Highland Fernwood Water Service

2020 Annual Report

CRD | Drinking Water

INTRODUCTION

This report provides a summary of the Highland Fernwood 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 Highland Fernwood Water Service is a semi-rural residential community located on Salt Spring Island and includes servicing Fernwood Elementary School.

The Highland service was first developed in the 1970's under the name Vesuvius Holdings and was converted to the Highland Water System in 1978. It then became a CRD service in 2004.

The Fernwood service was created in the 1970's by a private developer and was converted to the Fernwood Improvement Water District in 1984. It then became a Capital Regional District (CRD) service in 1989.

Water service to Highland and Maliview was administered by the Highland Water and Sewer Local Services Commission and water service to Fernwood was administered by the Fernwood Water Local Service Commission. A single commission to administer the merged service was established in 2020.

Previously, the two water services operated on separate treatment and distribution systems both drawing water from St. Mary Lake. As of mid-September 2012, both service areas are supplied through a single water treatment plant and interconnected distribution systems. A new operating budget was established in 2013 to accommodate the single treatment plant and combined distribution systems.

The Highland Fernwood Water Service (Figure 1) is comprised of 333 parcels of land with 321 of those parcels connected to the service.

The service obtains its drinking water from St. Mary Lake, which lies within an uncontrolled multi-use watershed. The CRD holds five licenses to divert a total of up to 230,000 m^3 per year and store up to 30,800 m^3. St. Mary Lake is subject to seasonal water quality changes and is affected by periodic algae blooms.

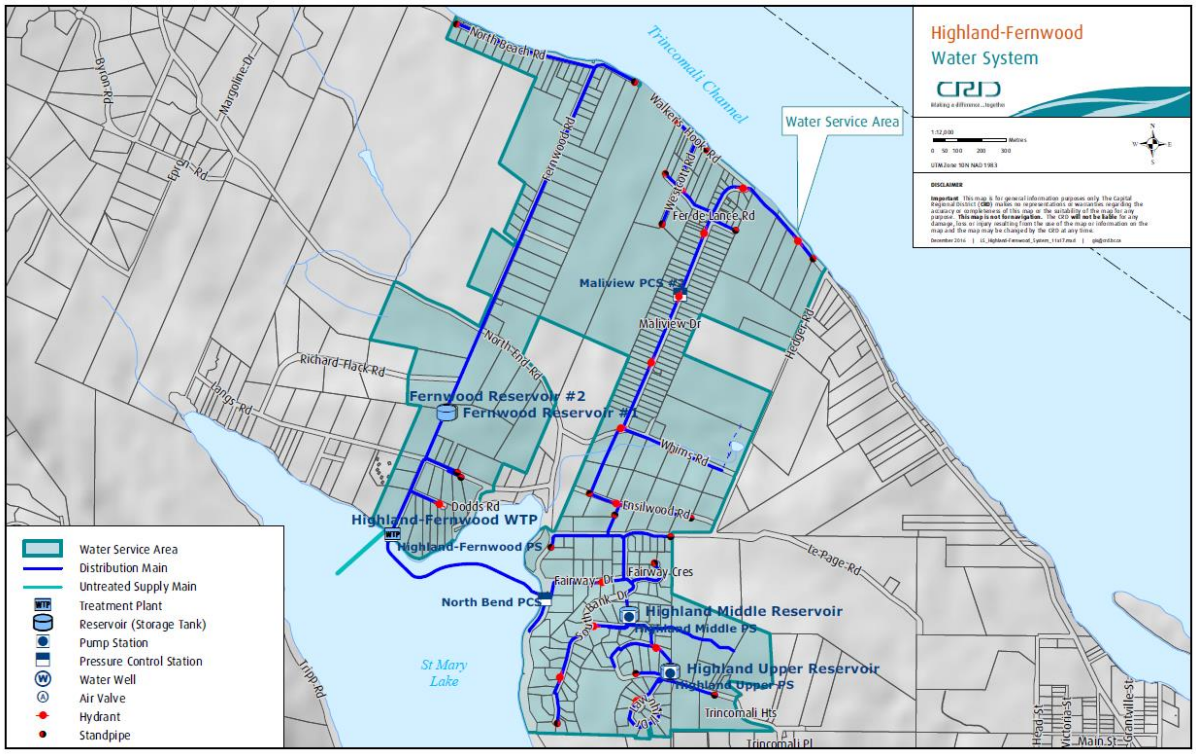

Figure 1: Highland Fernwood Water Service

The Highland Fernwood water system is primarily comprised of:

- a water treatment plant (WTP) that draws water from St. Mary Lake and treats it at a location on Maycock Road, adjacent to the lake. The water is treated using a rapid mix system, flocculation, dissolved air floatation (DAF) and filters, ultraviolet disinfection, then chlorination prior to being pumped, via the distribution system to two different reservoirs. The WTP design flow rate is 11.3 l/sec (150 Igpm);
- one raw water pump station on Maycock Road, adjacent to the lake. (flow rate of two pumps running is 4.6 l/sec (60 Igpm);
- approximately 12,000 m of water distribution pipe;
- 4 water reservoirs – one 180 m^3 (40,000 Ig) on the Highland system, one 91 m^3 (20,000 Ig) on the Highland system, one 45 m^3 (10,000 Ig) on the Fernwood system and, one 91 m^3 (20,000 Ig) on the Fernwood system;
- 2 water system booster pumps:
    - One located at the Highlands Middle Reservoir
    - One located at the Highlands Upper Reservoir
- fire hydrants, standpipes, and gate valves;
- water service connections complete with water meters;
- 2 pressure reducing valve stations - one on North End Road and one on Maliview Drive.

