



## MONTHLY REPORTING PERIOD - JUNE, 2021

### 1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in June 2021. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	618,250,027	2,340.08
Well 4	0	0
Well 5	29,876,287	113.08
Well 6 (Irrigation Only)	11,913,000	45.09
Scotty Creek (Irrigation Only)	12,764,000	48.31
Total	672,803,315	2,546.56

1. The month of June had minimal precipitation and water demands were high. The overall consumption for June 2021 was 2.5 x higher than the wet June of 2020. Overall flows through the WTP and through the system were much higher than normal.
2. BMID collected samples to be analysed for Per-fluro-alkyl substances (PFAS) on three water sources (Mission Creek, Scotty Creek and Well #5). PFAS are a group of chemicals widely used in manufactured goods, which have been linked to adverse health effects. No detectable PFAS were found in any of the samples;
3. A portion of the BMID's transmission main west of the Mission Creek Intake and east of the tunnel is located on an unstable slope. Slope movement has been minimal over the past 12 months. Monitoring has showed minor variations in groundwater levels, but no substantial changes. The hillside is being monitored for surface movement on a monthly basis and groundwater levels as required.
4. The WTP resumed full-time operations on March 21, 2021 as turbidity levels began to necessitate treatment. The WTP ran throughout June and will continue to operate until raw water quality improves in the late-fall or early-Winter;
5. Raw water turbidity levels in Mission Creek peaked at 58.43 NTU (average daily turbidity) on June 3. Average daily turbidity for June was 9.70 NTU at the intake (Grit Pond);
6. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.76 NTU on June 18, 2021. Turbidity levels between June 5 and June 9 were analysed at the WTP due to issues with the on-line turbidity meter. Average turbidity for June was 0.46 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
7. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.56 NTU on June 8, 2021. Average monthly turbidity at the first customer was 0.39 NTU for June;
8. BMID's Ultraviolet Treatment Facility treated 2,390,331 m<sup>3</sup> of water, 455 m<sup>3</sup> of which was "Off-Spec" (0.019%). Average UV Transmissivity was 90.1%. The average inlet chlorine residual level at the UV site was 1.24 mg/L. The average outgoing chlorine was 1.28 mg/L after the sodium hypochlorite top-up system;

9. BMID's Scotty Creek source, used for irrigation in the north-end, resumed operations on May 25, 2021. The Scotty Creek source will remain available for irrigation use until flows reduce later in the fall;
10. Well # 4 resumed operations as the primary domestic water source for the north-end on September 11, 2020 and continued to operate until May 14, 2021. Well 4 was placed on stand-by on May 15 and will be available to provide domestic water when flows reduce in the fall;
11. Well #5, used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption, resumed operations on May 4. Well 5 remained in operation for the rest of June. Well 5 will continue to provide both domestic and irrigation water until flows reduce later in the fall;
12. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, resumed operation on May 14 and will continue to operate for the remainder of the spring/summer;
13. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for spring with a peak count of 72 on June 28, 2021. The average *E.Coli* count was 31.5 for the month based on 4 samples;
14. *E.Coli* levels in the raw water at the water distribution system intake down-stream of the WTP, immediately prior to disinfection, had zero counts on 3 out of 4 samples with a peak count of 1 on June 8, 2021. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
15. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis;
16. One positive sample was detected by BMID's in-house presence/absence testing on June 21, however this is likely a false-positive as retesting did not indicate any bacteria at the sample location;
17. On June 30, 2021, there were three fires started by lightning in the upper Mission Creek watershed. The largest is the Derrickson fire. BMID is staying in contact with the BC Wildfire Service in regards to the location and protection of BMID facilities in the watershed that consist of 3 reservoir/dam sites at Graystoke, Fish Hawk and Loch Long.

