2018 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 should 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

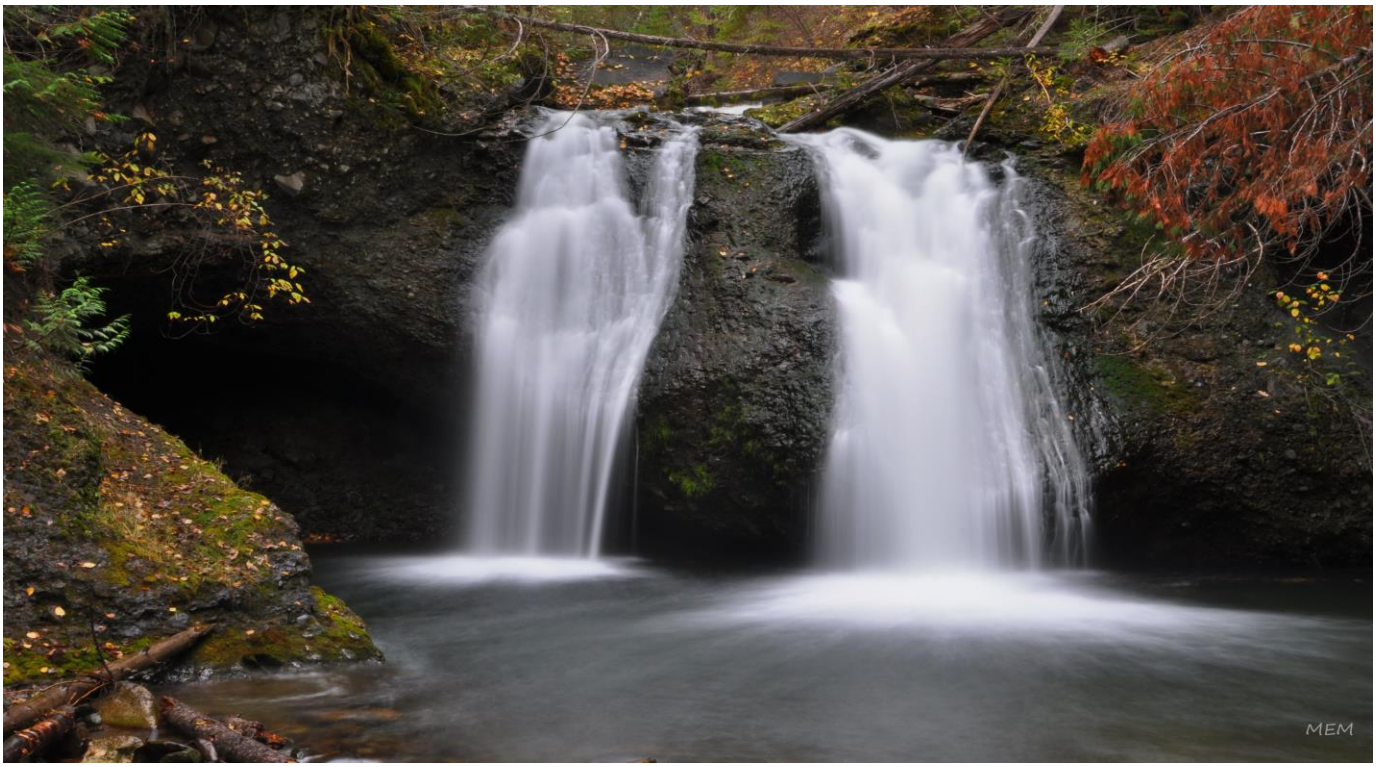


Photo by Ellen Monteith

The District of Barriere's potable water system is supplied by a system of two wells that were constructed during the 1990s. The 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, as well as the Bradford Park wells, located at the entrance to 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
#1 Deep	1994	28[1]	47	High Iron, Manganese
#2 Deep	1997	63	35	

[1] Capacity limited by greensand filtration

As noted in the above table, the water that is pumped from the 1994 deep well suffers from high iron and manganese levels and is subsequently treated by a Kisco greensand filtration system. This system is designed to treat 47 L/s (750 USGPM), but a failure in one of the filtration units has reduced the maximum flow to 28 L/s (400 USGPM).

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.

