



## MONTHLY REPORTING PERIOD - SEPTEMBER, 2021

### 1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	257,516,371	974.7
Well 4	6,453,000	24.42
Well 5	40,289	0.15
Scotty Creek (Irrigation Only)	13,238,855	50.11
Total	277,248,515	1,049.39

1. Stage 1 water restrictions were introduced by BMID on July 16. These restrictions, coupled with increased precipitation, helped to lower demands on the water system. BMID rescinded these restrictions on September 30 as system flows allowed for normal water use;
2. Resulting from the record heat and prolonged dry spring/summer, BMID began to release water from its high-elevation storage reservoirs some three weeks earlier than usual. Although the reservoirs were full in the spring, BMID staff will continue to monitor water levels throughout the early autumn;
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 bi-monthly basis and groundwater levels as required.
4. The WTP resumed full-time operations on March 21, 2021 as turbidity levels began to increase and necessitate treatment. The WTP ran throughout September 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 1.18 NTU (average daily turbidity) on September 19. Turbidity levels in Mission creek tend to stabilize in late summer as the creek's flow drops and BMID's high elevation reservoirs are utilized to supplement flow. Average daily raw water turbidity for September was 0.78 NTU at the intake;
6. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.56 NTU on September 1, 2021. Average clarified water turbidity for September was 0.44 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 0.54 NTU on September 2, 2021. Average monthly turbidity at the first customer was 0.42 NTU for September;
8. BMID's Ultraviolet Treatment Facility treated 974,805 m<sup>3</sup> of water, none of which was "Off-Spec" (0.000%). Average UV Transmissivity was 90.15%. The average inlet

- chlorine residual level at the UV site was 1.25 mg/L. The average outgoing chlorine was 1.38 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 a source for domestic water in the north-end of the distribution system on August 24 and will remain in operation until flows increase in the spring of 2022;
  11. Well #5, used as the primary domestic water source in the north-end of the system for both irrigation and domestic consumption during the summer months, was placed in stand-by mode on September 1. Well #5 operated for only a single day in September;
  12. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was placed in standby on August 21. This is a result of reduced irrigation demand in the north-end of the distribution system from the peak flows experienced in early summer. Well #6 will resume operations in the summer of 2022;
  13. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts for early autumn with a peak count of 14 on September 27, 2021. The average *E.Coli* count was 9.25 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 low counts on all samples with a peak count of 1 on September 13 and 27, 2021. The average *E.Coli* count was less than one ( > 1) colonies per sample for September based on 4 samples. 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. In addition, no positive samples were detected by BMID's in-house presence/absence testing throughout September;

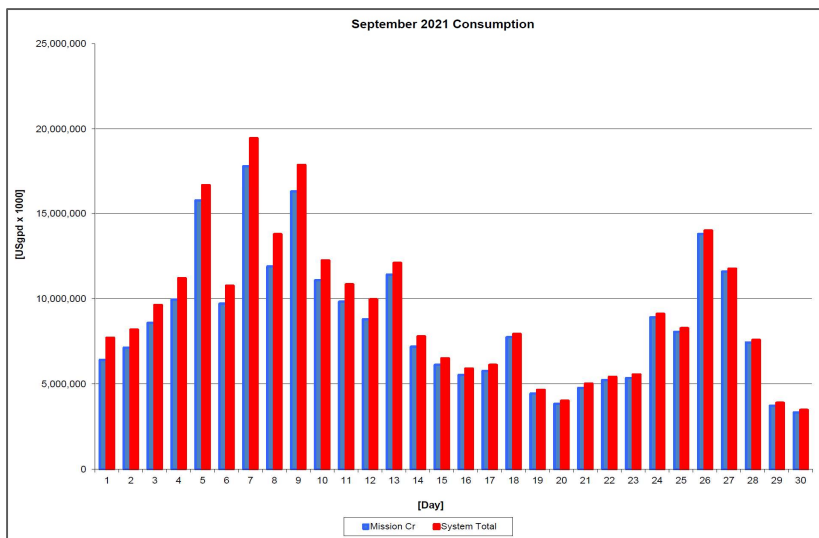
## 1.0 FLOWS - SEPTEMBER, 2021

The Maximum Daily Flow was on September 7, at 19,455,568 US gallons (70.64 ML)

