ANNUAL WATER REPORT

2021

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INTRODUCTION

The District of Barriere is working to continually improve the water system and public awareness to meet the changing needs of our community.

Water safety is of the utmost importance to the District of Barriere. The supply of good, clean drinking water has been taken for granted by the general public in Canada until events such as the Walkerton E. Coli outbreak brought the safety of the water supply into the public eye.

This report has been submitted to Interior Health and is posted on the District of Barriere website: www.barriere.ca

We are dedicated to providing safe, clean water to the residents of Barriere as indicated in the following report.

WATER UTILITY OBJECTIVES

- To ensure adequate supply of high-quality water to the community.
- To effectively treat the raw water to provide potable water of integrity to the community.
- To ensure the adequate delivery of high-quality potable water to all points within the system for domestic and emergency purposes.
- To ensure effective management of all water system aspects and provide excellent customer service and information to the community.
- To manage water demand by effectively assessing and managing water losses from leakage in the system.
- To develop an effective water conservation program for operations and the wider community.
- To maintain water rates that encourage conservation and resource awareness while providing quality accessible water to consumers.

PROVINCIAL REQUIREMENTS

All drinking water in the water system must meet the Canadian Guidelines for Drinking Water Quality. In British Columbia, the Ministry of Health regulates water suppliers through the Drinking Water Protection Act. This legislation ensures safe drinking water in the Province. It requires that the water supplier monitor the drinking water source and distribution system to ensure compliance with the Drinking Water Protection regulations and report all results to the Health Authority. Water monitoring, inspection and testing, emergency response planning, cross connection control and security standards are all regulated for persons operating a water system.

Changes in water systems must be approved by the Interior Health Authority (IHA), and conform to the District's specifications.

Under the *BC Water Act*, the District must acquire licenses for withdrawal from water bodies.

Under the *Community Charter*, the District may, by bylaw, regulate, prohibit and impose requirements in relation to municipal service and public health. The District must make reports available to the public on request regarding fees imposed under this section.

SUPPLY SOURCES

Photo by Ellen Monteith

The District of Barriere's potable water system is supplied by a system of two wells, one being constructed during the 1990s, the second as recent as 2019. Both wells are located in the northeast quadrant of the community, adjacent to the Barriere River. Two deep wells are located at the north end of Spruce Crescent, and a third production well, is located on Bradford Road. The wells are summarized in Table 3.1 below. The location of these wells can be seen on the overall water system plan on the following page.

Table 3.1: Barriere's Supply Wells

Well	Year Built	Pumping Capacity (L/s)	Approximate Depth (m)	Known Issues Or Concerns
PW1 Bradford Park	2019	22	91.44	High Iron, Manganese
DW2 Spruce Crescent	1997	63	35	Increasing evidence of iron and manganese - limited lifespan

WATER TREATMENT

The well water is injected with a chlorine solution at the pump stations such that it contains an approximate free residual chlorine concentration of 0.5mg/L adjacent to the pump stations and has been measured to 0.3 mg/L at the more remote parts of the system.
In terms of the Interior Health Authority requirements, this treatment is satisfactory in a ground water source that is not under the influence of surface water, as these types of supply are given credit for filtration. Referencing the 4-3-2-1-0 requirements, the chlorine addresses the 4 and the 0, while the fact that the supply is a non-GWUDI well appears to be protected by a confining layer and addresses points 3, 2, and 1.

RESERVOIR STORAGE

The North reservoir is a rectangular concrete tank with sloping sides and a capacity of 1,540 m^3 (406,560 USG). It is located at the north end of the community adjacent to Barriere Lakes Road and has a free water level of 451 meters. A 350mm diameter supply main connects the reservoir with the rest of the system at the intersection of Lodgepole Road and Barriere Lakes Road.

The South reservoir is a rectangular concrete tank and has a capacity of 1,300m^3 (343,200 USG). It is located at the south end of the community near the top of Mountain Road and has a free water level of 451 meters. A 250mm diameter supply main connects the reservoir with the rest of the system at Mountain Road.

