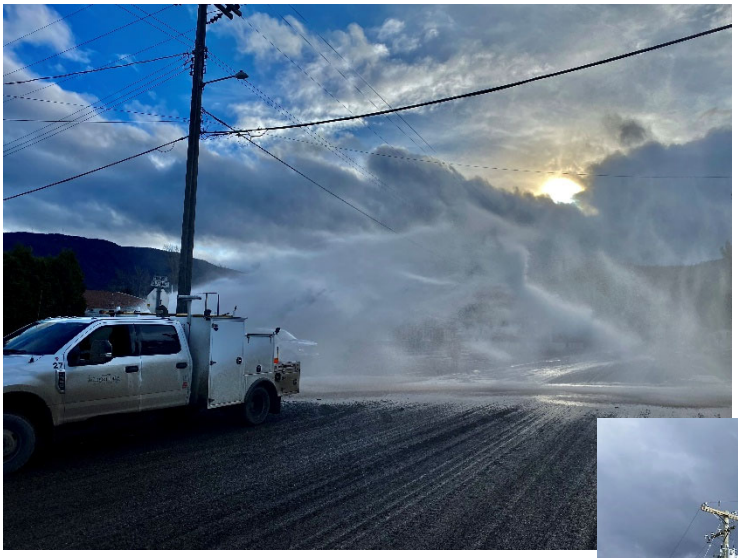

DISTRICT OF
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DISTRICT OF LOGAN LAKE 2021 ANNUAL WATER REPORT

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1 Opal Drive, Logan Lake, BC

2021 Annual Water Report

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2021 Annual Water Report

1.0 Introduction

This report was prepared in compliance with the requirements under the British Columbia *Drinking Water Protection Act* (DWPA) and the District of Logan Lake Operating Permit. This report includes an overview of source water and distribution system that supplies the District, a summary of the total water consumption and water quality analysis completed, and a recap of projects and related operations. This report has been provided to Interior Health and posted on the District's website.

2.0 The District of Logan Lake Water System

The District of Logan Lake takes pride in its water source, and is continually working towards improvements and operations that safely distribute that water throughout the District. For the 2021 calendar year the District had three operational wells, two of which were in production, and a fourth which was under construction. All four wells extract water from the Guichon Aquifer that is not under the influence of surface water. The unchlorinated groundwater is pumped up to two reservoirs which is distributed through 26.1 km of water mains throughout the community. The water utility for Logan Lake is classified by the Environmental Operators Certification Program (EOCP) as a Level II Water Distribution System.

2.1 The Wells

The District of Logan Lake's water distribution system is supplied from three deep wells located on the west side of the District. All wells draw water from the Guichon Aquifer, located within the Guichon Creek Valley immediately west of the town site. There are two main pumphouses which are situated approximately 200m apart. The first pumphouse contains Well #5 which was being developed to replace production Well #1. The second pump house contains Well's #2, #3 and #4. Well #2 and #4 are the current production wells in the second pumphouse and Well 3 currently operates as backup for Well 4.

2.1.1 Well Projects and Upgrades

The biggest upgrades to the District well system would be the drilling and development of Well 5 and the building of a new pump house which will be completed in 2022. This new Well #5 was slated for completion in late 2021 but was delayed slightly due to supply chain issues and the wildfires. This project will result in the top producing well for the District with a new and modern control system.

2.1.2 Source Water Protection

The District of Logan Lake employs a series of test wells and continuously monitors water levels within the wells used for production in order to monitor any changes within the source water. These measures came about through a series of reports. In 2007 the District had a study done which developed a "Framework for Wellhead Protection". This study developed from a series of tests, provided the flow rate and geotechnical profiles of each wells. A further study produced in 2019 which used data from 2012 to 2015 provided "Groundwater Supply Evaluation, Monitoring and a Protection Plan." The District also registered a common groundwater license for all wells that now allows for a combined extraction volume instead of individual amounts attributed to each well.

2.2 Water Storage

The two reservoirs in the District's water system, the Jasper Reservoir and the Breccia Reservoir, have full water levels at an elevation of 1166m. The Jasper Reservoir has a total volume of 1900m^3 and the Breccia Reservoir has a total volume of 690m^3. The Jasper Reservoir is located off of Jasper drive on the east side of town and the Breccia Reservoir is located east of Breccia Drive on the North side of town. The total water storage capacity for the Districts water distribution system is 2590m^3.

2.3 Distribution System

The District's distribution system provides potable water to over 2200 residents and multiple businesses, and contains approximately 1200 service connections within the District's boundaries. The distribution system extends for approximately 26.1 km and the composition of pipe material can be seen in Figure 1.

