

DRINKING WATER ANNUAL REPORT 2016



June 12, 2017

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Executive Summary

The City of Enderby operates and maintains a community water distribution system in accordance with the Drinking Water Protection Act and the Guidelines for Canadian Drinking Water Quality. In 2016, the total water distributed from the City of Enderby Water Treatment Plant was 500,896 m³. The maximum one-day demand was on May 16 at 3,261 m³. In a month-by-month comparison with 2015, there are some fluctuations which are most likely attributed to a mild summer and the implementation of metered water rates in 2015.

In 2016, the City of Enderby spent \$982,160 to provide safe drinking water, whereas in 2015 the City spent \$679,144. Capital investment was the main driver of the higher costs. Some operating costs decreased, which was primarily due to a higher number of major events in 2015, which required additional labour and material expenditures.

The total replacement value for the water distribution system (such as pipes and pumps) is \$18,595,988. As of December 31, 2016, the total depreciation is \$8,168,765. The remaining value is \$10,427,223. The total replacement value for the City of Enderby water treatment system (such as buildings, clarifier, chlorinators, and ultraviolet) is \$3,591,265. As of December 31, 2016, the total depreciation is \$1,298,789. The remaining value is \$2,292,476. In 2016, \$157,704 was contributed to the City of Enderby water reserve fund and \$381,102 was withdrawn. The interest earned on the reserve fund was \$12,658. The balance of the water reserve fund as of December 31, 2016 is \$497,144.

The major projects which were completed in 2016 include Vernon Street and Cliff Avenue distribution system upgrades, as well as obtaining a new chlorine analyser for the Water Treatment Plant. The City's Source Protection Planning report was partially completed in 2016, with the remainder to be completed in 2017. In 2017, the major capital projects will include the first phase of the distribution system upgrades on Salmon Arm Drive and the renewal of the Shuswap River water main crossing.

The City continues its monitoring program and nothing of concern was discovered in the drinking water system. 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 revive its Cross Connection Control program in 2017 and will use a risk-based approach to addressing hazards. Finally, the City's Drinking Water Emergency Response Plan was most recently updated in June 2017.

Introduction

The City of Enderby operates and maintains a community water distribution system in accordance with the Drinking Water Protection Act and associated 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 2016.

The goal of the City of Enderby is to provide clean, safe, and reliable drinking water. Our drinking water meets or exceeds the criteria used by the Federal-Provincial-Territorial Committee on Drinking Water in its definition of “high quality drinking water.” The Committee defines high quality drinking water as:

free of both disease-causing organisms and chemicals in concentrations that have been shown to cause health problems. Such drinking water has minimal taste and odour, making it aesthetically acceptable to the public for drinking.¹

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;
- Aesthetic objectives related to taste, colour, and odour; and
- Operational guidance values.

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.”²

There are a variety of potential hazards to drinking water which must be controlled. These threats involve chemical and microbiological contaminants that may be introduced at the source or intake, during treatment, or during distribution. These hazards are an ever-present threat to our drinking water supply which must be controlled. The City observes a robust water quality monitoring regime and uses multi-barrier treatment to manage these threats and protect the public.

Water System Overview

The Enderby water system consists of 3 main sources:

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

The total amount of pipe in the distribution system is 30,962 meters. This consists of 10,656 meters of PVC pipe, 19,893 meters of concrete pipe, 355 meters of steel pipe, and 58 meters of copper pipe.

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), 14.

² Ibid., 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.

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. Depending on demand, both systems can operate in conjunction. Each system can be isolated and run to the reservoirs alone. All water supplies can be operated with a portable generator.

It should be noted that, when water is drawn from the Shuswap Well supply, a number of customers east of the Enderby Bridge who are most proximate to the well source receive water that is not disinfected with UV light. When all supply is from the Shuswap River source, 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 ultimate source capacity, with infrastructure changes and assuming the capability to operate 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 effluent 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 effluent flow meter.

In 2016, the total water distributed from the Water Treatment Plant was 500,896 m³. The maximum one-day demand was on May 16 at 3,261 m³.