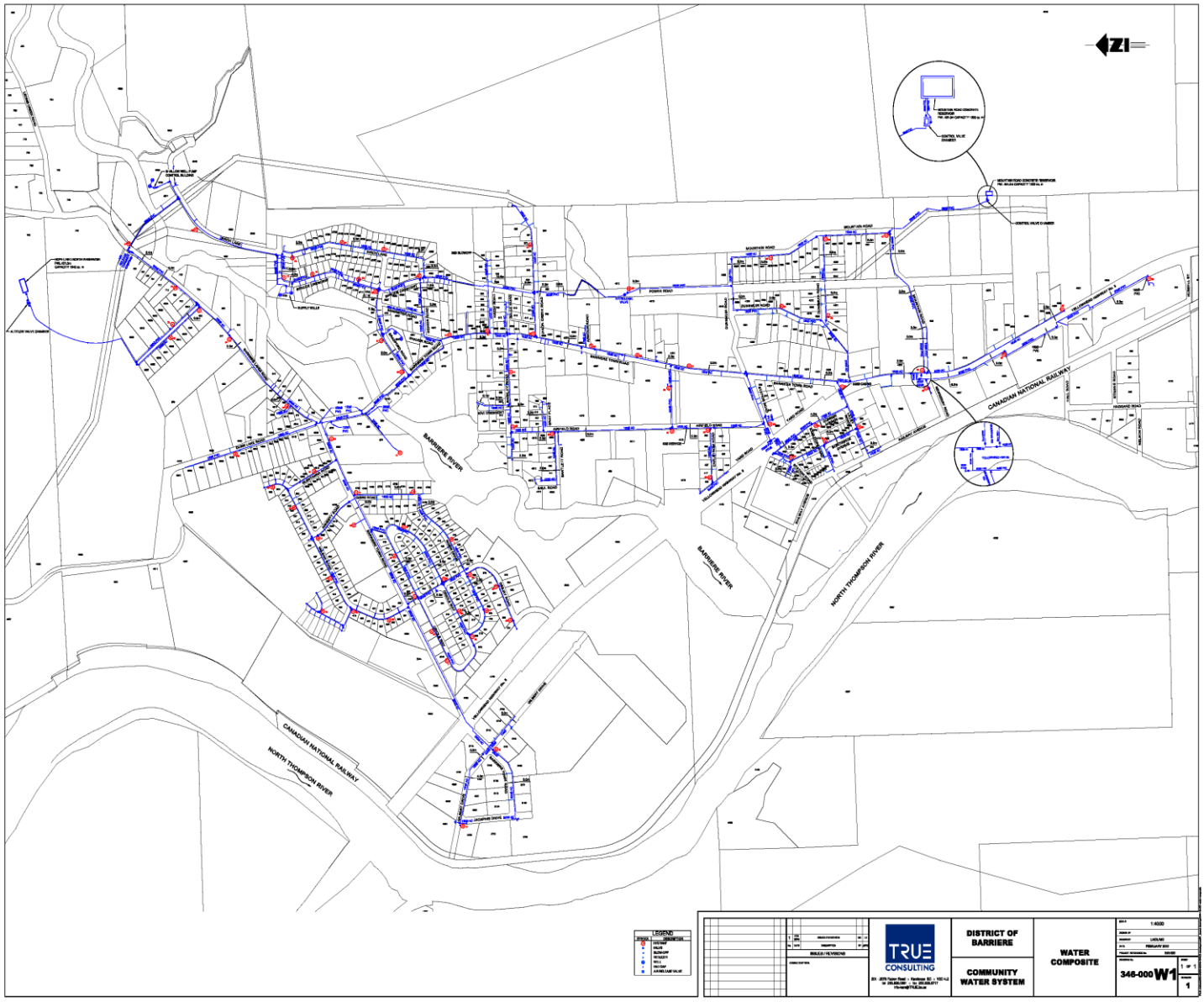
DISTRIBUTION SYSTEM

Approximately 24,750 meters of watermain are joined together to create the District of Barriere water system. The water system has been undergoing upgrades to ensure the water quality is safe for consumption. The first upgrades were from 1966 onwards when the pipes were asbestos cement. Beginning in the 1980's the pipes began to be upgraded to PVC pipes due to the potential health risks of leakage from decaying asbestos/cement pipe. The PVC pipes range in diameter from 100 mm to 350 mm and provide potable water to approximately 780 residential and 75 commercial service connections in Barriere.

Several sections of pipe within the District's water supply system are undersized, limiting flows and negatively impacting fire protection and pressures in certain parts of the network. Piping has been upgraded at the High School intersection along to Bradford Road, and from Barriere Town Road to Spruce Crescent.

In early 2021, the District began the process of drilling a new deep well alongside the current deep well (DW2) on Spruce Cres. This new well was given the moniker, "Deep Well 3 (DW3)" which is anticipated to be completed in the summer of 2022.

WATER SUPPLY SYSTEM



WATER SAMPLING AND TESTING

Bacteriological:
As required by the Interior Health Authority (IHA), staff takes weekly water samples for bacteriological testing for total coliforms and e-Coli bacteria. There are 3 different sampling sites used throughout Barriere.

Full Spectrum Analysis:
Water samples have been sent from the source water for a full spectrum analysis. Parameters such as alkalinity, metals, pH, turbidity, and hardness are tested. *SEE ATTACHMENT 4*

Summary:
In 2021 the District of Barriere had no positive bacteriological testing results pertaining to Total Coliforms or E.Coli and remained in compliance throughout the entire year of 2021.

EMERGENCY RESPONSE PLAN

The District of Barriere has an Emergency Response Plan for the water system. It identifies a number of potential emergencies that could occur and provides a systematic approach on how the District will deal with those emergencies. The plan is available for public viewing at the District Office, 4936 Barriere Town Road.

