

## MONTHLY REPORTING PERIOD - MAY, 2021

### 1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	422,864,294	1,600.54
Well 4	3,312,000	12.54
Well 5	22,011,987	83.32
Well 6 (Irrigation Only)	3,607,000	16.65
Scotty Creek (Irrigation Only)	357,000	1.35
Total	452,152,281	1,711.40

1. 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.
2. The WTP resumed full-time operations on March 21, 2021 as turbidity levels began to necessitate treatment. The WTP ran throughout May and will continue to operate until raw water quality improves in the late-fall or early-Winter;
3. Raw water turbidity levels in Mission Creek peaked at 33.83 (average daily turbidity) on May 17. Average daily turbidity for May was 11.68 NTU at the intake (Grit Pond);
4. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.62 NTU on May 18, 2021. Turbidity levels between May 18 and May 31 were analysed at the WTP due to issues with the on-line turbidity meter. Average turbidity for May was 0.46 NTU at the Distribution Intake at the lower end of Hadden Reservoir;
5. The highest recorded monthly turbidity level at the first customer (Booster #1) was 0.76 NTU on May 2, 2021. Average monthly turbidity at the first customer was 0.43 NTU for May;
6. BMID's Ultraviolet Treatment Facility treated 1,600,714.9 m<sup>3</sup> of water, 691m<sup>3</sup> of which was "Off-Spec" (0.043%). Average UV Transmissivity was 86.8%. The average inlet chlorine residual level at the UV site was 1.36 mg/L. The average outgoing chlorine was 1.35 mg/L after the sodium hypochlorite top-up system;
7. There were several instances of "off spec" water throughout the month as recorded at the UV treatment facility. These were caused by short-term drops in the UVT% which automatically logs any water as "off-spec" during low UVT% events. Only 0.043% of water treated at the UV plant was "off-spec" for the month;
8. 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;

9. 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;
10. 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 May. Well 5 will continue to provide both domestic and irrigation water until flows reduce later in the fall;
11. 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;
12. *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 18 on May 31, 2021. The average *E.Coli* count was 7.2 for the month based on 5 samples;
13. *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 4 out of 5 samples with a peak count of 1 on May 10, 2021. The reduction in *E.Coli* levels is credited to the settling of particles in the water in Stevens and Hadden Reservoirs;
14. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, no positive samples were detected by BMID's in-house presence/absence testing throughout May;

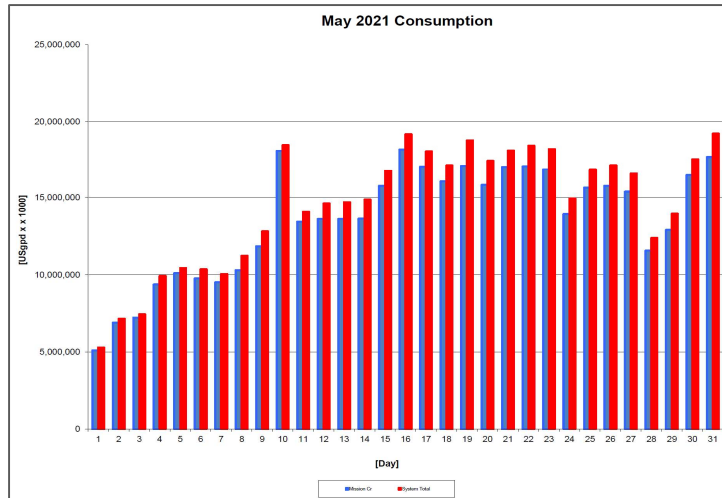
## 1.0 FLOWS - MAY, 2021

The Maximum Daily Flow was on May 31, at 19,213,97 US gallons (72.72 ML)

The Minimum Daily Flow was on May 1, at 5,279,501 US gallons (19.98 ML)