WATER PRODUCTION AND DEMAND

Referring to Figure 2, 78,025 cubic meters (m^3) of water was extracted (water production) from St. Mary Lake in 2020; a 6% increase from the previous year and is a 5% decrease from the five year rolling average. Water demand (customer water billing) for the service totalled 49,854 m^3 of water; a 2% increase from the previous year and a 2% decrease from the five year rolling average.

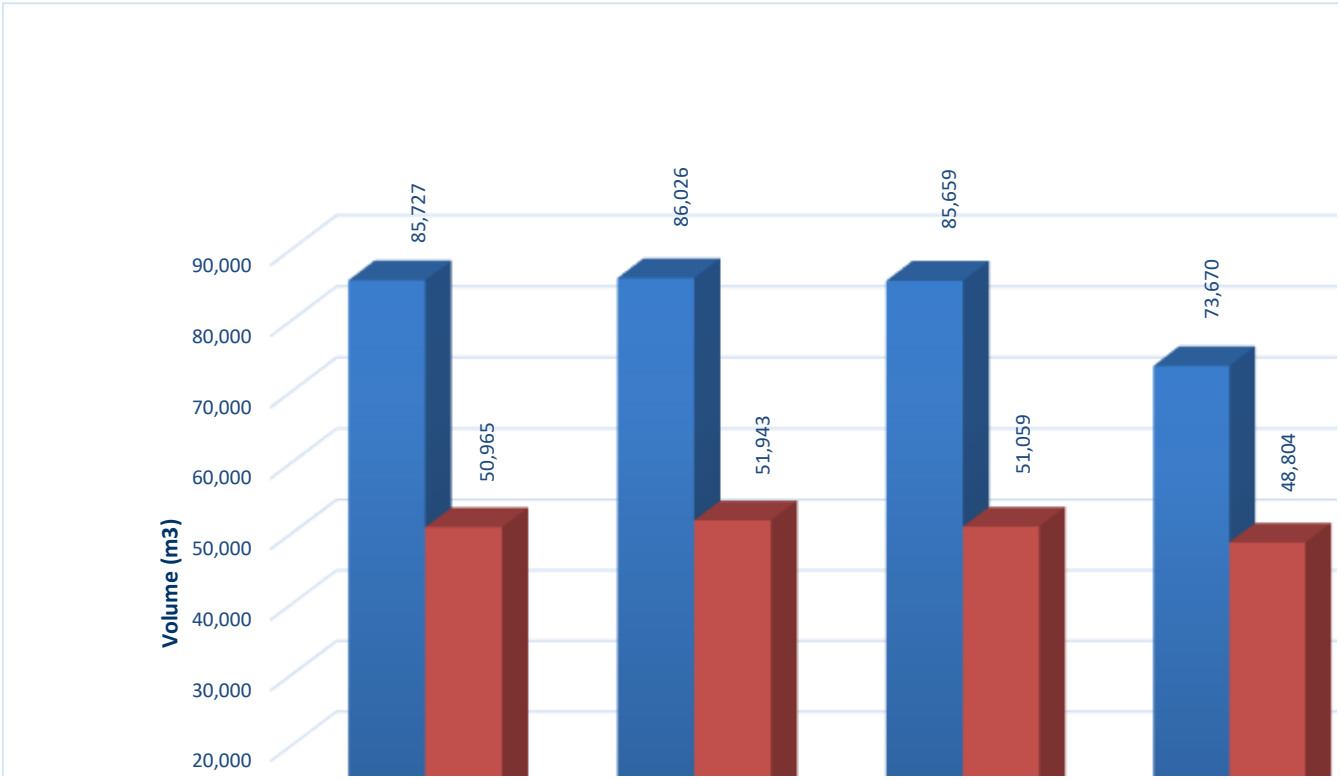

Figure 2: Highland Fernwood Water Service Annual Water Production and Demand

Water production by month for the past five years is shown in Figure 3. As with most water systems, water consumption follows a typical diurnal pattern where the monthly total flow peaks during the summer months. The 2019 monthly flow information is indicative of this diurnal pattern. However, for prior years it can be seen that the monthly flow trending does not follow this pattern and is indicative of water system leaks that influence and skew monthly production data.