WATER QUALITY COMPLAINTS

The District of Barriere received a number of complaints in the spring of 2021 in respect to the quality of water being provided, which is a result of elevated minerals in the groundwater source. The wells have elevated iron and manganese levels, which once combined with chlorine create a brownish precipitate that showed up throughout the distribution system, therefore creating an aesthetically unpleasing water quality. Although the water was still safe for human consumption, the District of Barriere along with the Interior Health authority (IHA), continued maintaining the water quality advisory (WQA) that was implemented in 2019. The WQA is still in effect.

SYSTEM UPGRADES COMPLETED IN 2021

- Drilling of Replacement supply well (DW3). See Installation and Testing of Replacement Supply Well: WPID 40541. *SEE ATTACHMENT 3*
- G.A.R.P Assessment DW2 & Dw3, Spruce Crescent Well Field. *SEE ATTACHMENT 1*
- Expanded Cross Connection Control Program
- Two Water Main Extension's (Siska, Clary)
- Upgrade facility control and data acquisition systems from Radio communications to cellular
- Upgrade Water Meter Reader

- Identified a number of unmetered service connections and repaired multiple leaks (Water Loss/Conservation)
- Camera Inspected both North and South Reservoirs
- Located majority of the distribution system curb stops, and noted needs of repair
- New dedicated sample site at the southern most end of the water distribution system (near Esso) for reliable and representative daily water samples

POTENTIAL SYSTEM UPGRADES

- Biological manganese removal Water Treatment Plant
- New Proposed Production Well (DW4)
- Commission Replacement Well (DW3) and bring into service
- Upgrading water main on Barriere Town Road (Installed 1966, Asbestos cement) from Bradford Rd. to Mountain Rd. For removal of bottleneck and balance North and South reservoirs
- New Remote Chlorine Analyzer
- Install Dual Chlorine Pumps for redundancy at Spruce Cr. wellhouse
- Install new Deep Well Control Panel and Alarm Dialer

