



District of 100 Mile House

Annual Drinking Water Report

2021



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Introduction

This report was prepared in compliance with the requirements under the British Columbia Drinking Water Protection Act (DWPA) and the District of 100 Mile House Operating Permit. Included in this document is an overview of the treatment and distribution system within the District, a summary of the total water consumption and water quality analysis within the system and a recap of projects and related operations. This report has been provided to Interior Health and posted on the District of 100 Mile House website for public reading.

District of 100 Mile House Water System

The District of 100 Mile House drinking water system consists of a single treatment plant that feeds the distribution system through most areas of 100 Mile House. The water distribution system consists of three reservoirs, one booster station and two pressure reducing valves. The storage capacity of our reservoirs is as follows: Low Zone Reservoir - 1.2 million liters, High Zone Reservoir – 455,000 liters and the Exeter Reservoir – 1.6 Million Liters.

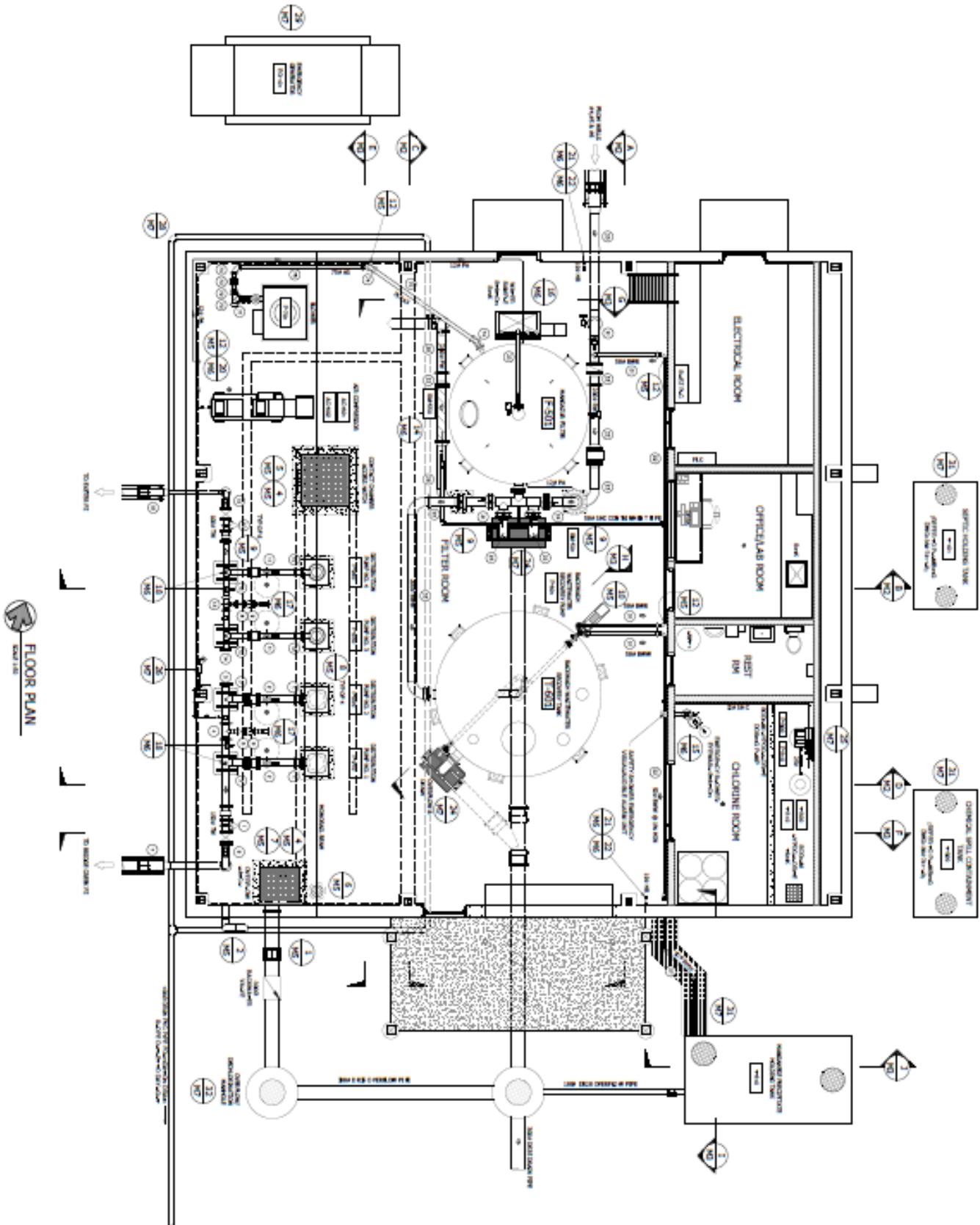
District of 100 Mile House Water Treatment Plant