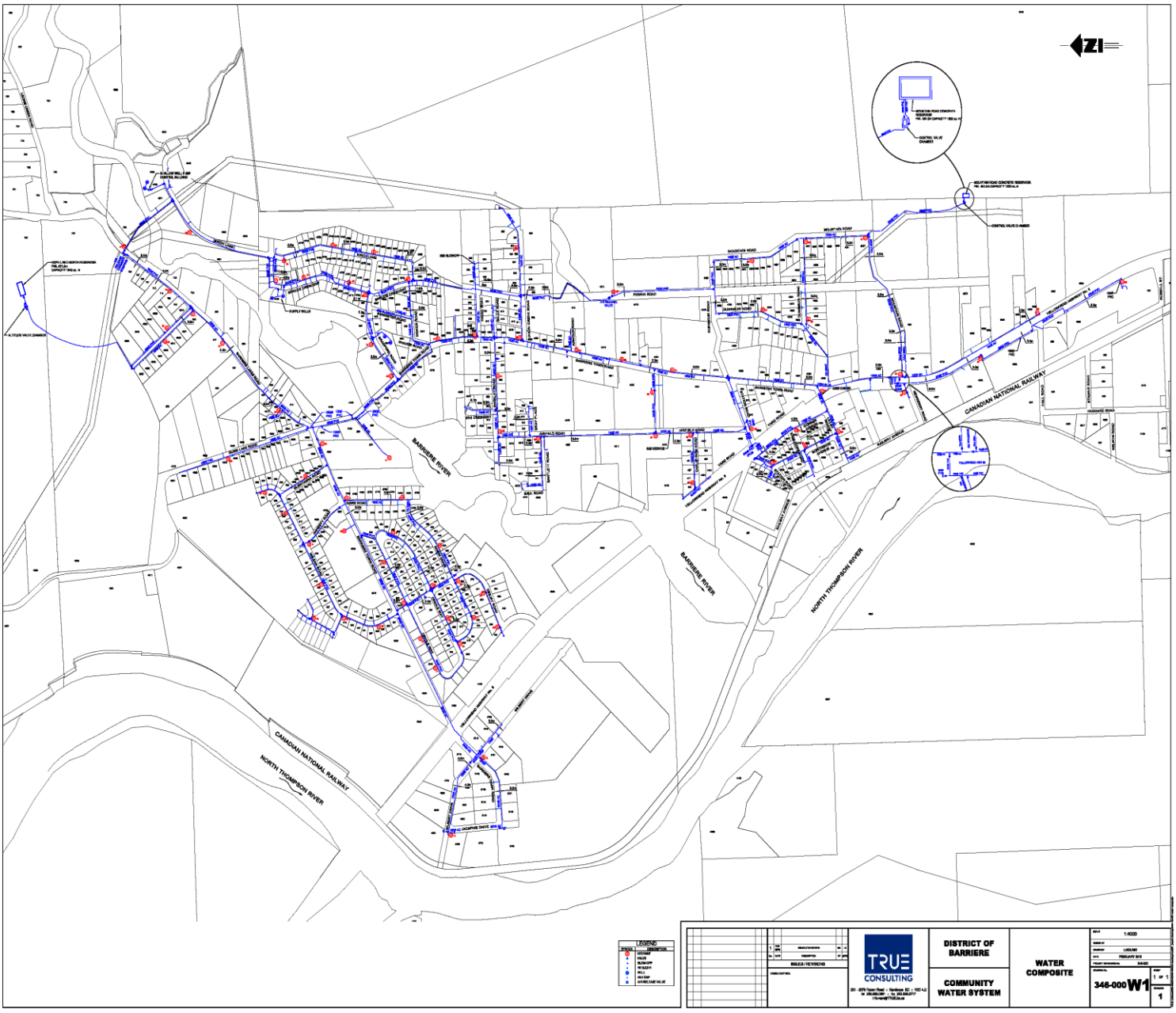
RESERVOIR STORAGE

The existing reservoir is a rectangular concrete tank with sloping sides and a capacity of 1,475 m^3 (390,000 USG). It is located at the north end of the community adjacent to Barriere Lakes Road and has a floor elevation of 448 metres. A 350 mm diameter supply main connects the reservoir with the rest of the system at the intersection of Lodgepole Road and Barriere Lakes Road. The new reservoir on the south side of Barriere near the North Thompson River has a capacity of 350,000 USG and is tied into at Mountain Road.

DISTRIBUTION SYSTEM

Approximately 24,750 metres of watermain are joined together to create the District of Barriere water system. The water system has been under going 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

DISTRICT OF BARRIERE
2018 ANNUAL WATER REPORT

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. *SEE APPENDIX III*

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*

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 Public Works department did not receive complaints in 2018 about water quality. There were a few complaints about a stronger than normal chlorine smell. Testing showed that there were no increased chlorine levels present.
Whenever there was a water main break there would be questions about the turbidity of the water in the area and residents were advised that this was normal and to run their water to flush out their water lines within their residence.

SYSTEM UPGRADES COMPLETED IN 2018

- Development of new reservoir
- Development of 2 production wells in Bradford Park on Bradford Road
- Upgrade Barriere Town Road waterline from High school to Bradford Road
- Back-up generator for Bradford Wells.