CROSS CONNECTION PROGRAM

The District of Barriere maintains a Cross Connection Control Program to prevent the potential backflow of non-potable water into the District's water distribution system. The Program is based on premises isolation to ensure there is a reliable barrier between private and public water systems. The program uses a priority approach with higher hazard ICI (Industrial, Commercial and Institutional) service connections being first in line for inspections and compliance mandates, as well as residential connections with auxiliary water. The District of Barriere Water System Bylaw # 189 gives the District authority to implement this program.

The District has a certified Cross Connection Control Inspector on staff who acts as the program administrator. He is also a certified Backflow Assembly Tester and is responsible for insuring all the Districts infrastructure is protected and in compliance with our program. The Inspector also performs inspections on new and existing facilities to determine whether there is a potential for contaminated water to flow back into the water distribution system.

All new ICI developments are required to be inspected for Cross Connections as a condition of the provision of water service.

In 2021, a total of 15 CCC inspections were conducted, including the reinspection of 6 District owned facilities to insure they continue to be properly isolated.

Backflow prevention devices are documented and tracked by the District to ensure they are tested annually and in good working order. This annual testing must be carried out by a certified

Backflow Assembly Tester. It is also worth noting that all residential outside hose bibs were confirmed have vacuum breakers installed (2012) and all new builds are required to have them.

The District also monitors for potential backflow situations through its water meter program. All service connections in the District must be metered and our water meters will detect and flag backflow occurrences and provide additional information on time of occurrence, duration and volume. If the situation were to occur, it would prompt immediate investigation and may trigger our Water System Emergency Response Plan.

2021 Summary Report

Total ICI Facilities/Premises (inc. District facilities and parks)	102
Total BFP's Tracked	47
Past Due Test Reports	11

Hazard (L/M/S)	Inspected Premises with CCs	Premises in Compliance
Sever	4	4
Moderate	15	13
Low	8	8
Total	27	25

The District will continue to improve and further implement its Cross Connection Control Program through inspections, tracking, program development and public education to eventually have all actual or potential cross connections identified and in compliance with our CCC Program.

OPERATOR CERTIFICATION

The District of Barriere currently employs 3 licensed operators, all in good standing with the EOCP. One Utilities Manager, who holds a Class 2 certification in Water Treatment and Water Distribution. One Water Technician 2, who holds a Class 2 certification in Water Treatment and a Class 1 certification in Water Distribution. One Water Technician 1, who holds a Class 1 certification in Water Distribution and will be obtaining his Class 1 certification in Water Treatment in 2021. The Water Technician 1 is also the District of Barriere's cross connection control inspector and certified backflow assembly tester.

SUMMARY OF SOURCE WATER PROTECTION EFFORTS

The District of Barriere currently has a wellhead protection plan in place to ensure a consistent effort is being made to protect our groundwater production wells. The wellhead protection plan assesses risks and makes recommendations with respect to source water protection. The plan notes that risks to production wells from activities within and outside the capture zone is low. Another measure the District of Barriere has implemented, is a property covenant on all surrounding resident homes which prohibits the use of fertilizers and pesticides. Further to this the District undertook a GWUDI/GARP study of its deep wells at the Spruce Crescent site to determine potential influences the nearby Barriere River may have. *SEE ATTACHMENT 1*

-APPENDIX I

WATER CONSUMPTION (US GALLONS)

