1.14													
03-Dec	722	0.02	6.03	1.14													
04-Dec	825	0.02	6.10	1.18													
05-Dec	423	0.02	6.02	1.19													

Date	SOURCE WATER			DISTRIBUTION SYSTEM														
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	Total Water Consumption (m3)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Macaulay Reservoir	8527 Island Hwy	1812 Miracle Beach	2220 Salmon Pt Rd	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road	1812 Miracle Beach	2220 Salmon Pt Rd	8527 Island Hwy	2315 King Road
06-Dec	690	0.02	5.97	1.14													
07-Dec	854	0.02	5.98	1.15		0.92			1.04			<1	<1			<1	<1
08-Dec	531	0.02	7.24	1.20													
09-Dec	621	0.02	5.95	1.17													
10-Dec	679	0.02	7.24	1.20													
11-Dec	623	0.02	5.91	1.14													
12-Dec	735	0.02	5.94	1.13													
13-Dec	710	0.02	7.07	1.20													
14-Dec	648	0.02	5.93	1.14			0.98	1		<1	<1			<1	<1		
15-Dec	829	0.02	6.11	1.20													
16-Dec	447	0.02	5.91	1.15													
17-Dec	796	0.02	6.02	1.13													
18-Dec	1124	0.02	5.99	1.17													
19-Dec	600	0.02	7.08	1.20													
20-Dec	663	0.02	5.91	1.14													
21-Dec	859	0.02	5.96	1.15		1.03			1.1			<1	<1			<1	<1
22-Dec	582	0.02	7.08	1.20													
23-Dec	702	0.02	5.89	1.12													
24-Dec	743	0.02	5.89	1.12													
25-Dec	850	0.02	5.90	1.12													
26-Dec	869	0.02	5.86	1.13													
27-Dec	816	0.02	7.19	1.21													
28-Dec	553	0.02	5.89	1.14													
29-Dec	832	0.02	5.91	1.13		0.92			1.06			<1	<1			<1	<1
30-Dec	696	0.02	7.30	1.20													
31-Dec	633	0.02	5.90	1.12													
Count	**366**	**366**	**366**	**366**	**2**	**25**	**21**	**23**	**25**	**21**	**23**	**25**	**25**	**21**	**23**	**28**	**27**
AVERAGE	**927**	**0.04**	**6.81**	**1.14**	**0.95**	**0.88**	**0.88**	**1.00**	**1.04**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**