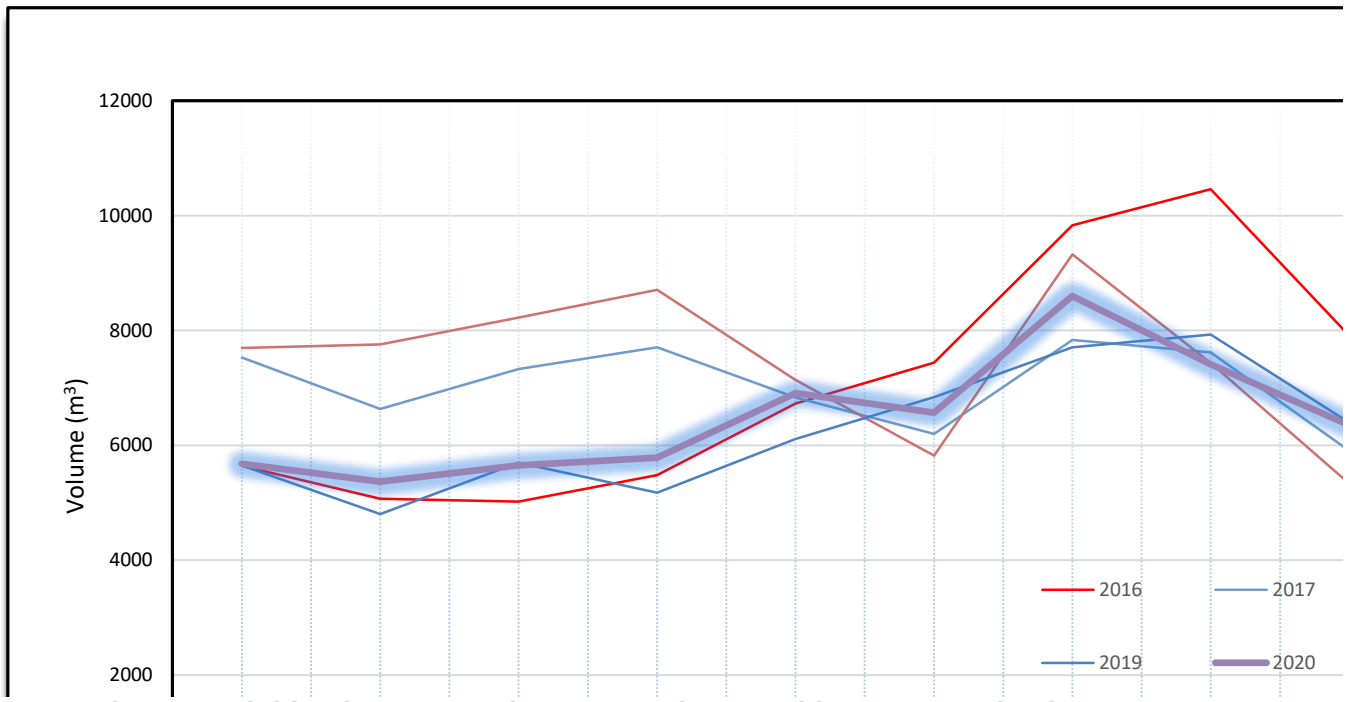

Figure 3: Highlands-Fernwood Water Service Monthly Water Production

The Highland Fernwood Water System is fully metered, and water meters are read quarterly. Water meters are manually read on a quarterly basis and the data 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 36%. Water loss is estimated to be approximately 32% which is considered high for a small water system such as Highland Fernwood.

WATER QUALITY

In 2020, the analytical results (biological, chemical and physical parameters) of water samples collected from the Highland Fernwood Water Systems indicated that the drinking water supplied to the customers was generally of good quality. Both, the Highland and the Fernwood distribution systems had challenges with water main breaks in 2020 that led to two Boil Water Advisories (BWA) in the Highland system (January 7 – 11 and July 17 – 31), and one BWA in the Fernwood system (June 13-15). Also, St. Mary Lake experienced a strong cyanobacteria bloom during the entire summer (May 12 – September 24) which had the potential to produce cyanotoxins. All samples taken from the intake of the Highland/Fernwood Water System tested negative for microcystin, a cyanotoxin frequently associated with such blooms. During this event, the Highland/Fernwood water treatment plant was able to produce safe and good quality drinking water. The Canadian Drinking Water Quality Guideline (GCDWQ) limit for turbidity (1 nephelometric turbidity unit (NTU)) in treated drinking water was exceeded on a number of occasions throughout the year at a few sampling stations in the Highland Distribution System, but also in the Fernwood Distribution System. These stations are typically characterized as low flow locations where particles and sediments are prone to settle in the pipes. A regular distribution pipe flushing program should address this issue.

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 cold weather periods, but much higher spikes during the summer.
- *Cryptosporidium and Giardia* parasites were detected in low concentrations in 2020.
- The analyses of raw water samples indicated low concentrations of iron and but elevated concentrations of manganese in the fall (November).
- The raw water was slightly hard (median hardness 38.9 mg/L $CaCO_3$).
- The raw water turbidity (cloudiness) was near 1 NTU during most months, but well over 1 NTU between July and October. Highest raw water turbidity was registered in July with 2.3 NTU. This was as a result of algal activity.
- A median annual total organic carbon (TOC) concentration of 3.40 mg/L confirms the mesotrophic (semi-productive) to eutrophic (productive) status of St. Mary Lake.
- The summer-long cyanobacteria bloom in St Mary Lake finally subsided in late September. Despite the strong bloom, no cyanotoxins (microcystin) were detected in the raw water entering the treatment plant in 2020.