Figure 1: District of Logan Lake Pipe Material Breakdown

Material	Total Length (m)	Total Length as %
AC	8018.7	30.76%
CMP Casing	15.0	0.06%
DI	1634.9	6.27%
HDPE	974.7	3.74%
PVC	15349.4	58.87%
STEEL	9.00	0.03%
unknown	70.0	0.27%
Grand Total	**26071.7**	**100.00%**

The system comprises of two pressure zones. Zone 1, has pressures established by 5 pressure reducing valve stations (PRVs) throughout the system. Zone 2 has pressures established by the levels of the Jasper and Breccia Reservoirs.

2.3.1 Distribution Maintenance and Events

Normal operations for the District distribution system consists of a mix of service requests for water connections and water on/offs, annual valve and hydrant maintenance, sampling events, flushing programs and response to small repairs such as curb stops and larger events such as water main breaks. As with most years 2021 contained a fair share of regular maintenance as mentioned above, the unique events included a heat dome in late June which resulted in record volumes of water being pumped in June and the Tremont Creek Wildfire which resulted in staff remaining on site after evacuation to ensure water was available for firefighting needs. Figure 2 includes a couple pictures of the maintenance and repairs seen within the District.

Figure 2: Fire Hydrant Extension and Water Main Repair

3.0 Cross Connection Control Program (CCCP)

The District of Logan Lake has a CCCP that targets industrial, commercial and multi-family residential buildings. The District uses a contractor to manage the program which includes processing test reports and follow up with non-compliant businesses. The District maintains 39 backflow prevention assemblies (BFA) and has two staff certified in cross connection control testing. Figure 3 provides a summary of the District CCCP at the end of 2021 calendar year.

Figure 3: Summary of District CCCP Status for 2021 Year End

Cross-Connection Control Program

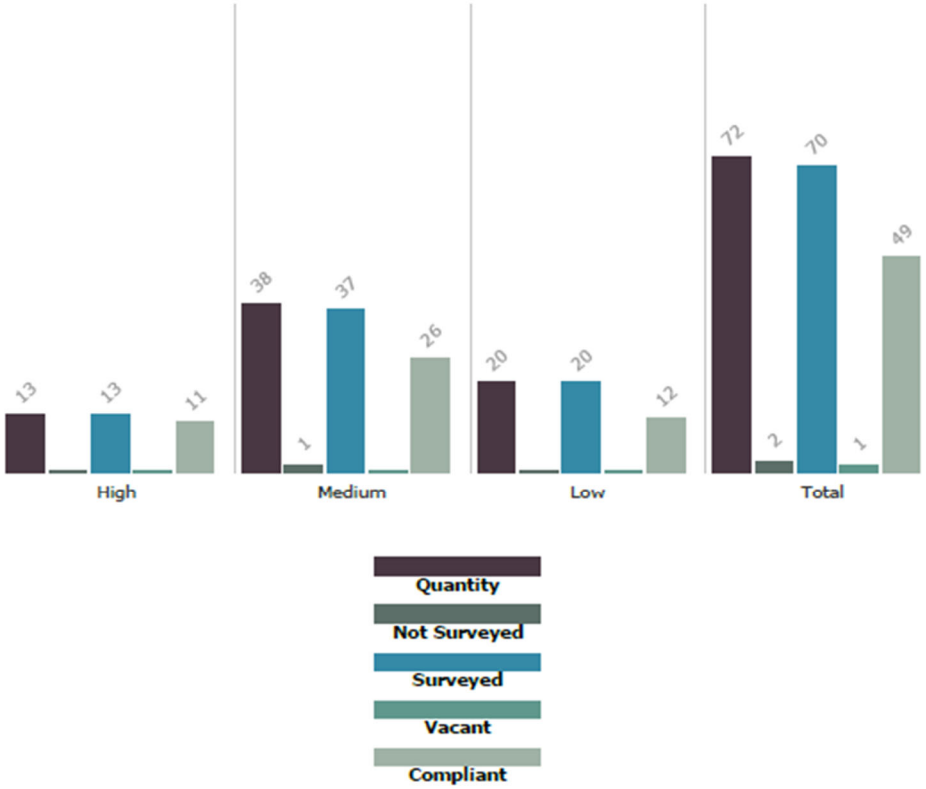
District of Logan Lake

Summary Report - Jan 05, 2022

Customers	72
Total BFPs Tracked	82
Past Due BFP Test Reports	9

Facilities

Hazards	Quantity	Not Surveyed	Surveyed	Vacant	Compliant
High	13	0	13	0	11
Medium	38	1	37	0	26
Low	20	0	20	0	12
None	1	1	0	1	0
Totals	72	2	70	1	49



4.0 Operator Training and Certification

The District of Logan Lake's water utility is classified as a Level II system by the EOCP. As the system is classified as Level II the District must employ at least one Level II certified Operator. Currently the District has two Level II Operators and one level I Operator. Training of operators is a top priority for the District, this is reflective in the number of employees which hold a variety of EOCP certifications including a Level IV in Water Treatment and a Level III and Level II in Wastewater Treatment.

