



2020 Annual Water Report

DISTRICT OF BARRIERE

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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

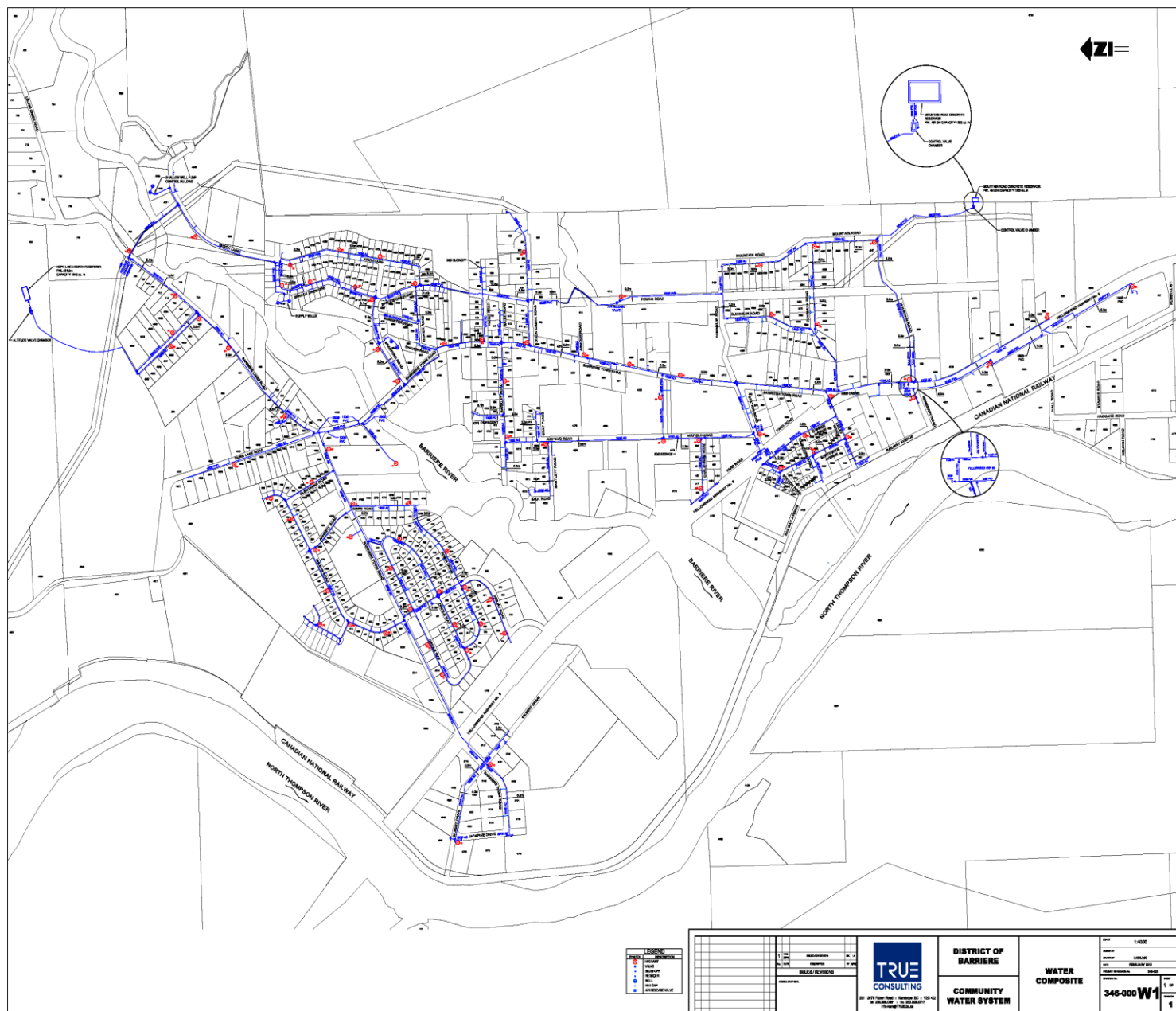
The North reservoir is a rectangular concrete tank with sloping sides and a capacity of 1,540 m³ (406,560 USG). It is located at the north end of the community adjacent to Barriere Lakes Road and has a free water level of 451 meters. A 350mm diameter supply main connects the reservoir with the rest of 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 1,300m³ (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.



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 APPENDIX IV*

Summary:

In 2020 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 2020.