Treated Water:

- The treated water was safe to drink outside the periods with a BWA; no indicator bacteria were detected in any Fernwood Distribution System sample throughout the year. The Highland System had 3 consecutive total coliform positive results in one sampling location (November 17, 24, 26). An investigation revealed that a bird had built a nest inside the standpipe that was used for sampling. After the standpipe was cleaned and disinfected, the samples from this location tested negative for indicator bacteria.
- The treated water turbidity was typically well below the turbidity limit of 1.0 NTU throughout the year in most parts of the system. However, a few standpipes in the Highland and also in the Fernwood system occasionally registered elevated turbidity. These low flow locations need to be flushed regularly to remove accumulated pipe sediments.
- The levels of disinfection by-products (THM) across the Fernwood and the Highland Distribution System were well below the 100 µg/L limit in the GCDWQ. Haloacetic acids (HAA) were not tested in 2020 due to a history of concentrations consistently well below the GCDWQ limit of 80 µg/L. HAA concentrations will be tested again in 2021.
- The treated water TOC in both distribution systems was lower than in previous years, ranging from 1.4 to 2.0 mg/L in the Fernwood Distribution System, and 1.3 to 2.0 mg/L in the Highland Distribution System. 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.
- Elevated iron and/or manganese concentrations, which can lead to water discolouration, have been below the aesthetic guideline limits throughout both distribution systems.
- One sample from a standpipe in the Fernwood System exhibited elevated lead concentrations when insufficiently flushed prior to sampling.

Table 1, 2 and 3 attached below provide a summary of the 2020 raw and treated water test results.

Water Quality data collected from these two distribution systems can be reviewed on the following 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:

- Emergency water distribution system multiple leak detection responses.
- Water system leak repair 120 LePage Road (resulted in a boil water advisory)
- Water system leak repair 324 Fernwood Road (resulted in a boil water advisory)
- Water system leak repair 201 Ensilwood Road
- Water system leak repair 272 Maliview Drive
- Water system leak repair 150 Southbank Drive
- Water Treatment Plant booster pump corrective maintenance
- Water Treatment Plant UV system corrective maintenance
- Emergency response to clogged raw water intake system

CAPITAL IMPROVEMENTS

Fernwood and Highland Water Capital

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

Water Intake Assessment (CE.677)
Fernwood water intake has not been performing as it should. Investigation and design of a new intake was commenced by a consultant engaged by the CRD.

Project	Spending
Budget	$20,000
Project Management	($1,726)
Design (Engineering, Drafting, etc.)	($9,284)
Balance Remaining	**$8,990**

Safe Work Procedures (CE.699.4501)
The work scope includes reviewing and developing safe work procedures for operational and maintenance tasks.

Project	Spending
Budget	$17,000
Project Management	($444)
Contract	($3,177)
Supplies/Materials	($209)
Balance Remaining	**$13,170**

Waste Pump Design and Construction (CE.707)

The control panel and pump for the DAF waste pump at the Highland Fernwood water treatment plant requires replacement. Investigation and design of a new waste pump will be completed by a consultant engaged by the CRD.

Project	Spending
Budget	$80,000
Project Management	($1,589)
Balance Remaining	**$78,411**

Highland Upper Reservoir (CE.360.4655)

The Highland Upper Reservoir requires replacement. Investigation and design of a new reservoir is in progress by a consultant engaged by the CRD.

Project	Spending
Budget	$50,000
Project Management	($5,062)
Balance Remaining	**$44,938**

2020 FINANCIAL REPORT

Please refer to the attached 2020 Financial Reports. 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 ($100,918) for Highland Fernwood Water Service. 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 Highland/Fernwood 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.

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Attachment:

Table 1: 2020 Summary of Raw Water Test Results, Highland / Fernwood Water System

Table 2: 2020 Summary of Treated Water Test Results, Fernwood Distribution System

Table 3: 2020 Summary of Treated Water Test Results, Highland Distribution System

Attachment 1 2020 Financial Report - Highland/Fernwood Water

Attachment 2 2020 Financial Report -Highland Water (Debt Service)

Attachment 3 2020 Financial Report - Fernwood Water (Debt Service)

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

Table 1: 2020 Summary of Raw Water Test Results, Highland / Fernwood Water System

