

Beddis Water Service

2020 Annual Report



INTRODUCTION

This report provides a summary of the Beddis Water Service for 2020. It 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 Beddis Water Utility is a rural residential community located on Salt Spring Island. The service was created in 1969 as the Beddis Waterworks District and became a CRD service in 2004. The Beddis Water Utility (Figure 1) is comprised of 137 parcels of land of which 128 are presently connected to the system.

The utility obtains its drinking water from Cusheon Lake, a relatively small lake that lies within an uncontrolled multi-use watershed. The Capital Regional District (CRD) holds two licenses to divert a total of up to 102,850 m³ per year. Cusheon Lake is subject to seasonal water quality changes and is affected by periodic algae blooms.

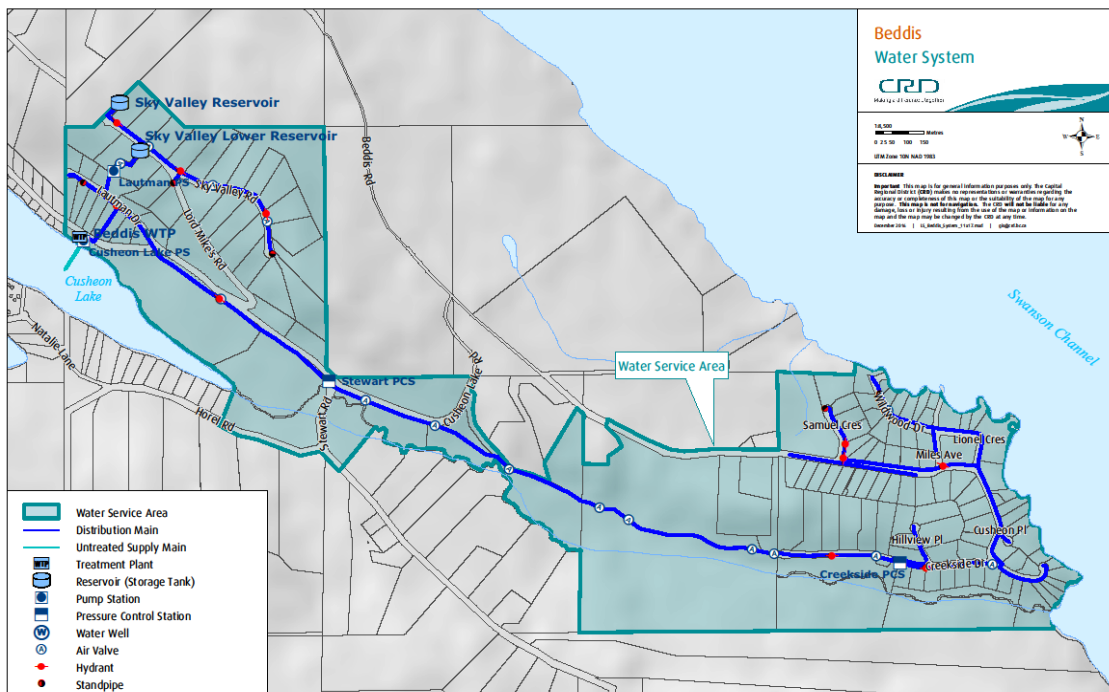


Figure 1: Beddis Water Service

The Beddis water system is primarily comprised of:

- water treatment plant (WTP) that draws water from Cusheon Lake and treats it at a location on Cusheon Road approximately 250m west of Lautman Drive. The water is treated using a rapid mix system, flocculation, dissolved air floatation (DAF) and filters, then chlorination prior to being pumped, via the distribution system to reservoirs. The water treatment plant (WTP) design flow is rate is 16.35 m³/hour (60 lpm);
- approximately 7,200 m of water distribution pipe;
- 1 pump station/re-chlorination station;
- 2 water reservoirs – one 45 m³ (10,000 lgal) and one 76 m³ (16,700 lgal);
- fire hydrants, standpipes, and gate valves;
- water service connections complete with water meters;
- 2 pressure reducing valve stations – one at Stewart Road and one on Creekside Drive.

