

Highland/Fernwood Water System

2019 Annual Report

CRD | **Drinking Water**

Introduction

This report provides a summary of the Highland/Fernwood Water Service for 2019. 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.

The AGM content in this report is for the combined Highland and Fernwood Water Utility. This utility has been operating as a combined entity since 2012; however, a joint commission has not been established at this time. A bylaw to formally establish the commission is in progress, but is not complete. Therefore, all discussions and motions are assumed to be independently supported by the Fernwood Water Service Commission and the Highland Water and Sewer Service Commission unless specifically indicated otherwise. For the purpose of this report, the term Commission refers to the Fernwood Water Service Commission and the Highland Water and Sewer Service Commission working together as a single commission.

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 CRD service in 1989.

Water service to Highland and Maliview are administered by the Highland Water and Sewer Local Services Commission and water service to Fernwood is administered by the Fernwood Water Local Service Commission. The intent is to establish a single commission to administer the merged service, but this has not been completed at the end of 2018 and is now scheduled to be done in 2019.

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 320 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 Capital Regional District (CRD) holds five licenses to divert a total of up to 230,000 m³ per year and store up to 30,800 m³. St. Mary Lake is subject to seasonal water quality changes and is affected by periodic algae blooms.

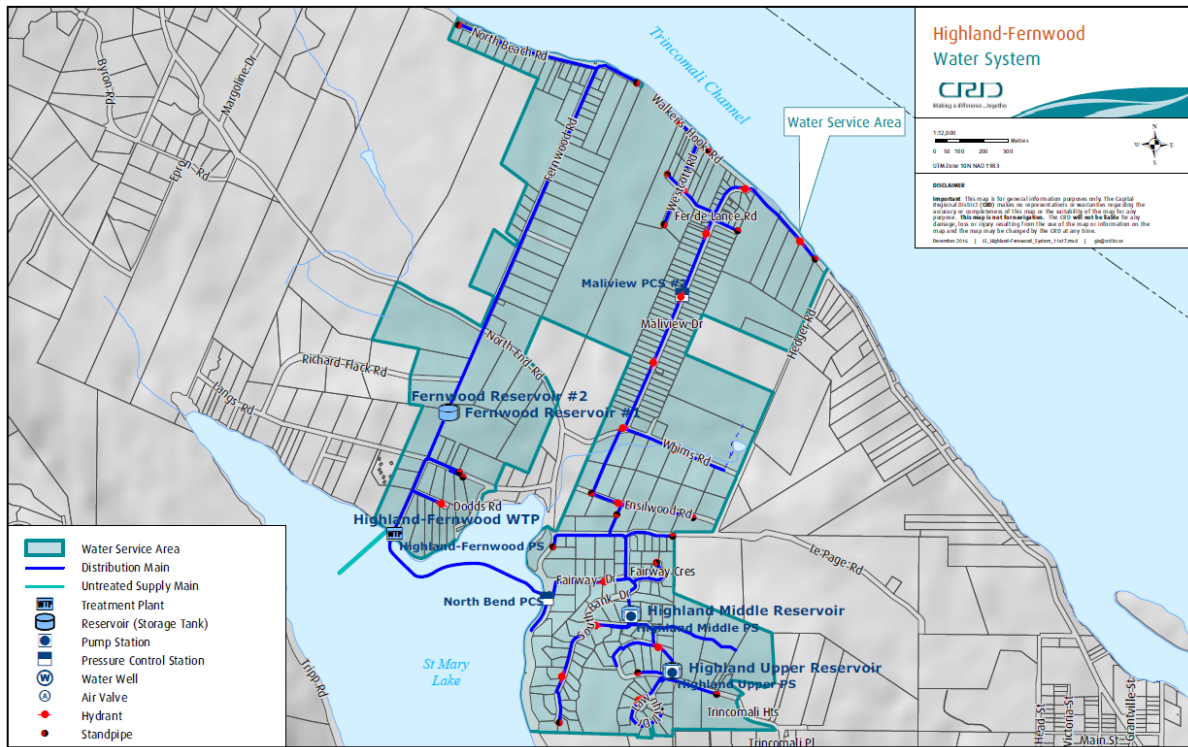


Figure 1: Highland/Fernwood Water Service

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 lgpm);
- one raw water pump station on Maycock Road, adjacent to the lake. (flow rate of two pumps running is 4.6 l/sec (60 lgpm);
- approximately 12,000 m of water distribution pipe;
- 4 water reservoirs – one 180 m³ (40,000 lg) on the Highland system, one 91 m³ (20,000 lg) on the Highland system, one 45 m³ (10,000 lg) on the Fernwood system and, one 91 m³ (20,000 lg) on the Fernwood system;
- 2 water system booster pumps – on Highland system, 1 at each 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 Supply

Referring to Figure 2, 73,670 cubic meters (m³) of water was extracted (water production) from St. Marys Lake in 2019; a 14% decrease from the previous year and is a 10% decrease from the five year average. Water demand (customer water billing) for the service totalled 48,804 m³ of water; a 4% decrease from the previous year and an 8% decrease from the five year average.

