

2018 Water Quality Report

Black Creek Oyster Bay



comoxvalleyrd.ca



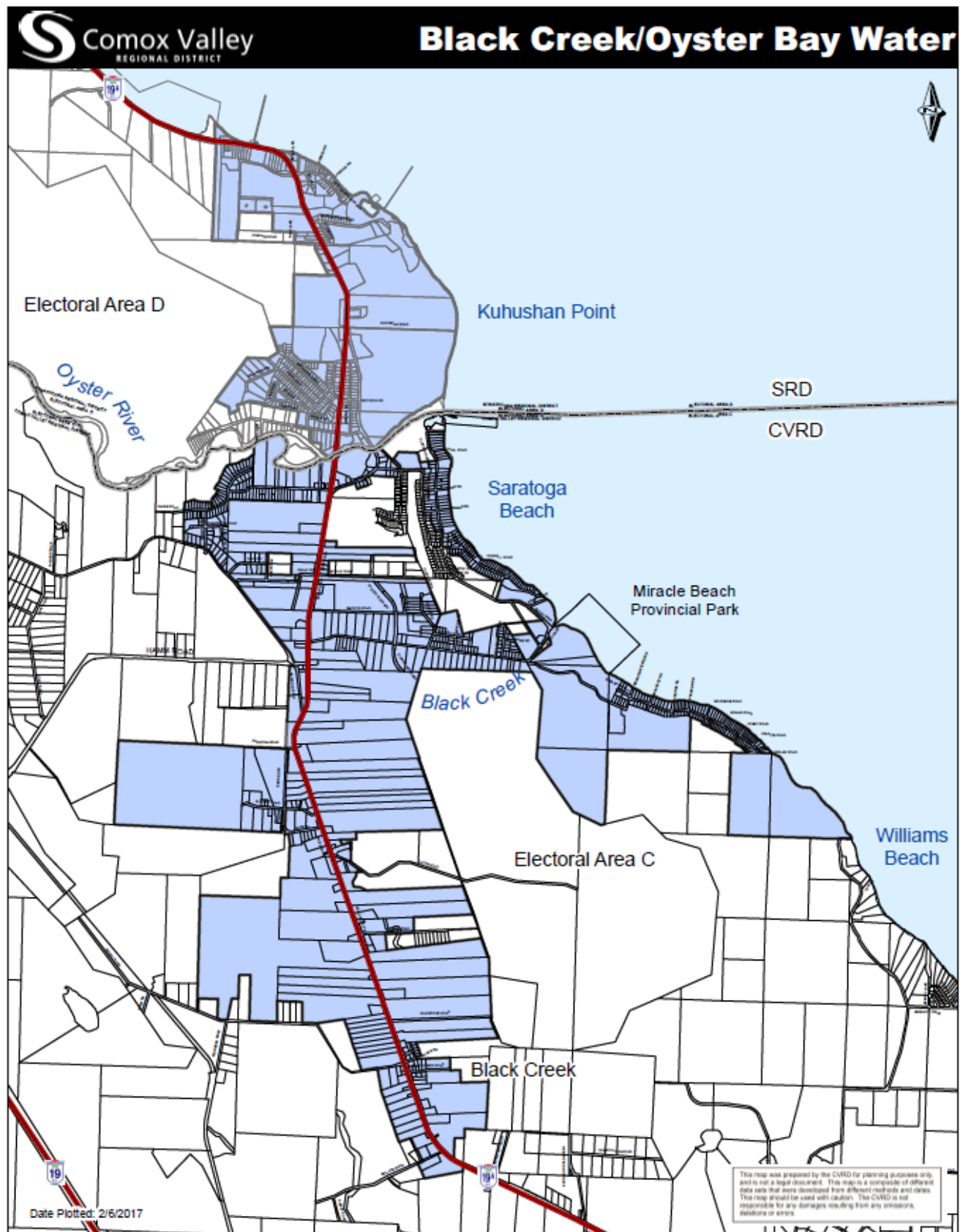
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“The CVRD continues to operate and maintain the BCOB water system to ensure continued supply of high quality drinking water. Further work on asset management was completed in 2018, along with the engineering for a watermain replacement along Smooth and Paulsen Road to improve fire flows to Miracle Beach Elementary”