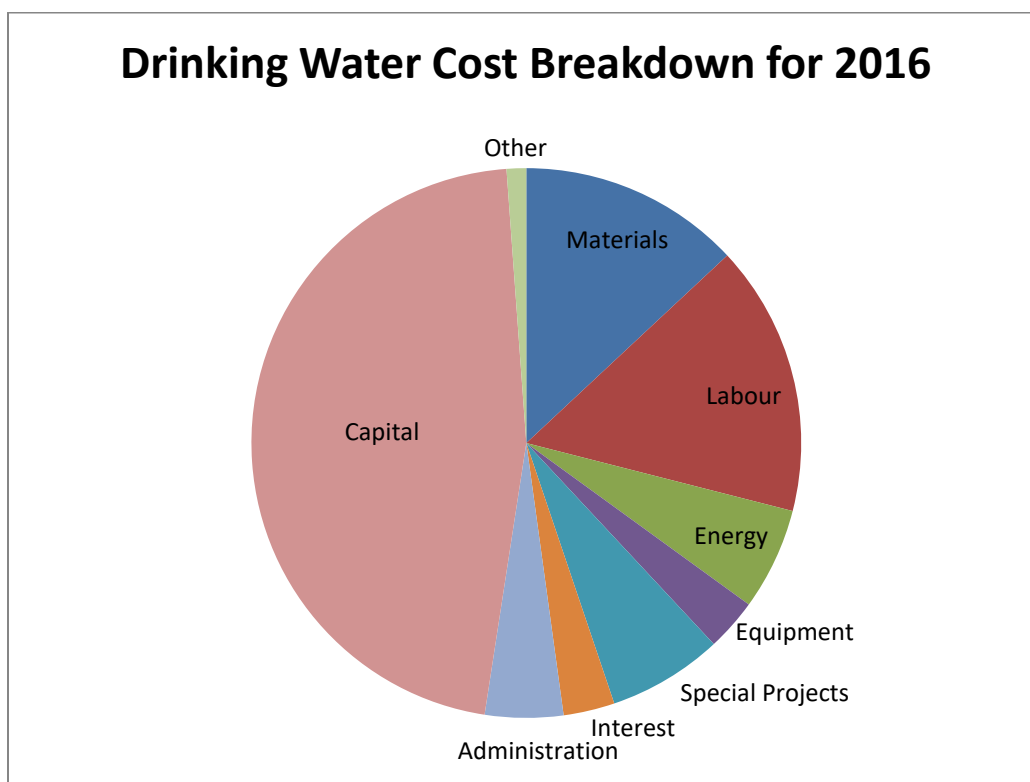
In 2015, the total water distributed from the City of Enderby Water Treatment Plant was 623,185 m³ and the maximum one-day demand was 5,160 m³ on June 15. In 2014, the total water distributed from the Water Treatment Plant was 624,476 m³ and the maximum one-day demand was on July 15 at 4,445 m³.

The following chart shows maximum and average daily demands from the Water Treatment Plant by month for 2015 and 2016. There decline in usage is most likely attributed to a mild summer and the implementation of metered water rates in 2015, both of which would impact demand.

Month	2015 Max. Daily Demand (m ³)	2015 Avg. Daily Demand (m ³)	2016 Max. Daily Demand (m ³)	2016 Avg. Daily Demand (m ³)
January	1310	1033	1519	1192
February	1666	1132	1641	1123
March	1506	1206	1784	1167
April	1744	1203	1936	1286
May	4808	2785	3261	1715
June	5160	3341	2860	1851
July	3093	2509	2852	1826
August	2610	2196	2694	2022
September	2395	1693	2249	1379
October	2725	1654	1480	1012
November	3933	1094	1217	930
December	1586	1163	1155	934

Drinking Water Cost Breakdown

In 2016, the City of Enderby spent \$982,160 to provide safe drinking water. This includes water treatment processes such as chlorination, ultraviolet, and filtration as well as improvement, repair, and maintenance of the distribution system. The costs by expense category are:



The following chart describes the dollar value associated with each expense category and compares these values to 2015:

Category	2015 Value	2016 Value
Materials	181,490	128,145
Labour	164,920	156,469
Energy	58,165	59,058
Equipment	26,082	30,084
Special Projects	13,781	66,408
Interest	35,840	29,594
Administration	43,105	45,162
Capital	145,319	455,929
Other	10,442	11,307
Total	679,144	982,160

Capital investment was the main driver of the higher costs. Some operating costs decreased, which was primarily due to a higher number of major events in 2015, which required additional labour and material expenditures.

Water System Assessment and Infrastructure Deficit

The total replacement value for the water distribution system (such as pipes and pumps) is \$18,595,988. As of December 31, 2016, the total depreciation is \$8,168,765. The remaining value is \$10,427,223.

The total replacement value for the City of Enderby water treatment system (such as buildings, clarifier, chlorinators, and ultraviolet) is \$3,591,265. As of December 31, 2016, the total depreciation is \$1,298,789. The remaining value is \$2,292,476.

In 2016, \$157,704 was contributed to the City of Enderby water reserve fund and \$381,102 was withdrawn. The interest earned on the reserve fund was \$12,658. The balance of the water reserve fund as of December 31, 2016 is \$497,144.

The City invested \$455,929 into capital assets during 2016.

In order to address its infrastructure deficit, the City has committed to an incremental water utility tax increase of 1% per year. This amount will be dedicated to asset management.

Completed Major Projects and Forthcoming Major Projects

There were several major water infrastructure projects in 2016:

1. Completed Vernon Street distribution system upgrades.
2. Completed Cliff Avenue distribution system upgrades.
3. Obtained a replacement chlorine analyser for the Water Treatment Plant.
4. Partial completion of Source Protection Planning report.

Some 2016 projects were deferred, such as the renewal of the cross-connection control program, renewal of the Water Treatment Plant's programmable logic controllers, and installation of wifi communication to the Shuswap Well.