PARAMETER		2020 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2010 - 2019 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum	Range Maximum	≤ = Less than or equal to	Median	Samples Analyzed	Range Minimum-Maximum
ND means Not Detected by analytical method used									
Physical/Biological Parameters									
Carbon, Total Organic	mg/L as C	**3.40**	4	2.90	4.30		4.10	16	2.80 - 5.67
Chlorophyll	ug/L	**6.8**	1	6.77	6.77		8.51	34	0.85 - 22.2
Colour, True	TCU	**8.0**	14	3.0	25		6.80	64	3.7 - 10.3
Hardness as $CaCO_3$	mg/L	**38.9**	4	36.0	39.2	No Guideline Required	39.2	20	28.1 - 46.1
pH	pH units	**8.6**	1	8.6	8.6	7.0 - 10.5 AO	7.70	21	7.18 - 8.90
Turbidity	NTU	**1.10**	17	0.60	2.30		1.26	186	0.10 - 27.1
Water Temperature	°C	**18.0**	20	5.0	23.0	15°C AO	14.0	54	5.0 - 24.6
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	**300**	17	70	1400		63	137	0 - 6000
E. coli	CFU/100 mL	**ND**	17	ND	4		1	138	ND - 12
Hetero. Plate Count, 7 day	CFU/1 mL	Last analyzed in 2013							
Algal Toxins									
Microcystin (Abraxis)	ug/L	**ND**	1	ND	0	1.5	ND	90	ND - 1.00
Cryptosporidium , Total oocysts	oocysts/100 L	**1**	2	0.49	1.92	Zero detection desirable	ND	14	ND - 0
Giardia , Total cysts	cysts/100 L	**ND**	2	ND	0.98	Zero detection desirable	0	14	ND - 1.20
Metals									
Aluminum	ug/L as Al	**10.25**	4	ND	22.0	2900 MAC / 100 OG	8	21	ND - 41.8
Antimony	ug/L as Sb	**ND**	4	ND	0.0	6 MAC	ND	21	ND - 0.54
Arsenic	ug/L as As	**0.41**	4	0.40	0.67	10 MAC	0.50	21	ND - 0.85
Barium	ug/L as Ba	**11.6**	4	10.2	13.3	100 MAC	12.10	21	ND - 15.1
Beryllium	ug/L as Be	**ND**	4	ND	0.0		ND	34	ND - 0.0
Bismuth	ug/L as Bi	**ND**	4	ND	0.0		ND	17	ND - 0.0
Boron	ug/L as B	**ND**	4	ND	54.0	5000 MAC	ND	21	ND - 56.0
Cadmium	ug/L as Cd	**ND**	4	ND	0.0	5 MAC	ND	21	ND - 0.10
Calcium	mg/L as Ca	**9.98**	4	9.25	10.1	No Guideline Required	10.3	21	7.85 - 12.3
Chromium	ug/L as Cr	**ND**	4	ND	0.0	50 MAC	ND	21	ND - 0.0
Cobalt	ug/L as Co	**ND**	4	ND	0.0		ND	21	ND - 0.03
Copper	ug/L as Cu	**1.37**	4	1.11	1.83	2000 MAC / ≤ 1000 AO	1.30	21	ND - 4.55
Iron	ug/L as Fe	**19.8**	4	6.0	73.7	≤ 300 AO	27.0	21	ND - 176
Lead	ug/L as Pb	**ND**	4	ND	0.0	5 MAC	ND	21	ND - 0.50
Lithium	ug/L as Li	**8.40**	1	8.40	8.40		8.35	8	7.50 - 11.5
Magnesium	mg/L as Mg	**3.35**	4	3.14	3.47	No Guideline Required	3.33	21	1.09 - 4.47
Manganese	ug/L as Mn	**16.75**	4	7.40	48.4	120 MAC / ≤ 20 AO	23.4	21	ND - 85.8
Molybdenum	ug/L as Mo	**ND**	4	ND	0.0		ND	21	ND - 4.40
Nickel	ug/L as Ni	**ND**	4	ND	0.0		ND	21	ND - 0.30
Potassium	mg/L as K	**0.79**	4	0.68	0.84		0.82	21	0.31 - 1.62
Selenium	ug/L as Se	**ND**	4	ND	0.0	50 MAC	ND	21	ND - 0.50
Silicon	ug/L as Si	**1062**	4	736	2171		1630	21	345 - 9530
Silver	ug/L as Ag	**ND**	4	ND	0.0	No Guideline Required	ND	34	ND - 0.06
Sodium	mg/L as Na	**19.7**	4	18.1	20.5	≤ 200 AO	20.0	21	ND - 87.3
Strontium	ug/L as Sr	**96.4**	4	87.7	99.9	7000 MAC	94.0	21	36.0 - 116.0
Sulphur	mg/L as S	**4.80**	4	4.30	5.60		4.7	17	ND - 8.70
Tin	ug/L as Sn	**ND**	4	ND	0.0		ND	21	ND - 0.0
Titanium	ug/L as Ti	**ND**	4	ND	0.0		ND	21	ND - 0.82
Thallium	ug/L as Tl	**ND**	4	ND	0.0		ND	17	ND - 0.0
Uranium	ug/L as U	**ND**	4	ND	0.0	20 MAC	ND	17	ND - 0.0
Vanadium	ug/L as V	**ND**	4	ND	0.0		ND	21	ND - 0.0
Zinc	ug/L as Zn	**ND**	4	ND	0.0	≤ 5000 AO	ND	20	ND - 136
Zirconium	ug/L as Zr	**ND**	4	ND	0.0		ND	17	ND - 0.0