WATER PRODUCTION AND DEMAND

Referring to Figure 2, 24,241 cubic meters (m³) of water was extracted (water production) from Cusheon Lake in 2020; an 8% decrease from the previous year and is 4% decrease from the five year rolling average. Water demand (customer water billing) for the service totaled 18,861 m³ of water; virtually no change from the previous year and a 2% decrease from the five year rolling average.

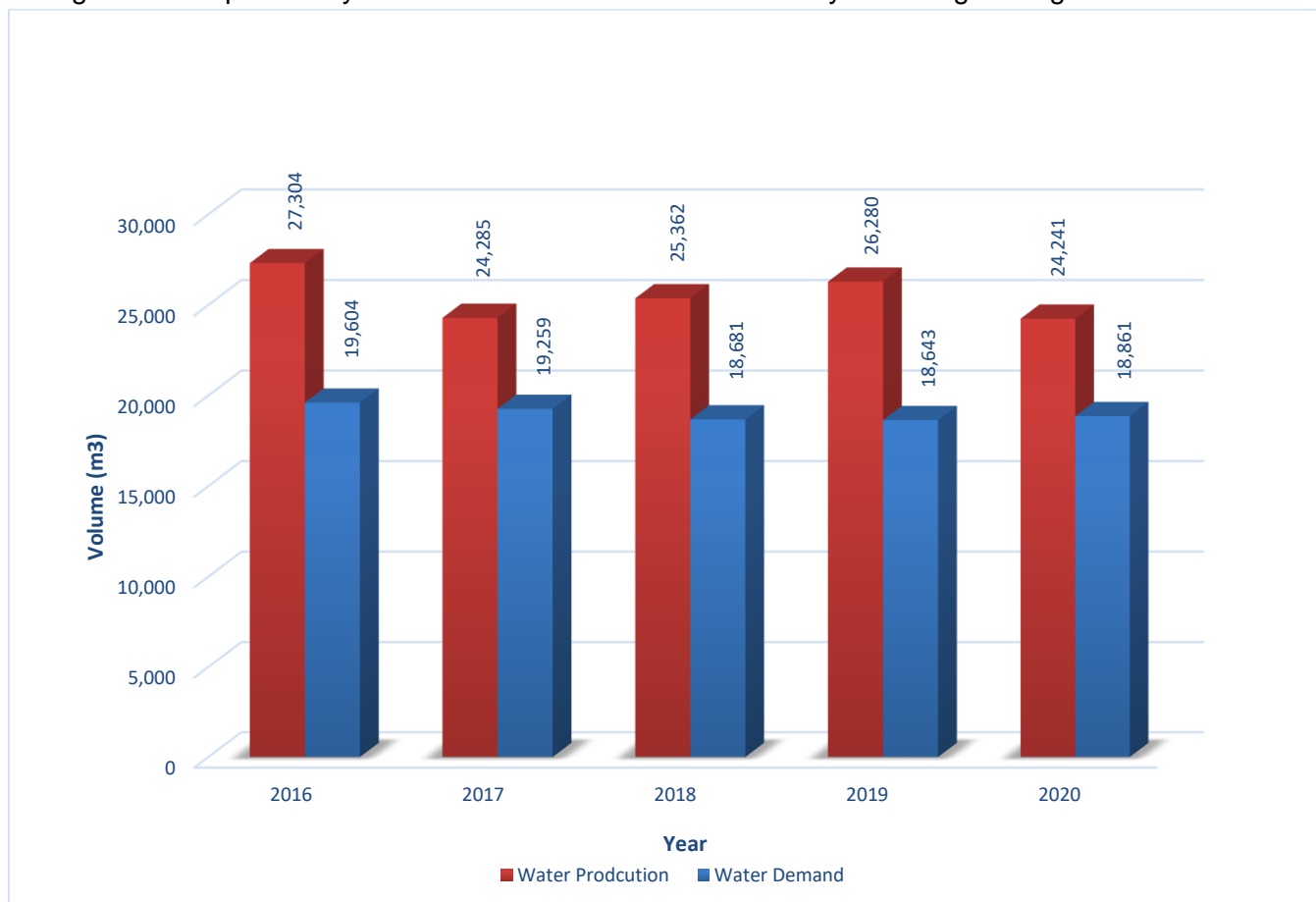


Figure 2: Beddis Water Service Annual Water Production and Demand

Water production by month for the past five years is shown in Figure 3.