The Water treatment plant commissioned in September 2018 treats ground water that is collected from three deep wells located next to the water treatment plant. The water is filtered through a Biological treatment process. When the well the water makes contact with the natural media, (the Biolite™ “S”) the natural occurring bacteria in the water start to consume the Manganese and Iron that is naturally present in the ground water which then forms the precipitate (sludge). The filtered water is then chlorinated and stored in our clear well before being introduced into the distributed system. The filter media is maintained through periodic backwashes which removes the precipitant (sludge) accumulated in the filter media. The bacteria naturally existing in the raw water stay in the media, even after an adapted wash of the filter. The backwashed water and waste material are then stored in the backwash wastewater recovery tank where the sludge will be sent to a holding tank, and the water will be recovered and reintroduced into the raw water entering the filter tank.



Figure 1: The District of 100 Mile House Water Treatment Plan





Water Treatment Plant Production

Figure 2: Monthly Total Production for the Past 5 Years

						Year to Year Comparison		
	2017	2018	2019	2020	2021	Average	Minimum	Maximum
January	36,405	38,975	32,247	29,351	30,187	33,433	29,351	38,975
February	32,963	35,434	27,998	27,541	30,296	30,846	27,541	35,434
March	35,855	39,150	32,000	32,160	35,070	34,973	32,000	39,150
April	36,187	40,866	30,858	28,308	38,657	34,975	28,308	40,866
May	46,264	61,000	50,049	24,909	48,868	46,218	24,909	61,000
June	66,881	52,474	59,347	42,283	65,163	57,229	42,283	66,881
July	94,560	77,069	49,196	48,817	89,144	71,757	48,817	94,560
August	80,275	73,960	57,980	52,247	74,862	67,865	52,247	80,275
September	53,458	47,155	41,492	40,256	53,593	47,191	40,256	53,593
October	37,348	31,879	31,512	30,336	41,262	34,467	30,336	41,262
November	38,861	30,941	28,055	28,797	38,988	33,128	28,055	38,988
December	39,627	40,184	29,908	27,730	40,629	35,616	27,730	40,629
Total	598,704	569,087	470,637	422,735	586,719			
Daily Peak	3,866	3,534	2,881	2,380	3,510			
Peak Date	06-Aug	14-July	10-Aug	20-Aug	03-July			
Daily Low	895	728	600	626	801			
Average Daily Usage	1640	1559	1289	1157	1,603			

These monthly numbers can be graphically seen in Figure 3. Total consumption for 2021 was 163,984 cubic meters more than 2020. Consumption has been measured in cubic meters.



