

DRINKING WATER ANNUAL REPORT 2019



August 3, 2020

Revised August 27, 2020

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Executive Summary

The City of Enderby operates and maintains a community drinking water system in accordance with the Drinking Water Protection Act and the *Guidelines for Canadian Drinking Water Quality*.

In 2019, the total water distributed from the City of Enderby Water Treatment Plant was 474,220 m³. The maximum one-day demand was on May 14, 2019 at 3,144 m³.

In 2019, the City of Enderby spent \$741,035 to operate and maintain the community drinking water system. Of that value, capital investment represents 37% of the total expended by the City of Enderby in 2019.

The total replacement value for the water distribution system (such as pipes and pumps) is \$25,284,390. As of December 31, 2019, the total depreciation is \$11,738,162. The total replacement value for the City of Enderby water treatment system (such as buildings, clarifier, chlorinators, and ultraviolet bank) is \$7,614,470. As of December 31, 2019, the total depreciation is \$3,473,001. In 2019, \$229,330 was contributed to the City of Enderby water reserve fund and \$33,245 was withdrawn. The balance of the water reserve fund as of December 31, 2019 is \$526,705.

The major projects undertaken in 2019 was a renewal of programmable logic controller (PLC) technology and enhancements to the air lift system to aid sand removal from the river intake. Water services on Reservoir Road were renewed as part of a road reconstruction project, which also involved realigning a water main on a corner of the road and adding a fire hydrant. The Shuswap River water main crossing work is being planned for completion in 2020. Planning for an expansion of the Water Treatment Plant is continuing.

The City continues its monitoring program and nothing of concern was discovered in the drinking water system in 2019. A positive coliform reading was identified at the Peacher sampling site on July 10, 2019 and at the Valcain sampling site on September 11, 2019; however, in both cases, subsequent resampling was returned negative.

The City's Public Works staff are working towards obtaining certifications which match the classification of the treatment and distribution systems. The City intends to increase compliance with its Cross Connection Control program in 2020 and will use a risk-based approach.

The City has completed its Source Protection Plan for both sources and has taken action to implement its short-term recommendations. The City also completed its annual update to its Drinking Water Emergency Response Plan.

Introduction

The City of Enderby operates and maintains a community drinking water system in accordance with the Drinking Water Protection Act and Regulations, as well as the *Guidelines for Canadian Drinking Water Quality*. Pursuant to Section 15(b) of the British Columbia Drinking Water Protection Act and Section 11 of the British Columbia Drinking Water Protection Regulation, the City of Enderby provides the following Annual Drinking Water Report for 2019.

The goal of the City of Enderby is to provide clean, safe, and reliable drinking water. This means that the drinking water quality meets the standards specified in the *Guidelines for Canadian Drinking Water Quality* and the operation of the drinking water system is consistent with the BC Drinking Water Protection Act and Drinking Water Protection Regulation.

High quality drinking water must meet requirements with respect to the following:

- Maximum acceptable concentrations of microbiological contaminants such as bacteria, protozoa, and viruses such as *Giardia*, *Cryptosporidium*, and *Escherichia coli*;
- Maximum acceptable levels of turbidity;
- Maximum acceptable chemical and physical parameters; and
- Aesthetic objectives related to taste, colour, and odour.

The City accomplishes these requirements through a multi-barrier approach to treatment. A multi-barrier approach is required as “the limitations or failure of one or more barriers may be compensated for by the effective operation of the remaining barriers. This compensation minimizes the likelihood of contaminants passing through the entire system and being present in sufficient amounts to cause illness to consumers.”¹

There are a variety of potential hazards to drinking water, most of which involve chemical and microbiological contaminants that may be introduced at the source or intake, during treatment, or during distribution. The City observes a robust water quality monitoring regime and uses multi-barrier treatment to manage these threats and protect the public. The City has an up-to-date Drinking Water Emergency Response Plan and a Source Protection Plan for both of its sources.

Water System Overview

The Enderby water system consists of two sources:

1. Shuswap Well (ground water; suspected of being under the direct influence of surface water); and
2. Shuswap River (surface water).

The total amount of pipe in the distribution system is 30,962 meters. There are booster stations by the Bawtree Bridge, at the bottom of Gunter-Ellison Road, and between the upper and lower reservoirs.

¹ Federal-Provincial-Territorial Committee on Drinking Water and the CCME Water Quality Task Group, “From Source to Tap: Guidance on the Multi-Barrier Approach to Safe Drinking Water” (Ottawa, Ontario: 2004), 17.