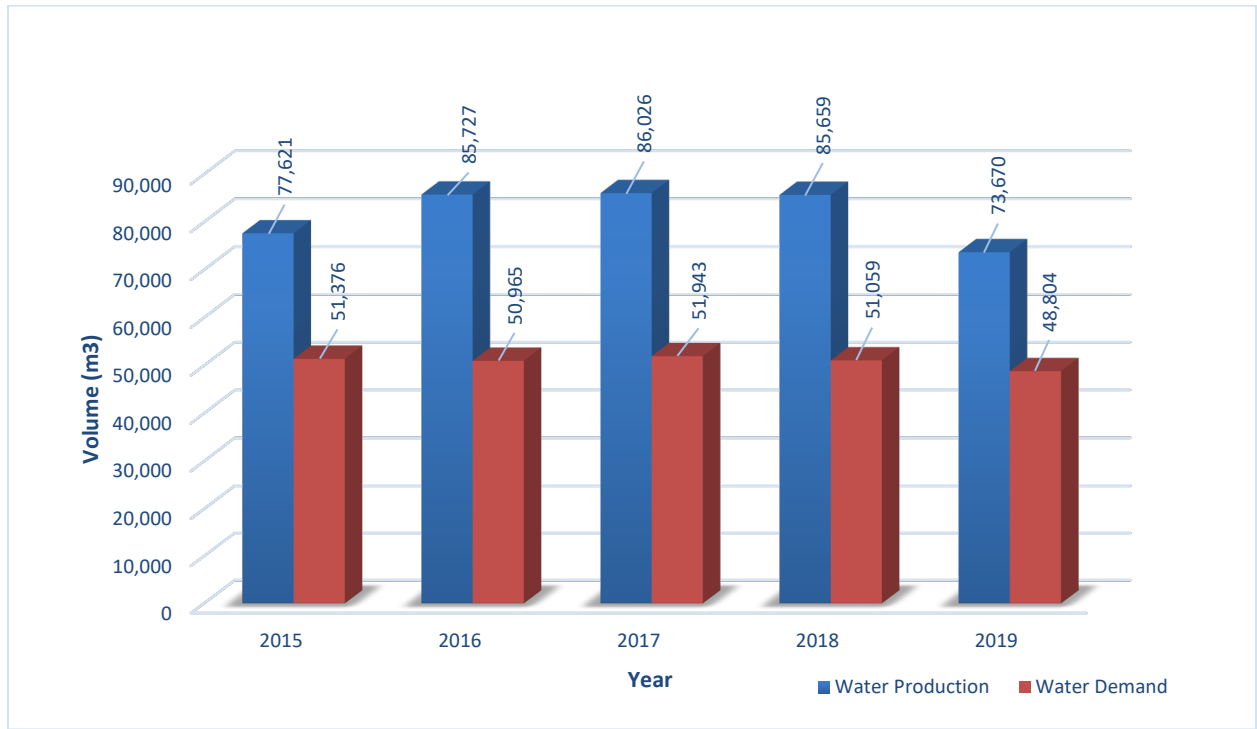


Figure 2: Highland/Fernwood Water Service Annual Water Production and Demand

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.