Table 2: 2020 Summary of Treated Water Test Results, Fernwood Distribution System									
PARAMETER		2020 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2010 - 2019 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Min.	Range Max.	≤ = Less than or equal to	Median	Samples Analyzed	Range Min.-Max.
ND means Not Detected by analytical method used									
Physical Parameters									
Hardness as $CaCO_3$	mg/L	**40.5**	9	36.6	43.3		41.0	181	35.1 - 49.1
Carbon, Total Organic	mg/L as C	**1.85**	4	1.40	2.00		2.20	29	ND - 9.28
Colour, True	TCU	Not tested in 2020					1.51	1	1.51 - 1.51
pH	pH units	**8.1**	1	8.1	8.1		7.50	1	7.50 - 7.50
Turbidity	NTU	**0.25**	20	ND	8.60	1 MAC and ≤ 5 AO	0.59	196	ND - 10.5
Water Temperature	°C	**13.0**	47	7.0	19.0	15°C AO	14	157	0.0 - 20.5
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	**ND**	57	ND	0	0 MAC	ND	218	ND - 5
E. coli	CFU/100 mL	**ND**	57	ND	0	0 MAC	ND	218	ND - 0
Hetero. Plate Count, 7 day	CFU/1 mL	**ND**	16	ND	60	No Guideline Required	10	73	ND - 800
		Not tested in 2020							
Algal Toxins									
Microcystin (Abraxis)	ug/L	**ND**	1	ND	0	1.5	ND	41	ND - 0.0
Anatoxin A	ug/L	Last analyzed in 2013					ND	90	ND - 0.16
Cylindrospermopsin	ug/L	Last analyzed in 2013					ND	90	
Microcystin-RR	ug/L	Last analyzed in 2013					ND	93	
Microcystin-YR	ug/L	Last analyzed in 2013					ND	90	ND - 0.56
Microcystin-LR	ug/L	Last analyzed in 2013				1.5 MAC	ND	90	ND - 0.16
Microcystin-LA	ug/L	Last analyzed in 2013					ND	26	
Nodularin	ug/L	Last analyzed in 2013					ND	90	
Disinfectants									
Disinfectants									
Chlorine, Free Residual	mg/L as Cl2	**1.14**	63	0.21	2.2	No Guideline Required	1.06	1071	0.20 - 3.30
Chlorine, Total Residual	mg/L as Cl_2	**1.38**	54	0.29	2.17	No Guideline Required	1.27	1067	0.01 - 4.00
Disinfection By-Products									
Trihalomethanes (THMs)									
Bromodichloromethane	ug/L	**13**	4	13.0	15		13.2	31	6.94 - 28.4
Bromoform	ug/L	**ND**	4	ND	0		ND	31	ND - 0.0
Chloroform	ug/L	**24.0**	4	20.0	27.0		23	31	12.7 - 115.0
Chlorodibromomethane	ug/L	**4.95**	4	4.7	5.4		4.9	31	2.19 - 32.1
Total Trihalomethanes	ug/L	**45**	4	37.0	47	100 MAC	42	30	23.0 - 145.0
Haloacetic Acids (HAAs)									
HAA5	ug/L	Not analyzed in 2020				80 MAC	10.75	6	ND - 22.2
Metals									
Aluminum	ug/L as Al	**7.7**	9	4.1	389.0	2900 MAC / 100 OG	13.2	18	5.70 - 219.0
Antimony	ug/L as Sb	**ND**	9	ND	0.0	6 MAC	ND	18	ND - 0.0
Arsenic	ug/L as As	**0.28**	9	0.2	0.8	10 MAC	0.32	18	0.20 - 0.55
Barium	ug/L as Ba	**11.5**	9	9.9	13.1	100 MAC	12.3	18	10.7 - 16.4
Beryllium	ug/L as Be	**ND**	9	ND	0.0		ND	18	ND - 0.0
Bismuth	ug/L as Bi	**ND**	9	ND	0.0		ND	18	ND - 0.0
Boron	ug/L as B	**ND**	9	ND	51.0	5000 MAC	ND	18	ND - 53.0
Cadmium	ug/L as Cd	**ND**	9	ND	0.0	5 MAC	ND	18	ND - 0.02
Calcium	mg/L as Ca	**10.6**	9	9.5	12.1	No Guideline Required	11.05	18	8.90 - 15.3
Chromium	ug/L as Cr	**ND**	9	ND	0.0	50 MAC	ND	18	ND - 0.0
Cobalt	ug/L as Co	**ND**	9	ND	0.0		ND	18	ND - 0.23
Copper	ug/L as Cu	**8.49**	9	3.0	75.9	2000 MAC / ≤ 1000 AO	4.10	18	1.50 - 25.2
Iron	ug/L as Fe	**34.2**	9	19.6	224.0	≤ 300 AO	57.85	18	23.7 - 770.0
Lead	ug/L as Pb	**0.57**	9	0.3	6.71	5 MAC	0.49	20	ND - 78.1
Lithium	ug/L as Li	**8.1**	3	7.7	11.7				
Magnesium	mg/L as Mg	**3.16**	9	2.9	3.4	No Guideline Required	2.95	18	2.52 - 3.57
Manganese	ug/L as Mn	**1.6**	9	ND	150.0	120 MAC / ≤ 20 AO	7.05	18	ND - 145.0
Molybdenum	ug/L as Mo	**ND**	9	ND	0.0		ND	18	ND - 0.0
Nickel	ug/L as Ni	**ND**	9	ND	0.0		ND	18	ND - 0.0
Potassium	mg/L as K	**0.77**	9	0.7	0.8		0.78	18	0.76 - 0.87
Selenium	ug/L as Se	**ND**	9	ND	0.0	50 MAC	ND	18	ND - 0.0
Silicon	ug/L as Si	**1310**	9	796	1940.0		1550	18	405 - 3700
Silver	ug/L as Ag	**ND**	9	ND	0.0	No Guideline Required	ND	18	ND - 0.0
Sodium	mg/L as Na	**22.4**	9	19.9	23.3	≤ 200 AO	22.6	18	19.8 - 25.2
Strontium	ug/L as Sr	**99.4**	9	87.1	104.0	7000 MAC	94.9	18	88.2 - 106.0
Sulphur	mg/L as S	**4.2**	9	3.9	5.4		4.85	18	3.80 - 5.40
Tin	ug/L as Sn	**ND**	9	ND	0.0		ND	18	ND - 0.0
Titanium	ug/L as Ti	**ND**	9	ND	0.0		ND	18	ND - 0.0
Thallium	ug/L as Th	**ND**	9	0.0	0.04		ND	18	ND - 0.04
Uranium	ug/L as U	**ND**	9	ND	0.0	20 MAC	ND	18	ND - 0.0
Vanadium	ug/L as V	**ND**	9	ND	0.0		ND	18	ND - 0.0
Zinc	ug/L as Zn	**20.8**	9	10.7	37.3	≤ 5000 AO	16.2	18	5.60 - 76.2
Zirconium	ug/L as Zr	**ND**	9	ND	0.0		ND	18	ND - 0.0

