

CITY OF ENDERBY DRINKING WATER SYSTEM

ANNUAL REPORT 2022

April 11, 2023

CONTENTS

Executive Summary	3
Introduction.....	4
Water System Overview	5
Annual Consumption Data.....	6
Drinking Water Cost Breakdown.....	7
Water System Assessment and Infrastructure Deficit	8
Completed and Forthcoming Major Projects	9
Major Events.....	10
Water Quality Monitoring.....	11
Environmental Operators Certification.....	14
Water Conservation Plan.....	15
Cross Connection Control Program	16
Source Protection Plan.....	17
Emergency Response Plan.....	18

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 2022, the total water distributed from the Water Treatment Plant was 529,280 m³. The maximum one-day demand was on 2,785 m³ on August 9, 2022. By contrast, in 2021, the total water distributed from the Water Treatment Plant was 541,333 m³ and the maximum one-day demand was on July 1, 2021 at 2,960 m³.

In 2022, the City of Enderby spent \$795,009 to operate and maintain the community drinking water system. Of that value, capital investment represents 27% of the total expended by the City of Enderby in 2022.

The City continues its water quality monitoring program. Nothing of concern was discovered in the drinking water system in 2022.

The City's Public Works staff is certified to meet the legislative requirements of operating the Water Treatment Plant and distribution system.

Major projects completed or planned include:

1. Mill Avenue from George Street to Sicamous Street water main and service renewal (completed).
2. Planning for Water Treatment Plant expansion (in progress).
3. Reservoir #1 renewal (forthcoming).
4. Reservoir #1 bypass programming (in progress).
5. Peacher Crescent service renewal (forthcoming).

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 2022.

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 has implemented a water quality monitoring regime and uses multi-barrier treatment to manage the risks to public health. The City has a Drinking Water Emergency Response Plan and a Source Protection Plan for both of its sources.

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.

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.

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 planned source capacity, with expanded infrastructure, 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 2022, the total water distributed from the Water Treatment Plant was 529,280 m³. The maximum one-day demand was on 2,785 m³ on August 9, 2022. By contrast, in 2021, the total water distributed from the Water Treatment Plant was 541,333 m³ and the maximum one-day demand was on July 1, 2021 at 2,960 m³.

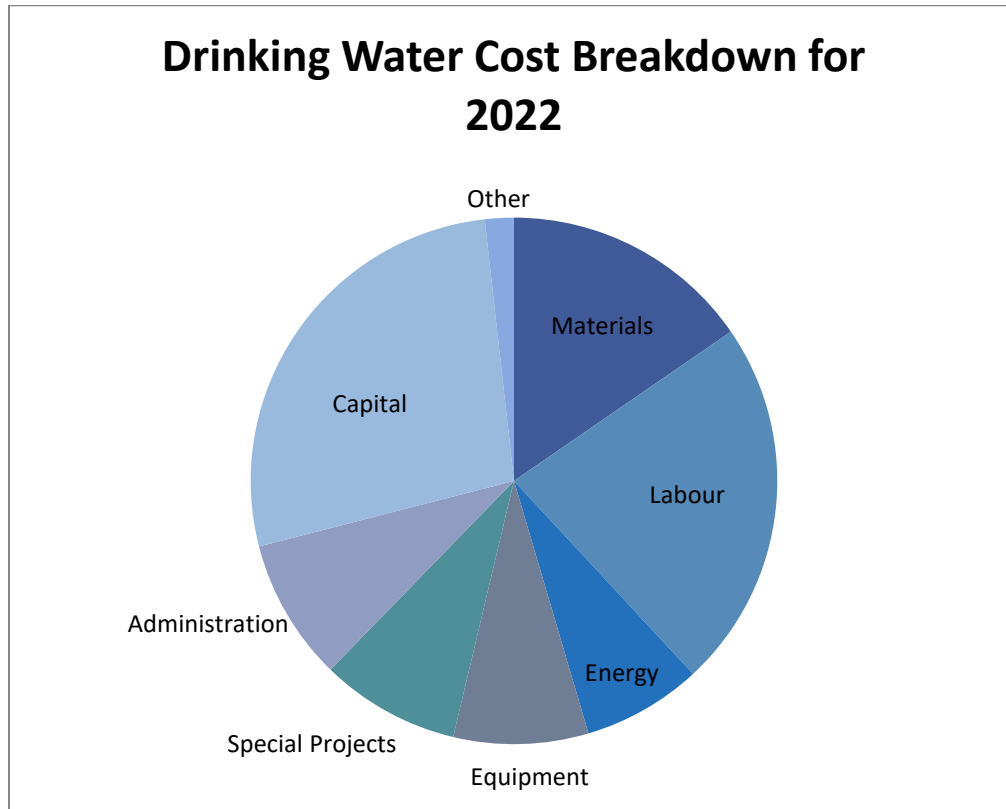
The following chart shows maximum and average daily demands from the Water Treatment Plant by month for 2021 and 2022.