Water Usage

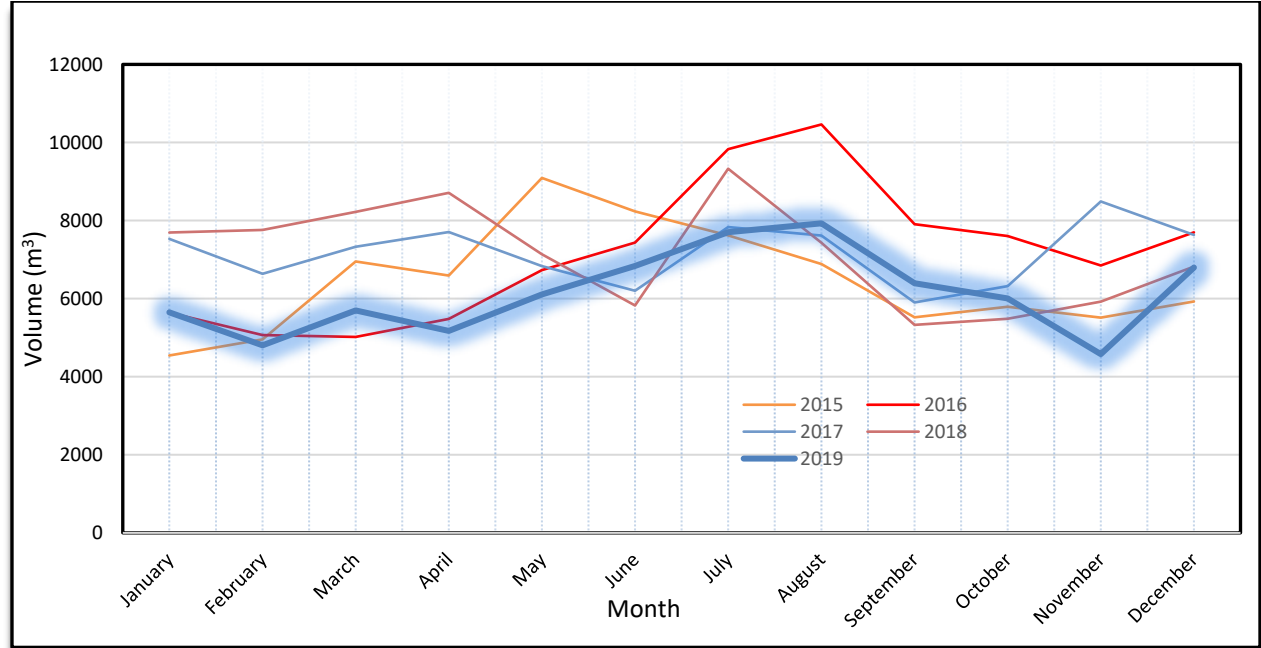


Figure 3: Highlands Water Service Monthly Water Production

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 34%. Water loss is estimated to be approximately 29% which is considered high for a small water system such as Highland/Fernwood.

Drinking Water Quality

In 2019, 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. The Canadian Drinking Water Quality Guideline (GCDWQ) limit for turbidity of 1 nephelometric turbidity unit (NTU) was exceeded on a number of occasions throughout the year at a few sampling stations that are characterized as low flow locations. A regular distribution pipe flushing program should address this issue. Raw water conditions in St. Mary Lake were improved due to lower algal activity in 2019. All treatment components have functioned satisfactory and were able to produce consistently safe drinking water. The vulnerability to leaks and breaks of the pipes in the Highland Distribution System remain a significant risk to the safety of the drinking water.

A Boil Water Advisory due to a system depressurization after a December 2018 windstorm event lasted until January 6, 2019. Another Boil Water Advisory was necessary for the Highland Distribution System

after total coliform and *E.coli* bacteria were detected in several samples from January 22. A complete distribution system flush and two consecutive rounds of samples finally confirmed that the water was safe for consumption and the Boil Water Advisory was lifted on January 28, 2019. Subsequent investigations into this incident concluded that sampling errors were most likely the reason for this string of adverse bacteriological results.

The data below provides a summary of the water quality characteristics in 2019:

Raw Water:

- The raw water exhibited typically low concentrations of total coliform and *E. coli* bacteria throughout the cold weather periods and higher spikes during late summer and fall.
- *Cryptosporidium* parasites were detected in very low concentrations in May, but no *Giardia* parasites.
- The analyses of raw water samples indicated low concentrations of iron and but higher concentrations of manganese throughout the year.
- The raw water was soft (median hardness 38.3 mg/L CaCO₃).
- The raw water turbidity (cloudiness) was well under 1 NTU during most months but slightly over 1 NTU between January and March. The annual median raw water turbidity was 0.5 NTU and the highest raw water turbidity was registered in February with 1.8 NTU. The turbidity was generally much lower than in previous years, likely due to a lower algal activity in 2019.
- A mean annual total organic carbon (TOC) concentration of 3.20 mg/L confirms the mesotrophic (semi-productive) to eutrophic (productive) status of St. Mary Lake.
- No cyanobacteria blooms were detected in St Mary Lake in 2019.