5.0 Water Consumption

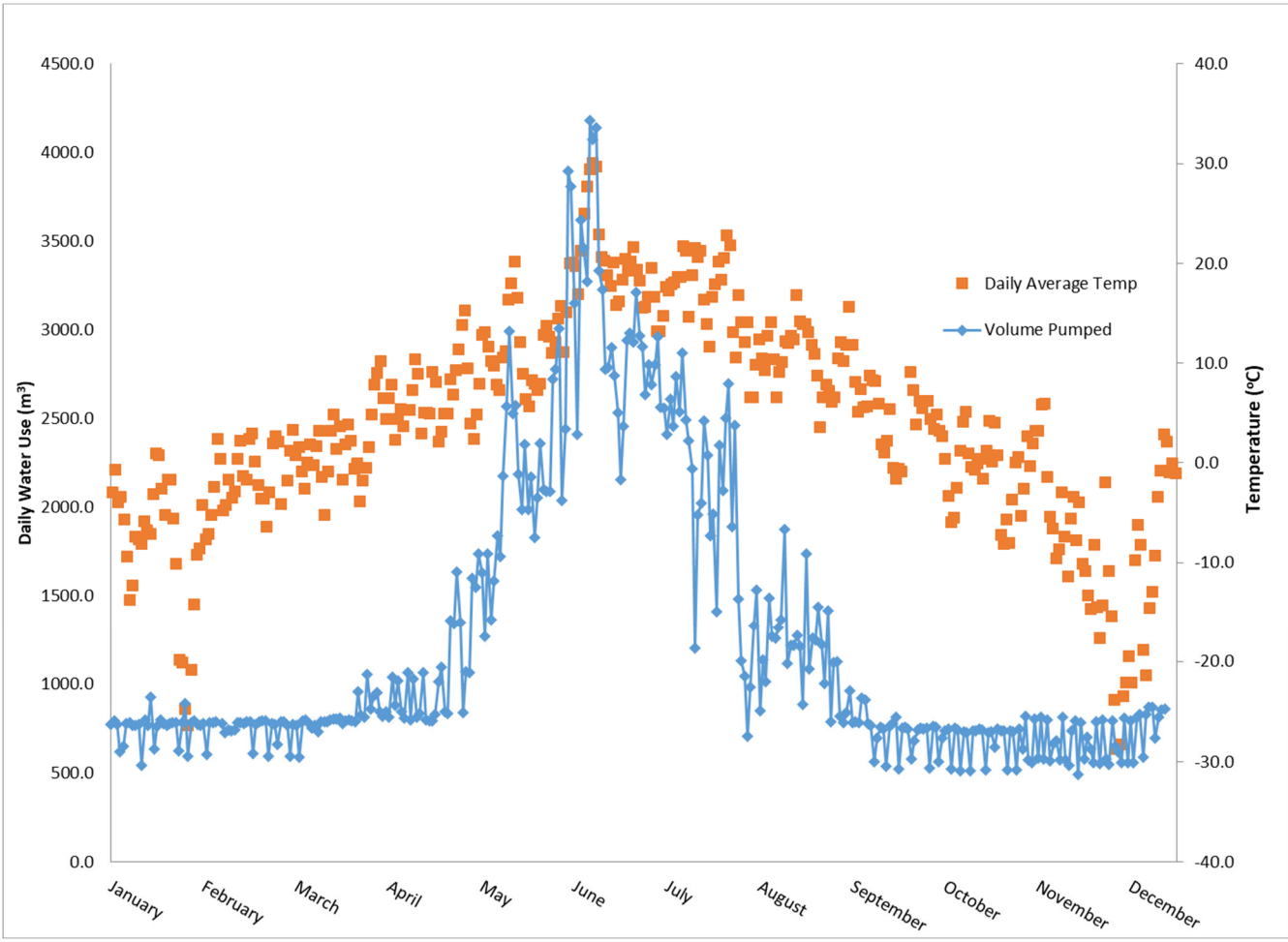
The District's water consumption is monitored and recorded through SCADA systems for each of the supply wells. The following Figure 4 presents the total volume of water pumped in cubic meters monthly for the 2012 to 2021 calendar year.