Mission Creek provided 94% of domestic and irrigation flow throughout May.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - May 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-May	5,100,501	179,000	0.0	0.0	0	5,279,501	19.98
2-May	6,896,580	253,000	0.0	0.0	0	7,149,580	27.06
3-May	7,226,716	212,000	0.0	0.0	0	7,438,716	28.16
4-May	9,370,577	217,000	340,380.0	0.0	0	9,927,957	37.58
5-May	10,110,232	252,000	75,007.0	0.0	0	10,437,239	39.50
6-May	9,763,559	218,000	369,512.0	0.0	0	10,351,071	39.18
7-May	9,511,671	267,000	271,915.0	0.0	0	10,050,586	38.04
8-May	10,297,108	274,000	654,280.0	0.0	0	11,225,388	42.49
9-May	11,840,110	339,000	634,186.0	0.0	0	12,813,296	48.50
10-May	18,093,537	258,000	114,419.0	0.0	0	18,465,956	69.89
11-May	13,433,278	273,000	373,901.0	0.0	0	14,080,179	53.29
12-May	13,614,659	171,000	831,372.0	0.0	0	14,617,031	55.33
13-May	13,614,949	251,000	831,584.0	0.0	0	14,697,533	55.63
14-May	13,637,880	148,000	999,489.0	81,000.0	0	14,866,369	56.27
15-May	15,772,125	0	999,474.0	19,000.0	0	16,790,599	63.55
16-May	18,181,823	0	999,301.0	0.0	0	19,181,124	72.60
17-May	17,063,002	0	999,322.0	0.0	0	18,062,324	68.37
18-May	16,061,684	0	999,493.0	83,000.0	0	17,144,177	64.89
19-May	17,113,828	0	999,251.0	663,000.0	0	18,776,079	71.07
20-May	15,818,751	0	998,210.0	622,000.0	0	17,438,961	66.01
21-May	17,038,777	0	999,498.0	77,000.0	0	18,115,275	68.57
22-May	17,072,908	0	999,748.0	353,000.0	0	18,425,656	69.74
23-May	16,876,126	0	999,403.0	335,000.0	0	18,210,529	68.93
24-May	13,933,541	0	999,609.0	0.0	0	14,933,150	56.52
25-May	15,648,625	0	999,288.0	177,000.0	46,000	16,870,913	63.86
26-May	15,770,963	0	998,739.0	287,000.0	92,000	17,148,702	64.91
27-May	15,384,109	0	722,841.0	261,000.0	197,000	16,564,950	62.70
28-May	11,562,993	0	804,129.0	0.0	16,000	12,383,122	46.87
29-May	12,906,017	0	999,343.0	38,000.0	6,000	13,949,360	52.80
30-May	16,463,252	0	998,729.0	81,000.0	0	17,542,981	66.40
31-May	17,684,413	0	999,564.0	530,000.0	0	19,213,977	72.72
Totals Usgpd	422,864,294	3,312,000	22,011,987	3,607,000	357,000	452,152,281	1711.40
Totals ML	1,600.54	12.54	83.32	13.65	1.35	1,711	
Avg's	13,640,784	51.63				14,585,557	55.21
Max	18,181,823	68.82				19,213,977	72.72
Min	5,100,501	19.31				5,279,501	19.98

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

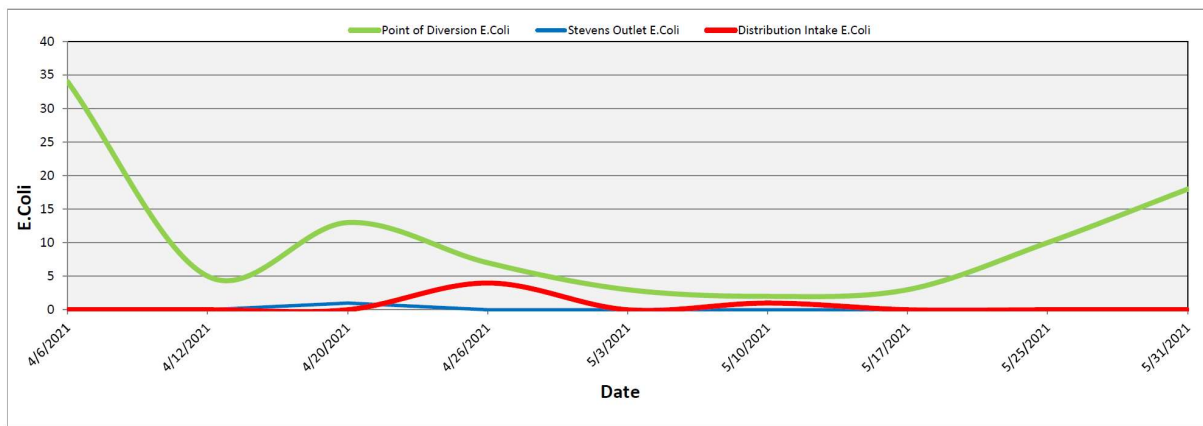
Raw water samples were taken at three points at BMID settling ponds before chlorination

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) April 2021 - May 2021**



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

Date	Point of Diversion E. Coli	Stevens Outlet E. Coli	Distribution Intake E. Coli
6-Apr-21	34	0	0
12-Apr-21	5	0	0
20-Apr-21	13	1	0
26-Apr-21	7	0	4
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

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.)