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 numerous complaints in 2020 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 2020

- Development of Bradford Park wells

POTENTIAL SYSTEM UPGRADES

- Biological Water Treatment Plant
- Upgrading watermain on Barriere Town Road

CROSS CONNECTION PROGRAM

The District of Barriere maintains a Cross Connection Control Program to ensure that non-potable water can not be introduced into the District's water distribution system due to a backflow situation. The Program focuses on premises isolation of ICI (Industrial, Commercial and Institutional) service connections and residential connections with auxiliary water. Our Water System Bylaw No. 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 2020 the District also conducted inspections on two large pre-existing industrial facilities suspected of having high hazard cross connections.

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.

All residential outside hose bibs have vacuum breakers installed (2012).

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 with a "BF" icon. If the situation were to occur, it would prompt immediate investigation and may trigger our Water System Emergency Response Plan.

2020 Summary Report.

Total ICI Facilities/Premises (inc. District facilities and parks)	101
Total BFP's Tracked	41
Past Due Test Reports	11

Hazard (L/M/S)	Inspected Premises with CCs	Premises in Compliance
Sever	4	3
Moderate	13	11
Low	0	0
Total	17	15

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 Bylaw.

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 is undertaking a GUDI/GARP study of its deep wells at the Spruce Crescent site to determine potential influences the near by Barriere river may have.

-APPENDIX I**WATER CONSUMPTION (US GALLONS)**

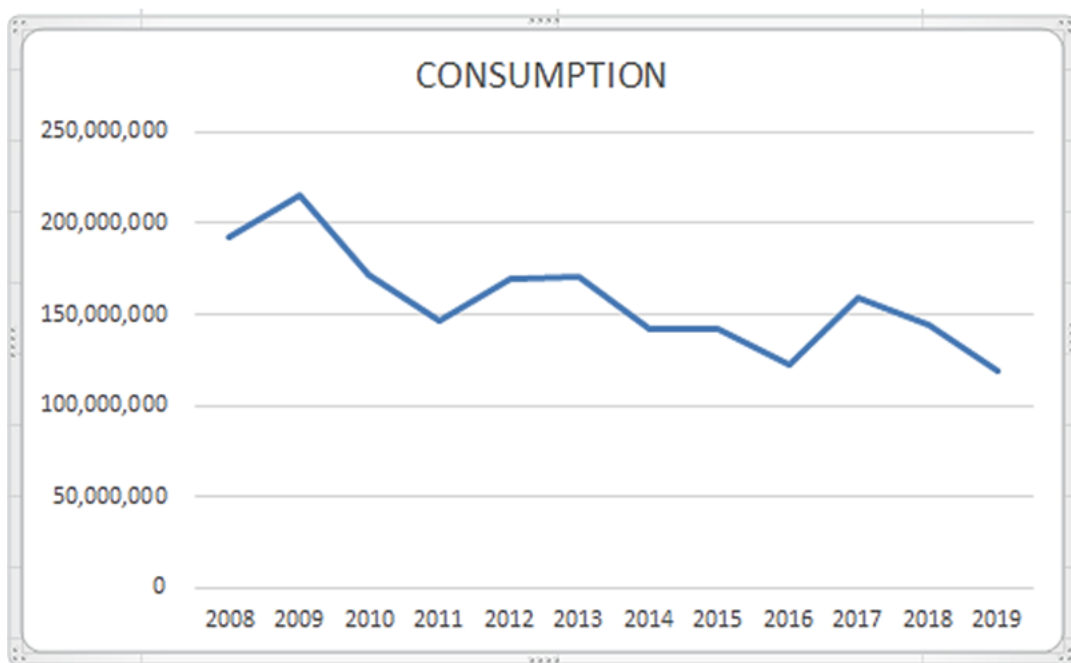
Month	2020 PW#1	2020 DW#2	2019 DW#2	2018 DW#2	2017 DW#2	2016 DW#2	2015 DW#2
January		7,434,506	7,358,400	6,412,300	7,629,400	4,931,000	5,819,900
February		7,210,840	6,008,155	5,847,300	6,897,000	6,322,000	5,767,600
March		5,874,752	7,132,632	5,912,900	6,292,600	4,934,600	10,512,500
April		6,451,104	9,876,852	6,691,300	6,600,696	7,709,200	7,865,100
May		9,001,828	9,152,742	17,302,700	13,297,400	17,569,100	15,735,326
June		6,221,416	18,399,654	19,729,400	22,456,500	17,845,000	20,584,284
July	736,639	6,657,220	18,752,814	23,890,600	35,345,355	17,679,600	20,468,173
August		9,915,824	11,149,300	22,315,700	22,934,300	21,965,999	23,200,226
September		7,292,080	9,736,024	10,752,300	15,454,700	8,767,500	11,904,700
October		5,500,160	7,593,404	7,878,900	7,513,400	5,742,000	7,276,100
November		4,974,608	6,130,388	7,597,200	6,111,800	4,161,900	5,827,800
December		5,207,212	8,256,120	8,322,100	8,127,500	4,578,300	5,640,800