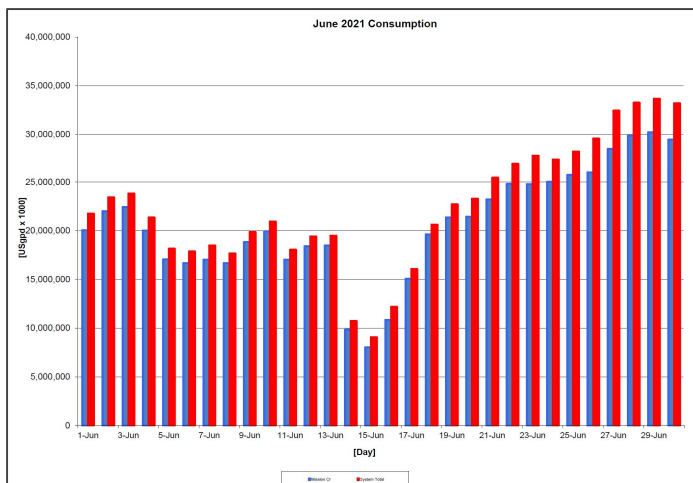
## 1.0 FLOWS - JUNE, 2021

The Maximum Daily Flow was on June 29, at 33,675,802 US gallons (127.46 ML)

The Minimum Daily Flow was on June 15, at 9,069,820 US gallons (34.33 ML)

Mission Creek provided 92% of domestic and irrigation flow throughout June.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - June 2021 - Daily Consumption Report**

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2021	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Jun	20,040,986	0	999,599	719,000	0	21,759,585	82.36
2-Jun	21,995,568	0	999,956	405,000	6,000	23,406,524	88.59
3-Jun	22,423,659	0	999,674	300,000	92,000	23,815,333	90.14
4-Jun	20,017,475	0	999,509	340,000	0	21,356,984	80.84
5-Jun	17,052,012	0	999,795	93,000	0	18,144,807	68.68
6-Jun	16,665,317	0	999,212	208,000	0	17,872,529	67.65
7-Jun	17,016,190	0	999,710	464,000	0	18,479,900	69.95
8-Jun	16,662,015	0	999,123	0	0	17,661,138	66.85
9-Jun	18,817,764	0	999,200	43,000	0	19,859,964	75.17
10-Jun	19,920,180	0	998,911	20,000	0	20,939,091	79.25
11-Jun	17,033,546	0	999,189	0	0	18,032,735	68.25
12-Jun	18,403,225	0	998,843	0	0	19,402,068	73.44
13-Jun	18,480,126	0	999,453	0	0	19,479,579	73.73
14-Jun	9,818,666	0	894,743	0	0	10,713,409	40.55
15-Jun	8,018,333	0	999,487	52,000	0	9,069,820	34.33
16-Jun	10,847,193	0	999,168	330,000	0	12,176,361	46.09
17-Jun	15,066,601	0	999,798	0	0	16,066,399	60.81
18-Jun	19,622,115	0	998,930	0	0	20,621,045	78.05
19-Jun	21,360,763	0	999,072	354,000	0	22,713,835	85.97
20-Jun	21,438,535	0	998,241	847,000	0	23,283,776	88.13
21-Jun	23,202,280	0	998,872	384,000	847,000	25,432,152	96.26
22-Jun	24,798,037	0	999,615	1,019,000	141,000	26,957,652	102.03
23-Jun	24,776,348	0	999,117	1,012,000	1,014,000	27,801,465	105.23
24-Jun	25,006,469	0	999,315	628,000	777,000	27,410,784	103.75
25-Jun	25,719,654	0	999,085	566,000	946,000	28,230,739	106.85
26-Jun	25,993,600	0	999,926	816,000	1,754,000	29,563,526	111.90
27-Jun	28,518,451	0	999,930	927,000	1,985,000	32,430,381	122.75
28-Jun	29,871,011	0	999,674	739,000	1,646,000	33,255,685	125.87
29-Jun	30,204,132	0	999,670	739,000	1,733,000	33,675,802	127.46
30-Jun	29,459,775	0	999,470	908,000	1,823,000	33,190,245	125.63
Totals Usgpd	618,250,027	0	29,876,287	11,913,000	12,764,000	672,803,314	2,546.56
Totals ML	2,340.08	0.00	113.08	45.09	48.31		
Avg's	20,608,334	78.00				22,426,777	84.89
Max	30,204,132	114.32				33,675,802	127.46
Min	8,018,333	30.35				9,069,820	34.33