All water is chlorinated prior to distribution. The Shuswap River surface water is filtered through a two-stage rapid filtration system which reduces turbidity and minimizes the threat of giardia and cryptosporidium. The Shuswap Well is normally piped to the Water Treatment Plant clearwell, where it receives ultraviolet treatment in addition to the chlorination received on-site.

Under normal operation, water from the Shuswap River is filtered and chlorinated, then pumped from the clearwell through the UV disinfection system and into the distribution system to a water reservoir. Water from the Shuswap Well is chlorinated on-site and pumped to the clearwell, then through the UV disinfection system and to the reservoirs. There is a total of 3,782 m³ of reservoir capacity. Each system can be isolated and run to the reservoirs alone.

It should be noted that, when the Shuswap Well is supplying water, a number of customers east of the Bawtree Bridge may receive water that is only disinfected with chlorine, meaning that it does not receive the two forms of treatment required for surface water (the Shuswap Well is suspected of being under the influence of surface water). However, when the supply of water is from the Water Treatment Plant, all customers receive fully treated water.

Under current operating parameters, the combined source capacity of the Shuswap River and the Shuswap Well is 4,753 m³ per day. The maximum production capacity of the Water Treatment Plant is 3,150 m³ per day under normal operating conditions at peak demand, although the rate of production is affected by source water turbidity, which increases backwashing frequency and reduces available production time. The ultimate source capacity, with infrastructure investment, operational changes, and assuming the capability to run the Shuswap Well for twenty-four hours per day, is 6,135 m³.

Annual Consumption Data

Note: the below figures only describe the Water Treatment Plant flow meter; this does not reflect the full quantity of water sent from the Shuswap Well, some of which is distributed to residents east of the Bawtree Bridge without being captured by the flow meter.

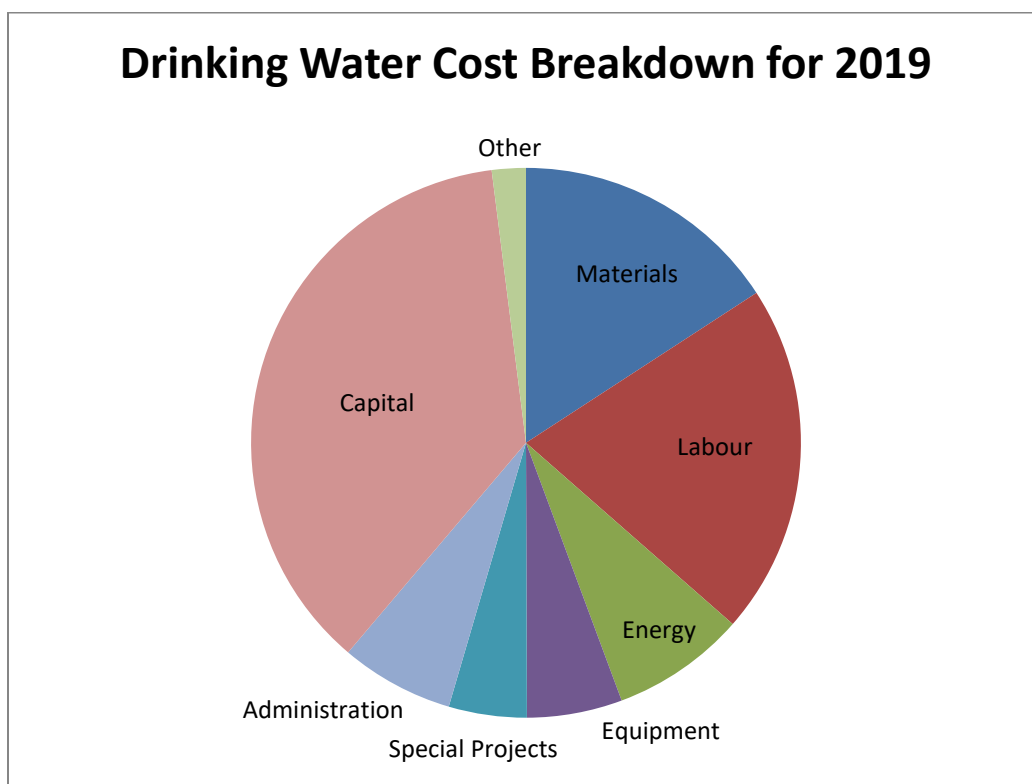
In 2019, the total water distributed from the City of Enderby Water Treatment Plant was 474,220 m³. The maximum one-day demand was on May 14, 2019 at 3,144 m³. By contrast, in 2018, the total water distributed from the Water Treatment Plant was 471,563 m³ and the maximum one-day demand was on July 29, 2018 at 3,064 m³.