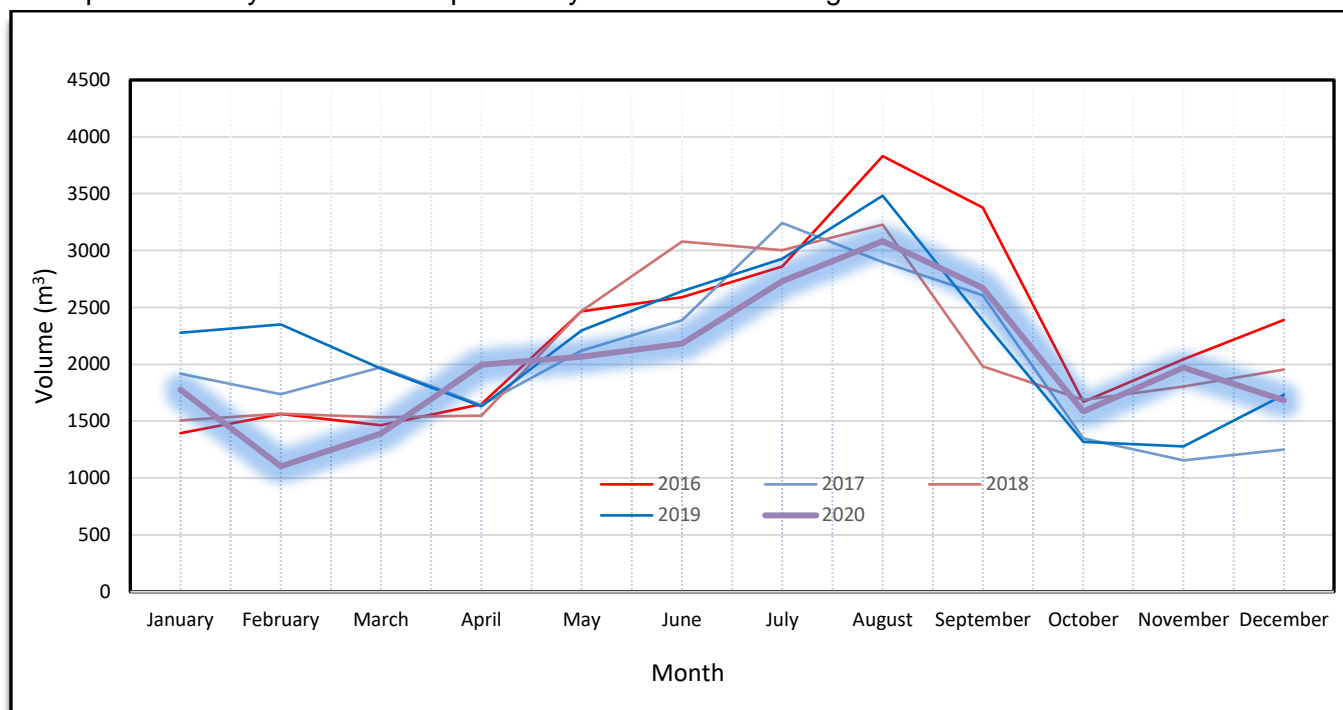


Figure 3: Beddis Water Service Monthly Water Production

The Beddis Water System is fully metered, and water meters are read quarterly. Water meter information enables water production and consumption to be compared in order to estimate leakage losses in the distribution system. The difference between water produced and water demand (total metered consumption) is called non-revenue water and includes distribution leaks, meter error, and unmetered uses such as fire hydrant usage, distribution system maintenance, and process water for the treatment plant. Non-revenue water is approximately 22%. Water loss is estimated to be approximately 20% which is down from the previous year. The amount of water loss is considered acceptable for small water system such as Beddis.