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

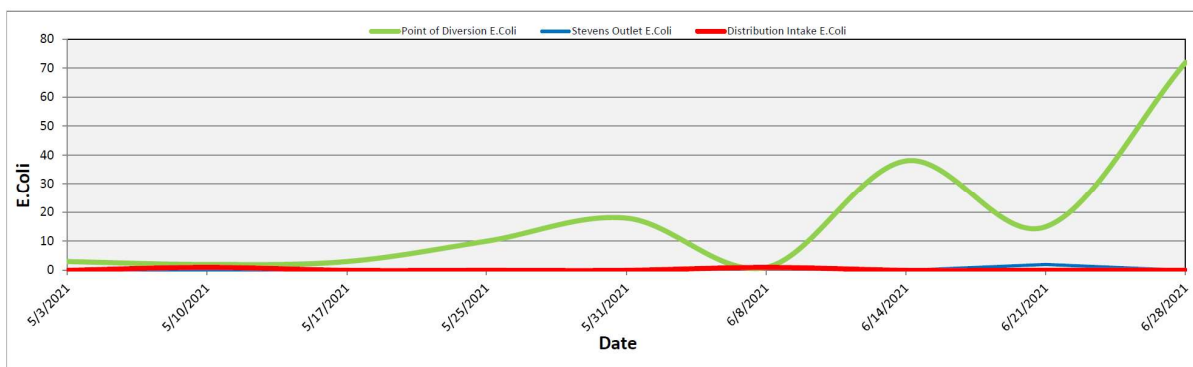
Raw water samples were taken at three points at BMID settling ponds before chlorination

Samples were taken at the Distribution Intake's Point of Disinfection and at the Mission Creek raw water Point of Diversion and at Stevens Pond outlet (point halfway between WTP Outlet and Distribution Intake).

Samples from the previous month are also provided to show a two-month trend

The WTP lowers colour, turbidity and particle counts in the raw water. The *E. Coli* readings are consistent with the reduction in those other parameters. The *E. Coli* readings confirm the WTP's effectiveness in reducing raw water quality risks with coagulation, flocculation, and sedimentation process followed by settling times across Stevens and Hadden Reservoirs.

**Figure 2.1 - Raw Water *E. Coli* Readings (CARO Lab results) May 2021 - June 2021**



**Table 2.1 - *E. Coli* Readings (CARO Labs)**

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
3-May-21	3	0	0
10-May-21	2	0	1
17-May-21	3	0	0
25-May-21	10	0	0
31-May-21	18	0	0
8-Jun-21	1	1	1
14-Jun-21	38	0	0
21-Jun-21	15	2	0
28-Jun-21	72	0	0

Stevens or WTP Intake (Raw) - Sampling of raw water at intake from Mission Creek

Stevens Outlet (Raw) - Sampling point after exiting 142,000 m<sup>3</sup> 1<sup>st</sup> upper balancing reservoir (Stevens Res.)

Hadden Outlet (Raw) - Sampling point after exiting 75,000 m<sup>3</sup> 2<sup>nd</sup> lower balancing reservoir (Hadden Res.)