POTENTIAL SYSTEM UPGRADES

- Check sedimentation level in reservoir
- Upgrade Barriere Town Road from Bradford Road to Mountain Road
- Loop waterline from old Industrial Park to Borthwick Ave
- Since all upgrades in the past 20 year plan will be completed by the end of 2017, we will be formulating a new 20 year plan for the future.

CROSS CONNECTION PROGRAM

The municipality has a Cross Connection Control Program (Bylaw # 0038) to address the potential for the water system to be compromised by high risk service connections which could introduce contaminated water into the water system.

APPENDIX I
WATER CONSUMPTION

Month	2017 DW#1	2016 DW#1	2015 DW#1	2014 DW#1	2013 DW#1	2012 DW#1
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	0	0	0	0	609	0
April	1,904	0	0	0	0	0
May	0	0	231,874	0	37,251	26,900
June	83,045	0	0580,216	0	83,306	84,421
July	120,245	0	537,987	1,645,111	1,808,401	919,055
August	0	6901	270,974	663,823	1,740,5920	1,578,358
September	0	0	0	25	0	257,264
October	0	0	0	5	228,328	0
November	0	0	0	0	0	0
December	0	0	0	0	0	0

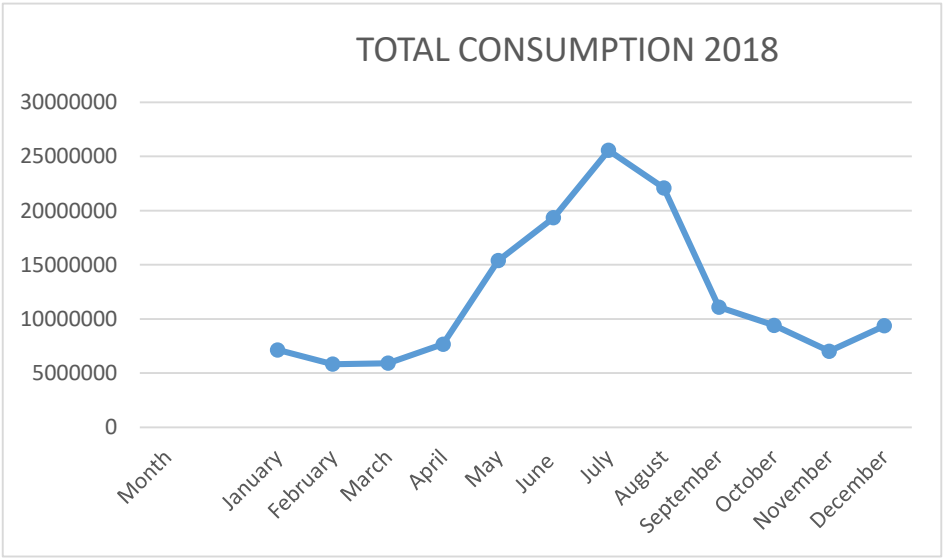
Month	2018 DW#2	2017 DW#2	2016 DW#2	2015 DW#2	2014 DW#2	2013 DW#2
January	6,412,300	7,629,400	4,931,000	5,819,900	6,365,300	6,909,800
February	5,847,300	6,897,000	6,322,000	5,767,600	5,473,200	7,177,500
March	5,912,900	6,292,600	4,934,600	10,512,500	5,737,310	8,274,300
April	6,691,300	6,600,696	7,709,200	7,865,100	7,093,209	9,402,500
May	17,302,700	13,297,400	17,569,100	15,735,326	12,119,478	19,352,900
June	19,729,400	22,456,500	17,845,000	20,584,284	16,604,300	16,584,400
July	23,890,600	35,345,355	17,679,600	20,468,173	25,899,936	29,375,900
August	22,315,700	22,934,300	21,965,999	23,200,226	20,898,575	24,842,208
September	10,752,300	15,454,700	8,767,500	11,904,700	13,218,656	18,745,500
October	7,878,900	7,513,400	5,742,000	7,276,100	9,987,876	9,443,372
November	7,597,200	6,111,800	4,161,900	5,827,800	8,116,200	7,646,500
December	8,322,100	8,127,500	4,578,300	5,640,800	8,551,000	5,621,200

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
Total Consumption for 2012: 169,469,432 US Gallons