WATER QUALITY

In 2020, the analytical results of water samples collected from the Beddis Water System indicated that the drinking water was of good quality. The source water from Cusheon Lake was of good quality throughout the year with low concentrations of algae, most metals and generally low turbidity. Indicator bacteria concentrations (*E.coli* and total coliforms) in the raw water were very low between October and April and higher during the warm weather season. Manganese concentrations were elevated in Cusheon Lake throughout the year and due to a lack of manganese specific treatment, the aesthetic objective in the Guidelines for Canadian Drinking Water Quality (GCDWQ) was exceeded on several occasions in the treated water (May and November). Manganese concentrations in exceedance of the aesthetic objective can lead to water discolouration and become a nuisance for customers. The maximum acceptable concentration (MAC) in the GCDWQ for manganese was never reached. Besides this, the DAF treatment system functioned very well under these source water conditions. The annual average of the disinfection by-product concentrations was below the limit in the GCDWQ in both sampled locations. There have been individual results that exceeded the MAC for the disinfection by-product trihalomethanes (THM) indicating the potential for exceedances. Other than water temperature, there have been no exceedances of any monitored water quality parameter in the system. There have been no public water quality advisories in 2020.

The data below provides a summary of the water quality characteristics in 2020:

Raw Water:

- The raw water exhibited typically low concentrations of total coliform and *E. coli* bacteria throughout the year with significantly higher concentrations of total coliform and *E. coli* bacteria during the summer months.
- One sample exhibited a low concentration of parasitic oocysts (*Cryptosporidium*). No *Giardia* cysts were detected.
- The raw water samples indicated fluctuating and elevated concentrations of iron and manganese. Manganese concentrations were elevated and typically above the aesthetic objective year round. Episodes of elevated iron and manganese concentrations can lead to discolouration of the drinking water. Manganese has also a health related MAC which was never reached.
- The raw water was soft (median hardness 36.5 mg/L CaCO₃).
- The raw water turbidity (cloudiness) was often below 1 NTU with some higher peaks in the fall and winter. Highest recorded raw water turbidity was 3.6 NTU on February 12.
- The median annual total organic carbon, an indicator of organic compounds and material in the lake water, was a moderate 4.4 mg/L.

Treated Water:

- The treated water was bacteriologically safe to drink. No sample tested positive for total coliform or *E. coli* bacteria.
- The treated water turbidity was consistently well below the turbidity limit of 1.0 NTU with a range from <0.14 NTU to 0.55 NTU.
- The annual average levels of disinfection by-products (TTHM = 75 µg/L) across the distribution system were below the 100 µg/L limit in the GCDWQ. Two samples from the Samuel Road standpipe recorded total THM concentrations of 130 µg/L limit. Haloacetic acid concentrations (HAA) were not tested in 2020 due to the data history of very low concentrations in this system. This parameter will be tested again in 2021.
- The treated water total organic carbon (TOC) was lower than during the previous year, with a median value of 1.75 mg/L. There is currently no guideline in the GCDWQ for TOC levels, however the USEPA suggests a treated water TOC concentration of < 2 mg/L as confirmation of effective treatment and disinfection by-product control.
- All treated water sampled were low in iron concentrations. Manganese concentrations exceeded the aesthetic limits as per GCDWQ in May and November in several locations. Cusheon Lake is known for the potential of seasonally high iron and manganese concentrations. Such exceedances can lead to water discolouration.