Figure 4: District of Logan Lake Water Monthly Water Use for the Past 10 Years

	Year										Year to Year Averages	
Month	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	10 Year Average	10 Year Max
January	24,965	26,234	22,253	21,262	22,206	24,058	25,673	22,657	21,210	22,969	23,349	26,234
February	22,326	22,437	19,874	19,999	20,343	18,910	23,225	22,057	18,574	21,136	20,888	23,225
March	23,613	26,099	22,766	20,321	20,986	22,319	25,644	24,167	21,711	23,130	23,076	26,099
April	21,830	21,891	21,382	24,171	30,969	20,700	26,214	24,562	21,122	25,588	23,843	30,969
May	42,260	45,645	30,900	45,813	42,991	29,846	60,686	39,343	34,832	38,362	41,068	60,686
June	32,785	43,679	39,861	52,752	50,682	62,299	55,350	47,460	29,152	82,856	49,687	82,856
July	62,539	80,295	82,699	56,370	46,754	95,181	71,442	43,625	46,710	84,544	67,016	95,181
August	75,150	58,179	58,375	69,975	51,920	82,229	56,664	60,430	62,427	50,012	62,536	82,229
September	49,785	50,507	34,687	48,691	29,530	42,931	30,112	26,822	47,674	30,346	39,108	50,507
October	27,066	32,622	22,730	24,161	22,176	24,222	23,022	19,767	26,588	21,396	24,375	32,622
November	24,159	31,604	19,670	20,176	22,070	23,053	22,496	19,680	25,250	20,132	22,829	31,604
December	23,942	23,453	22,069	22,720	22,984	24,975	22,342	20,661	26,876	21,871	23,189	26,876
Total Volume	430,419	462,646	397,266	426,412	383,612	470,722	442,869	371,230	382,128	442,343	420,965	470,722
Peak Day	3,258	3,295	4,353	4,218	2,431	3,739	4,368	2,497	2,764	4,178	3,510	4,368
Date	20-Aug	23-Jul	16-Jul	25-Jul	05-Jun	07-Jul	26-May	07-Aug	17-Aug	28-Jun		
Average Daily Use	1,179	1,268	1,088	1,168	1,051	1,290	1,213	1,017	1,047	1,212	1,153	1,290
Average Indoor Use	792	870	711	721	763	746	795	724	761	737	762	870

The 2021 Calendar year represented the third highest annual production for the past 10 years. Peak day usage was also higher than average with the peak day occurring at the end of June during the heat dome that blanketed much of BC. The Daily Water production can be seen in Figure 5.

Figure 5: Average Daily Water Use for 2021



6.0 Water Quality Sampling and Analysis

The water quality from the source wells through to the distribution system is analyzed regularly as part of the measures to ensure safe drinking water. Samples are taken weekly from within the distribution system and the wells are sampled annually for a multitude of parameters and sent off to an accredited lab.

6.1 Distribution Water Quality

The District is committed to providing safe drinking water throughout the Distribution System. To ensure this happens two sites are sampled for bacteriological analysis weekly. The sample locations are rotated between summer and winter locations at spots on the furthest points within the distribution system. These bacteriological analyses include background bacterial counts, total coliforms, and E. coli.

6.1.1 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 GCDWQ. This test tells us if there are conditions within the system that bacteria can regrow or thrive in.

The District uses this test to monitor for growth within the distribution system which may indicate need for flushing.

6.1.2 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 and 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 these 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 coliforms are found again further steps are introduced which include system flushing and may lead to boil water advisories.

6.1.3 E. Coli Bacterial Monitoring

E. coli bacteria are a subsection of coliform bacteria. 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 the feces of mammals; therefore, they are 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. The results for the 2020 distribution system can be seen in Figure 6 and 7.

Figure 6: Distribution Bacteriological Testing

Date	Lab	Total Coliform (cfu/100mL)	Background Bacteria Counts (cfu/100mL)	E Coli (cfu/100mL)	Location	Notes
04-Jan	ALS	<1		<1	District Office	MPN/100 mL
04-Jan	ALS	<1		<1	PW Shop	MPN/100 mL
11-Jan	ALS	<1		<1	District Office	MPN/100 mL
11-Jan	ALS	<1		<1	PW Shop	MPN/100 mL
18-Jan	ALS	<1		<1	District Office	MPN/100 mL
18-Jan	ALS	<1		<1	PW Shop	MPN/100 mL
26-Jan	ALS	<1		<1	District Office	MPN/100 mL
26-Jan	ALS	<1		<1	PW Shop	MPN/100 mL
01-Feb	ALS	<1		<1	District Office	MPN/100 mL
01-Feb	ALS	<1		<1	PW Shop	MPN/100 mL
08-Feb	ALS	<1		<1	District Office	MPN/100 mL
08-Feb	ALS	<1		<1	PW Shop	MPN/100 mL
16-Feb	ALS	<1	<1	<1	District Office	
16-Feb	ALS	<1	<1	<1	PW Shop	
22-Feb	ALS	<1	<1	<1	District Office	
22-Feb	ALS	<1	<1	<1	PW Shop	
01-Mar	ALS	<1	<1	<1	District Office	
01-Mar	ALS	<1	<1	<1	PW Shop	
08-Mar	ALS	<1	<1	<1	District Office	
08-Mar	ALS	<1	<1	<1	PW Shop	
15-Mar	ALS	<1	<1	<1	District Office	
15-Mar	ALS	<1	<1	<1	PW Shop	
22-Mar	ALS	<1	<1	<1	District Office	
22-Mar	ALS	<1	<1	<1	PW Shop	
29-Mar	ALS	<1	<1	<1	District Office	
29-Mar	ALS	<1	<1	<1	PW Shop	
06-Apr	ALS	<1	<1	<1	District Office	
06-Apr	ALS	<1	<1	<1	PW Shop	
12-Apr	ALS	<1	<1	<1	District Office	
12-Apr	ALS	<1	<1	<1	PW Shop	
19-Apr	ALS	<1	<1	<1	District Office	
19-Apr	ALS	<1	<1	<1	PW Shop	
26-Apr	ALS	<1	<1	<1	District Office	
26-Apr	ALS	<1	<1	<1	PW Shop	
03-May	ALS	<1	<1	<1	Lea Rig	
03-May	ALS	<1	<1	<1	Calcite	
10-May	ALS	<1	<1	<1	Lea Rig	
10-May	ALS	<1	<1	<1	Calcite	
17-May	ALS	<1	<1	<1	Lea Rig	
17-May	ALS	<1	<1	<1	Calcite	
25-May	ALS	<1	<1	<1	Lea Rig	
25-May	ALS	<1	<1	<1	Calcite	
31-May	ALS	<1	<1	<1	Lea Rig	
31-May	ALS	<1	<1	<1	Calcite	
07-Jun	ALS	<1	<1	<1	Lea Rig	
07-Jun	ALS	<1	<1	<1	Calcite	
14-Jun	ALS	<1	<1	<1	Lea Rig	
14-Jun	ALS	<1	<1	<1	Calcite	
22-Jun	ALS	<1		<1	Lea Rig	MPN/100 mL
22-Jun	ALS	<1		<1	Calcite	MPN/100 mL
28-Jun	ALS	<1	<1	<1	Lea Rig	
28-Jun	ALS	1	<1	<1	Calcite	
02-Jul	ALS	<1	<1	<1	Calcite	Resample from June 28th