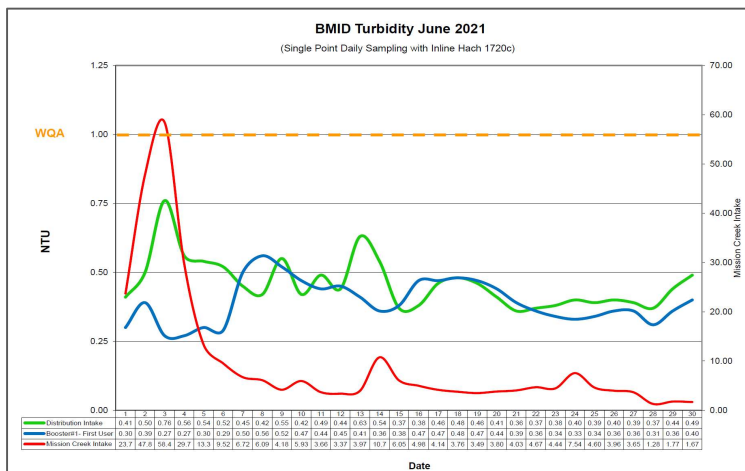
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through June 2021, turbidity for the Mission Creek source was measured at Booster Station No. 1 on Gallagher’s Road, which is the approximate location of the first-customer. The highest turbidity level recorded at this location was 0.56 NTU on June 8, 2021.

The distribution intake is where the water leaves Hadden Reservoir. Turbidity levels are greatly reduced through the settling process as Mission Creek treated water makes its way through the reservoirs.

**Figure 3.1 – Daily Turbidity Readings (Distribution Intake and Booster Station 1)**



**Table 3.1 - Daily Monitoring Record – Turbidity at Distribution Intake & Bst Stn 1**

Turbidity Point Sampling for June 2021			
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	23.70	0.41	0.30
2	47.87	0.50	0.39
3	58.43	0.76	0.27
4	29.75	0.56	0.27
5	13.30	0.54	0.30
6	9.52	0.52	0.29
7	6.72	0.45	0.50
8	6.09	0.42	0.56
9	4.18	0.55	0.52
10	5.93	0.42	0.47
11	3.66	0.49	0.44
12	3.37	0.44	0.45
13	3.97	0.63	0.41
14	10.76	0.54	0.36
15	6.05	0.37	0.38
16	4.98	0.38	0.47
17	4.14	0.46	0.47
18	3.76	0.48	0.48
19	3.49	0.46	0.47
20	3.80	0.41	0.44
21	4.03	0.36	0.39
22	4.67	0.37	0.36
23	4.44	0.38	0.34
24	7.54	0.40	0.33
25	4.60	0.39	0.34
26	3.96	0.40	0.36
27	3.65	0.39	0.36
28	1.28	0.37	0.31
29	1.77	0.44	0.36
30	1.67	0.49	0.40
AVG	9.70	0.46	0.39

### 4.0 CHLORINE CONTACT TIME

Temperature, pH, peak flow and chlorine residual levels are recorded to determine the CT levels that are required to provide 3 log inactivation of *Giardia*. Chlorine Contact times exceeded the CT levels required to provide 3 log (99.9%) inactivation of *Giardia Lamblia* throughout the month of June, 2021.