Table 1 and 2 below provide a summary of the 2020 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 during the 2020 operating period:

- Water treatment plant:

- ventilation fan corrective maintenance
- clear well level transducer replacement
- chlorine analyser membrane replacement
- Stewarts pressure regulating station water system leak response and repair.
- SCADA alarm troubleshooting.
- 107 Hillview water system leak repair.
- Emergency manual operation of the Lautman Pump Station and Sky Valley Reservoir for a period while emergency capital improvement work was completed and commissioned.

CAPITAL IMPROVEMENTS

The following is a summary of the major capital improvements including year ending spending for 2020:

Asset Management Plan (CE.291.4500): A prioritized list of infrastructure replacements, which will serve as the basis for future capital spending plans.

Project	Spending
Budget	\$20,000
Project Management	(\$5,251)
Contract	(\$14,212)
Project Closed Balance Returned to CWF	\$537

Sky Valley Reservoir Level Control Upgrade (CE.705.): Repair work to the level control system of the Upper Sky Valley Reservoir to monitor and control the system automatically. The lack of functional level control system creates risks to the environment as well as significant additional operating costs. The recommended solution to address the problem involved accessing the top of the reservoir and installing a level measuring transducer inside the reservoir which communicates wirelessly with the Lautman pump station and water treatment plant.

Project	Spending
Budget	\$45,000
Project Management	(\$9,658)
Contract	(\$21,046)
Supplies/Materials	(\$9,335)
Balance Remaining	\$4,961

Water Intake Assessment/Design (CE.676): The intake pumps have been drawing in air/gas, resulting in reduced flow, and even air-locking of the pump(s). Design engineering services were procured, to provide a detailed analysis, technical memo, and (if necessary) construction/procurement tender package, to facilitate construction/installation of a recommended solution.

Project	Spending
Budget	\$20,000
Project Management	(\$1,449)
Design (Engineering, Drafting, etc.)	(\$9,284)
Balance Remaining	\$9,267

Safe Work Procedures (CE.699.4503): The work scope includes reviewing and developing safe work procedures for operational and maintenance tasks.

Project	Spending
Budget	\$12,000
Project Management	(\$444)
Contract	(\$2,478)
Supplies/Materials	(\$209)
Balance Remaining	\$8,870

Back-up Power Design (CE.735.4502): Complete electrical designs for new onsite back up power.

Project	Spending
Budget	\$10,000
Project Management	(\$49)
Balance Remaining	\$9,951

2020 FINANCIAL REPORT

Please refer to the attached 2020 Financial Report. Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), water Sales (Sale-Water), interest on savings (Interest Earnings), a transfer from the Operating Reserve Fund, and miscellaneous revenue such as late payment charges (Other Revenue).

Expenses includes all costs of providing the service. General Government Services includes budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs includes 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 includes 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 it is 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.

As of December 31, 2020, the accumulated deficit was (\$13,650). In alignment with Local Government Act Section 374 (11), if actual expenditures exceed actual revenues, any deficiency must be included in the next year's financial plan. The financial plan approved on March 24, 2021 incorporated this deficit.

WATER SYSTEM PROBLEMS - WHO TO CALL:

To report any event or to leave a message regarding the Beddis Water System, call either:

CRD water system emergency call centre:	1-855-822-4426 (toll free)
CRD water system emergency call centre:	1-250-474-9630 (toll)
CRD water system general enquiries:	1-800-663-4425 (toll free)

When phoning with respect to an emergency, please specify to the operator, the service area in which the emergency has occurred.

Submitted by:	Matthew McCrank, MSc., P.Eng, Senior Manager, Wastewater Infrastructure Operations
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Concurrence	Ted Robbins, BSc, C.Tech, General Manager, Integrated Water Services

Attachment: [2020 Financial Report](#)