Figure 7: Distribution Bacteriological Testing Continued

Date	Lab	Total Coliform (cfu/100mL)	Background Bacteria Counts (cfu/100mL)	E Coli (cfu/100mL)	Location	Notes
05-Jul	ALS	<1	<1	<1	Lea Rig	
05-Jul	ALS	<1	<1	<1	Calcite	
12-Jul	ALS	<1	<1	<1	Lea Rig	
12-Jul	ALS	<1	<1	<1	Calcite	
19-Jul	ALS	<1	<1	<1	Lea Rig	
19-Jul	ALS	<1	<1	<1	Calcite	
26-Jul	ALS	<1	<1	<1	Lea Rig	
26-Jul	ALS	<1	<1	<1	Calcite	
03-Aug	ALS	<1	<1	<1	Lea Rig	
03-Aug	ALS	<1	<1	<1	Calcite	
09-Aug	ALS	<1	<1	<1	Lea Rig	
09-Aug	ALS	<1	<1	<1	Calcite	
16-Aug	ALS	<1	<1	<1	Lea Rig	
16-Aug	ALS	<1	<1	<1	Calcite	
23-Aug	ALS	>1	64	<1	Lea Rig	
23-Aug	ALS	<1	<1	<1	Calcite	
25-Aug	ALS	<1		<1	Lea Rig	Resample from Aug 23rd, MPN/100 mL
30-Aug	ALS	<1	<1	<1	Calcite	
30-Aug	ALS	28	<1	<1	Lea Rig	
01-Sep	ALS	<1		<1	Lea Rig	Resample from Aug 30th, MPN/100 mL
01-Sep	ALS	<1		<1	Lea Rig PRV	Extra Site, MPN/100 mL
01-Sep	ALS	<1		<1	Breccia Reservoir	Extra Site, MPN/100 mL
07-Sep	ALS	<1	<1	<1	Calcite	
07-Sep	ALS	15	<1	<1	Lea Rig	Resample Taken
09-Sep	ALS	<1		<1	Lea Rig	Chlorination and Flushing Begins, MPN/ 100 mL
13-Sep	ALS	<1	<1	<1	Calcite	Resample from Sept 7th
13-Sep	ALS	<1	<1	<1	Lea Rig	
20-Sep	ALS	<1	<1	<1	Calcite	
20-Sep	ALS	<1	<1	<1	Lea Rig	
27-Sep	ALS	<1	<1	<1	Calcite	
27-Sep	ALS	<1	<1	<1	Lea Rig	
04-Oct	ALS	<1	<1	<1	District Office	
04-Oct	ALS	<1	<1	<1	PW Shop	
12-Oct	ALS	<1	<1	<1	District Office	
12-Oct	ALS	<1	<1	<1	PW Shop	
18-Oct	ALS	<1	<1	<1	District Office	
18-Oct	ALS	<1	<1	<1	PW Shop	
25-Oct	ALS	<1	<1	<1	District Office	
25-Oct	ALS	<1	<1	<1	PW Shop	
01-Nov	ALS	<1	<1	<1	District Office	
01-Nov	ALS	<1	<1	<1	PW Shop	
08-Nov	ALS	<1	<1	<1	District Office	
08-Nov	ALS	<1	<1	<1	PW Shop	
15-Nov	ALS	<1	<1	<1	District Office	Full Water Quality Analsys Done of Well 2 and 4
15-Nov	ALS	<1	<1	<1	PW Shop	
22-Nov	ALS	<1	<1	<1	District Office	
22-Nov	ALS	<1	<1	<1	PW Shop	
29-Nov	ALS	<1	<1	<1	District Office	
29-Nov	ALS	<1	<1	<1	PW Shop	
06-Dec	ALS	<1	<1	<1	District Office	
06-Dec	ALS	<1	<1	<1	PW Shop	
13-Dec	ALS	<1	<1	<1	District Office	
13-Dec	ALS	<1	<1	<1	PW Shop	
20-Dec	ALS	<1	<1	<1	District Office	
20-Dec	ALS	<1	<1	<1	PW Shop	
29-Dec	ALS	<1	<1	<1	District Office	
29-Dec	ALS	<1	<1	<1	PW Shop	