Figure 4.1 - CT Trending – BMID Mission Creek Source – June 2021

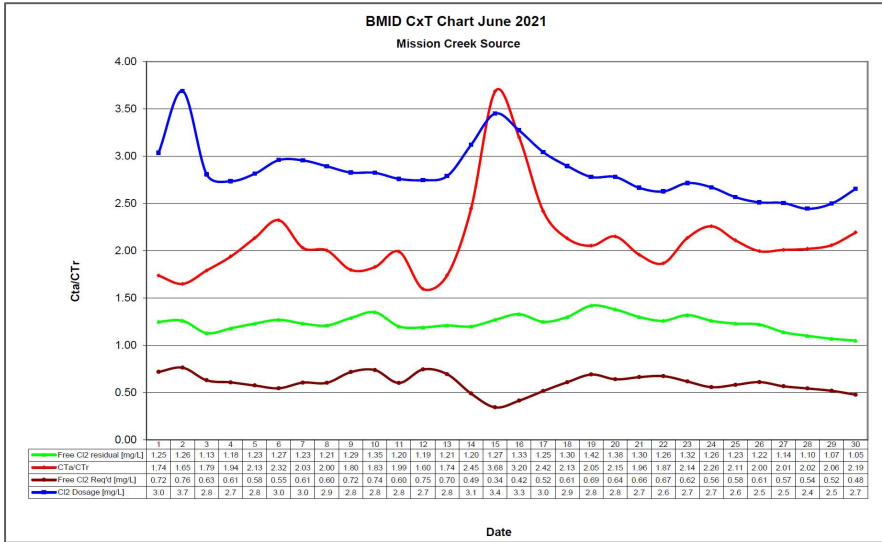


Table 4.2 - CT Table – Mission Creek Source

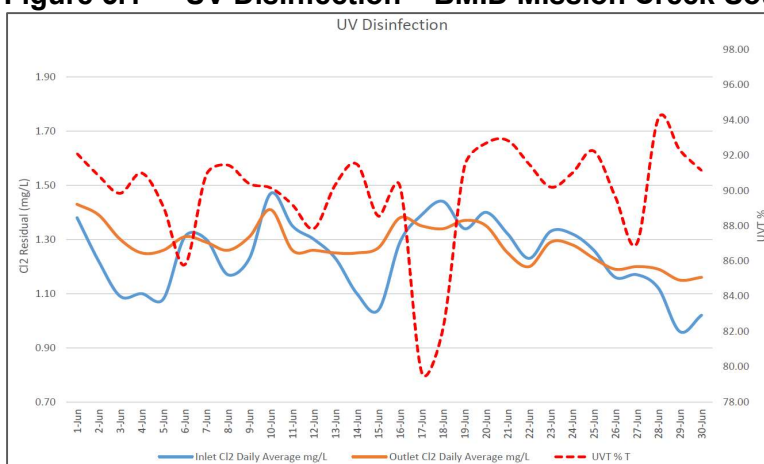
BMID June 2021 Mission Creek Source													
DATE	pH (Average)	TEMP (Present) [°C]	PEAK FLOW [Usgpm]	Free Cl <sub>2</sub> residual [mg/L]	CT achieved	CT req'd	CTa/CTr	Free Cl <sub>2</sub> Req'd [mg/L]	Cl <sub>2</sub> Dosage [mg/L]	VOLUME TOTAL [USgal]	TIME [mins]	FLOW Daily Average [USGPM]	CL <sub>2</sub> DOSAGE Average [PPD]
June 1	7.20	12.2	17,686	1.25	187.3	107.8	1.74	0.72	3.0	2649600	150	14,164	516
2	7.18	13.2	20,257	1.26	164.8	99.9	1.65	0.76	3.7	2649600	131	12,394	549
3	7.21	14.0	17,772	1.13	168.5	94.0	1.79	0.63	2.8	2649600	149	15,857	535
4	7.23	13.9	16,787	1.18	186.2	96.0	1.94	0.61	2.7	2649600	158	14,177	466
5	7.22	13.4	15,318	1.23	212.8	99.7	2.13	0.58	2.8	2649600	173	12,077	408
6	7.22	13.1	14,165	1.27	237.5	102.3	2.32	0.55	3.0	2649600	187	11,790	419
7	7.23	12.2	14,759	1.23	220.8	108.7	2.03	0.61	3.0	2649600	180	12,042	428
8	7.24	11.3	13,812	1.21	232.1	115.9	2.00	0.60	2.9	2649600	192	11,791	410
9	7.26	11.0	15,809	1.29	216.2	120.3	1.80	0.72	2.8	2649600	168	13,308	452
10	7.28	11.0	16,034	1.35	223.1	122.1	1.83	0.74	2.8	2649600	165	14,093	478
11	7.30	11.2	13,401	1.20	237.3	119.1	1.99	0.60	2.8	2649600	198	12,033	399
12	7.36	10.9	15,906	1.19	198.2	124.2	1.60	0.75	2.7	2649600	167	13,029	430
13	7.34	11.5	15,544	1.21	206.3	118.6	1.74	0.70	2.8	2649600	170	13,056	438