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

Table 1: 2020 Summary of Raw Water Test Results, Beddis Water System

PARAMETER		2020 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2010 - 2019 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/Biological									
Chlorophyll a	ug/L	1.44	4	1.02	2.43	≤ 15 AO	2.31	66	ND - 51.6
Colour, True	TCU	16	17	13	30		17	84	11 - 32
Conductivity @ 25C	uS/cm	Last analyzed in 2011				No Guideline Required	114	3	102 - 116
Hardness as CaCO ₃	mg/L	36.5	4	30.2	38.5		35.9	31	17.9 - 45.6
pH	pH Units	7.20	3	7.20	7.20	7.0-10.5 AO	7.30	28	6.91 - 7.70
Carbon, Total Organic	mg/L	4.40	10	3.50	5.20		4.55	32	3.48 - 6.57
Turbidity	NTU	1.10	18	0.40	3.60		1.26	175	ND - 25.1
Water Temperature	Degrees C	17.7	23	4.0	24.5	≤ 15 AO	12.5	630	3.0 - 26.1
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	71	18	1	2700		44	169	0 - 7200
<i>E. coli</i>	CFU/100 mL	1	18	ND	4		0.5	170	0 - 13
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2020					1200	64	170 - 11900
Parasites						No MAC Established			
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	ND	2	ND	2.45	Zero detection desirable	ND	19	ND - 4.40
<i>Giardia</i> , Total cysts	cysts/100 L	ND	2	ND	0	Zero detection desirable	ND	19	ND - 0
Algal Toxins									
Microcystin (Abraxis)	ug/L	ND	4	ND	ND	1.5 MAC	ND	14	ND - 0.0
Anatoxin A	ug/L	Last analyzed in 2014					ND	10	ND - 0.0
Cylindrospermopsin	ug/L	Last analyzed in 2014					ND	10	ND - 0.0
Microcystin-RR	ug/L	Last analyzed in 2014					ND	10	ND - 0.0
Microcystin-YR	ug/L	Last analyzed in 2014					ND	10	ND - 9.18
Microcystin-LR	ug/L	Last analyzed in 2014					ND	10	ND - 0.0
Total Microcystins	ug/L	Last analyzed in 2016				1.5 MAC	ND	13	ND - 9.18
Nodularin	ug/L	Last analyzed in 2014					ND	10	ND - 0.0
Metals									
Aluminum	ug/L as Al	10.65	4	ND	138.0	2900 MAC / 100 OG	25.4	31	ND - 184
Antimony	ug/L as Sb	ND	4	ND	0.0	6 MAC	ND	31	ND - 1.80
Arsenic	ug/L as As	0.27	4	0.17	0.34	10 MAC	0.28	31	ND - 0.76
Barium	ug/L as Ba	6.25	4	5.70	7.0	100 MAC	6.30	31	ND - 13.0
Beryllium	ug/L as Be	ND	4	ND	0.0		ND	31	ND - 0.0
Bismuth	ug/L as Bi	ND	4	ND	0.0		ND	23	ND - 0.0
Boron	ug/L as B	ND	4	ND	0.0	5000 MAC	ND	31	ND - 586
Cadmium	ug/L as Cd	ND	4	ND	0.0	5 MAC	ND	31	ND - 0.02
Calcium	mg/L as Ca	9.95	4	8.41	10.6	No Guideline Required	9.96	31	5.34 - 11.6
Chromium	ug/L as Cr	ND	4	ND	0.0	50 MAC	ND	31	ND - 1.10
Cobalt	ug/L as Co	ND	4	ND	0.0		ND	31	ND - 0.0
Copper	ug/L as Cu	5.53	4	4.46	8.25	2000 MAC / ≤ 1000 AO	7.11	31	ND - 32.5
Iron	ug/L as Fe	150.5	4	91.9	296.0	≤ 300 AO	138.0	31	ND - 855
Lead	ug/L as Pb	0.49	4	0.32	0.83	5 MAC	0.37	31	ND - 3.17
Lithium	ug/L as Li	ND	2	ND	0.0		ND	14	ND - 0.0
Magnesium	mg/L as Mg	2.80	4	2.24	2.94	No Guideline Required	2.63	31	1.10 - 4.76
Manganese	ug/L as Mn	36.6	4	20.7	80.0	120 MAC / ≤ 20 AO	38.5	31	8.00 - 220
Molybdenum	ug/L as Mo	ND	4	ND	0.0		ND	31	ND - 27.0
Nickel	ug/L as Ni	ND	4	ND	0.0		ND	31	ND - 50.0
Potassium	mg/L as K	0.55	4	0.49	0.62		0.54	31	0.15 - 0.72
Selenium	ug/L as Se	ND	4	ND	0.0	50 MAC	ND	31	ND - 0.62
Silicon	mg/L as Si	3.67	4	3.10	4.61		3.84	31	0.43 - 5.88
Silver	ug/L as Ag	ND	4	ND	0.0	No Guideline Required	ND	31	ND - 0.0
Sodium	mg/L as Na	6.21	4	5.12	6.64	≤ 200 AO	6.18	30	1.71 - 15.6
Strontium	ug/L as Sr	72.0	4	58.3	80.5	7000 MAC	68.0	31	ND - 86.0
Sulfur	mg/L as S	ND	4	ND	3.10		ND	23	ND - 5.70
Tin	ug/L as Sn	ND	4	ND	0.0		ND	31	ND - 0.0
Titanium	ug/L as Ti	ND	4	ND	5.90		ND	31	ND - 5.90
Thallium	ug/L as Tl	ND	4	ND	0.0		ND	23	ND - 0.0
Uranium	ug/L as U	ND	4	ND	0.0	20 MAC	ND	23	ND - 0.0
Vanadium	ug/L as V	ND	4	ND	0.0		ND	31	ND - 10.0
Zinc	ug/L as Zn	10.75	4	8.0	14.5	≤ 5000 AO	8.00	31	ND - 200.0
Zirconium	ug/L as Zr	ND	4	ND	0.12		ND	23	ND - 0.13