The following chart shows maximum and average daily demands from the Water Treatment Plant by month for 2018 and 2019. Variations in demand tend to be influenced by a variety of factors such as population growth and consumption habits, with weather playing a particularly significant role.

Month	2018 Max. Daily Demand (m ³)	2018 Avg. Daily Demand (m ³)	2019 Max. Daily Demand (m ³)	2019 Avg. Daily Demand (m ³)
January	1722	1044	1409	1021
February	1169	969	1317	1011
March	1171	1007	1334	1046
April	1326	1092	1487	972
May	2334	1547	2226	1487
June	2693	1726	2679	1288
July	3064	1999	2053	1592
August	2635	1895	2248	1782
September	1586	1180	1920	1348
October	1352	979	1611	1179
November	1362	941	1467	1169
December	1208	989	1403	1040

Drinking Water Cost Breakdown

In 2019, the City of Enderby spent \$741,035 to operate and maintain the community drinking water system, whereas in 2018 the City spent \$990,169. Capital investment represents 37% of the total expended by the City of Enderby in 2019. The costs by expense category are:



The following chart describes the dollar value associated with each expense category and compares the values to 2018:

Category	2018 Value	2019 Value
Materials	123,816	117,232
Labour	155,237	152,918
Energy	62,335	58,455
Equipment	32,453	41,527
Special Projects	53,783	33,976
Interest	-	-
Administration	48,760	49,421
Capital	501,772	272,704
Other	12,033	14,802
Total	990,169	741,035

Water System Assessment and Infrastructure Deficit

The total replacement value for the water distribution system (such as pipes and pumps) is \$25,284,390. As of December 31, 2019, the total depreciation is \$11,738,162.

The total replacement value for the City of Enderby water treatment system (such as buildings, clarifier, chlorinators, and ultraviolet bank) is \$7,614,470. As of December 31, 2019, the total depreciation is \$3,473,001.

The replacement values for both the water distribution system and the water treatment system were substantially revised from the 2018 values to reflect a 2019 appraisal.

In 2019, \$229,330 was contributed to the City of Enderby water reserve fund and \$33,245 was withdrawn. The balance of the water reserve fund as of December 31, 2019 is \$526,705.

In order to address its infrastructure deficit, the City has committed to an incremental tax increase of 1% per year to the water utility. This amount is dedicated to asset management. The anticipated 2019 contribution to water reserves is \$233,992.

Completed Major Projects and Forthcoming Major Projects

There were a number of major water projects completed or forthcoming as of December 31, 2019:

1. Programmable Logic Controller (PLC) renewal.
2. Enhancements to the air lift system for the river intake to aid sand removal.
3. Water services renewed, portion of a water main realigned, and a fire hydrant added on Reservoir Road as part of a road reconstruction project.
4. Shuswap River water main crossing renewal (forthcoming).
5. Planning for Water Treatment Plant expansion (forthcoming).

Major Events

There were no major events in 2019, although there were several water main breaks.

Water Quality Monitoring

Daily samples are collected at the Shuswap Well and River and tested for pH, temperature, and turbidity. Daily samples are also collected at the Water Treatment Plant and tested for pH, temperature, turbidity, and colour. The clearwell is tested on a daily basis for pH, temperature, turbidity, colour, and free and total chlorine.

Weekly system checks and distribution samples are tested for chlorine residuals to ensure a minimum of 0.20 mg/L of free chlorine is found throughout the distribution system. Chlorine residuals were above the minimum threshold for all sample locations and dates.

At least once per month, samples are collected at 10 monitoring stations within the distribution system for microbiological testing. No E. Coli was detected at any of the sample points within the distribution system. A positive coliform reading was identified at the Peacher sampling site on July 10, 2019 and at the Valcairn sampling site on September 11, 2019; however, in both cases, subsequent resampling was returned negative.

The filter backwash is sampled on a bi-monthly schedule for pH, conductivity, turbidity, total suspended solids, aluminum, and microbiology.

On a quarterly basis, trihalomethane (THM) samples are collected from the Brash PRV, Booster #1, and Valcairn stations. THMs are by-products caused by the chemical reaction between chlorine and organic matter naturally present in water. High levels of THMs can have adverse health effects and, as a result, the *Guidelines for Canadian Drinking Water Quality* set a maximum acceptable concentration of 0.1 mg/L. All THM tests from the above sample stations reported below the maximum acceptable concentration, with concentrations ranging from 0.00734 to 0.0548 mg/L.