14	7.29	11.7	11,341	1.20	280.4	114.7	2.45	0.49	3.1	2649600	234	6,937	260
15	7.28	11.9	8,037	1.27	418.7	113.6	3.68	0.34	3.4	2649600	330	5,668	235
16	7.28	12.2	9,829	1.33	358.5	112.1	3.20	0.42	3.3	2649600	270	7,683	302
17	7.21	13.4	13,760	1.25	240.7	99.5	2.42	0.52	3.0	2649600	193	10,661	390
18	7.21	14.2	17,067	1.30	201.8	94.7	2.13	0.61	2.9	2649600	155	13,862	482
19	7.22	14.3	19,153	1.42	196.4	95.7	2.05	0.69	2.8	2649600	138	15,106	505
20	7.25	14.8	18,271	1.38	200.1	93.1	2.15	0.64	2.8	2649600	145	15,158	506
21	7.26	15.1	19,412	1.30	177.4	90.7	1.96	0.66	2.7	2649600	136	16,405	525
22	7.28	16.4	21,515	1.26	155.2	83.1	1.87	0.67	2.6	2649600	123	17,558	554
23	7.29	17.0	20,340	1.32	172.0	80.5	2.14	0.62	2.7	2649600	130	17,516	571
24	7.32	17.8	19,318	1.26	172.8	76.5	2.26	0.56	2.7	2649600	137	17,674	567
25	7.33	18.1	20,616	1.23	158.1	74.9	2.11	0.58	2.6	2649600	129	18,189	561
26	7.36	19.1	22,944	1.22	140.9	70.6	2.00	0.61	2.5	2649600	115	18,388	555
27	7.37	20.2	23,136	1.14	130.6	65.0	2.01	0.57	2.5	2649600	115	20,154	607
28	7.37	21.1	23,755	1.10	122.7	60.7	2.02	0.54	2.4	2649600	112	21,143	621
29	7.42	22.6	24,810	1.07	114.3	55.5	2.06	0.52	2.5	2649600	107	21,354	641
30	7.46	23.5	24,043	1.05	115.7	52.8	2.19	0.48	2.7	2649600	110	20,805	664
Averages	7.28	14.74		1.2367	201.577	95.4	2.11	0.603	2.83395				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	2,340,331 m <sup>3</sup>	100.00%
On-Spec Water:	2,339,876 m <sup>3</sup>	99.981%
Off-Spec Water:	455 m <sup>3</sup>	0.019%