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

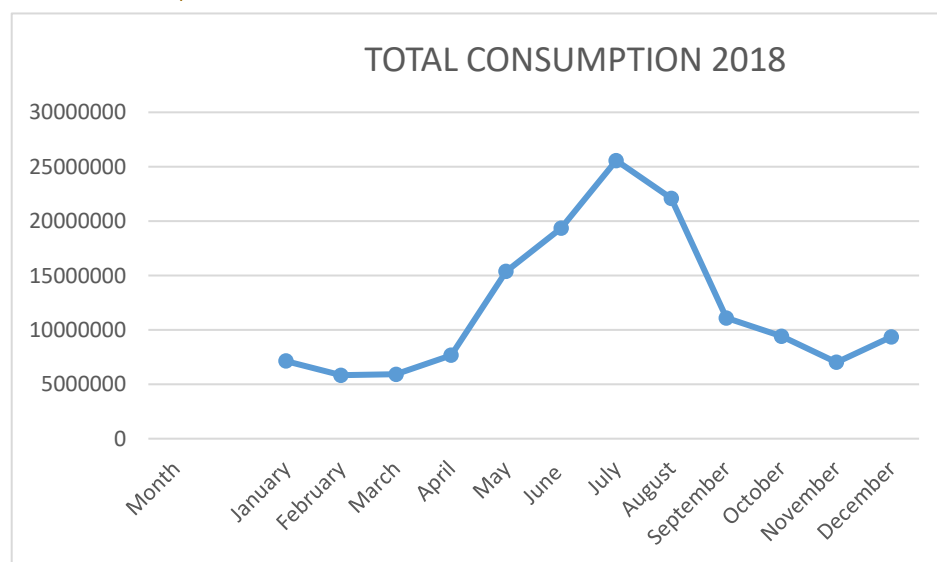
APPENDIX II

WATER CONSUMPTION

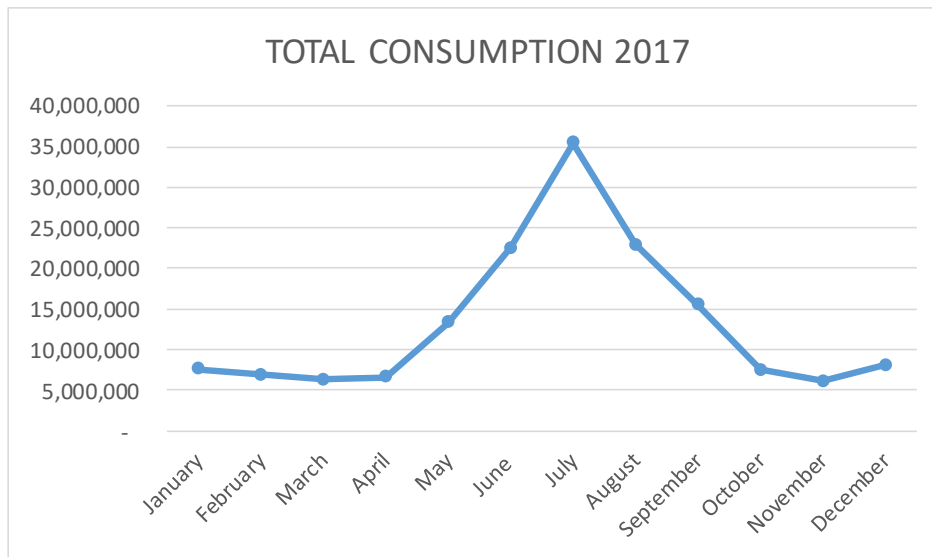
2019 Water Consumption



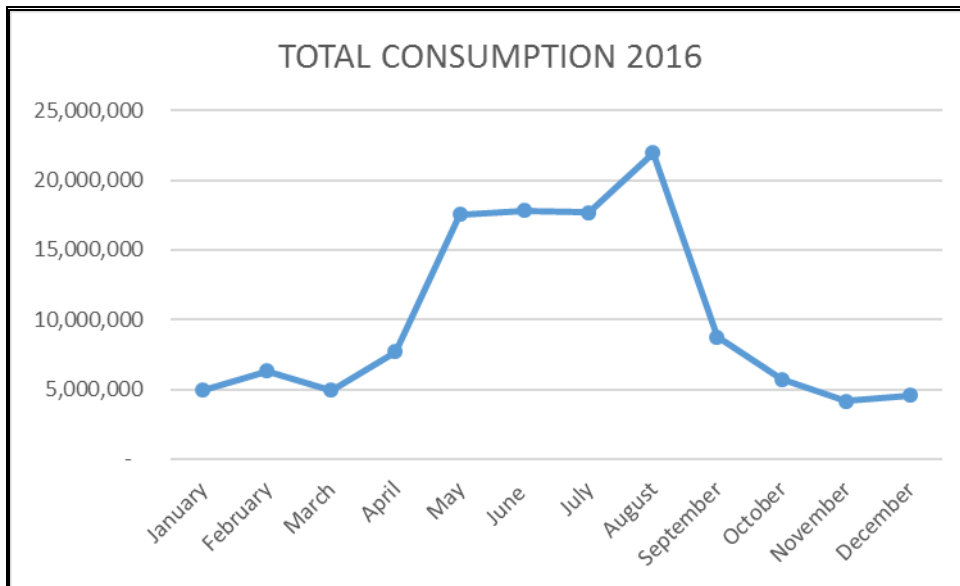
2018 Water Consumption