Month	2022 Max. Daily Demand (m ³)	2022 Avg. Daily Demand (m ³)	2021 Max. Daily Demand (m ³)	2021 Avg. Daily Demand (m ³)
January	1535	1300	1227	1023
February	1368	1204	1304	1077
March	1248	1109	1218	1064
April	1296	1106	1634	1253
May	1608	1236	2247	1586
June	1901	1429	2901	2019
July	2776	2085	2960	2523
August	2785	2446	2588	2242
September	2628	1806	2117	1569
October	1483	1203	1473	1239
November	1365	1177	1266	1122
December	1669	1267	1265	1112

Year-to-year variations in demand tend to be influenced by the impact of weather upon consumption habits, particularly irrigation, while longer-range trends are influenced by the population growth rate offset by demand management initiatives such as water rates.

DRINKING WATER COST BREAKDOWN

In 2022, the City of Enderby spent \$795,009 to operate and maintain the community drinking water system. Of that value, capital investment represents 27% of the total expended by the City of Enderby in 2022.



The following chart describes the dollar value associated with each expense category and compares the values to 2022:

Category	2022 Value	2021 Value
Materials	122,493	162,084
Labour	180,416	187,439
Energy	58,296	65,846
Equipment	65,813	57,583
Special Projects	68,079	64,011
Interest	-	-
Administration	69,301	56,250
Capital	216,485	347,390
Other	14,125	12,979
Total	795,005	953,582

WATER SYSTEM ASSESSMENT AND INFRASTRUCTURE DEFICIT

The total replacement value for the water distribution system (such as pipes and pumps) is \$27,282,868. As of December 31, 2022, the total depreciation is \$12,463,101.

The total replacement value for the City of Enderby water treatment system (such as buildings, clarifier, chlorinators, and ultraviolet bank) is \$7,833,763. As of December 31, 2022, the total depreciation is \$4,060,406.

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

In 2022, \$243,423 was contributed to the City of Enderby water reserve fund and \$186,264 was withdrawn, for a balance at the end of the year of \$467,023.

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 2022 contribution to water reserves is \$250,500.

COMPLETED AND FORTHCOMING MAJOR PROJECTS

There were a number of major water projects completed or forthcoming as of December 31, 2022:

1. Mill Avenue from George Street to Sicamous Street water main and service renewal (completed).
2. Planning for Water Treatment Plant expansion (in progress).
3. Reservoir #1 renewal (forthcoming).
4. Reservoir #1 bypass programming (in progress).
5. Peacher Crescent service renewal (forthcoming).

MAJOR EVENTS

There were 3 periods of elevated turbidity levels exceeding 10 NTU in the Shuswap River: late March, early May, and mid June. The first 2 events are attributable to rainfall, while the mid June event is due to freshet. During these events, the Water Treatment Plant was used as a secondary source and the Shuswap Well was the primary source.

Freshet runoff peaked between June 14 and 26. During this time, the Shuswap River was elevated to a point where the Shuswap Well was inaccessible by vehicle due to the access road being inundated. The well was monitored via SCADA and samples were taken from a sample port at 487 Mable Lake Road to verify water potability.

On June 28 a leak was repaired on the main line entering the water treatment plant from the Shuswap Well. The public was notified via a water quality advisory and encouraged to reduce water consumption.

In August, it was determined that there were significant failures in the roof of Reservoir #1. Due to the age and condition of the facility, the City designed an emergency response plan and commenced work on design and financing a renewal of Reservoir #1. A bypass program has been designed to enable water to flow directly from Booster #2 to Reservoir #2 in a way that can supply the whole community, which will be used during the construction phase of the project, and may also be used in the event that Reservoir #1 fails prior to the planned renewal commencing.

There were seven water breaks or leaks identified during the year. They were addressed and handled promptly and no major service disruptions were experienced.

WATER QUALITY MONITORING

Daily samples are collected at the Shuswap Well and Shuswap 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 in 2022.

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 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 below the maximum acceptable concentration, with concentrations never exceeding 0.0616 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 second year for comprehensive testing. Only the Shuswap River was tested in 2022. The results are as follows.