Average monthly chlorine residual before UV Treatment was 1.24 mg/L  
The average monthly chlorine residual after UV treatment and re-chlorination was 1.28 mg/L.

**Figure 5.1 - UV Disinfection – BMID Mission Creek Source – June 2021**



**Table 5.2 - UV Disinfection Table – Mission Creek Source**

	Inlet Cl2 Daily	Outlet Cl2 Daily	UVT		In Spec Water Volume	Off Spec Water	Off Spec % of Water
Date	mg/L	mg/L	% T		Cubic Meters	Cubic Meters	Percentage
1-Jun	1.38	1.43	92.10		75,764.6	98.8	0.13%
2-Jun	1.22	1.39	90.85		83,262.3	0	0.00%
3-Jun	1.09	1.30	89.85		84,882.8	0	0.00%
4-Jun	1.10	1.25	91.00		75,774.4	0	0.00%
5-Jun	1.08	1.26	89.10		64,548.9	0	0.00%
6-Jun	1.31	1.31	85.80		63,069.8	15.3	0.02%
7-Jun	1.30	1.29	90.90		64,412.5	0.8	0.00%
8-Jun	1.17	1.26	91.45		63,072.6	0	0.00%
9-Jun	1.23	1.31	90.40		71,233.0	0	0.00%
10-Jun	1.47	1.41	90.15		75,406.1	0	0.00%
11-Jun	1.35	1.26	89.20		64,363.9	115.1	0.18%
12-Jun	1.30	1.26	87.85		69,663.8	0	0.00%
13-Jun	1.23	1.25	90.35		69,954.9	0	0.00%
14-Jun	1.10	1.25	91.50		37,167.7	0	0.00%
15-Jun	1.04	1.27	88.55		30,352.7	0	0.00%
16-Jun	1.29	1.38	90.25		41,061.1	0	0.00%
17-Jun	1.39	1.35	79.70		57,033.3	0	0.00%
18-Jun	1.44	1.34	82.20		74,154.9	122.9	0.17%
19-Jun	1.34	1.37	91.40		80,859.3	0	0.00%
20-Jun	1.40	1.35	92.70		81,153.7	0	0.00%
21-Jun	1.32	1.25	92.85		87,814.8	15.4	0.02%
22-Jun	1.23	1.20	91.50		93,870.8	0	0.00%
23-Jun	1.33	1.29	90.20		93,788.7	0	0.00%
24-Jun	1.32	1.28	91.00		94,659.8	0	0.00%
25-Jun	1.26	1.23	92.25		97,359.5	0	0.00%
26-Jun	1.16	1.19	89.65		98,396.5	0	0.00%
27-Jun	1.17	1.20	87.00		107,867.2	86.9	0.08%
28-Jun	1.12	1.19	94.10		113,074.1	0	0.00%
29-Jun	0.96	1.15	92.30		114,335.1	0	0.00%
30-Jun	1.02	1.16	91.15		111,517.4	0	0.00%
<b>Average</b>	<b>1.24</b>	<b>1.28</b>	<b>90.10</b>	<b>Total</b>	<b>2,339,876.20</b>	<b>455.2</b>	<b>0.019%</b>

## 6.0 WATER DISTRIBUTION SAMPLING (TREATED)

### Third Party Analysis (CARO Analytical Services)

- Samples taken once per week at ten locations around the BMID service area
- 26 samples were found to be absent of Coliforms.
- 26 samples were found to be absent of *E. Coli*.

**Table 6.1 - CARO Independent Lab Testing – Total Coliforms – E.Coli**

Date	2021 Belgo Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #6		Well #5		Kirschner Res		Pearson School	
	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli	Coliforms	E.coli
3-May-21	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-May-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0	0	0	0	0
17-May-21	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-May-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0	0	0	0	0
31-May-21	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-Jun-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0	0	0	0	0
14-Jun-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0
21-Jun-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0	0	0	0	0
28-Jun-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0

### In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three-week cycle at seven sites around the BMID service area.
- Eight samples were found to be absent of both *Total Coliforms* and *E.Coli* and one sample was found with bacteria present. Subsequent re-testing of the site did not show any bacteria present.

**Table 6.2 - BMID In-house Testing – Presence Absence**

Location	6/8/2021				6/15/2021				6/21/2021				6/29/2021			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.72	18.8	-	X								
170 Kneller Rd					0.79	18.8	-	X								
2105 Morrison	1.08	14.8	-	X									0.96	18.5	-	X
Staymen Rd	0.64	17.8	-	X									0.53	20.2	-	X
260 Campion Rd									0.22	19.6	-	X				
Fenwick Rd									0.55	20.2	X	-				
Solly Ct					1.03	17.6	-	X								

- BMID Population = 28,000

#### RECOMMENDED TESTS

- Recommended number of samples per month = 28  
(as per Guide for Canadian Drinking Water Quality)

#### ACTUAL TESTS

- Total tests by BMID staff (presence/absence) = 9
- Total tests sampled by BMID and tested by Caro Labs = 26
- Total tests sampled in BMID treated distribution system = 35 (One positive sample)