-Mike Herschmiller, Manager of Water Services

Map of Service Area

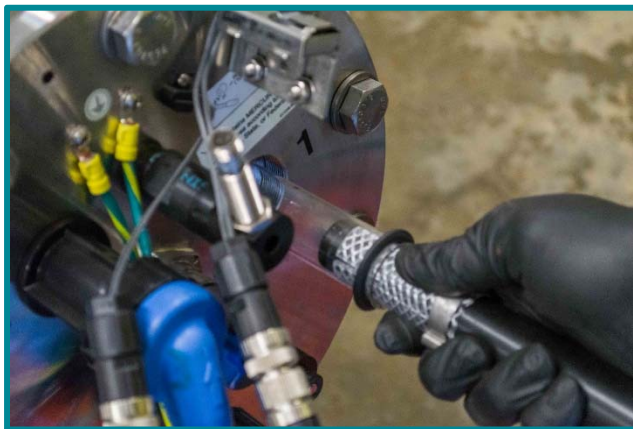


Introduction

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, 2018 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	2017	2018	Target
Source Water			
Source Water Turbidity (average NTU)	0.04	0.03	<1.0
Source Water Temperature (Celsius)	14.7	12.1	15
Water Treatment			
Chlorine Dose (mg/L)	1.23	1.13	<2.0
Distribution Water pH Level (after adjustment)	7.25	7.38	7.0-8.5
Distribution System			
Chlorine residual-distribution system (mg/L)	0.81	0.88	>0.20
Total Coliforms (positive samples)	0	0	0
E.Coli (positive samples)	0	0	0
Total Trihalomethanes (mg/L)	0.012	0.006	<0.1

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

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.