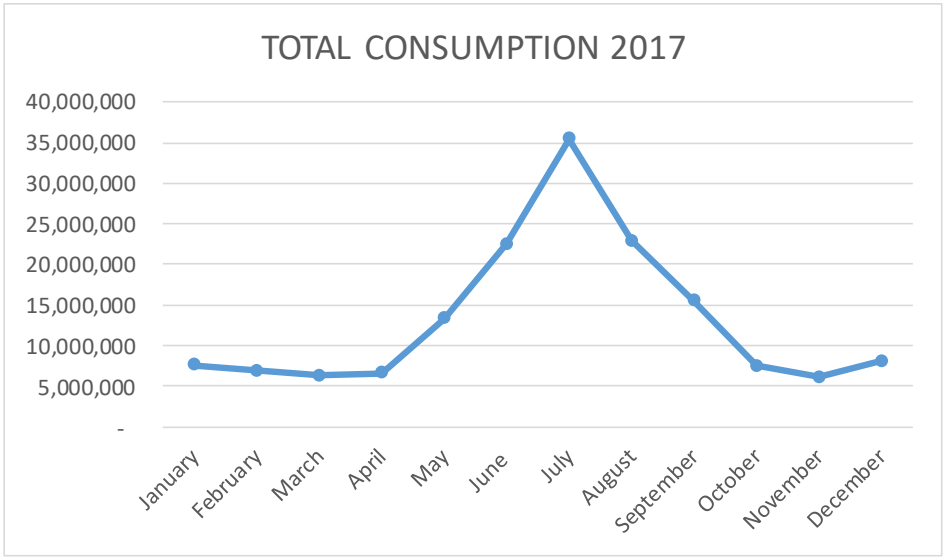
APPENDIX II

WATER CONSUMPTION

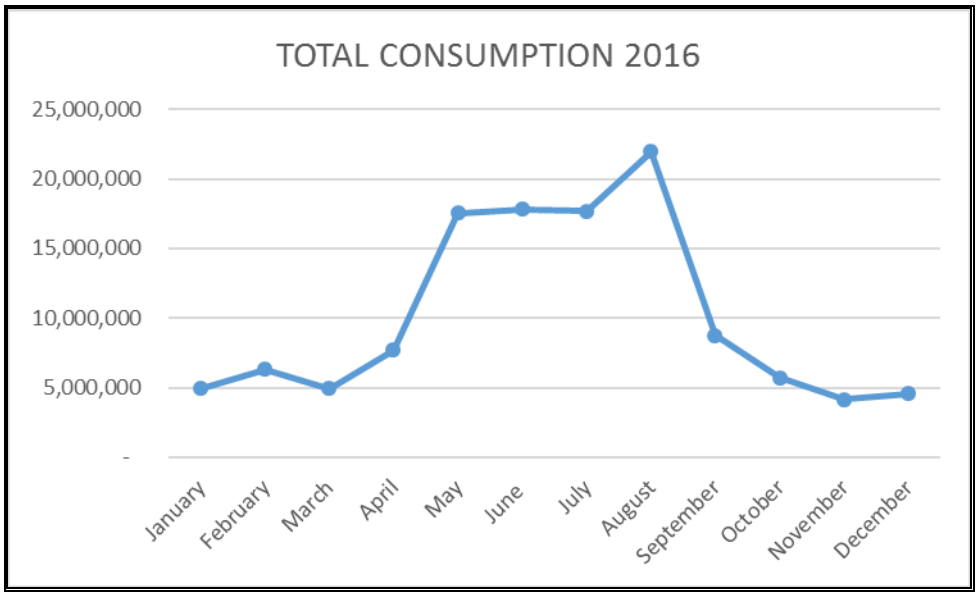
2018 Water Consumption



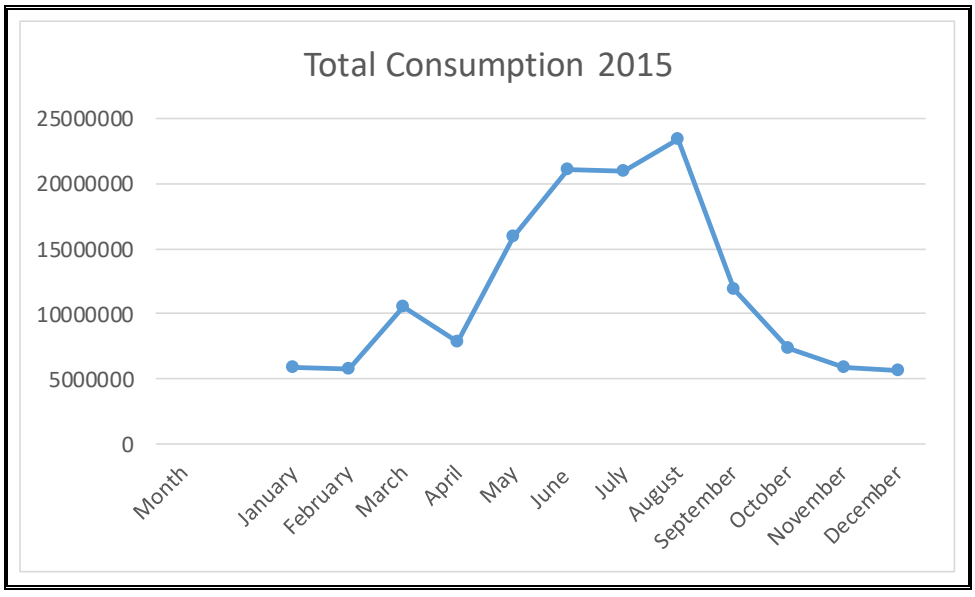
2017 Water Consumption



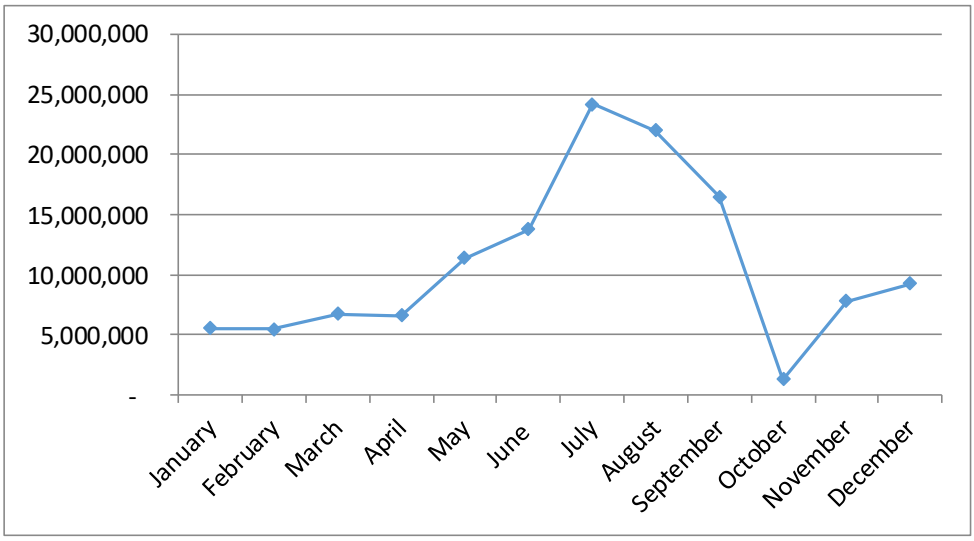
2016 Water Consumption