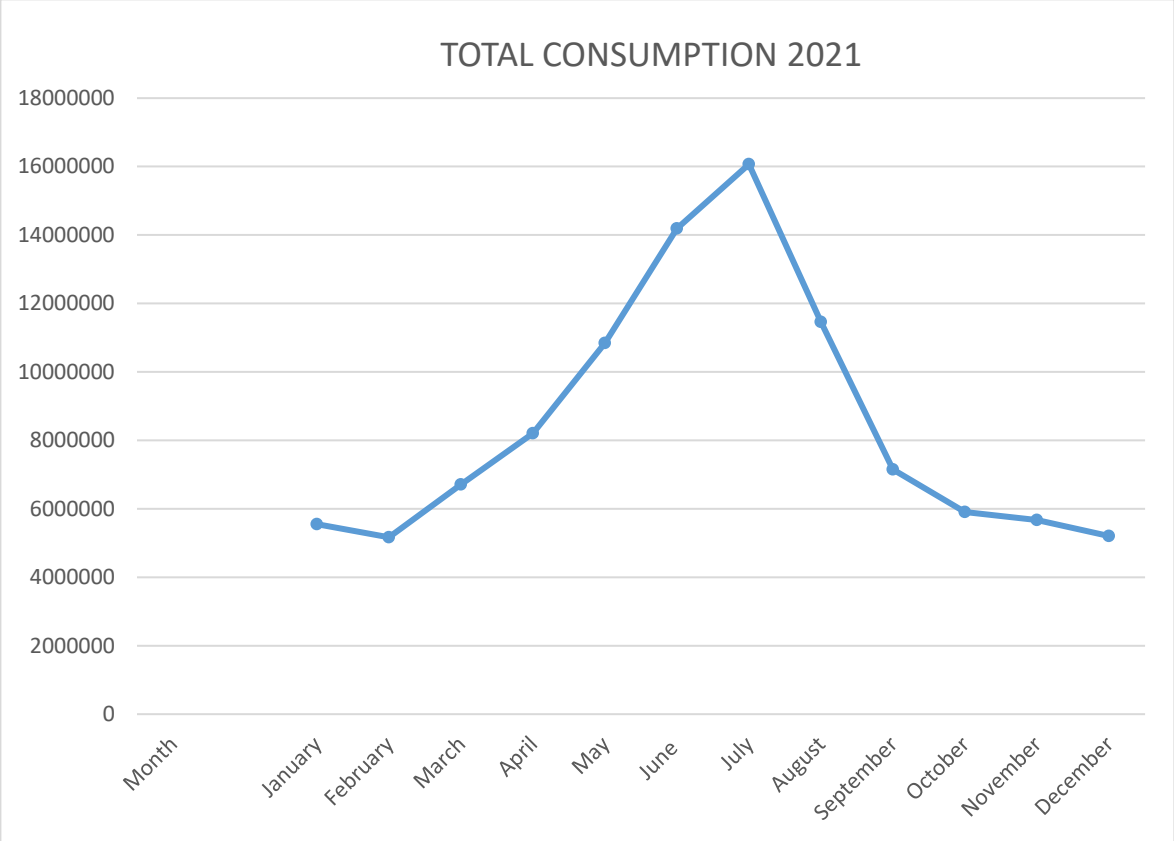
Month	2021 PW#1	2021 DW#2	2020 PW#1	2020 DW#2	2019 DW#2	2018 DW#2	2017 DW#2	2016 DW#2
January	0	5,554,308	0	7,434,506	7,358,400	6,412,300	7,629,400	4,931,000
February	1,996,269	3,171,904	0	7,210,840	6,008,155	5,847,300	6,897,000	6,322,000
March	6,709,999	0	0	5,874,752	7,132,632	5,912,900	6,292,600	4,934,600
April	2,972,517	5,229,866	0	6,451,104	9,876,852	6,691,300	6,600,696	7,709,200
May	190,547	10,650,658	0	9,001,828	9,152,742	17,302,700	13,297,400	17,569,100
June	90,902	14,100,544	0	6,221,416	18,399,654	19,729,400	22,456,500	17,845,000
July	615,574	15,452,256	736,639	6,657,220	18,752,814	23,890,600	35,345,355	17,679,600
August	167,274	11,291,344	0	9,915,824	11,149,300	22,315,700	22,934,300	21,965,999
September	264	7,145,984	0	7,292,080	9,736,024	10,752,300	15,454,700	8,767,500
October	0	5,908,984	0	5,500,160	7,593,404	7,878,900	7,513,400	5,742,000
November	0	5,671,928	0	4,974,608	6,130,388	7,597,200	6,111,800	4,161,900
December	0	5,207,212	0	5,207,212	8,256,120	8,322,100	8,127,500	4,578,300