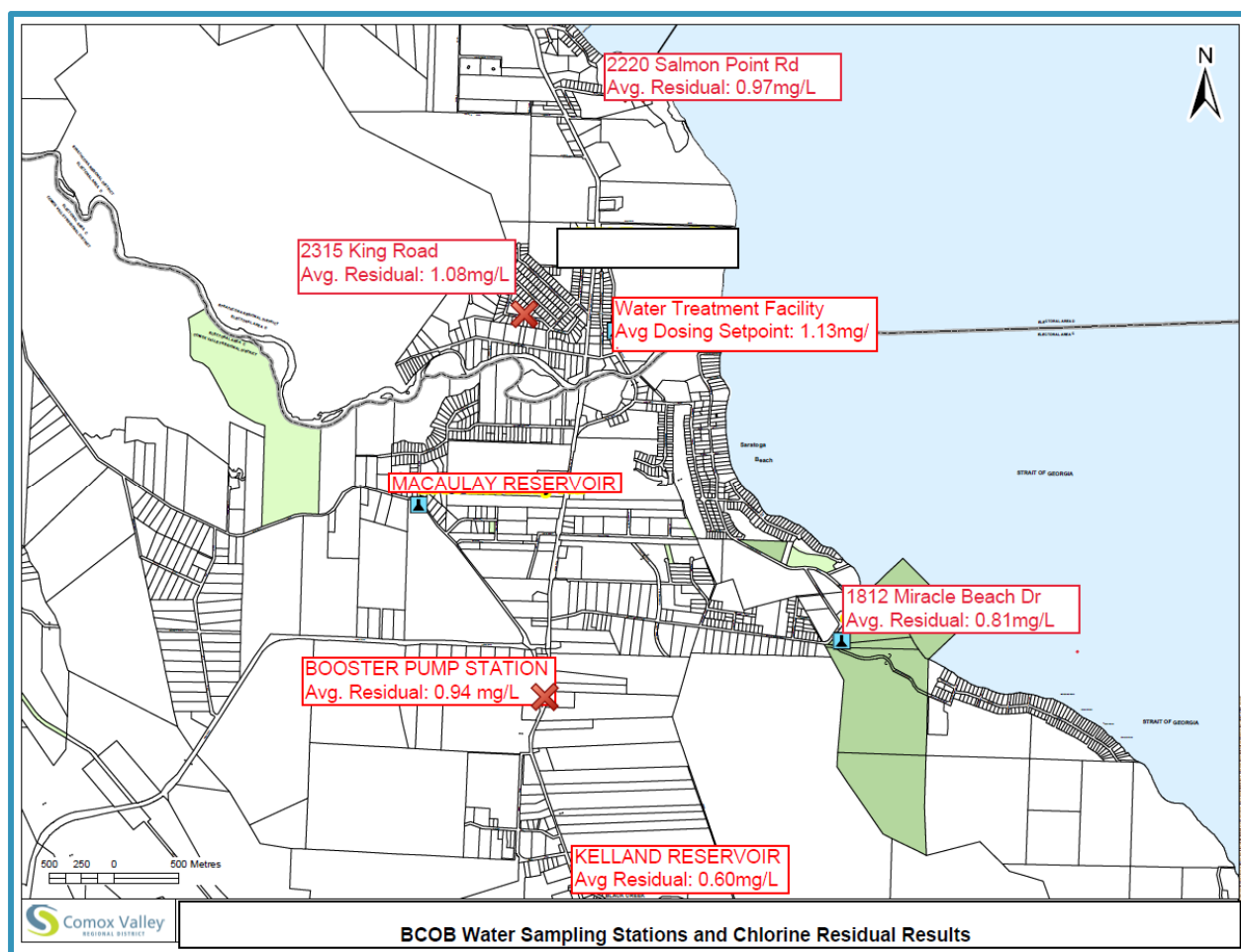


Figure No.3: Average Chlorine Residual at the BCOB Sampling Locations

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 quarterly 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	0.004
Bromodichloromethane	0.002
Dibromochloromethane	0.001
Bromoform	<0.001
Average Total THMs (mg/L)	0.006

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 2018, 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	8	0	8
February	0	8	0	8
March	0	8	0	8
April	0	10	0	10
May	0	6	0	6
June	0	8	0	8
July	0	10	0	10
August	0	8	0	8
September	0	7	0	7
October	0	8	0	8
November	0	8	0	8
December	0	8	0	8
Totals	0 exceedances per 97 samples		0 exceedances per 97 samples	

¹Standard-No detectable E.Coli per 100mL

²Standard-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 2018, the system was below all maximum allowable concentrations as illustrated in the Table No.3.

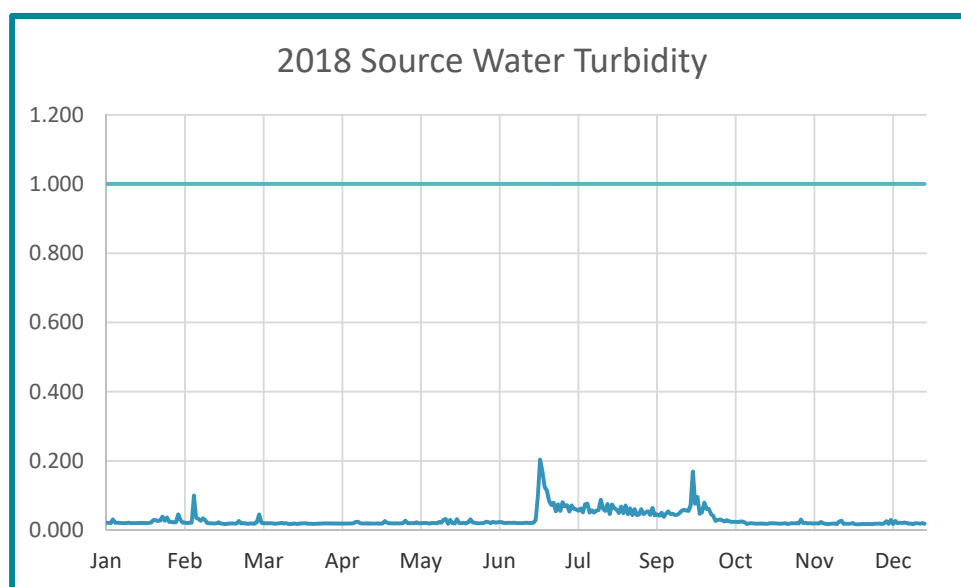
More information on the parameters listed below, including common sources and health considerations, can be found on the [Health Canada website](#).