Table 3: 2020 Summary of Treated Water Test Results, Highland Distribution System									
PARAMETER		2020 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2010 - 2019 RESULTS		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Min.	Range Max.	≤ = Less than or equal to	Median	Samples Analyzed	Range Min.-Max.
ND means Not Detected by analytical method used									
Physical Parameters									
Hardness as $CaCO_3$	mg/L	**42.5**	8	36.9	48.6		43	26	34.1 - 54.9
Carbon, Total Organic	mg/L as C	**1.80**	12	1.30	2.00		1.95	64	ND - 19.7
Colour, True	TCU	Not tested in 2020					1.95	2	1.80 - 2.10
pH	pH units	7.40	4	7.30	8.10		6.96	15	6.55 - 7.57
Turbidity	NTU	**0.18**	52	ND	2.10	1 MAC and ≤ 5 AO	0.40	476	ND - 37.8
Water Temperature	**°C**	**13.0**	144	5.0	22.6	15°C AO	12.7	411	0.0 - 24.5
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	**ND**	179	ND	209	0 MAC	ND	1065	ND - 106
E. coli	CFU/100 mL	**ND**	179	ND	0	0 MAC	ND	1065	ND - 1
Hetero. Plate Count 7 day	CFU/1 mL	Not tested in 2020				No Guideline Required	30	58	ND - 310
Algal Toxins									
Microcystin (Abraxis)	ug/L	**ND**	1	ND	0	1.5	ND	41	ND - 0.0
Anatoxin A	ug/L	Last analyzed in 2013					ND	85	ND - 0.0
Cylindrospermopsin	ug/L	Last analyzed in 2013					ND	85	ND - 0.0
Microcystin-RR	ug/L	Last analyzed in 2013					ND	84	ND - 0.0
Microcystin-YR	ug/L	Last analyzed in 2013					ND	85	ND - 0.58
Microcystin-LR	ug/L	Last analyzed in 2013				1.5 MAC	ND	85	ND - 0.51
Microcystin-LA	ug/L	Last analyzed in 2013					ND	28	ND - 0.0
Nodularin	ug/L	Last analyzed in 2013					ND	85	ND - 0.0
Disinfectants									
Disinfectants									
Chlorine, Free Residual	mg/L as Cl2	**1.29**	194	0.20	2.20	No Guideline Required	0.85	3928	ND - 5.30
Chlorine, Total Residual	mg/L as Cl_2	**1.43**	174	0.34	2.20	No Guideline Required	1.08	3930	0.02 - 9.10
Disinfection By-Products									
Trihalomethanes (THMs)									
Bromodichloromethane	ug/L	**15.5**	8	14.0	25.0		17.0	62	ND - 31.9
Bromoform	ug/L	**ND**	8	ND	0.0		ND	62	ND - 4.20
Chloroform	ug/L	**27.5**	8	24.0	62.0		32.8	63	6.41 - 127.0
Chlorodibromomethane	ug/L	**5.65**	8	4.90	9.40		5.99	63	ND - 31.7
Total Trihalomethanes	ug/L	**51.0**	8	44.0	92.0	100 MAC	56.1	60	14.6 - 161.0
Haloacetic Acids (HAAs)									
HAA5	ug/L	Not tested in 2020				80 MAC	18.2	12	9.21 - 37.7
Metals									
Aluminum	ug/L as Al	**14.85**	8	6.2	41.2	2900 MAC / 100 OG	15.75	26	4.50 - 58.8
Antimony	ug/L as Sb	**ND**	8	ND	0.0	6 MAC	ND	26	ND - 0.0
Arsenic	ug/L as As	**0.28**	8	0.2	0.5	10 MAC	0.29	26	0.20 - 0.51
Barium	ug/L as Ba	**11.1**	8	6.7	12.1	100 MAC	11.8	26	7.50 - 14.6
Beryllium	ug/L as Be	**ND**	8	ND	0.0		ND	26	ND - 0.0
Bismuth	ug/L as Bi	**ND**	8	ND	0.0		ND	26	ND - 0.0
Boron	ug/L as B	**ND**	8	ND	53.0	5000 MAC	ND	26	ND - 51.0
Cadmium	ug/L as Cd	**ND**	8	ND	0.0	5 MAC	ND	26	ND - 0.0
Calcium	mg/L as Ca	**12.4**	8	9.5	16.8	No Guideline Required	13.1	26	8.57 - 19.1
Chromium	ug/L as Cr	**ND**	8	ND	0.0	50 MAC	ND	26	ND - 0.0
Cobalt	ug/L as Co	**ND**	8	ND	0.0		ND	26	ND - 0.0
Copper	ug/L as Cu	**3.89**	8	2.0	5.7	2000 MAC / ≤ 1000 AO	5.69	26	2.49 - 19.5
Iron	ug/L as Fe	**35.1**	8	ND	237.0	≤ 300 AO	58.85	26	ND - 591.0
Lead	ug/L as Pb	**ND**	8	ND	0.4	5 MAC	0.35	26	ND - 3.62
Lithium	ug/L as Li	**8.1**	2	8.1	8.1		7.35	2	7.30 - 7.40
Magnesium	mg/L as Mg	**2.73**	8	1.0	3.5	No Guideline Required	2.70	26	1.12 - 3.70
Manganese	ug/L as Mn	**2.45**	8	ND	14.2	120 MAC / ≤ 20 AO	3.15	26	ND - 57.9
Molybdenum	ug/L as Mo	**ND**	8	ND	0.0		ND	26	ND - 0.0
Nickel	ug/L as Ni	**ND**	8	ND	0.0		ND	26	ND - 0.0
Potassium	mg/L as K	**0.76**	8	0.7	0.85		0.80	26	0.72 - 0.90
Selenium	ug/L as Se	**ND**	8	ND	0.0	50 MAC	ND	26	ND - 0.0
Silicon	ug/L as Si	**1375**	8	706	2020.0		1735	26	322 - 3490
Silver	ug/L as Ag	**ND**	8	ND	0.0	No Guideline Required	ND	26	ND - 0.0
Sodium	mg/L as Na	**22.5**	8	21.0	23.0	≤ 200 AO	22.45	26	19.3 - 25.4
Strontium	ug/L as Sr	**98.55**	8	90.8	104.0	7000 MAC	101.0	26	87.0 - 115.0
Sulphur	mg/L as S	**4.55**	8	4.1	5.3		4.95	26	3.80 - 5.90
Tin	ug/L as Sn	**ND**	8	ND	0.0		ND	26	ND - 0.0
Titanium	ug/L as Ti	**ND**	8	ND	0.0		ND	26	ND - 0.0
Thallium	ug/L as Th	**ND**	8	ND	0.0		ND	26	ND - 0.0
Uranium	ug/L as U	**ND**	8	ND	0.0	20 MAC	ND	26	ND - 0.0
Vanadium	ug/L as V	**ND**	8	ND	0.0		ND	26	ND - 0.0
Zinc	ug/L as Zn	**14.65**	8	ND	20.9	≤ 5000 AO	11.2	26	ND - 42.1
Zirconium	ug/L as Zn	**ND**	8	ND	0.0		ND	26	ND - 0.0