The Minimum Daily Flow was on September 30, at 3,469,114 US gallons (13.13 ML)

Mission Creek provided 93% of domestic and irrigation flow throughout September.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - September 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-Sep	6,423,448	223,000	0.0	0.0	1,057,000.0	7,703,448	29.16
2-Sep	7,130,557	250,000	0.0	0.0	800,000.0	8,180,557	30.96
3-Sep	8,575,340	245,000	0.0	0.0	802,000.0	9,622,340	36.42
4-Sep	9,961,028	270,000	0.0	0.0	959,000.0	11,190,028	42.35
5-Sep	15,770,831	255,000	0.0	0.0	679,000.0	16,704,831	63.23
6-Sep	9,709,166	258,000	0.0	0.0	781,000.0	10,748,166	40.68
7-Sep	17,827,568	303,000	0.0	0.0	1,325,000.0	19,455,568	73.64
8-Sep	11,889,563	312,000	0.0	0.0	1,570,000.0	13,771,563	52.13
9-Sep	16,297,590	256,000	0.0	0.0	1,337,000.0	17,890,590	67.72
10-Sep	11,084,763	292,000	0.0	0.0	854,000.0	12,230,763	46.29
11-Sep	9,824,398	257,000	0.0	0.0	751,000.0	10,832,398	41.00
12-Sep	8,800,283	250,000	0.0	0.0	900,000.0	9,950,283	37.66
13-Sep	11,412,600	229,000	40,289.0	0.0	407,000.0	12,088,889	45.76
14-Sep	7,184,290	222,000	0.0	0.0	379,000.0	7,785,290	29.47
15-Sep	6,123,745	207,000	0.0	0.0	165,059.0	6,495,804	24.59
16-Sep	5,538,419	170,000	0.0	0.0	191,013.0	5,899,432	22.33
17-Sep	5,769,807	209,000	0.0	0.0	127,811.0	6,106,618	23.11
18-Sep	7,745,919	158,000	0.0	0.0	16,202.0	7,920,121	29.98
19-Sep	4,441,312	190,000	0.0	0.0	15,171.0	4,646,483	17.59
20-Sep	3,839,951	162,000	0.0	0.0	9,110.0	4,011,061	15.18
21-Sep	4,770,709	181,000	0.0	0.0	61,158.0	5,012,867	18.97
22-Sep	5,235,097	167,000	0.0	0.0	7,062.0	5,409,159	20.47
23-Sep	5,350,830	195,000	0.0	0.0	5,027.0	5,550,857	21.01
24-Sep	8,901,830	195,000	0.0	0.0	6,037.0	9,102,867	34.45
25-Sep	8,049,928	207,000	0.0	0.0	6,038.0	8,262,966	31.28
26-Sep	13,785,895	202,000	0.0	0.0	6,021.0	13,993,916	52.97
27-Sep	11,582,569	159,000	0.0	0.0	6,057.0	11,747,626	44.46
28-Sep	7,435,887	132,000	0.0	0.0	5,022.0	7,572,909	28.66
29-Sep	3,724,957	162,000	0.0	0.0	5,045.0	3,892,002	14.73
30-Sep	3,328,092	135,000	0.0	0.0	6,022.0	3,469,114	13.13
Totals Usgpd	257,516,371	6,453,000	40,289	0	13,238,855	277,248,515	1049.39
Totals ML	974.70	24.42	0.15	0.00	50.11		
Avg's	8,583,879	32.49				9,241,617	34.98
Max	17,827,568	67.48				19,455,568	73.64
Min	3,328,092	12.60				3,469,114	13.13