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	0.001	≤ 1.0
Boron	0.017	≤ 5.0
Chloride	6.54	250
Chromium	0.004	≤ 0.05
Colour	<5 (TCU)	<15 (TCU)
Copper	0.0013	1
Fluoride	<0.01	≤ 1.5
Iron	0.017	≤ 0.30
Lead	0.00008	≤ 0.01
Manganese	<0.001	≤ 0.05
Nitrite (as N)	<0.01	10
Selenium	<0.0002	≤ 0.05
Sodium	20.9	≤ 200
Zinc	0.0025	≤ 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 0.03 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 significant changes in water temperature can upset chlorination and chemical water treatment processes. The guidelines recommend water temperature to be less than 15°Celsius. The average temperature for the incoming source water was 12.1° Celsius and within the distribution was 12.5° 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 pH ranging between 7-10.5. In 2018, the average pH of the source water was 6.75 and the average pH within the distribution system was 7.38.

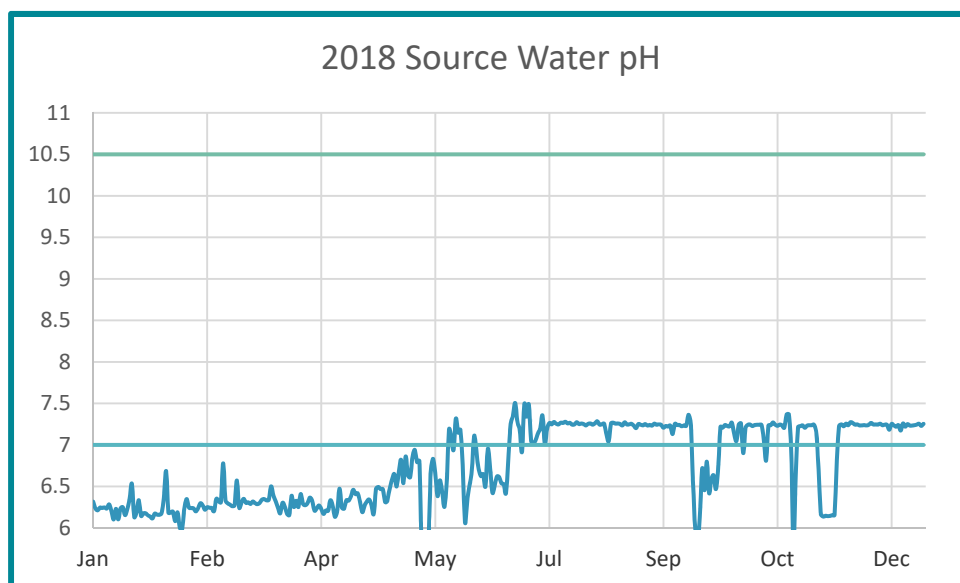


Figure No.5: Source Water pH

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 2018, the CVRD treated a total of 367,786m³ of water. The average daily water consumption for the system is 1008m³/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. 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. The maximum day demand was 2,014m³ and occurred on August 9, 2018. Stage 1 water restrictions take effect yearly on May 1st and Stage 2 restrictions take effect yearly on July 1st.