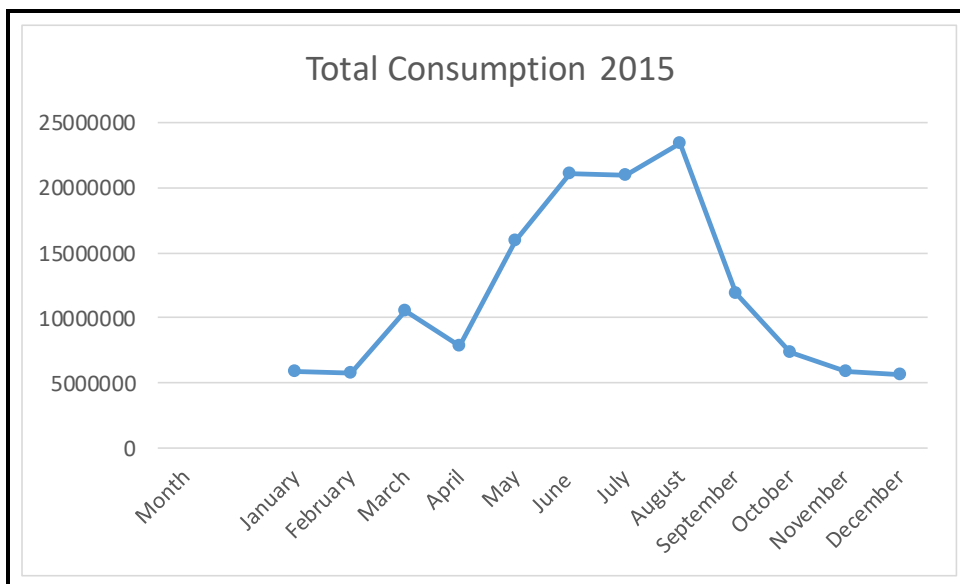
2017 Water Consumption



2016 Water Consumption



2015 Water Consumption



APPENDIX III

FULL SPECTRUM ANALYSIS

Page : 3 of 4
 Work Order : KS2002453
 Client : District of Barriere
 Project : District of Barriere Raw Water



Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID		Spruce Crescent DW2 - Raw Water Analysis	Bradford Park PW1 - Raw Water Analysis	Louis Creek - Raw Water Analysis	---	---
Client sampling date / time						04-Nov-2020 09:20	04-Nov-2020 09:05	04-Nov-2020 12:10	---	---
Analyte	CAS Number	Method	LOR	Unit	KS2002453-001	KS2002453-002	KS2002453-003	-----	-----	---
						Result	Result	Result	---	---
Physical Tests										
alkalinity, total (as CaCO3)	---	E290	1.0	mg/L	153	210	192	---	---	---
colour, true	---	E329	5.0	CU	<5.0	<5.0	<5.0	---	---	---
conductivity	---	E100	2.0	µS/cm	327	438	424	---	---	---
pH	---	E108	0.10	pH units	7.90	8.25	8.24	---	---	---
solids, total dissolved [TDS]	---	E162	10	mg/L	204	276	280	---	---	---
turbidity	---	E121	0.10	NTU	<0.10	0.25	<0.10	---	---	---
hardness (as CaCO3), from total Ca/Mg	---	EC100A	0.60	mg/L	164	216	226	---	---	---
Anions and Nutrients										
chloride	16887-00-6	E235.Cl	0.50	mg/L	4.98	0.71	1.97	---	---	---
fluoride	16984-48-8	E235.F	0.020	mg/L	0.093	0.189	0.096	---	---	---
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.511	<0.0050	<0.0050	---	---	---
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	<0.0010	---	---	---
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	15.8	29.4	39.4	---	---	---
Bacteriological Tests										
coliforms, Escherichia coli [E. coli]	---	E010.EC	1	MPN/100mL	<1	<1	<1	---	---	---
coliforms, total	---	E010.TC	1	MPN/100mL	<1	<1	<1	---	---	---
Total Metals										
aluminum, total	7429-90-5	E420	0.0100	mg/L	<0.0100	<0.0100	<0.0100	---	---	---
antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	---	---	---
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00116	0.00638	0.00139	---	---	---
barium, total	7440-39-3	E420	0.0200	mg/L	<0.0200	0.0377	<0.0200	---	---	---
boron, total	7440-42-8	E420	0.100	mg/L	<0.100	<0.100	<0.100	---	---	---
cadmium, total	7440-43-9	E420	0.000200	mg/L	<0.000200	<0.000200	<0.000200	---	---	---
calcium, total	7440-70-2	E420	0.100	mg/L	38.3	49.1	65.4	---	---	---
chromium, total	7440-47-3	E420	0.00200	mg/L	<0.00200	<0.00200	<0.00200	---	---	---
copper, total	7440-50-8	E420	0.00100	mg/L	0.00201	0.00135	0.00122	---	---	---
iron, total	7439-89-6	E420	0.030	mg/L	<0.030	0.080	0.034	---	---	---
lead, total	7439-92-1	E420	0.000500	mg/L	0.000766	<0.000500	<0.000500	---	---	---
magnesium, total	7439-95-4	E420	0.100	mg/L	16.7	22.8	15.2	---	---	---

Page : 4 of 4
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Analytical Results

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Analyte	CAS Number	Method	LOR	Unit			KS2002453-001	KS2002453-002	KS2002453-003	-----	-----
							Result	Result	Result	---	---
Total Metals											
manganese, total	7439-96-5	E420	0.00200	mg/L			<0.00200	0.0994	0.0608	---	---
mercury, total	7439-97-6	E508	0.0000050	mg/L			<0.0000050	<0.0000050	<0.0000050	---	---
potassium, total	7440-09-7	E420	0.100	mg/L			1.63	3.25	3.45	---	---
selenium, total	7782-49-2	E420	0.00100	mg/L			<0.00100	<0.00100	<0.00100	---	---
sodium, total	17341-25-2	E420	2.00	mg/L			6.56	12.6	4.49	---	---
uranium, total	7440-61-1	E420	0.000100	mg/L			0.00183	0.000266	<0.000100	---	---
zinc, total	7440-66-6	E420	0.0500	mg/L			<0.0500	<0.0500	<0.0500	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.

APPENDIX IV

LOUIS CREEK INDUSTRIAL PARK (LCIP)

The District of Barriere has a new, as of 2020, Small Water System in the Louis Creek Industrial Park 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, with no back up power available. There is a non-potable storage reservoir which is located on the east side of the industrial park.

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 2020.

A full spectrum analysis of the raw water source was conducted in 2020 and is located in Appendix III, of this document.

WATER CONSUMPTION (CUBIC METERS)

Month	2020 LCIP
January	0.0
February	0.0
March	0.0
April	0.0
May	0.0
June	551.2
July	428.5
August	388.0
September	327.7
October	320.0
November	359.4
December	337.9

Total Consumption for 2020: 2712.7 m3