In 2017, the major capital projects will include the first phase of distribution system upgrades on Salmon Arm Drive and the renewal of the Shuswap River water main crossing.

Major Events

The City had to contend with 7 water breaks and also performed emergency response after a petroleum spill into Fortune Creek on November 3, which flows into the Shuswap River. In comparison to previous years, 2016 was relatively uneventful.

Water Quality Monitoring

Daily samples are collected at the Shuswap Well and Riverbank sites and tested for pH, temperature, and turbidity. Daily samples are also collected at the Water Treatment Plant and tested for testing pH, temperature, turbidity, and colour. The clearwell is also 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 at the furthest points in the distribution system. Residuals were above the minimum threshold for all sample locations and dates, except for a reading of 0.15 mg/L of free chlorine at the Brash PRV on July 15. The line was flushed to bring the residual up to acceptable levels.

At least once per month, samples are collected at 11 monitoring stations within the distribution system for microbiological testing. Monthly samples are also collected at the Shuswap Well and the Water Treatment Plant effluent point. No Coliforms or E. Coli – which are measured in Colony-Forming Units (CFU) - were detected at any of the sample points within the distribution system.

The BCA 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 Valcain 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 a range well below the maximum acceptable concentration, with concentrations ranging from 0.01 to 0.042 mg/L.

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 three years for comprehensive testing. Comprehensive tests were performed on the Shuswap River on August 17, 2016 as follows:

Test	Unit	Result
Chloride	mg/L	0.34
Fluoride	mg/L	<0.10
Nitrate (as N)	mg/L	<0.010
Nitrite (as N)	mg/L	<0.010
Sulfate	mg/L	5.4
Temperature	°C	22
Colour, True	CU	6
Alkalinity, Total (as CaCO ₃)	mg/L	43
Alkalinity, Phenolphthalein (as CaCO ₃)	mg/L	<1
Alkalinity, Bicarbonate (as CaCO ₃)	mg/L	43
Alkalinity, Carbonate (as CaCO ₃)	mg/L	<1
Alkalinity, Hydroxide (as CaCO ₃)	mg/L	<1
Cyanide, Total	mg/L	<0.0020
Turbidity	NTU	0.72
pH	pH units	7.72
Conductivity (EC)	uS/cm	96
Langelier Index	-	-0.9
Hardness, Total (as CaCO ₃)	mg/L	48.6
Solids, Total Dissolved	mg/L	52.1
Aluminum, total	mg/L	<0.050
Antimony, total	mg/L	<0.0010
Arsenic, total	mg/L	<0.0050
Barium, total	mg/L	<0.050
Boron, total	mg/L	0.068
Cadmium, total	mg/L	<0.00010
Calcium, total	mg/L	16.7
Chromium, total	mg/L	<0.0050
Cobalt, total	mg/L	<0.00050
Copper, total	mg/L	0.0033
Iron, total	mg/L	<0.10
Lead, total	mg/L	<0.0010
Magnesium, total	mg/L	1.7
Manganese, total	mg/L	0.004
Mercury, total	mg/L	<0.00002
Molybdenum, total	mg/L	<0.0010
Nickel, total	mg/L	<0.0020
Potassium, total	mg/L	0.62
Selenium, total	mg/L	<0.0050

Test	Unit	Result
Sodium, total	mg/L	1
Uranium, total	mg/L	0.0003
Zinc, total	mg/L	<0.040
Coliforms, Total	CFU/100 mL	240
Background Colonies	CFU/100 mL	> 200

Environmental Operators Certification

City of Enderby operators are progressing in obtaining their EOCP certifications. Interior Health requires that the City has a designated 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 2016, City of Enderby employed the following operators:

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

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, 2016, 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 which uses informational materials to raise awareness of our water resources.
 - b. Continuing compliance patrols and enforcement by a City of Enderby Bylaw Enforcement Officer with respect to 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 the Service Agreement with SplatSin to require water meters on reserve connections serviced by the City.
 - d. Amended policy for out-of-town service connections (e.g. Area F customers) to require water meters on connections serviced by the City.

- e. 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. Nearing completion of a Water Study to update for 20-year growth projections and infrastructure implications.

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. It is worth noting that, based on anecdotal information, the City of Enderby's progress compares favorably with other communities.

Below is a synopsis of the categories and status as of December 31, 2013:

Hazard	Quantity	Surveyed	Not Surveyed	Vacant	Compliant*
High	54	51	0	3	36 (71%)
Medium	44	24	18	2	12 (29%)
Low	90	32	55	2	18 (21%)
TOTAL:	188	107	73	7	66 (37%)

*Compliance percentages are based only on occupied sites which have been assessed/surveyed.

The City of Enderby intends to revive the Cross Connection Control program in 2017, and will follow a risk-based approach that focuses on premises isolation.

Emergency Response Plan

The City of Enderby Drinking Water Emergency Response Plan was completed in early 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 most recently updated in June 2017.