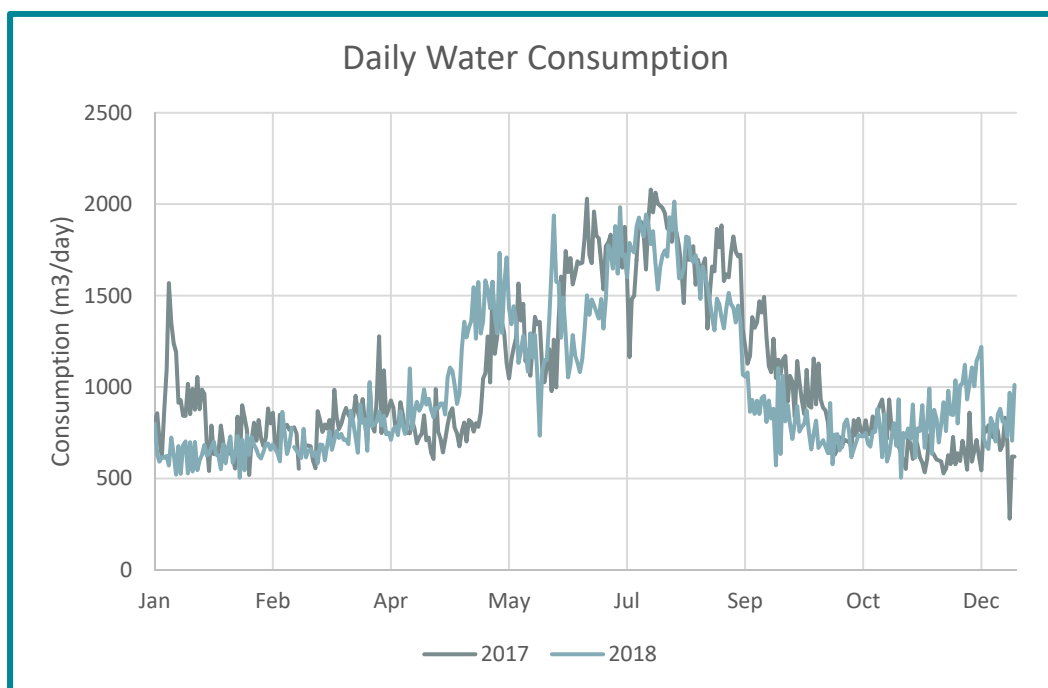


Figure No.6: Daily Water Consumption in BCOB for 2017 and 2018

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

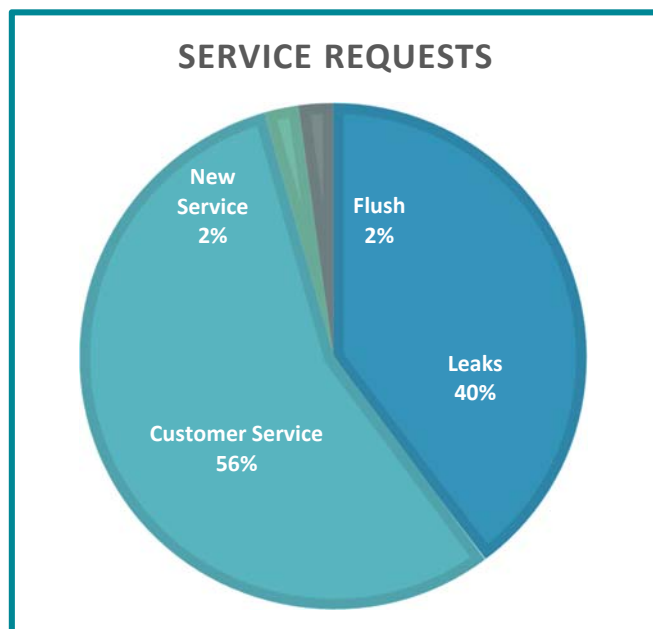


Figure No.7: Service Requests by Category

Environmental Operator's Certification Program within BC and is required to remain in good standing by taking yearly continuing education courses.

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.

184 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

An application to the Clean Water and Wastewater Fund (CWWF) was submitted in 2016 for grant funding for the installation of a new water supply well for the system. The CVRD was informed in spring 2017 that the application was successful. The project is 83 per cent funded by the CWWF and the CVRD will be proceeding with the drilling, engineering and construction of a new production well. The new well will help to alleviate capacity concerns for the system in the dry summer months. Funding for the project expires in March 2020.