6.2 Source Water Quality

Water quality monitoring for the wells consists of routine turbidity analysis and a yearly in depth analysis of the wells which are in production. The results of the routine turbidity analysis can be seen in Figure 8 and 9, while the results from the annual in-depth analysis can be found in Figure 10, 11 and 12.

Figure 8: Turbidity Analysis For 2021

Dates	Location	NTU	Dates	Location	NTU
05-01-2021	Well #2	0.18	01-04-2021	Well #4	0.12
08-01-2021	Well #4	0.11	06-04-2021	PW Shop	0.08
11-01-2021	District Office	0.07	06-04-2021	District Office	0.08
11-01-2021	PW Shop	0.09	06-04-2021	Well #4	0.08
12-01-2021	Well #2	0.09	09-04-2021	Well #2	0.13
15-01-2021	Well #4	0.08	13-04-2021	Well #2	0.10
18-01-2021	District Office	0.08	16-04-2021	Well #4	0.10
18-01-2021	PW Shop	0.06	19-04-2021	PW Shop	0.07
19-01-2021	Well #4	0.08	19-04-2021	District Office	0.07
22-01-2021	Well #2	0.08	20-04-2021	Well #2	0.20
26-01-2021	District Office	0.07	23-04-2021	Well #4	0.18
26-01-2021	PW Shop	0.07	26-04-2021	PW Shop	0.11
26-01-2021	Well #4	0.08	26-04-2021	District Office	0.13
29-01-2021	Well #2	0.09	27-04-2021	Well #2	0.10
01-02-2021	District Office	0.08	30-04-2021	Well #4	0.07
01-02-2021	PW Shop	0.06	03-05-2021	Lea Rig	0.07
02-02-2021	Well #4	0.08	03-05-2021	Calcite	0.07
05-02-2021	Well #2	0.20	04-05-2021	Well #2	0.09
08-02-2021	District Office	0.06	07-05-2021	Well #4	0.12
08-02-2021	PW Shop	0.06	10-05-2021	Lea Rig	0.09
09-02-2021	Well #4	0.07	10-05-2021	Calcite	0.09
12-02-2021	Well #2	0.21	11-05-2021	Well #2	0.19
16-02-2021	District Office	0.06	21-05-2021	Well #4	0.11
16-02-2021	PW Shop	0.06	25-05-2021	Well #2	0.14
16-02-2021	Well #4	0.09	25-05-2021	Lea Rig	0.10
19-02-2021	Well #4	0.07	25-05-2021	Calcite	0.08
22-02-2021	District Office	0.06	28-05-2021	Well #4	0.04
22-02-2021	PW Shop	0.07	31-05-2021	Lea Rig	0.08
23-02-2021	Well #4	0.24	31-05-2021	Calcite	0.16
26-02-2021	Well #2	0.06	01-06-2021	Well #4	0.09
01-03-2021	PW Shop	0.07	04-06-2021	Well #2	0.18
01-03-2021	District Office	0.09	07-06-2021	Calcite	0.13
02-03-2021	Well #2	0.24	07-06-2021	Lea Rig	0.06
05-03-2021	Well #4	0.08	08-06-2021	Well #2	0.09
08-03-2021	PW Shop	0.05	11-06-2021	Well #4	0.07
08-03-2021	District Office	0.07	14-06-2021	Calcite	0.07
09-03-2021	Well #2	0.06	14-06-2021	Lea Rig	0.06
12-03-2021	Well #4	0.12	15-06-2021	Well #2	0.06
15-03-2021	PW Shop	0.08	18-06-2021	Well #4	0.03
15-03-2021	District Office	0.07	22-06-2021	Calcite	0.08
16-03-2021	Well #2	0.24	22-06-2021	Lea Rig	0.08
19-03-2021	Well #4	0.11	22-06-2021	Well #2	0.06
22-03-2021	PW Shop	0.08	25-06-2021	Well #4	0.13
22-03-2021	District Office	0.07	28-06-2021	Calcite	0.17
23-03-2021	Well #2	0.14	28-06-2021	Lea Rig	0.08
26-03-2021	Well #4	0.09	29-06-2021	Well #4	0.12
29-03-2021	PW Shop	0.09			
29-03-2021	District Office	0.07			
30-03-2021	Well #2	0.10			