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

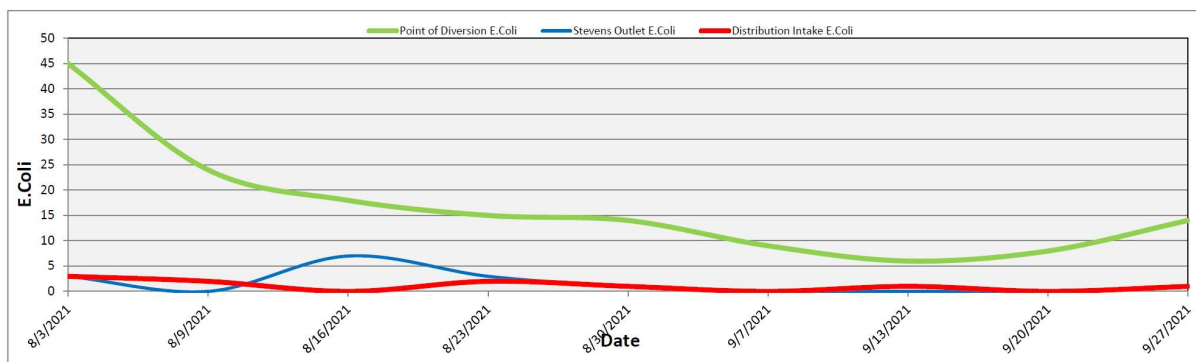
Raw water samples were taken at three points at BMID settling ponds before chlorination

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) August 2021 - September 2021**



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

Date	Point of Diversion E. Coli	Stevens Outlet E. Coli	Distribution Intake E. Coli
3-Aug-21	45	3	3
9-Aug-21	24	0	2
16-Aug-21	18	7	0
23-Aug-21	15	3	2
30-Aug-21	14	1	1
7-Sep-21	9	0	0
13-Sep-21	6	0	1
20-Sep-21	8	0	0
27-Sep-21	14	1	1

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.)

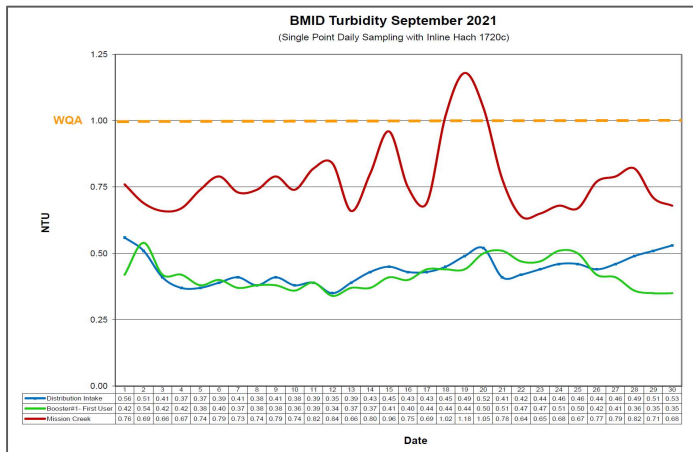
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through September 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 0.54 NTU on September 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**