Treated Water:

- The treated water was safe to drink outside the periods of Boil Water Advisories; one sample tested positive for *E.coli* bacteria and several other samples positive for total coliform bacteria on January 22 and 23, which led to a Boil Water Advisory between January 23 and 28. A complete system flush and thorough resampling and testing reinstated and confirmed the safety of drinking water before the Boil Water Advisory was lifted. The cause of the adverse results was likely inadequate sampling techniques. Outside this event, the treated water was free of any 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, Standpipe #19 in the Highland Distribution System exceeded 1 NTU regularly throughout the year and reached up to 3.4 NTU in June. Also, Standpipes #3, 4 and 8 in the Highland Distribution System exhibited isolated turbidity exceedances of up to 5.9 NTU, mostly during the winter. The Fernwood Distribution System sampling stations at the end of North Beach Road and at the end of Fernwood Road, which historically exceeded 1 NTU on a regular basis, had a turbidity > 1 NTU on several occasions during the winter months. Thorough water main flushing conducted in the Fernwood Distribution System in 2018 had all but eliminated these turbidity exceedances but during the winter in 2019 the turbidity levels increased again in these locations.

- 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 2019 due to a history of concentrations consistently well below the GCDWQ limit of 80 µg/L.
- The treated water TOC in both distribution systems was lower than in previous years, ranging from 1.1 to 1.9 mg/L in the Fernwood Distribution System, and 0.85 to 2.1 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. The lower level of TOC concentrations in 2019 is a result of lower algal activity that year.
- Elevated iron and/or manganese concentrations in excess of the GCDWQ aesthetic objective can lead to water discolouration. The Fernwood Distribution System registered in one location in February a manganese concentration slightly above the aesthetic objective, but in general, both distribution systems had lower iron and manganese concentrations than in years prior to 2018 when a water main flushing program was introduced.
- On May 22, 2019, a sample collected from a standpipe on Lang Road exhibited a lead concentration (5.63 µg/L) in excess of the limit in the GCDWQ (5 µg/L). A resample that was collected on June 5 following proper standpipe-sampling procedures yielded a much lower lead concentration of 1.12 µg/L. The results, however, show that lead can leach into the drinking water if the water has a long contact time with lead-containing pipe material.
- The treated water temperature exceeded the aesthetic objective of 15°C for much of the summer months in both distribution systems.

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 154 Maliview.
- Water system leak repair 184 Maliview
- Water system leak repair Lawnhill Drive
- Water system leak repair 216 Southbank
- Water system leak repair 216 Fairway Drive
- Water Treatment Plant float pump replacement
- Water Treatment Plant air compressor replacement

Capital Project Updates

Highland/Fernwood Water Capital

There was five capital project planned for 2019:

1. Undertake Intake Assessment and Design – (\$20,000 allocated, \$10,094 spent). Current intake is undersized, therefore limiting the treatment plant capacity. The intake has also experienced significant algae growth on the screen requiring emergency maintenance. This work is to complete an assessment of the intake, confirm, the anticipated construction costs, complete the design for construction and complete any required permits. The assessment and design work was started in 2019 and expected to be completed in 2020.
2. Fernwood Asset Management Plan – (\$5,000 allocated, \$4,547 spent). Identify condition of assets, develop prioritized list of infrastructure replacement. This work was initiated in 2018, continued in 2019 and is completed in 2020.
3. High/Fern WTP Discharge Header Improvements (\$16,024 allocated, \$16,024 spent). The existing discharge header is corroding pre-maturely. The project is for the design and construction of a new replacement header. The project was completed in 2019.
4. Safe Work Procedures (\$17,000 allocated, \$0 spent). The work scope includes reviewing and developing safe work procedures for operational and maintenance tasks. The work was not started in 2019. However it has commenced in early 2020 and is expected to complete in 2020.
5. Water Treatment Plant Waste Pump Design and Construction (\$80,000 allocated, \$0 spent) The waste pump and its control panel at the Highland Fernwood water treatment plant stopped working and are currently replaced with a temporary pump. The scope of work for this project is to design and install a new waste pump system. The project was not started in 2019 and expected to start and complete in 2020.

Highland Water Capital

There were six capital projects planned for 2019:

1. Highland Middle Reservoir repairs (\$80,000 allocated, \$486 spent). Work did not advance in 2019 and is expected to start in 2020.
2. Highland Upper Reservoir assessment and repairs (\$50,000 allocated, 0 spent). Work did not advance in 2019 and is expected to start in 2020.
3. Demolition of abandoned Highlands Treatment Plant (\$35,000 allocated, \$5,634 spent). Operations has completed the disconnection from the old water system. Work to demolish the building is still planned. A hazardous material assessment has been completed. Environmental impact abatement plan will be required due to proximity to St. Mary's Lake. Work did not advance in 2019 and is deferred to 2021.
4. Repair Failed Standpipes (\$45,000 allocated, \$33,627 spent). Work is completed to repair 8 standpipes.