Figure 9: Turbidity Analysis for 2021 Continued

Dates	Location	NTU
02-07-2022	Well #4	0.13
02-07-2022	Calcite	0.13
05-07-2021	Calcite	0.10
05-07-2021	Lea Rig	0.09
07-07-2021	Well #2	0.11
09-07-2021	Well #4	0.09
12-07-2021	Calcite	0.06
12-07-2021	Lea Rig	0.08
13-07-2021	Well #2	0.15
16-07-2021	Well #4	0.16
19-07-2021	Calcite	0.05
19-07-2021	Lea Rig	0.08
20-07-2021	Well #4	0.11
23-07-2021	Well #2	0.33
26-07-2021	Calcite	0.10
26-07-2021	Lea Rig	0.07
27-07-2021	Well #4	0.12
30-07-2021	Well #2	0.17
03-08-2021	Calcite	0.16
03-08-2021	Lea Rig	0.10
06-08-2021	Well #4	0.11
09-08-2021	Calcite	0.17
09-08-2021	Lea Rig	0.11
10-08-2021	Well #2	0.20
13-08-2021	Well #4	0.12
16-08-2021	Lea Rig	0.08
16-08-2021	Calcite	0.21
17-08-2021	Well #2	0.21
20-08-2021	Well #4	0.10
23-08-2021	Lea Rig	0.10
23-08-2021	Calcite	0.16
24-08-2022	Well #2	0.16
27-08-2022	Well #4	0.09
30-08-2021	Calcite	0.06
30-08-2021	Lea Rig	0.09
31-08-2021	Well #2	0.20
01-09-2022	Breccia Reservoir	0.11
01-09-2022	Lea Rig	0.08
03-09-2022	Well #4	0.13
07-09-2021	Lea Rig	0.12
07-09-2021	Calcite	0.10
09-09-2022	Lea Rig	0.09
10-09-2022	Calcite	0.11
13-09-2021	Calcite	0.20
13-09-2021	Lea Rig	0.22
14-09-2021	District Office	0.11
17-09-2021	Lea Rig	0.15
20-09-2021	Calcite	0.28
20-09-2021	Lea Rig	0.15
21-09-2021	District Office	0.12
24-09-2021	Well #4	0.15
27-09-2021	Lea Rig	0.09
27-09-2021	Calcite	0.13
28-09-2021	District Office	0.11

Dates	Location	NTU
04-10-2021	District Office	0.09
04-10-2021	PW Shop	0.08
05-10-2021	Well #4	0.10
08-10-2021	Well #2	0.14
12-10-2021	PW Shop	0.19
12-10-2021	District Office	0.11
15-10-2021	Well #2	0.19
13-10-2021	Well #4	0.19
18-10-2021	PW Shop	0.12
18-10-2021	District Office	0.08
19-10-2021	Well #4	0.11
22-10-2021	Well #2	0.13
25-10-2021	PW Shop	0.09
25-10-2021	District Office	0.15
26-10-2021	Well #4	0.17
29-10-2021	Well #2	0.18
01-11-2021	PW Shop	0.08
01-11-2021	District Office	0.07
02-11-2021	Well #4	0.17
05-11-2021	Well #2	0.12
08-11-2021	District Office	0.09
08-11-2021	PW Shop	0.08
09-11-2021	Well #4	0.08
12-11-2021	Well #2	0.17
15-11-2021	District Office	0.09
15-11-2021	PW Shop	0.09
16-11-2021	Well #4	0.09
19-11-2021	Well #2	0.13
22-11-2021	District Office	0.08
22-11-2021	PW Shop	0.10
23-11-2021	Well #4	0.09
26-11-2021	Well #2	0.12
29-11-2021	Well #4	0.10
03-12-2021	Well #2	0.13
06-12-2021	PW Shop	0.09
06-12-2021	District Office	0.09
07-12-2021	Well #4	0.17
10-12-2021	Well #2	0.16
13-12-2021	PW Shop	0.08
13-12-2021	District Office	0.11
14-12-2021	Well #4	0.15
17-12-2021	Well #2	0.17
20-12-2021	PW Shop	0.21
20-12-2021	District Office	0.11
21-12-2021	Well #4	0.12
24-12-2021	Well #2	0.13
29-12-2021	PW Shop	0.17
29-12-2021	District Office	0.11
31-12-2021	Well #4	0.10