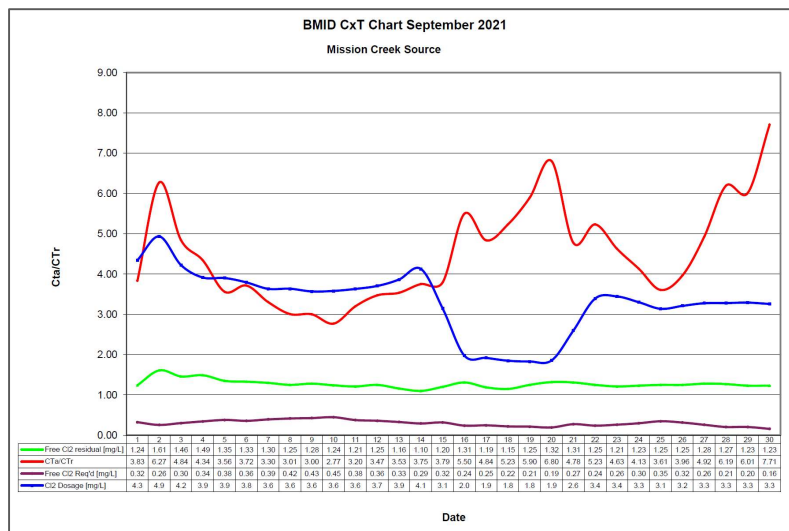
Turbidity Point Sampling for September 2021			
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	0.76	0.56	0.42
2	0.69	0.51	0.54
3	0.66	0.41	0.42
4	0.67	0.37	0.42
5	0.74	0.37	0.38
6	0.79	0.39	0.40
7	0.73	0.41	0.37
8	0.74	0.38	0.38
9	0.79	0.41	0.38
10	0.74	0.38	0.36
11	0.82	0.39	0.39
12	0.84	0.35	0.34
13	0.66	0.39	0.37
14	0.80	0.43	0.37
15	0.96	0.45	0.41
16	0.75	0.43	0.40
17	0.69	0.43	0.44
18	1.02	0.45	0.44
19	1.18	0.49	0.44
20	1.05	0.52	0.50
21	0.78	0.41	0.51
22	0.64	0.42	0.47
23	0.65	0.44	0.47
24	0.68	0.46	0.51
25	0.67	0.46	0.50
26	0.77	0.44	0.42
27	0.79	0.46	0.41
28	0.82	0.49	0.36
29	0.71	0.51	0.35
30	0.68	0.53	0.35
Average	0.78	0.44	0.42