Figure 3: Graphical Representation of 2017 – 2021 Water Consumption

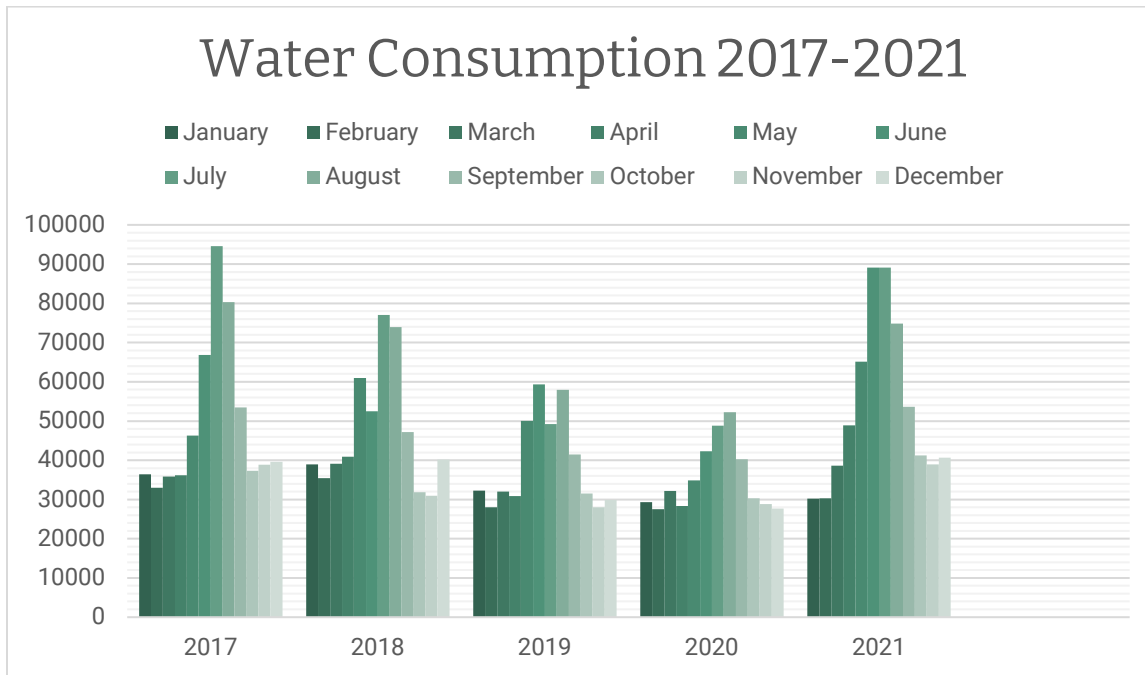
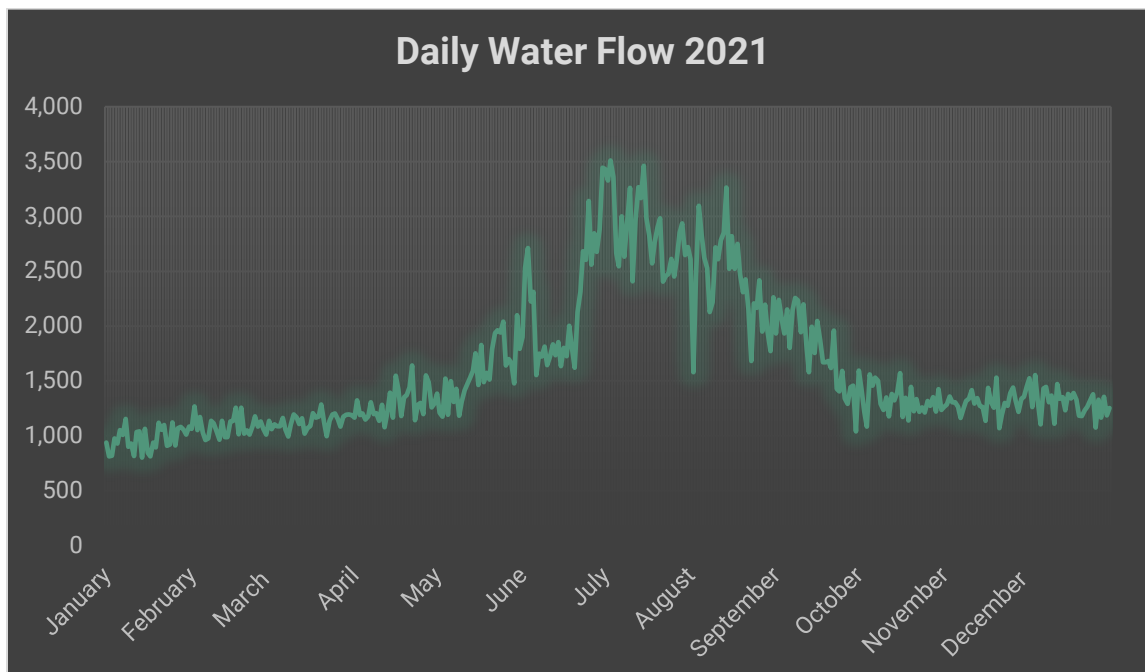