5. Failing Water Service Repairs (\$13,623 allocated, \$11,544 spent). The fund is allocated to repair/replace miscellaneous water services infrastructure as they fail. Project budget is almost spent.
6. Highland Asset Management Plan (\$20,000 allocated, \$18,908 spent). Identify condition of assets, develop prioritized list of infrastructure replacement. This work was initiated in 2018, continued in 2019 and is finalized in 2020.

Financial Report

Please refer to the attached [Statement of Operations](#). Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), consumption based revenue (Water Sales), interest on savings (Interest Earnings), a transfer from the maintenance reserve account, 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 accounts 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.

Highland/Fernwood Water

2019 User Fee charges were \$858.15 per Single Family Equivalent (SFE) and 2019 Parcel Tax charges were \$174.36 per Taxable Parcel.

Highland Water

2019 Parcel Tax charges were \$153.26 per Taxable Parcel.

Fernwood Water

2019 Parcel Tax charges were \$252.87 per Taxable Parcel.

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 (toll free):	1-800-663-4425

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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Making a difference...together

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CAPITAL REGIONAL DISTRICT

HIGHLAND / FERNWOOD WATER Statement of Operations (Unaudited) For the Year Ended December 31, 2019

	2019	2018
Revenue		
Transfers from government	55,000	55,000
User Charges	275,469	274,897
Sale - Water	39,495	75,693
Other revenue from own sources:	-	-
Interest earnings	62	11
Other revenue	1,154	1,251
	31,612	36,277
Total Revenue	402,791	443,129
Expenses		
General government services	15,659	16,350
Contract for Services	8,842	30,570
CRD Labour and Operating costs	230,824	209,163
Debt Servicing Costs	41,364	41,389
Other expenses	87,101	113,178
Total Expenses	383,791	410,649
Net revenue (expenses)	19,000	32,480
Transfers to own funds:		
Capital Reserve Fund	-	-
Operating Reserve Fund	19,000	32,480
Annual surplus (deficit)	-	-
Accumulated deficit, beginning of year	-	-
Accumulated deficit, end of year	\$ -	-

CAPITAL REGIONAL DISTRICT

HIGHLAND / FERNWOOD WATER Statement of Reserve Balances (Unaudited) For the Year Ended December 31, 2019

	Capital Reserve	
	2019	2018
Beginning Balance	103,201	97,553
Transfer from Operating Budget	-	-
Transfers from completed capital projects	-	-
Interest Income	5,715	5,648
Transfer to Capital Project	(53,024)	-
Ending Balance	55,892	103,201

	Operating Reserve	
	2019	2018
Beginning Balance	28,840	31,425
Transfer from Operating Budget	19,000	32,480
Transfer to Operating Budget	(31,612)	(36,277)
Interest Income	1,116	1,212
Ending Balance	17,345	28,840

CAPITAL REGIONAL DISTRICT

HIGHLAND WATER Statement of Operations (Unaudited) For the Year Ended December 31, 2019

	2019	2018
Revenue		
Transfers from government	36,840	37,230
Other revenue from own sources:	-	-
Interest earnings	94	78
Other revenue	119	109
Total Revenue	37,053	37,417
Expenses		
General government services	1,456	1,820
Debt Servicing Costs	34,560	35,567
Total Expenses	36,016	37,387
Net revenue (expenses)	1,037	29
Annual surplus (deficit)	1,037	29
Accumulated surplus (deficit), beginning of year	83	53
Accumulated surplus (deficit), end of year	\$ 1,120	83

CAPITAL REGIONAL DISTRICT

FERNWOOD WATER Statement of Operations (Unaudited) For the Year Ended December 31, 2019

	2019	2018
Revenue		
Transfers from government	18,980	19,350
Other revenue from own sources:	-	-
Interest earnings	43	36
Other revenue	58	53
Total Revenue	19,081	19,439
Expenses		
General government services	1,373	1,720
CRD Labour and Operating costs	-	-
Debt Servicing Costs	17,300	17,702
Total Expenses	18,673	19,422
Net revenue (expenses)	408	18
Annual surplus (deficit)	408	18
Accumulated surplus, beginning of year	43	26
Accumulated surplus, end of year	\$ 451	43