Table 2: 2020 Summary of Treated Water Test Results, Beddis Water System									
PARAMETER		2020 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2010 - 2019 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Min. Max.		≤ = Less than or equal to	Median	Samples Analyzed	Range Min.-Max.
ND means Not Detected by analytical method used									
Physical Parameters									
Carbon, Total Organic Colour, True Hardness as CaCO ₃ pH Turbidity Water Temperature	mg/L as C TCU mg/L pH units NTU Degress C	1.75 ND 38.6 6.80 ND 8.0	12 17 16 3 18 210	1.50 ND 29.8 6.70 ND 3.0	2.70 6.0 51.9 6.80 0.55 24.0	≤ 15 AO No Guideline Required 7.0-10.5 AO 1 MAC and ≤ 5 AO ≤ 15 AO	2.15 1.10 37.4 6.90 0.24 12.0	65 78 57 21 184 3099	ND - 8.52 ND - 4.0 30.7 - 53.1 6.57 - 9.03 ND - 5.68 1.0 - 26.0
Microbial Parameters									
Indicator Bacteria		ND	95	ND	0	0 MAC	0	727	0 - 4
Coliform, Total <i>E. coli</i>	CFU/100 mL CFU/100 mL	ND	94	ND	0	0 MAC	0	727	ND - 0
Hetero. Plate Count, 7 day	CFU/1 mL	Not tested in 2020				No Guideline Required	10	126	ND - 280
Algal Toxins									
Anatoxin A Cylindrospermopsin Microcystin-RR Microcystin-YR Microcystin-LR Total Microcystins Nodularin	ug/L ug/L ug/L ug/L ug/L ug/L ug/L		Last analyzed in 2014 Last analyzed in 2014 Last analyzed in 2014 Last analyzed in 2014 Last analyzed in 2015 Last analyzed in 2014				ND ND ND ND ND ND ND	2 2 2 2 5 2	ND - 0.0 ND - 0.0 ND - 0.0 ND - 0.0 ND - 0.0 ND - 0.0 ND - 0.0
Disinfectants									
Disinfectants		1.05	209	0.30	2.24	No Guideline Required	0.69	3942	ND - 2.50
Chlorine, Free Residual Chlorine, Total Residual	mg/L as Cl ₂ mg/L as Cl ₂	1.18	210	0.34	2.24	No Guideline Required	0.91	3716	ND - 4.52
Disinfection By-Products									
Trihalomethanes (THMs)									
Bromodichloromethane Bromoform Chloroform Chlorodibromomethane Total Trihalomethanes	ug/L ug/L ug/L ug/L ug/L	12.0 ND 59.0 1.45 73.0	22 22 22 22 22	7.5 ND 37.0 ND 44.0	20.0 0.0 110.0 3.30 130.0		12.0 ND 62.45 0.77 75.7	51 52 52 51 52	ND - 18.0 ND - 0.0 6.91 - 234 ND - 6.88 6.91 - 251
Haloacetic Acids (HAAs)									
HAA5	ug/L	Last analyzed in 2016				80 MAC	29.4	17	13.0 - 232
Metals									
Aluminum Antimony Arsenic Barium Beryllium Bismuth Boron Cadmium Calcium Chromium Cobalt Copper Iron Lead Lithium Magnesium Manganese Molybdenum Nickel Potassium Selenium Silicon Silver Sodium Strontium Sulfur Tin Titanium Thallium Uranium Vanadium Zinc Zirconium	ug/L as Al ug/L as Sb ug/L as As ug/L as Ba ug/L as Be ug/L as Bi ug/L as B ug/L as Cd mg/L as Ca ug/L as Cr ug/L as Co ug/L as Cu ug/L as Fe ug/L as Pb ug/L as Li mg/L as Mg ug/L as Mn ug/L as Mo ug/L as Ni mg/L as K ug/L as Se mg/L as Si ug/L as Ag mg/L as Na ug/L as Sr mg/L as Si ug/L as Sn ug/L as Ti ug/L as Tl ug/L as U ug/L as V ug/L as Zn ug/L as Zr	9.35 ND 0.20 5.65 ND ND ND ND 10.8 ND ND ND 6.49 19.2 0.27 ND 2.44 5.30 ND ND ND 0.55 ND 3.65 ND 8.38 76.85 ND ND ND ND ND 3.80 ND	16 16 16 16 16 16 16 16 16 16 16 16 16 16 8 16 1						