In 2018, the CVRD continued to work with the Strathcona Regional District to secure their approval for installation of the new production well in the Oyster River Nature Park, and study ground water availability within the Oyster River Nature Park was completed.

The Watutco Water System feasibility study was continued in 2018, delays to the final report were due to the requirements of completing a third pump test of the Watutco infiltration gallery in the dry summer months to develop a better understanding of system capacity. Next steps and a recommended course of action will be presented as part of the feasibility study work in 2019.

Procurement of a consultant to develop a detailed asset management plan for the service was completed in 2017. The plan is expected in early 2019 and will include development of an asset inventory, review of the condition of current infrastructure required levels of service and long term asset replacement requirements. Water rates will be reviewed as part of this work to ensure sufficient revenue is being collected to help fund future upgrades.

2018 Accomplishments

- ✓ Completion of the detailed design for a watermain replacement along Oyster River Way and Paulson Road.
- ✓ Completion of a study reviewing water capacity within the Oyster River Nature Park.
- ✓ Completion of the preliminary engineering and design for a new production well within the Oyster River Nature Park.
- ✓ Completion of detailed asset inventories and condition assessments of assets for the service for the development of a detailed asset management plan.
- ✓ Adoption of a water conservation bylaw

2019 Objectives

- Replace a watermain along Oyster River Way and Paulson Road.
- Complete an assessment of the Oyster River infiltration gallery.
- Complete the detailed asset management plan for the service.
- Complete the design and construction of the new production well project (2019 & 2020).
- Complete the Watutco Water System feasibility study.
- Install new meters along highway to improve meter-reading efficiency and operator safety.

Appendix A

[illegible]

Date	SOURCE WATER				DISTRIBUTION SYSTEM													
					Chlorine Residuals (mg/L)						E.Coli				Total Coliforms			
	Total Water Consumption (m3)	Temp (°C)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Kelland 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
8-Feb	545	9.5	0.02	6.00	1.04	0.54												
9-Feb	736	13.7	0.10	5.98	1.15	0.83												
10-Feb	629		0.04	6.24	1.23													
11-Feb	727		0.03	6.35	1.26													
12-Feb	686		0.03	6.25	1.25													
13-Feb	658	13.6	0.03	6.24	1.15		1.02			0.78				<1	<1			<1
14-Feb	625	13.0	0.03	6.24	1.25	0.54												
15-Feb	609	13.2	0.02	6.20	1.25	0.53												
16-Feb	645	12.8	0.02	6.24	1.18													
17-Feb	687		0.02	6.30	1.10													
18-Feb	691		0.02	6.27	1.10													
19-Feb	657	12.8	0.02	6.22	1.12	0.52		0.66	0.99		<1	<1			<1	<1		
20-Feb	687	12.8	0.02	6.25	1.12	0.54												
21-Feb	661	12.6	0.02	6.24	1.12	0.54												
22-Feb	638	12.6	0.02	6.24	1.12													
23-Feb	594	13.1	0.02	6.20	1.12	0.54												
24-Feb	864		0.02	6.35	1.11													
25-Feb	747		0.02	6.32	1.10													
26-Feb	634	12.8	0.02	6.31	1.10	0.59		0.86	1.04		<1	<1			<1	<1		
27-Feb	682	12.3	0.02	6.78	1.09	0.57												
28-Feb	778		0.02	6.33	1.10													
1-Mar	672	12.4	0.03	6.30	1.08	0.56												
2-Mar	651	13.4	0.02	6.28	1.09													
3-Mar	635		0.02	6.26	1.09													
4-Mar	613		0.02	6.27	1.09													
5-Mar	772	13.5	0.02	6.57	1.10	0.54					<1	<1			<1	<1		
6-Mar	616		0.02	6.25	1.11													
7-Mar	652	13.4	0.02	6.30	1.11													
8-Mar	661		0.02	6.35	1.10													
9-Mar	624	13.3	0.02	6.30	1.10													
10-Mar	644		0.04	6.31	1.10													
11-Mar	583		0.02	6.29	1.11													
12-Mar	686	13.4	0.02	6.32	1.12	0.56	0.96			1.09				<1	<1		<1	<1
13-Mar	683		0.02	6.30	1.09													
14-Mar	600	13.5	0.02	6.29	1.11	0.56												
15-Mar	676	13.7	0.02	6.30	1.10													
16-Mar	757	13.8	0.02	6.34	1.10	0.60												