On July 11, 2019, testing for haloacetic acids, another disinfection by-product, was completed at Brash PRV, Booster #1, and Valcairn stations, which returned results, respectively, of 0.0167, 0.007, and 0.0298 mg/L. The maximum acceptable concentration is 0.08 mg/L per the *Guidelines for Canadian Drinking Water Quality*, meaning that all three stations are lower than the maximum value.

The Shuswap Well is tested monthly for nitrogen levels (including nitrates and nitrites) and microbiology. The Shuswap River is sampled monthly for microbiology. Both sources are sampled quarterly for total organic carbon.

The Shuswap River is sampled annually for comprehensive testing. The Shuswap Well is sampled every second year for comprehensive testing. In 2019, both sources were tested.

Test	River	Well
Chloride	0.34	1.43

Test	River	Well
Fluoride	<0.10	<0.10
Nitrate (as N)	<0.010	0.21
Nitrite (as N)	<0.010	<0.010
Sulfate	5.7	5.9
EPHw10-19	379	445
EPHw19-32	559	563
LEPHw	379	445
HEPHw	559	563
Langelier Index	-1.1	-0.9
Hardness, Total (as CaCO ₃)	41.1	51.5
Solids, Total Dissolved (calc)	48.5	64.3
Temperature, at pH	23.2	23.6
Colour, True	6.3	<5.0
Alkalinity, Total (as CaCO ₃)	41.2	53.9
Alkalinity, Phenolphthalein (as CaCO ₃)	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO ₃)	41.2	53.9
Alkalinity, Carbonate (as CaCO ₃)	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO ₃)	<1.0	<1.0
Cyanide, Total	<0.0020	<0.0020
Turbidity	0.33	0.14
pH	7.63	7.56
Conductivity (EC)	90.4	120
Coliforms, Total	>= 320	<1
Background Colonies	> 200	
E. coli	12	<1
Acenaphthene	<0.050	<0.050
Acenaphthylene	<0.200	<0.200
Acridine	<0.050	<0.056
Anthracene	<0.010	<0.010
Benz(a)anthracene	<0.010	<0.010
Benzo(a)pyrene	<0.010	<0.010
Benzo(b+j)fluoranthene	<0.050	<0.050
Benzo(g,h,i)perylene	<0.050	<0.050
Benzo(k)fluoranthene	<0.050	<0.050
2-Chloronaphthalene	<0.100	<0.100
Chrysene	<0.050	<0.050
Dibenz(a,h)anthracene	<0.010	0.011
Fluoranthene	<0.030	<0.030
Fluorene	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	<0.050	<0.050
1-Methylnaphthalene	<0.100	<0.100
2-Methylnaphthalene	0.11	0.138

Test	River	Well
Naphthalene	<0.200	<0.232
Phenanthrene	<0.100	<0.100
Pyrene	<0.020	<0.020
Quinoline	<0.050	<0.050
Aluminum, total	0.0336	0.0063
Antimony, total	<0.00020	<0.00020
Arsenic, total	<0.00050	<0.00050
Barium, total	0.0093	0.0114
Boron, total	0.0206	0.0179
Cadmium, total	0.000027	0.000012
Calcium, total	13.3	15.3
Chromium, total	0.0007	<0.00050
Cobalt, total	<0.00010	<0.00010
Copper, total	0.00177	0.0134
Iron, total	0.056	<0.010
Lead, total	<0.00020	0.00227
Magnesium, total	1.89	3.19
Manganese, total	0.00455	<0.00020
Mercury, total	<0.000010	<0.000010
Molybdenum, total	0.00069	0.00149
Nickel, total	0.00048	0.00122
Potassium, total	0.72	1.08
Selenium, total	<0.00050	<0.00050
Sodium, total	1.39	3.52
Strontium, total	0.0691	0.0846
Uranium, total	0.000334	0.000355
Zinc, total	0.0044	0.03
Benzene	<0.5	<0.5
Bromodichloromethane	<1.0	<1.0
Bromoform	<1.0	<1.0
Carbon tetrachloride	<0.5	<0.5
Chlorobenzene	<1.0	<1.0
Chloroethane	<2.0	<2.0
Chloroform	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
1,2-Dibromoethane	<0.3	<0.3
Dibromomethane	<1.0	<1.0
1,2-Dichlorobenzene	<0.5	<0.5
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0