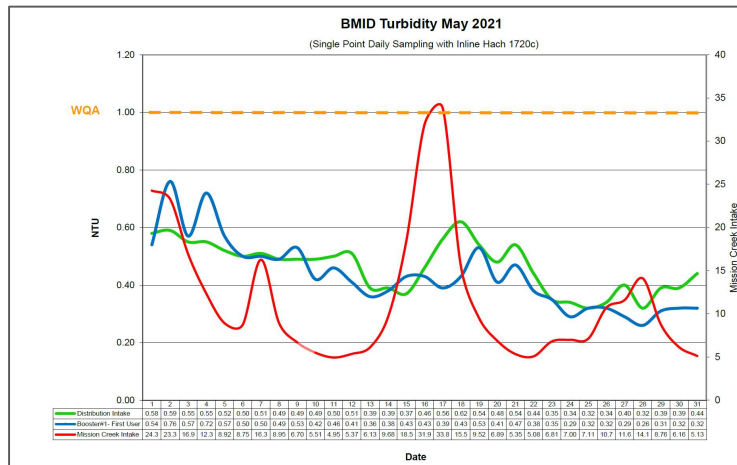
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through May 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 0.76 NTU on May 2, 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 May 2021			
Date	Mission Creek Intake Daily Average [NTU]	Distribution Intake Daily Average [NTU]	Booster#1- First User Daily Average [NTU]
1	24.28	0.58	0.54
2	23.3	0.59	0.76
3	16.92	0.55	0.57
4	12.34	0.55	0.72
5	8.92	0.52	0.57
6	8.75	0.50	0.50
7	16.28	0.51	0.50
8	8.95	0.49	0.49
9	6.70	0.49	0.53
10	5.51	0.49	0.42
11	4.95	0.50	0.46
12	5.37	0.51	0.41
13	6.13	0.39	0.36
14	9.677	0.39	0.38
15	18.45	0.37	0.43
16	31.93	0.46	0.43
17	33.83	0.56	0.39
18	15.49	0.62	0.43
19	9.52	0.54	0.53
20	6.89	0.48	0.41
21	5.35	0.54	0.47
22	5.08	0.44	0.38
23	6.81	0.35	0.35
24	7.00	0.34	0.29
25	7.11	0.32	0.32
26	10.72	0.34	0.32
27	11.59	0.40	0.29
28	14.11	0.32	0.26
29	8.76	0.39	0.31
30	6.16	0.39	0.32
31	5.13	0.44	0.32
AVG	11.68	0.46	0.43