## 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 September, 2021.

**Figure 4.1 - CT Trending – BMID Mission Creek Source – September 2021**



**Table 4.2 - CT Table – Mission Creek Source**

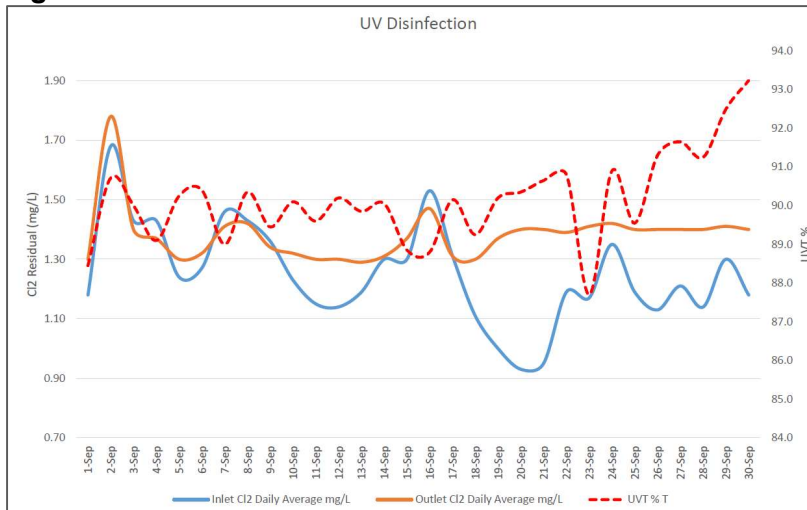
BMID September 2021													
Mission Creek Source													
DATE	pH	TEMP	PEAK	Free Cl <sub>2</sub>	CT	CT	CTa/CTr	Free Cl <sub>2</sub>	Cl <sub>2</sub>	VOLUME	TIME	FLOW	CL <sub>2</sub> DOSAGE
	(Average)	(Present)	FLOW	residual	achieved	req'd		Req'd	Dosage	TOTAL		Daily Average	Average
September		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.71	15.1	8100	1.24	405.6	105.8	3.83	0.32	4.3	2649600	327	4422	231
2	7.52	15.0	6562	1.61	650.1	103.6	6.27	0.26	4.9	2649600	404	4945	293
3	7.61	15.0	7576	1.46	510.6	105.4	4.84	0.30	4.2	2649600	350	5976	303
4	7.66	15.3	8623	1.49	457.9	105.4	4.34	0.34	3.9	2649600	307	6958	327
5	7.70	14.8	9209	1.35	388.4	109.1	3.56	0.38	3.9	2649600	288	6483	304
6	7.67	14.6	8686	1.33	405.7	109.2	3.72	0.36	3.8	2649600	305	6752	308
7	7.69	15.0	9780	1.30	352.2	106.6	3.30	0.39	3.6	2649600	271	8163	357
8	7.71	15.1	10398	1.25	318.5	106.0	3.01	0.42	3.6	2649600	255	8290	362
9	7.72	14.9	10445	1.28	324.7	108.2	3.00	0.43	3.6	2649600	254	8210	352
10	7.73	15.0	11048	1.24	297.4	107.3	2.77	0.45	3.6	2649600	240	7703	332
11	7.74	14.8	9209	1.21	348.1	108.8	3.20	0.38	3.6	2649600	288	6942	303
12	7.75	15.2	8940	1.25	370.5	106.7	3.47	0.36	3.7	2649600	296	6229	277
13	7.76	15.5	8385	1.16	366.6	103.7	3.53	0.33	3.9	2649600	316	5706	265
14	7.74	15.6	7656	1.10	380.7	101.5	3.75	0.29	4.1	2649600	346	4993	248
15	7.74	15.0	7830	1.20	406.1	107.2	3.79	0.32	3.1	2649600	338	4248	161
16	7.66	14.2	5659	1.31	613.4	111.6	5.50	0.24	2.0	2649600	468	3852	92
17	7.68	14.0	5801	1.19	543.5	112.3	4.84	0.25	1.9	2649600	457	4026	93
18	7.71	13.4	4945	1.15	616.1	117.7	5.23	0.22	1.8	2649600	536	3249	72
19	7.72	13.2	4628	1.25	715.6	121.3	5.90	0.21	1.8	2649600	572	3059	67
20	7.73	12.8	4074	1.32	858.6	126.2	6.80	0.19	1.9	2649600	650	2710	61
21	7.74	12.7	5706	1.31	608.3	127.3	4.78	0.27	2.6	2649600	464	3329	104
22	7.76	12.9	5040	1.25	657.1	125.6	5.23	0.24	3.4	2649600	526	3646	149
23	7.77	13.0	5563	1.21	576.3	124.5	4.63	0.26	3.4	2649600	476	3788	157
24	7.72	13.3	6562	1.23	496.6	120.2	4.13	0.30	3.3	2649600	404	4850	193
25	7.77	13.4	7545	1.25	439.0	121.7	3.61	0.35	3.1	2649600	351	5627	212
26	7.82	14.1	7085	1.25	467.5	118.0	3.96	0.32	3.2	2649600	374	5785	223
27	7.77	13.2	5563	1.28	609.6	123.9	4.92	0.26	3.3	2649600	476	3677	145
28	7.77	13.3	4422	1.27	760.9	122.9	6.19	0.21	3.3	2649600	599	3123	123
29	7.78	12.9	4295	1.23	758.7	126.1	6.01	0.20	3.3	2649600	617	2631	104
30	7.78	12.8	3329	1.23	979.1	127.0	7.71	0.16	3.3	2649600	796	2314	91
Averages	7.72	14.17	7089	1.27	522.778	114	4.53	0.30	3.32				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 974,805.7 m<sup>3</sup> 100.00%  
On-Spec Water: 974,805.7 m<sup>3</sup> 100.00%  
Off-Spec Water: 0.0 m<sup>3</sup> 0.00%

Average monthly chlorine residual before UV Treatment was 1.25 mg/L  
The average monthly chlorine residual after UV treatment and re-chlorination was 1.38 mg/L.