CAPITAL REGIONAL DISTRICT

BEDDIS WATER

Statement of Operations (Unaudited)

For the Year Ended December 31, 2020

	2020	2019
Revenue		
Transfers from government	72,240	72,240
User Charges	87,411	81,270
Sale - Water	77,017	68,622
Other revenue from own sources:		
Interest earnings	107	129
Transfer from Operating Reserve	-	14,514
Other revenue	5,685	475
Total Revenue	242,459	237,249
Expenses		
General government services	9,247	8,330
Contract for Services	72,356	76,113
CRD Labour and Operating costs	41,324	34,289
Debt Servicing Costs	65,208	66,513
Other expenses	50,178	47,004
Total Expenses	238,313	232,249
Net revenue (expenses)	4,146	5,000
Transfers to own funds:		
Capital Reserve Fund	13,373	-
Operating Reserve Fund	4,423	5,000
Annual surplus/(deficit)	(13,650)	-
Accumulated surplus/(deficit), beginning of year	-	-
Accumulated surplus/(deficit), end of year	\$ (13,650)	-

CAPITAL REGIONAL DISTRICT

BEDDIS WATER

Statement of Reserve Balances (Unaudited)

For the Year Ended December 31, 2020

	Capital Reserve	
	2020	2019
Beginning Balance	50,869	75,255
Transfer from Operating Budget	13,373	-
Transfers from Completed Capital Projects	2,461	6,115
Transfer to Capital Project	(52,500)	(32,000)
Interest Income	342	1,499
Ending Balance	14,544	50,869

	Operating Reserve	
	2020	2019
Beginning Balance	10,679	19,652
Transfer from Operating Budget	4,423	5,000
Transfer to Operating Budget	-	(14,514)
Interest Income	181	540
Ending Balance	15,284	10,679