Total Consumption for 2021: 102,128,334 US Gallons
Total Consumption for 2020: 82,478,189 US Gallons
Total Consumption for 2019: 119,537,215 US Gallons
Total Consumption for 2018: 145,826,200 US Gallons
Total Consumption for 2017: 158,865,845 US Gallons
Total Consumption for 2016: 122,206,199 US Gallons
Total Consumption for 2015: 142,223,460 US Gallons
Total Consumption for 2014: 141,532,585 US Gallons
Total Consumption for 2013: 172,664,965 US Gallons

APPENDIX II

WATER CONSUMPTION

2021 Total Water Consumption



APPENDIX III

LOUIS CREEK INDUSTRIAL PARK (LCIP)

The District of Barriere has a small water system in the Louis Creek Industrial Park (LCIP) which is located 4 kilometers south of the town of Barriere. This water system serves only the businesses which are located in the industrial park, along with 1 residential homeowner. The LCIP water system started production on June 1, 2020.

The water system consists of a 50-gpm production well, and a pump house where disinfection occurs. There is a non-potable storage reservoir which is located on the east side of the industrial park. Backup power is planned to be installed in 2022.

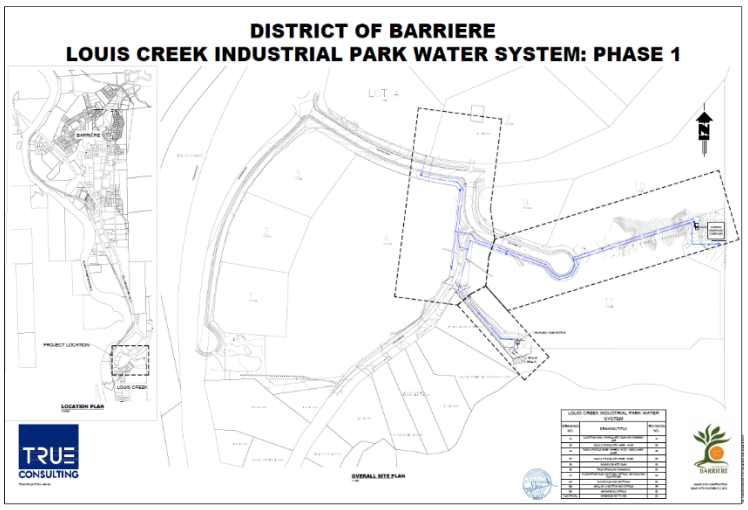
The district utility staff attends this site daily where chlorine levels and flows are monitored. Weekly bacteriological samples are collected for analysis from an outside independent laboratory. LCIP had no positive bacteriological testing results pertaining to Total Coliforms or E. Coli and remained in compliance throughout the entire year of 2021.

The District applied for a grant to fund a new reservoir and water system upgrades in the fall. The result of that grant application is expected in 2022.

A full spectrum analysis of the raw water source was conducted in 2021 and can be located in as an Addendum of this document.

LCIP WATER CONSUMPTION (CUBIC METERS)

Month	2021 LCIP	2020 LCIP
January	266.1	
February	219.6	
March	241.9	
April	148.6	
May	190.2	
June	170.7	551.2
July	651.9	428.5
August	262.7	388.0
September	140.7	327.7
October	141.9	320.0
November	135.9	359.4
December	253.5	337.9



Total Consumption for 2021: 2392.0 m3
Total Consumption for 2020: 2712.7 m3