Test	River	Well
1,1-Dichloroethylene	<1.0	<1.0
cis-1,2-Dichloroethylene	<1.0	<1.0
trans-1,2-Dichloroethylene	<1.0	<1.0
Dichloromethane	<3.0	<3.0
1,2-Dichloropropane	<1.0	<1.0
1,3-Dichloropropene (cis + trans)	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Methyl tert-butyl ether	<1.0	<1.0
Styrene	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<0.5	<0.5
Tetrachloroethylene	<1.0	<1.0
Toluene	<1.0	<1.0
1,1,1-Trichloroethane	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
Trichloroethylene	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0
Vinyl chloride	<1.0	<1.0
Xylenes (total)	<2.0	<2.0

Due to the laboratory detection of EPH, LEPH, and HEPH in both sources, which are not typically present in either source, additional testing was conducted to determine whether these substances were anthropogenic (human-caused) or non-anthropogenic (natural). After the results of further testing came back inconclusive, and given the lack of other physical characteristics associated with the presence of these substances (such as smell), both sources were re-sampled and no further presence was detected. While it cannot be conclusively determined, the indicators point towards sampling cross-contamination, rather than source water presence.

Environmental Operators Certification

City of Enderby operators are progressing in obtaining their EOCP certifications. Interior Health requires that the City has a Chief Operator certified at Level III for Water Treatment and Level III for Water Distribution, but has accepted the existing level of certifications on the understanding that the City is working towards full compliance. During 2019, City of Enderby employed the following operators:

Name	Title	Water Treatment
Clayton Castle	Lead Hand	Level II
Desiree Vetter	Systems Operator I	Level I
Jamie Prevost	Utility Worker III	
Ray Brown	Utility Worker III	Level I
Cliff Vetter	Utility Worker III	

Water Conservation Plan

The City of Enderby's Water Conservation Plan establishes strategies to reduce water demand throughout the community. Reducing water demand helps to protect our water resources, mitigate requirements for infrastructure expansion, and reduce operating and maintenance costs.

As of December 31, 2018, the City of Enderby has achieved a number of strategies within its Water Conservation Plan, including:

1. Education
 - a. Implementing a Water Conservation Education program.
 - b. Continuing compliance patrols and enforcement of sprinkling regulations.
2. Metering and Rates
 - a. Adopted a rate structure which balances conservation and equity.
 - b. Amended the Building Inspection Bylaw to include requirements for water meters.
 - c. Amended policies and agreements for out-of-town service connections to require water meters.
 - d. Completed water meter installations on all residential, commercial, industrial and civic properties.
3. Loss Control
 - a. Completed a Loss Control Program in 2012, which estimated the total Unaccounted For Water at 6.5% or 12.05 m³ per hour.
 - b. Completed a Leak Detection Audit to identify and repair water leaks within municipal infrastructure.
4. Planning for the Future
 - a. Developing infrastructure upgrade plans for both treatment and distribution, in order to pursue grant funding.

Cross Connection Control Program

In 2003, Interior Health required all large water purveyors (City of Enderby included) to implement a cross connection control program as a condition of operating permit. The purpose of the program is to protect public health by ensuring that the drinking water provided by the City of Enderby is not contaminated due to a backflow incident.

The City adopted a Cross Connection Control Program in 2004 and began the program implementation with assessments of a number of commercial, industrial, institutional and agricultural customers in June, 2004. Under Enderby's program, owners were expected to implement the recommendations in a timely manner and were responsible for all costs associated with their backflow prevention systems.

For a number of reasons, including cost and internal capacity limitations, the Cross Connection Control Program has not been fully implemented. The City of Enderby intends to increase compliance with its Cross Connection Control program in 2020, and will follow a risk-based approach focusing on premises isolation.

Source Protection Plan

In February 2017, the City completed its Source Protection Plan for both the surface water intake and the Shuswap Well. The Source Protection Plan characterized the sources, provided an inventory of potential contaminants and threats, characterized risks, and recommended various actions to mitigate risk. As a result of this plan, the City has completed analyses of both sources for herbicides, pesticides, and petroleum in order to characterize the source water better. The City has also reached out to relevant third parties to inform them of the locations of the City's drinking water sources and request that they notify the City in the event of an accident, spill, fire, or natural disaster. The City has also requested that the Regional District of North Okanagan refer development applications within the designated groundwater protection area.

Emergency Response Plan

The City of Enderby Drinking Water Emergency Response Plan was completed in 2013. The Emergency Response Plan includes provisions for public notification and response procedures for emergency situations, such as backflow incidents, broken water mains, chlorinator failure, source and/or reservoir contamination, and spills or vehicle accidents affecting the distribution system. It also provides an emergency contact directory.

The Emergency Response Plan was updated on January 13, 2019 and revised on June 10, 2019.