Parameter	River
Chloride	0.36
Fluoride	<0.10
Nitrate (as N)	0.01
Nitrite (as N)	<0.010
Sulfate	5.5
EPHw10-19	<250
EPHw19-32	<250
LEPHw	<250
HEPHw	<250
Langelier Index	-0.9
Hardness, Total (as CaCO ₃)	42
Solids, Total Dissolved (calc)	53.5
Temperature, at pH	24
Colour, True	<5.0
Alkalinity, Total (as CaCO ₃)	49.2
Alkalinity, Phenolphthalein (as CaCO ₃)	<1.0

Alkalinity, Bicarbonate (as CaCO ₃)	49.2
Alkalinity, Carbonate (as CaCO ₃)	<1.0
Alkalinity, Hydroxide (as CaCO ₃)	<1.0
Cyanide, Total	<0.0020
Turbidity	0.61
pH	7.81
Conductivity (EC)	92
Coliforms, Total	1300
E. coli	12
Acenaphthene	<0.050
Acenaphthylene	<0.200
Acridine	<0.050
Anthracene	<0.010
Benz(a)anthracene	<0.010
Benzo(a)pyrene	<0.010
Benzo(b+j)fluoranthene	<0.050
Benzo(g,h,i)perylene	<0.050
Benzo(k)fluoranthene	<0.050
2-Chloronaphthalene	<0.100
Chrysene	<0.050
Dibenz(a,h)anthracene	<0.010
Fluoranthene	<0.030
Fluorene	<0.050
Indeno(1,2,3-cd)pyrene	<0.050
1-Methylnaphthalene	<0.100
2-Methylnaphthalene	<0.100
Naphthalene	<0.200
Phenanthrene	<0.100
Pyrene	<0.020
Quinoline	<0.050
Aluminum, total	0.0672
Antimony, total	<0.00020
Arsenic, total	<0.00050
Barium, total	0.0097
Boron, total	<0.0500
Cadmium, total	<0.000010
Calcium, total	14
Chromium, total	<0.00050
Cobalt, total	<0.00010
Copper, total	0.00325
Iron, total	0.081
Lead, total	0.00033
Magnesium, total	1.68
Manganese, total	0.00454
Mercury, total	<0.000010
Molybdenum, total	0.00065
Nickel, total	0.00041
Potassium, total	0.82
Selenium, total	<0.00050
Sodium, total	1.06
Strontium, total	0.0631
Uranium, total	0.0003
Zinc, total	0.0051

Benzene	<0.5
Bromodichloromethane	<1.0
Bromoform	<1.0
Carbon tetrachloride	<0.5
Chlorobenzene	<1.0
Chloroethane	<2.0
Chloroform	<1.0
Dibromochloromethane	<1.0
1,2-Dibromoethane	<0.3
Dibromomethane	<1.0
1,2-Dichlorobenzene	<0.5
1,3-Dichlorobenzene	<1.0
1,4-Dichlorobenzene	<1.0
1,1-Dichloroethane	<1.0
1,2-Dichloroethane	<1.0
1,1-Dichloroethylene	<1.0
cis-1,2-Dichloroethylene	<1.0
trans-1,2-Dichloroethylene	<1.0
Dichloromethane	<3.0
1,2-Dichloropropane	<1.0
1,3-Dichloropropene (cis + trans)	<1.0
Ethylbenzene	<1.0
Methyl tert-butyl ether	<1.0
Styrene	<1.0
1,1,2,2-Tetrachloroethane	<0.5
Tetrachloroethylene	<1.0
Toluene	<1.0
1,1,1-Trichloroethane	<1.0
1,1,2-Trichloroethane	<1.0
Trichloroethylene	<1.0
Trichlorofluoromethane	<1.0
Vinyl chloride	<1.0
Xylenes (total)	<2.0

ENVIRONMENTAL OPERATORS CERTIFICATION

The *Drinking Water Protection Regulation* requires that the City have a Chief Operator certified at a level that matches the facility classification for Water Treatment and Water Distribution.

In November 2020, the Water Treatment Plant was reclassified from Class III to Class II. In December 2020, the Water Distribution system was reclassified from Class II to Class I.

During 2022, City of Enderby employed the following certified operators:

Name	Title	Water Treatment	Water Distribution
Clayton Castle	Lead Hand	Level II	Level I
Damon Kipp	Systems Operator II	Level II	Level I
Ray Brown	Utility Worker III	Level I	Level 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, 2022, 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.

Loss Control

- e. Completed a Loss Control Program in 2012, which estimated the total Unaccounted For Water at 6.5% or 12.05 m³ per hour.
- f. Completed a Leak Detection Audit to identify and repair water leaks within municipal infrastructure.

Planning for the Future

- g. 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 2023 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;
- 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; and
- 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 February 17, 2023.