## 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 May, 2021.

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

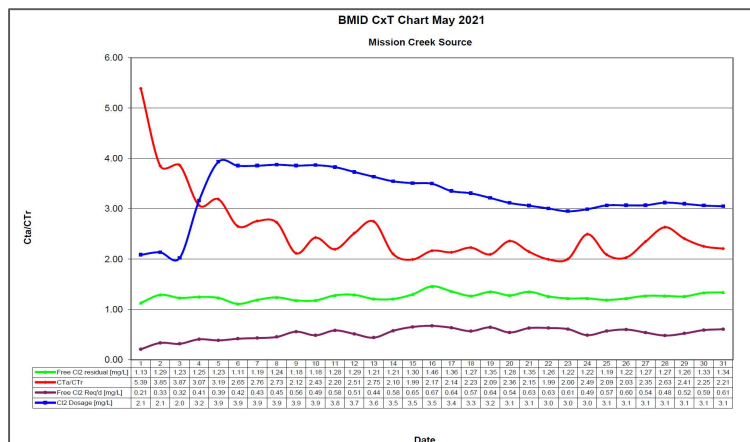


Table 4.2 - CT Table – Mission Creek Source

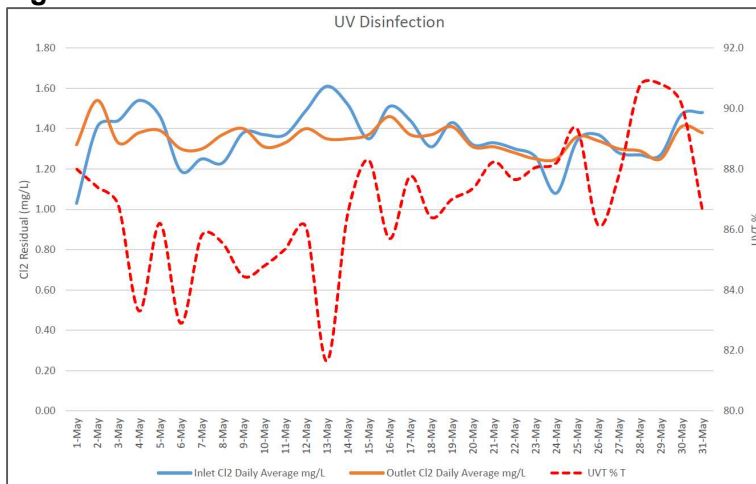
BMID May 2021 Mission Creek Source													
DATE	pH (Average)	TEMP (Present) [°C]	PEAK FLOW [Usgpm]	Free Cl2 residual [mg/L]	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd [mg/L]	Cl2 Dosage [mg/L]	VOLUME TOTAL [USgal]	TIME [mins]	FLOW Daily Average [Usgpm]	CL2 DOSAGE Average [PPD]
May													
1	7.50	13.4	5096	1.13	587.6	109.0	5.39	0.21	2.1	2649600	520	3619	91
2	7.48	12.4	7498	1.29	455.9	118.3	3.85	0.33	2.1	2649600	353	4869	125
3	7.50	12.7	7272	1.23	448.1	115.9	3.87	0.32	2.0	2649600	364	5111	124
4	7.50	12.3	9041	1.25	366.3	119.5	3.07	0.41	3.2	2649600	293	6638	252
5	7.50	12.7	8816	1.23	369.7	115.9	3.19	0.39	3.9	2649600	301	7131	337
6	7.53	12.8	9680	1.11	303.8	114.6	2.65	0.42	3.9	2649600	274	6896	320
7	7.52	12.1	9447	1.19	333.8	121.1	2.76	0.43	3.9	2649600	280	6727	312
8	7.54	12.0	9740	1.24	337.3	123.6	2.73	0.45	3.9	2649600	272	7277	339
9	7.51	12.2	12348	1.18	253.2	119.7	2.12	0.56	3.9	2649600	215	8373	388
10	7.50	12.6	11104	1.18	281.6	116.0	2.43	0.49	3.9	2649600	239	8272	384
11	7.52	12.6	13056	1.28	259.8	118.3	2.20	0.58	3.8	2649600	203	9511	438
12	7.48	13.4	12311	1.29	277.6	110.4	2.51	0.51	3.7	2649600	215	9639	432
13	7.53	12.8	10054	1.21	318.9	116.1	2.75	0.44	3.6	2649600	264	8443	369
14	7.50	12.7	13198	1.21	242.9	115.6	2.10	0.58	3.5	2649600	201	9629	410
15	7.45	13.2	15592	1.30	220.9	110.9	1.99	0.65	3.5	2649600	170	11162	471
16	7.39	14.1	17215	1.46	224.7	103.7	2.17	0.67	3.5	2649600	154	12855	540
17	7.32	14.1	16862	1.36	213.7	100.0	2.14	0.64	3.4	2649600	157	12075	487
18	7.27	13.1	14494	1.27	232.2	104.2	2.23	0.57	3.3	2649600	183	11373	452
19	7.26	12.5	15643	1.35	228.7	109.2	2.09	0.64	3.2	2649600	169	12100	468
20	7.27	12.1	12859	1.28	263.7	111.8	2.36	0.54	3.1	2649600	206	11198	419
21	7.30	11.7	14231	1.35	251.3	117.1	2.15	0.63	3.1	2649600	186	12060	444
22	7.31	12.5	15204	1.26	219.6	110.1	1.99	0.63	3.0	2649600	174	12083	437
23	7.34	13.0	15093	1.22	214.2	107.0	2.00	0.61	3.0	2649600	176	11939	423
24	7.36	13.0	12023	1.22	268.9	107.8	2.49	0.49	3.0	2649600	220	9852	354
25	7.33	12.9	14123	1.19	223.3	106.9	2.09	0.57	3.1	2649600	188	11048	407
26	7.33	12.1	14026	1.22	230.5	113.5	2.03	0.60	3.1	2649600	189	11152	411
27	7.31	12.6	13093	1.27	257.0	109.4	2.35	0.54	3.1	2649600	202	10891	402
28	7.33	12.6	11583	1.27	290.5	110.3	2.63	0.48	3.1	2649600	229	8184	307
29	7.31	12.6	12685	1.26	263.2	109.3	2.41	0.52	3.1	2649600	209	9123	340
30	7.27	12.9	14696	1.33	239.8	106.4	2.25	0.59	3.1	2649600	180	11636	429
31	7.22	13.9	16491	1.34	215.3	97.5	2.21	0.61	3.1	2649600	161	12505	459
Average	7.40	12.76	12406	1.2571	286.9	112	2.55	0.52	3.3				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 1,600,714.9 m<sup>3</sup> 100.00%  
On-Spec Water: 1,600,023.9 m<sup>3</sup> 99.957%  
Off-Spec Water: 691 m<sup>3</sup> 0.043%

Average monthly chlorine residual before UV Treatment was 1.36 mg/L  
The average monthly chlorine residual after UV treatment and re-chlorination was 1.35 mg/L.