Figure 4 shows the daily water consumption for 2021. The daily peak for 2021 was 3,510 cubic meters, which occurred on July 3rd. The treatment plant can achieve a maximum daily flow of 3.45 million liters which allows room for population growth well into the future.

Figure 4: Daily Water Flows for 2021



Distribution System Overview

The distribution system consists of 24.98 km of water mains, one booster station, two pressure reducing valves, three reservoirs, and a total of approximately 850 connections. In 2021 a new subdivision was added with approximately 0.5 km of water mains.

Distribution System

The maintenance of the distribution system consists of actively replacing lines that have either reached the end of their functional life, need upgrading due to inadequate sizing for development, or are in poor condition and cause issues.

Figure 5: Water Main Material Summary

Length by Material Type	Abandoned Pipe (km)	Existing Total (km)
PVC:	0.105	12.76
AC:	0.48	12.22
Total:	0.585	24.98

SCADA – Supervisory Control and Data Acquisition (SCADA)

The SCADA system is designed to allow operators real time data on how the Water treatment plant and distribution system are functioning, as well as enabling a operator to make changes to the operation of the Water treatment plant and booster station. The SCADA system is also designed to send an alarm to the operator if there is problem within the system to help ensure that the Districts water distribution system continues to function.



Water Quality Sampling and Analysis

The water quality from our source water, at the treatment facility and within the distribution system is analyzed extensively. Samples are collected daily and analyzed locally from the raw water and treated water at the plant. Bacteriological samples are also analyzed throughout the distribution system on a weekly basis. Samples of our source water and from within the distribution system are taken and sent off to an accredited lab for extensive analysis.

Water Quality Testing

There are a variety of parameters measured which are listed in the following paragraphs which are monitored at the plant in order to check the treatment process. The following Figure 6 summarizes the results of the daily analysis for the water treatment plant. These analyses are done in house by the certified operators at the District of 100 Mile House.

pH

pH is a measure of the activity of the hydrogen ion in water. It represents the acidity or basicity of water. The pH scale goes from 0 to 14 with anything smaller than 7 being acidic, anything greater than 7 being basic and 7 being neutral. Drinking water is regulated to fall between a pH of 6.5 to 8.5.

Free and Total Chlorine (Cl₂)

Chlorine levels are important in water treatment to ensure that water is safe all the way through the distribution system to each home. The primary form of chlorine used in our treatment system is sodium hypochlorite. Free chlorine measures the amount of hypochlorite in our water, while total chlorine measures the free chlorine plus any combined chlorine disinfectants such as chloramines. In our system we must maintain a residual free chlorine level of greater than 0.2 mg/L at the end of the distribution system.

	Average PH	Average Free Cl ₂	Average Total Cl ₂
January	8.448	0.850	0.982
February	8.555	0.866	1.044
March	7.491	0.893	1.027
April	7.106	0.87	0.994
May	7.134	0.985	1.087
June	7.186	1.003	1.189
July	7.243	1.031	1.197
August	7.276	0.981	1.159
September	7.294	1.031	1.166
October	7.307	1.021	1.155
November	7.399	0.945	1.102
December	7.415	1.027	1.203
Yearly Average	7.487	0.958	1.109



Distribution Sampling

The District of 100 Mile House is committed to providing safe drinking water to each and every connection within its service area. To this end the distribution system is sampled at least 3 different locations weekly. These locations change on a weekly basis. These samples are analyzed for background bacterial counts, total coliforms and E. Coli.