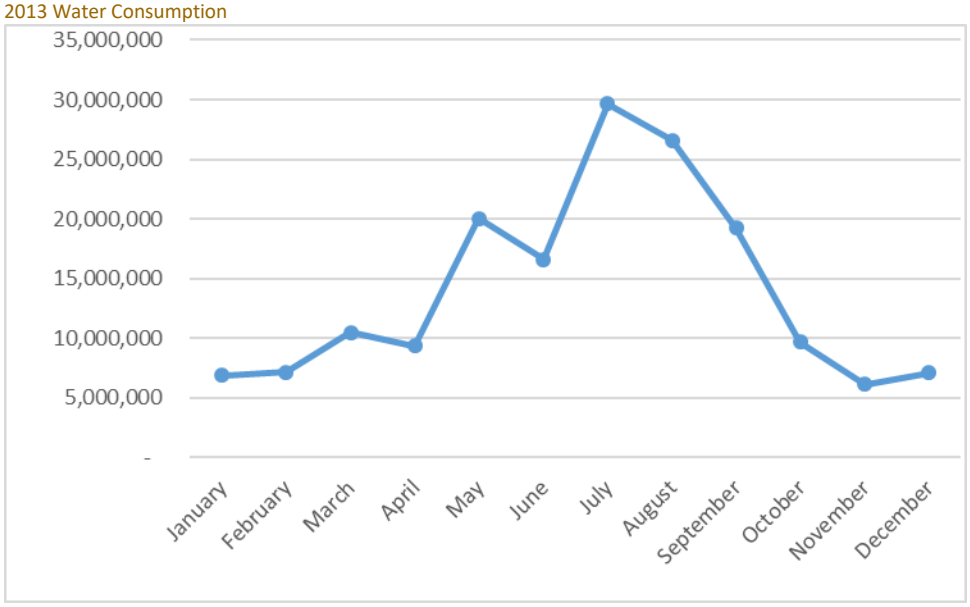
2015 Water Consumption



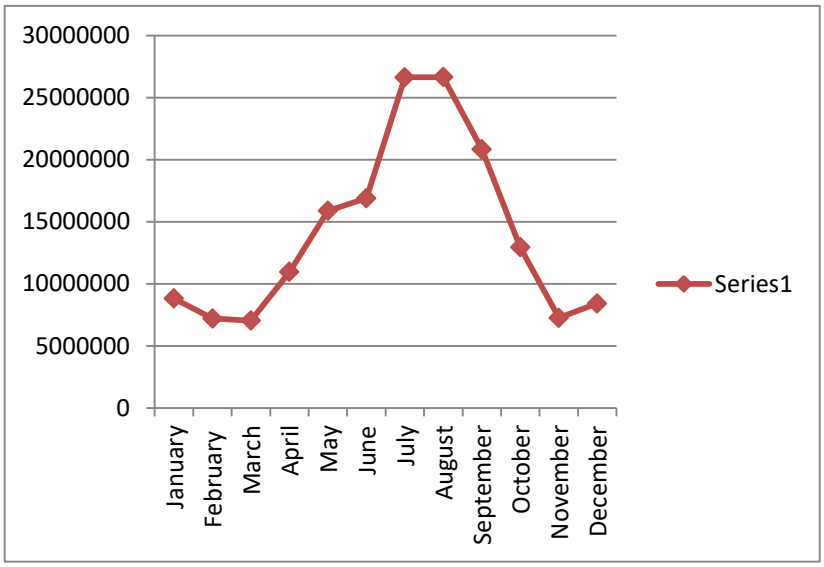
2014 Water Consumption



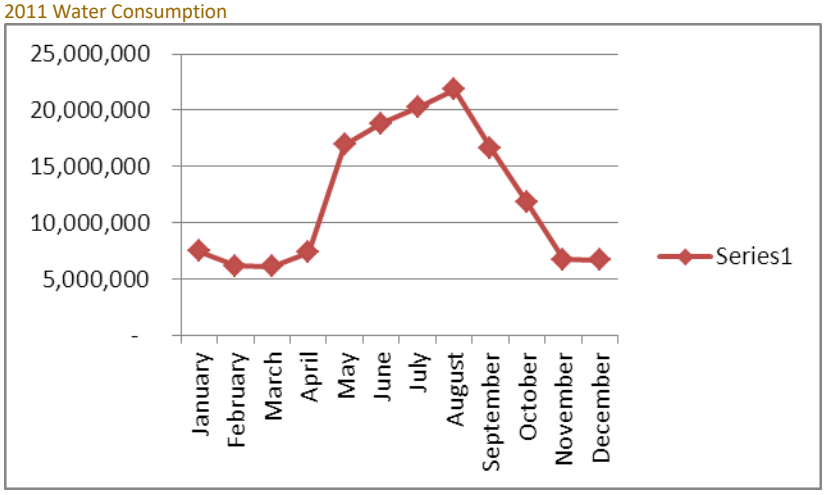
2013 Water Consumption



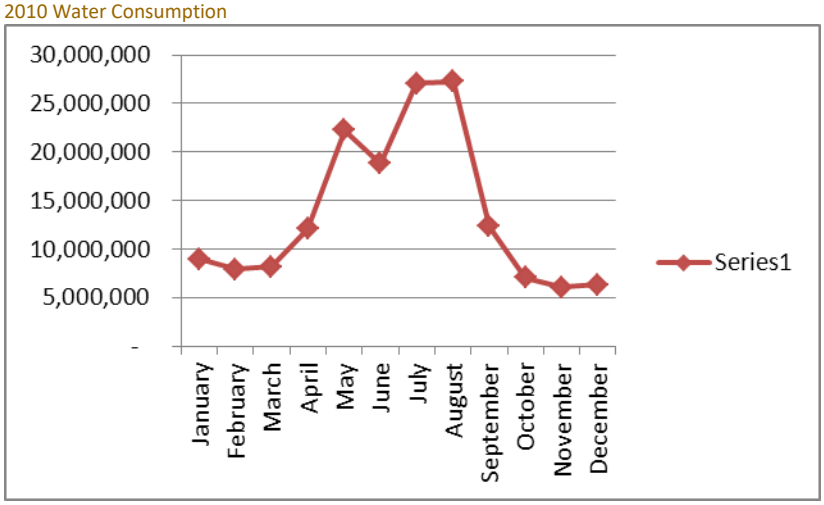
2012 Water Consumption



2011 Water Consumption



2010 Water Consumption



APPENDIX III

BACTERIOLOGICAL ANALYSIS 2018

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Jan 4	ALS	<1	<1	<1	<1	Office
Jan 11	ALS	<1	<1	<1	<1	Esso
Jan18	ALS	<1	<1	<1	<1	Office
Jan 25	ALS	<1	<1	<1	<1	HealthCl.