CAPITAL REGIONAL DISTRICT

HIGHLAND / FERNWOOD WATER
Statement of Operations (Unaudited)
For the Year Ended December 31, 2020

		2020	2019
Revenue			
Transfers from government		56,822	55,000
User Charges		283,083	275,469
Sale - Water		55,805	39,495
Other revenue from own sources:			
Insurance claim reimbursement		4,250	-
Interest earnings		-	62
Transfer from Operating Reserve Fund		34,262	31,612
Other revenue		1,492	1,154
Total Revenue		435,715	402,791
Expenses			
General government services		16,822	15,659
Contract for Services		21,102	11,474
CRD Labour and Operating costs		273,289	234,570
Debt Servicing Costs		41,351	41,364
Other expenses		117,480	80,724
Total Expenses		470,043	383,791
Net revenue (expenses)		(34,328)	19,000
Transfers to own funds:			
Capital Reserve Fund		47,210	-
Operating Reserve Fund		19,380	19,000
Annual surplus/(deficit)		(100,918)	-
Accumulated surplus/(deficit), beginning of year		-	-
Accumulated surplus/(deficit), end of year	$	(100,918)	-

CAPITAL REGIONAL DISTRICT

HIGHLAND / FERNWOOD WATER
Statement of Reserve Balances (Unaudited)
For the Year Ended December 31, 2020

	Capital Reserve	
	2020	**2019**
Beginning Balance	55,892	103,201
Transfer from Operating Budget	47,210	-
Transfers from Completed Capital Projects	-	-
Transfer to Capital Project	(80,000)	(53,024)
Interest Income	2,643	5,715
Ending Balance	25,744	55,892

	Operating Reserve	
	2020	**2019**
Beginning Balance	17,345	28,840
Transfer from Operating Budget	19,380	19,000
Transfer to Operating Budget	(34,262)	(31,612)
Interest Income	356	1,116
Ending Balance	2,818	17,345

CAPITAL REGIONAL DISTRICT

HIGHLAND WATER
Statement of Operations (Unaudited)
For the Year Ended December 31, 2020

		2020	2019
Revenue			
Transfers from government		30,514	36,840
Other revenue from own sources:			
Interest earnings		34	94
Other revenue		108	119
Total Revenue		30,656	37,053
Expenses			
General government services		876	1,456
Debt Servicing Costs		30,866	34,560
Total Expenses		31,742	36,016
Net revenue (expenses)		(1,086)	1,037
Annual surplus/(deficit)		(1,086)	1,037
Accumulated surplus/(deficit), beginning of year		1,120	83
Accumulated surplus/(deficit), end of year	$	33	1,120

CAPITAL REGIONAL DISTRICT

FERNWOOD WATER
Statement of Operations (Unaudited)
For the Year Ended December 31, 2020

		2020	2019
Revenue			
Transfers from government		16,138	18,980
Other revenue from own sources:			
Interest earnings		25	43
Other revenue		53	58
Total Revenue		16,216	19,081
Expenses			
General government services		821	1,373
CRD Labour and Operating costs		-	-
Debt Servicing Costs		14,646	17,300
Total Expenses		15,467	18,673
Net revenue (expenses)		749	408
Annual surplus/(deficit)		749	408
Accumulated surplus/(deficit), beginning of year		451	43
Accumulated surplus/(deficit), end of year	$	1,200	451