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



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

	Inlet Cl2 Daily	Outlet Cl2 Daily	UVT		In Spec Water	Off Spec Water	Off Spec % of Water Volume
Date	mg/L	mg/L	% T		Cubic Meters	Cubic Meters	Percentage
1-May	1.03	1.32	88.0		19307.5	0.0	0.00%
2-May	1.41	1.54	87.4		26106.4	0.0	0.00%
3-May	1.44	1.33	86.8		27356.1	0.0	0.00%
4-May	1.54	1.38	83.3		35471.5	0.0	0.00%
5-May	1.46	1.39	86.2		38209.9	61.5	0.16%
6-May	1.19	1.30	82.9		36956.0	3.1	0.01%
7-May	1.25	1.30	85.8		35963.5	42.1	0.12%
8-May	1.23	1.37	85.6		38976.7	2.1	0.01%
9-May	1.38	1.40	84.5		44819.7	0.0	0.00%
10-May	1.37	1.31	84.8		68129.2	362.3	0.53%
11-May	1.37	1.33	85.4		50832.4	18.1	0.04%
12-May	1.49	1.40	86.1		51527.3	9.8	0.02%
13-May	1.61	1.35	81.7		51528.4	9.8	0.02%
14-May	1.52	1.35	86.5		51625.0	0.0	0.00%
15-May	1.35	1.37	88.3		59704.0	0.0	0.00%
16-May	1.51	1.46	85.7		68825.7	0.0	0.00%
17-May	1.44	1.37	87.8		64564.6	25.9	0.04%
18-May	1.31	1.37	86.4		60800.1	0.0	0.00%
19-May	1.43	1.41	87.0		64782.9	0.0	0.00%
20-May	1.32	1.31	87.4		59880.5	0.0	0.00%
21-May	1.33	1.31	88.2		64498.8	0.0	0.00%
22-May	1.30	1.28	87.7		64628.0	0.0	0.00%
23-May	1.26	1.25	88.1		63883.1	0.0	0.00%
24-May	1.08	1.25	88.2		52744.2	0.0	0.00%
25-May	1.34	1.36	89.3		59109.8	126.7	0.21%
26-May	1.37	1.34	86.2		59699.6	0.0	0.00%
27-May	1.28	1.30	87.8		58235.2	0.0	0.00%
28-May	1.27	1.29	90.8		43770.7	0.0	0.00%
29-May	1.27	1.25	90.8		48824.1	30.5	0.06%
30-May	1.47	1.41	90.2		62320.2	0.0	0.00%
31-May	1.48	1.38	86.7		66942.8	0.0	0.00%
Average	1.36	1.35	86.8	Total	1600023.9	691.9	0.043%

## 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
- 34 samples were found to be absent of Coliforms.
- 34 samples were found to be absent of *E. Coli*.

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

Date	2921 Belgo Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #5		Well #4		Kinschner 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
6-Apr-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	-	-	0	0	-	-	0	0
12-Apr-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	0	0	0	0	-	-	0	0
20-Apr-21	-	-	0	0	0	0	0	0	0	0	-	-	0	0	-	-	0	0	-	-	0	0
26-Apr-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	0	0	0	0	-	-	0	0
3-May-21	-	-	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
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

### In-House Analysis (BMID Staff)

- Presence/Absence samples taken on a three-week cycle at seven sites around the BMID service area.
- All 12 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

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

Location	5/3/2021				5/10/2021				5/17/2021				5/25/2021				5/31/2021			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.86	14.2	-	X									0.49	16.6	-	X				
170 Kneller Rd	0.66	14.4	-	X									0.62	19.8	-	X				
2105 Morrison Staymen Rd									1.12	2.8	-	X								
260 Campion Rd					0.27	17.4	-	X	0.84	12.0	-	X					0.14	18.2	-	X
Fenwick Rd					0.05	18.6	-	X									0.26	19.2	-	X
Solly Ct	0.72	17.3	-	X									0.72	17.3	-	X				

- BMID Population = 25,000

#### RECOMMENDED TESTS

- Recommended number of samples per month = 25  
(as per Guide for Canadian Drinking Water Quality)

#### ACTUAL TESTS

- Total tests by BMID staff (presence/absence) = 12
- Total tests sampled by BMID and tested by Caro Labs = 34
- Total tests sampled in BMID treated distribution system = 46 (Zero positive samples)