		Total coliform	Fecal coliform	Ecoli	Background colonies	
FEB 1	ALS	<1	<1	<1	<1	Esso
FEB 9	ALS	<1	<1	<1	<1	Office
FEB 15	ALS	<1	<1	<1	<1	Health Cl
FEB 22	ALS	<1	<1	<1	<1	Esso

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Mar 1	ALS	<1	<1	<1	<1	Health Cl
Mar 8	ALS	<1	<1	<1	<1	Office
Mar 16	ALS	<1	<1	<1	<1	Health Cl
Mar 22	ALS	<1	<1	<1	<1	Esso
Mar 29	ALS	<1	<1	<1	<1	Health Cl

		Total coliform	Fecal coliform	Ecoli	Background colonies	
April 4	ALS	<1	<1	<1	<1	Esso
April 13	ALS	<1	<1	<1	<1	Esso
April 20	ALS	<1	<1	<1	<1	Office
April 26	ALS	<1	<1	<1	<1	Health Cl

		Total coliform	Fecal coliform	Ecoli	Background colonies	
May 4	ALS	<1	<1	<1	<1	Esso
May 11	ALS	<1	<1	<1	<1	
May 17	ALS	<1	<1	<1	<1	Health Cl
May 24 -1	ALS	<1	<1	<1	<1	Office
May 24 -2	ALS	<1	<1	<1	<1	Esso
May 29	ALS	<1	<1	<1	<1	Health Cl

		Total coliform	Fecal coliform	Ecoli	Background colonies	
June 7	ALS	<1	<1	<1	<1	Esso

June 14	ALS	<1	<1	<1	<1	Office
June 21	ALS	<1	<1	<1	<1	Health Cl
June 29	ALS	<1	<1	<1	<1	Esso

		Total coliform	Fecal coliform	Ecoli	Background colonies	
July 6	ALS	<1	<1	<1	<1	Office
July 12	ALS	<1	<1	<1	<1	Health Cl
July 19	ALS	<1	<1	<1	<1	Esso
July 21	ALS	<1	<1	<1	<1	Health Cl
July 26	ALS	<1	<1	<1	<1	Office

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Aug 3	ALS	<1	<1	<1	<1	Health Cl
Aug 17	ALS	<1	<1	<1	<1	Esso
Aug 23	ALS	<1	<1	<1	<1	Health Cl

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Sept 6	ALS	<1	<1	<1	<1	Office
Sept 14	ALS	<1	<1	<1	<1	Health Cl
Sept 20	ALS	<1	<1	<1	<1	Esso
Sept 27	ALS	<1	<1	<1	<1	Office

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Oct 4	ALS	<1	<1	<1	<1	Office
Oct 12	ALS	<1	<1	<1	<1	Health Cl
Oct 19	ALS	<1	<1	<1	<1	Esso
Oct 26	ALS	<1	<1	<1	<1	Office
Oct 31	ALS	<1	<1	<1	<1	4226 YH Hwy

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Nov 2	ALS	<1	<1	<1	<1	4230 YH Hwy
Nov 8	ALS	<1	<1	<1	<1	Health Cl
Nov 16	ALS	<1	<1	<1	<1	Esso
Nov 22	ALS	<1	<1	<1	<1	Office
Nov 29	ALS	<1	<1	<1	<1	Health Cl

		Total coliform	Fecal coliform	Ecoli	Background colonies	
Dec 7	ALS	<1	<1	<1	<1	Esso

Dec 14	ALS	<1	<1	<1	<1	Office
Dec 20	ALS	<1	<1	<1	<1	Esso
Dec 20	ALS	<1	<1	<1	<1	Health Cl

APPENDIX IV

FULL SPECTRUM ANALYSIS

DISTRICT OF BARRIERE
PO Box 219
Barriere BC V0E 1E0
ATTN: Nora Johnson

Date: 20-OCT-15
PO No.: 248189
WO No.: L1687245
Project Ref: DEEP WELL #1 RAW
Sample ID: DEEP WELL #1
Sampled By: Doug
Date Collected: 13-OCT-15
Lab Sample ID: L1687245-1
Matrix: Water