Background Bacterial Monitoring

Background bacteria monitoring is done through what is called a heterotrophic plate count (HPC). Heterotrophic bacteria are a group of bacteria that use carbon as a food source and can be found in a variety of water sources. Most bacteria found in water are actually heterotrophic. In general, these bacteria are not pathogenic and the HPC test in itself will not tell you whether the water is bad to drink. Because of this there is no maximum acceptable concentration (MAC) as stated in the Canadian Drinking Water Guidelines. What this test does tell you is whether there are conditions within the system that bacteria can regrow or thrive in.

The District of 100 Mile House uses this test to monitor integrity and overall 'health' of the distribution system. If a sample is positive for background bacteria greater than 200 counts the system is flushed and resampled. Any positive counts of any size for background bacteria are also resampled immediately which is above and beyond any legislative requirements.

Coliform Bacterial Monitoring

Coliform bacteria are a group of bacteria that is a little more of a narrow focus from the HPC test. These bacteria again represent a large group of bacteria found in water, soil, on vegetation and in the feces of mammals. Most of these bacteria are not harmful to humans, but because of the ease of testing of this bacteria it makes for a great indicator of contamination.

In water treatment systems there is a zero threshold allowance for coliforms within water samples. If a sample shows up positive for coliforms the site is immediately resampled and if there are again coliforms a boil water advisory put in place. The distribution area is then pulled offline and cleaned before being put back into action and resampled.

E. Coli Bacterial Monitoring

E. Coli bacteria are a sub section of coliform bacteria. Again these bacteria may not be harmful to human health, but specific strains can cause serious health issues and even death in some instances. These bacteria are also found almost exclusively in warm blooded feces and therefore a definite sign of contamination. Any positive counts for coliforms or E.coli result in an immediate boil water advisory, resampling and cleaning of the affected area.

2021 Bacterial Monitoring Results

There was a total of zero positive results for background bacteria and one positive for coliforms in 2021. After resampling the coliform positive result, the results came back negative. There were no positive results for E.Coli bacteria in 2021.



Figure 11: 2021 Distribution System Biological Sampling

Date	Number of Samples Taken	Samples Positive for Background Bacteria	Samples Positive for Coliforms	Samples Positive for E. Coli	Notes/ Measures Taken
Jan 5	3				
Jan 12	6				
Jan 19	4				
Jan 26	3				
Feb 2	3				
Feb 9	3				
Feb 16	3				
Feb 23	3				
Mar 2	3				
Mar 9	3				
Mar 16	3				
Mar 23	3				
Mar 30	3				
April 6	3				
April 13	3				
April 20	4				
April 27	3				
May 4	3				
May 11	3				
May 18	3				
May 25	3				
June 1	3				
June 8	3				
June 15	3				
June 22	3				
June 29	3				
July 6	3		1		
July 14	5				
July 27	3				
Aug 4	3				
Aug 10	3				
Aug 17	3				
Aug 24	3				
Aug 31	3				
Sept 7	3				
Sept 14	4				
Sept 21	3				
Sept 28	3				
Oct 5	3				
Oct 12	3				
Oct 19	4				
Oct 26	3				
Nov 2	3				
Nov 9	4				
Nov 16	3				
Nov 23	3				
Nov 30	3				
Dec 7	3				
Dec 14	3				
Dec 20	3				
Totals	145	0	1	0	



Quarterly Raw and Distribution Sampling

The following are extensive water quality analysis results as completed by a provincially accredited lab from the source water and within the distribution system. The samples were taken by District staff and sent off to CARO Analytical Services in Kelowna, BC. The results of these extensive analysis can be seen in below. As seen in the tables all of the treated water quality parameters are within the Guidelines for Canadian Drinking Water Quality.