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



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

	Inlet Cl2	Outlet Cl2			In Spec Water	Off Spec	Off Spec %
	Daily	Daily			Volume	Water	of Water
Date	mg/L	mg/L	UVT		Cubic Meters	Cubic Meters	Percentage
			% T				
1-Sep	1.18	1.30	88.5		24,315	0	0.00%
2-Sep	1.68	1.78	90.7		26,992	0	0.00%
3-Sep	1.43	1.40	90.0		32,461	0	0.00%
4-Sep	1.43	1.37	89.1		37,707	0	0.00%
5-Sep	1.24	1.30	90.3		59,699	0	0.00%
6-Sep	1.27	1.32	90.4		36,753	0	0.00%
7-Sep	1.46	1.41	89.0		67,485	0	0.00%
8-Sep	1.43	1.42	90.4		45,007	0	0.00%
9-Sep	1.36	1.34	89.5		61,693	0	0.00%
10-Sep	1.23	1.32	90.1		41,960	0	0.14%
11-Sep	1.15	1.30	89.6		37,189	0	0.14%
12-Sep	1.14	1.30	90.2		33,313	0	0.85%
13-Sep	1.19	1.29	89.9		43,201	0	0.86%
14-Sep	1.30	1.31	90.1		27,196	0	0.00%
15-Sep	1.30	1.37	88.9		23,181	0	1.68%
16-Sep	1.53	1.47	88.8		20,965	0	1.40%
17-Sep	1.31	1.31	90.2		21,841	0	0.00%
18-Sep	1.11	1.30	89.3		29,322	0	0.00%
19-Sep	1.00	1.37	90.2		16,812	0	0.00%
20-Sep	0.93	1.40	90.4		14,536	0	0.00%
21-Sep	0.95	1.40	90.7		18,059	0	0.01%
22-Sep	1.19	1.39	90.8		19,817	0	0.01%
23-Sep	1.17	1.41	87.7		20,255	0	0.00%
24-Sep	1.35	1.42	90.9		33,697	0	0.00%
25-Sep	1.19	1.40	89.6		30,472	0	0.00%
26-Sep	1.13	1.40	91.3		52,185	0	0.00%
27-Sep	1.21	1.40	91.7		43,845	0	0.00%
28-Sep	1.14	1.40	91.3		28,148	0	0.00%
29-Sep	1.30	1.41	92.5		14,101	0	0.00%
30-Sep	1.18	1.40	93.2		12,598	0	0.00%
Average	1.25	1.38	90.15	Total	974,805.70	0	0.000%

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

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

Date	2021 Belgio Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #4		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
3-Aug-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0	0	0
9-Aug-21	-	-	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
16-Aug-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0	0	0
23-Aug-21	-	-	0	0	0	0	0	0	-	-	-	-	0	0	-	-	-	-	-	-
30-Aug-21	0	0	0	0	-	-	-	-	-	-	0	0	-	-	0	0	0	0	0	0
7-Sep-21	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-Sep-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Sep-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27-Sep-21	0	0	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.
- All nine samples were found to be absent of both *Total Coliforms* and *E. Coli*.

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

Location	9/7/2021				9/13/2021				9/20/2021				9/27/2021			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					0.65	19.8	-	X								
170 Kneller Rd					0.69	20.8	-	X								
2105 Morrison									0.58	18.2	-	X				
Staymen Rd									0.56	18.6	-	X				
260 Campion Rd	0.10	19.4	-	X									0.22	17.6	-	X
Fenwick Rd	0.18	18.6	-	X									0.32	16.8	-	X
Solly Ct					0.63	20	-	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 = 24
- Total tests sampled in BMID treated distribution system = 33 (Zero Positive Samples)