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Physical Tests						
Colour, True	<5.0		CU			15-OCT-15
Conductivity	573		uS/cm			19-OCT-15
Hardness (as CaCO3)	317		mg/L		500	20-OCT-15
pH	8.23		pH		6.5-8.5	19-OCT-15
Total Dissolved Solids	331		mg/L		500	17-OCT-15
Turbidity	4.35		NTU	0.1		16-OCT-15
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	283		mg/L			15-OCT-15
Chloride (Cl)	0.63		mg/L		250	15-OCT-15
Fluoride (F)	0.154		mg/L	1.5		15-OCT-15
Nitrate (as N)	<0.0050		mg/L	10		15-OCT-15
Nitrite (as N)	<0.0010		mg/L	1		15-OCT-15
Sulfate (SO4)	48.5		mg/L		500	15-OCT-15
Bacteriological Tests						
E. coli	<1		CFU/100mL	0		14-OCT-15
Background colonies	<1		CFU/100mL			14-OCT-15
Coliform Bacteria - Total	<1		CFU/100mL	0		14-OCT-15
Total Metals						
Aluminum (Al)-Total	<0.010		mg/L		0.1	18-OCT-15
Antimony (Sb)-Total	<0.00050		mg/L	0.006		18-OCT-15
Arsenic (As)-Total	0.00313		mg/L	0.01		18-OCT-15
Barium (Ba)-Total	0.021		mg/L	1		16-OCT-15
Boron (B)-Total	<0.10		mg/L	5		16-OCT-15
Cadmium (Cd)-Total	<0.00020		mg/L	0.005		18-OCT-15
Calcium (Ca)-Total	69.0		mg/L			16-OCT-15
Chromium (Cr)-Total	<0.0020		mg/L	0.05		18-OCT-15
Copper (Cu)-Total	0.0032		mg/L		1.0	18-OCT-15
Iron (Fe)-Total	0.682		mg/L		0.3	16-OCT-15
Lead (Pb)-Total	0.00137		mg/L	0.01		18-OCT-15
Magnesium (Mg)-Total	35.0		mg/L			16-OCT-15
Manganese (Mn)-Total	0.140		mg/L		0.05	18-OCT-15
Mercury (Hg)-Total	<0.00020		mg/L	0.001		16-OCT-15
Potassium (K)-Total	2.82		mg/L			18-OCT-15
Selenium (Se)-Total	<0.0010		mg/L	0.05		18-OCT-15
Sodium (Na)-Total	11.6		mg/L		200	16-OCT-15
Uranium (U)-Total	<0.00010		mg/L	0.02		19-OCT-15
Zinc (Zn)-Total	<0.050		mg/L		5.0	16-OCT-15

ADDRESS: 1445 McGill Rd, Unit 2B, Kamloops BC, V2C 6K7 | Phone: +1 250 372 3588 | Fax: +1 250 372 3670
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

DISTRICT OF BARRIERE
PO Box 219
Barriere BC V0E 1E0
ATTN: Nora Johnson

Date: 20-OCT-15
PO No.: 248189
WO No.: L1687242
Project Ref: DEPP WELL #2 RAW
Sample ID: DEEP WELL #2 RAW
Sampled By: Doug
Date Collected: 13-OCT-15
Lab Sample ID: L1687242-1
Matrix: Water

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Physical Tests						
Colour, True	<5.0		CU			15-OCT-15
Conductivity	372		uS/cm			19-OCT-15
Hardness (as CaCO3)	190		mg/L		500	20-OCT-15
pH	8.03		pH		6.5-8.5	19-OCT-15
Total Dissolved Solids	221		mg/L		500	15-OCT-15
Turbidity	0.18		NTU	0.1		16-OCT-15
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	180		mg/L			15-OCT-15
Chloride (Cl)	2.73		mg/L		250	15-OCT-15
Fluoride (F)	0.093		mg/L	1.5		15-OCT-15
Nitrate (as N)	0.226		mg/L	10		15-OCT-15
Nitrite (as N)	<0.0010		mg/L	1		15-OCT-15
Sulfate (SO4)	20.2		mg/L		500	15-OCT-15
Bacteriological Tests						
E. coli	<1		CFU/100mL	0		14-OCT-15
Background colonies	<1		CFU/100mL			14-OCT-15
Coliform Bacteria - Total	<1		CFU/100mL	0		14-OCT-15
Total Metals						
Aluminum (Al)-Total	<0.010		mg/L		0.1	18-OCT-15
Antimony (Sb)-Total	<0.00050		mg/L	0.006		18-OCT-15
Arsenic (As)-Total	0.00131		mg/L	0.01		18-OCT-15
Barium (Ba)-Total	<0.020		mg/L	1		16-OCT-15
Boron (B)-Total	<0.10		mg/L	5		16-OCT-15
Cadmium (Cd)-Total	<0.00020		mg/L	0.005		18-OCT-15
Calcium (Ca)-Total	43.9		mg/L			16-OCT-15
Chromium (Cr)-Total	<0.0020		mg/L	0.05		18-OCT-15
Copper (Cu)-Total	0.0037		mg/L		1.0	18-OCT-15
Iron (Fe)-Total	<0.030		mg/L		0.3	16-OCT-15
Lead (Pb)-Total	<0.00050		mg/L	0.01		18-OCT-15
Magnesium (Mg)-Total	19.5		mg/L			16-OCT-15
Manganese (Mn)-Total	0.0052		mg/L		0.05	18-OCT-15
Mercury (Hg)-Total	<0.00020		mg/L	0.001		16-OCT-15
Potassium (K)-Total	1.83		mg/L			18-OCT-15
Selenium (Se)-Total	<0.0010		mg/L	0.05		18-OCT-15
Sodium (Na)-Total	7.9		mg/L		200	16-OCT-15
Uranium (U)-Total	0.00196		mg/L	0.02		18-OCT-15
Zinc (Zn)-Total	<0.050		mg/L		5.0	16-OCT-15