Figure 10: Physical Tests

Parameters	Units	Well #4	Well #2
conductivity	µS/cm	400	494
Langelier index (@ 4°C)		0.674	0.840
absorbance, UV (@ 254nm), unfiltered	AU/cm	0.0390	0.0250
alkalinity, bicarbonate (as CaCO3)	mg/L	211	241
alkalinity, carbonate (as CaCO3)	mg/L	6.2	10.8
alkalinity, hydroxide (as CaCO3)	mg/L	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	mg/L	3.1	5.4
alkalinity, total (as CaCO3)	mg/L	218	251
colour, true	CU	<5.0	<5.0
hardness (as CaCO3), from total Ca/Mg	mg/L	192	224
pH	pH units	8.32	8.36
solids, total dissolved [TDS]	mg/L	247	266
turbidity	NTU	<0.10	<0.10
Langelier index (@ 15°C)		0.848	1.01
transmittance, UV (@ 254nm), unfiltered	% T/cm	91.4	94.4
Langelier index (@ 20°C)		0.922	1.08
Langelier index (@ 25°C)		0.992	1.16
Langelier index (@ 60°C)		1.43	1.60
Langelier index (@ 77°C)		1.63	1.80
pH, saturation (@ 4°C)	pH units	7.64	7.52
pH, saturation (@ 15°C)	pH units	7.47	7.35
pH, saturation (@ 20°C)	pH units	7.40	7.27
pH, saturation (@ 25°C)	pH units	7.33	7.20
pH, saturation (@ 60°C)	pH units	6.89	6.76
pH, saturation (@ 77°C)	pH units	6.69	6.56

Figure 11: Anions and Nutrients

Parameters	Units	Well #4	Well #2
Kjeldahl nitrogen, total [TKN]	mg/L	0.076	0.090
ammonia, total (as N)	mg/L	<0.0050	<0.0050
bromide	mg/L	<0.050	0.067
chloride	mg/L	9.17	16.4
fluoride	mg/L	0.120	0.119
nitrate (as N)	mg/L	0.129	0.662
nitrite (as N)	mg/L	<0.0010	<0.0010
nitrogen, total organic	mg/L	0.076	0.090
phosphate, ortho-, dissolved (as P)	mg/L	0.0413	0.0351
sulfate (as SO4)	mg/L	9.29	13.0
cyanide, strong acid dissociable (total)	mg/L	<0.0050	<0.0050
carbon, total organic [TOC]	mg/L	3.44	2.10
coliforms, Escherichia coli [E. coli]	CFU/100mL	<1	<1
coliforms, total	CFU/100mL	<1	<1
coliforms, total background	CFU/100mL	<1	<1
anion sum	meq/L	4.82	5.80
cation sum (total)	meq/L	4.44	5.25
ion balance (cation-anion difference)	%	4.10	4.98

Figure 12: Metals

Parameters	Units	Well #4	Well #2
aluminum, total	mg/L	<0.0030	<0.0030
antimony, total	mg/L	<0.00010	<0.00010
arsenic, total	mg/L	0.00088	0.00082
barium, total	mg/L	0.0229	0.0291
beryllium, total	mg/L	<0.000100	<0.000100
bismuth, total	mg/L	<0.000050	<0.000050
boron, total	mg/L	0.012	0.020
cadmium, total	mg/L	<0.0000050	<0.0000050
calcium, total	mg/L	47.5	55.8
cesium, total	mg/L	<0.000010	<0.000010
chromium, total	mg/L	<0.00050	0.00113
cobalt, total	mg/L	<0.00010	<0.00010
copper, total	mg/L	0.00538	0.00972
iron, total	mg/L	<0.010	<0.010
lead, total	mg/L	0.000213	<0.000050
lithium, total	mg/L	<0.0010	0.0011
magnesium, total	mg/L	17.8	20.5
manganese, total	mg/L	<0.00010	<0.00010
mercury, total	mg/L	<0.0000050	<0.0000050
molybdenum, total	mg/L	0.00368	0.00334
nickel, total	mg/L	<0.00050	<0.00050
phosphorus, total	mg/L	0.057	0.057
potassium, total	mg/L	2.39	2.45
rubidium, total	mg/L	0.00096	0.00115
selenium, total	mg/L	0.000112	0.000425
silicon, total	mg/L	11.6	10.8
silver, total	mg/L	<0.000010	<0.000010
sodium, total	mg/L	12.6	16.5
strontium, total	mg/L	0.231	0.285
sulfur, total	mg/L	3.08	4.56
tellurium, total	mg/L	<0.00020	<0.00020
thallium, total	mg/L	<0.000010	<0.000010
thorium, total	mg/L	<0.00010	<0.00010
tin, total	mg/L	<0.00010	<0.00010
titanium, total	mg/L	<0.00030	<0.00030
tungsten, total	mg/L	<0.00010	<0.00010
uranium, total	mg/L	0.00139	0.00206
vanadium, total	mg/L	0.00383	0.00364
zinc, total	mg/L	0.0031	<0.0030
zirconium, total	mg/L	<0.00020	<0.00020