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12-Aug	1601		0.07	7.25	1.19													
13-Aug	1650	18.0	0.05	7.25	1.22	0.42	0.97			0.96			<1	<1			<1	<1
14-Aug	1822		0.07	7.13	1.21													
15-Aug	1816	17.7	0.06	7.04	1.28	0.68												
16-Aug	1703	18.0	0.06	7.26	1.21													
17-Aug	1684	20.5	0.05	7.27	1.19	0.64												
18-Aug	1721		0.07	7.26	1.22													
19-Aug	1653		0.05	7.26	1.21													
20-Aug	1482	16.8	0.07	7.25	1.21						<1	<1			<1	<1		
21-Aug	1658	16.5	0.05	7.23	1.24	0.50												
22-Aug	1606	16.4	0.06	7.27	1.23	0.49												
23-Aug	1551	16.5	0.04	7.25	1.24	0.33												
24-Aug	1465	16.2	0.06	7.25	1.20	0.10												
25-Aug	1383		0.04	7.25	1.25													
26-Aug	1311		0.04	7.23	1.20													
27-Aug	1483	16.3	0.06	7.20	1.27	0.21	0.96			0.98			<1	<1			<1	<1
28-Aug	1453	16.2	0.05	7.25	1.23													
29-Aug	1380	16.5	0.05	7.24	1.20													
30-Aug	1321	16.4	0.05	7.24	1.25	0.40												
31-Aug	1431	16.5	0.04	7.25	1.25	0.40												
1-Sep	1515		0.06	7.23	1.19													
2-Sep	1453		0.04	7.24	1.20													
3-Sep	1434		0.05	7.23	1.23													
4-Sep	1353	15.1	0.04	7.26	1.22	0.35		0.73	0.87		<1	<1			<1	<1		
5-Sep	1445		0.05	7.24	1.23													
6-Sep	1357	15.3	0.04	7.25	1.24	0.54												
7-Sep	1067	15.8	0.05	7.24	1.12	0.61												
8-Sep	1057		0.05	7.21	1.15													
9-Sep	1080		0.05	7.23	1.10													
10-Sep	865	14.2	0.05	7.22	1.08	0.56	0.81			0.91			<1				<1	
11-Sep	929	14.0	0.04	7.23	1.10	0.61												
12-Sep	854	13.7	0.04	7.13	1.09													
13-Sep	924		0.05	7.25	1.11													
14-Sep	853	14.5	0.06	7.24	1.09	1.12												
15-Sep	940		0.06	7.24	1.09													
16-Sep	952		0.06	7.23	1.11													
17-Sep	809	12.3	0.06	7.24	1.08	1.39		0.58	0.83		<1	<1			<1	<1		

Date	SOURCE WATER				DISTRIBUTION SYSTEM													
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18-Sep	925		0.07	7.23	1.03													
19-Sep	828		0.17	7.36	0.88													
20-Sep	881		0.08	7.26	1.24													
21-Sep	572	12.9	0.10	6.51	1.13													
22-Sep	1104		0.05	5.96	1.54													
23-Sep	634		0.05	5.81	1.46													
24-Sep	1060	12.9	0.08	6.17	1.20	1.20	0.95			1.34			<1	<1			<1	<1
25-Sep	813	12.8	0.06	6.72	1.33													
26-Sep	902	9.8	0.06	6.46	0.99													
27-Sep	798		0.05	6.80	1.27													
28-Sep	716		0.04	6.42	1.15													
29-Sep	806		0.03	6.59	1.19													
30-Sep	896		0.03	6.63	1.15													
1-Oct	756	10.4	0.03	6.47	1.21			1.13	1.16		<1	<1			<1	<1		
2-Oct	781		0.03	6.72	1.15													
3-Oct	799	10.0	0.03	7.22	1.16													
4-Oct	872		0.03	7.21	1.10													
5-Oct	748	10.0	0.03	7.24	1.13													
6-Oct	659		0.02	7.23	1.10													
7-Oct	744		0.02	7.22	1.17													
8-Oct	816		0.02	7.27	1.17													
9-Oct	667	10.0	0.02	7.13	1.15	0.83	1.09			1.19			<1	<1			<1	<1
10-Oct	690	10.2	0.02	7.05	1.16	0.70												
11-Oct	710	9.9	0.02	7.24	1.14	0.78												
12-Oct	674	10.2	0.02	7.26	1.12	0.80												
13-Oct	638		0.02	6.90	1.14													
14-Oct	912		0.02	7.21	1.16													
15-Oct	578	9.7	0.02	7.24	1.16						<1	<1			<1	<1		
16-Oct	739		0.02	7.25	1.11													
17-Oct	742	9.5	0.02	7.23	1.13													
18-Oct	654		0.02	7.24	1.18													
19-Oct	680	9.8	0.02	7.24	1.15	0.77												
20-Oct	800		0.02	7.24	1.16													
21-Oct	822		0.02	7.24	1.14													
22-Oct	759	9.6	0.02	7.07	1.12	0.75	1.09			1.23			<1	<1			<1	<

[illegible]

Date	SOURCE WATER				DISTRIBUTION SYSTEM													
					Chlorine Residuals (mg/L)						E.Coli				Total Coliforms			
	Total Water Consumption (m3)	Temp (°C)	Turbidity (NTU)	pH	Calculated Chlorine Dose	Kelland 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
1-Dec	917		0.02	7.24	1.14													
2-Dec	760		0.02	7.25	1.11													
3-Dec	980	8.4	0.02	7.23	1.17	0.76		0.96	1.24		<1	<1			<1	<1		
4-Dec	851		0.02	7.24	1.15													
5-Dec	847	7.8	0.02	7.24	1.19	0.76												
6-Dec	1037		0.02	7.23	1.16													
7-Dec	801	7.6	0.02	7.24	1.15	0.76												
8-Dec	1009		0.02	7.26	1.18													
9-Dec	1019		0.02	7.25	1.15													
10-Dec	1121	8.0	0.02	7.25	1.19	0.76	1.06			1.16			<1	<1			<1	<1
11-Dec	933		0.02	7.24	1.13													
12-Dec	1017	8.0	0.02	7.26	1.18	0.78												
13-Dec	1107		0.02	7.24	1.20													
14-Dec	1004	8.2	0.03	7.24	1.20	0.78												
15-Dec	1144		0.02	7.24	1.15													
16-Dec	1176		0.03	7.18	1.16													
17-Dec	1220	7.9	0.02	7.25	1.19						<1	<1			<1	<1		
18-Dec	723		0.03	7.24	1.18													
19-Dec	677	7.9	0.02	7.22	1.16													
20-Dec	661		0.02	7.24	1.13													
21-Dec	831	6.8	0.02	7.17	1.18	0.77												
22-Dec	796		0.02	7.26	1.15													
23-Dec	702		0.02	7.22	1.16													
24-Dec	850	7.1	0.02	7.25	1.20													
25-Dec	881		0.02	7.23	1.14													
26-Dec	811		0.02	7.23	1.16													
27-Dec	810	6.8	0.02	7.24	1.13								<1	<1			<1	<1
28-Dec	729	7.2	0.02	7.24	1.14													
29-Dec	968		0.02	7.26	1.20													
30-Dec	707		0.02	7.23	1.14													
31-Dec	1011	6.8	0.02	7.25	1.16	0.78												
COUNT	365	183	365	365	365	126	21	17	17	21	26	26	23	22	26	26	23	22
AVG	1008	12.1	0.03	6.75	1.13	0.60	0.94	0.81	0.97	1.08								