



## MONTHLY REPORTING PERIOD - SEPTEMBER, 2022

### 1. SUMMARY

The list below provides a summary of the water quality information collected by BMID in September 2022. Documentation and figures are provided on the following pages to support this submission.

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	340,981,013	1290.61
Well 4	2,956,326	11.19
Well 5	23,768,432	89.96
Well 6 (Irrigation Only)	5,898,024	22.32
Scotty Creek (Irrigation Only)	721,390	2.73
Total	374,325,185	1,416.82

1. A Water Quality Advisory was called on September 27th and was rescinded on October 5th. The scheduled WQA was called to allow BMID to undertake a planned inspection of its infrastructure which required the UV Plant to be bypassed for limited periods on September 27th and September 28th;
2. The WQA remained in effect, after the work was completed on September 28th, to allow UV disinfected water to run through the entire distribution system. Moreover, primary chlorine disinfection remained in operation throughout the WQA;
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 continues to be monitored. It is currently stable and not moving;
4. The WTP resumed operation on February 8th and remained in operation throughout September as raw water quality in Mission Creek required treatment to lower both turbidity and colour;
5. Raw water turbidity levels in Mission Creek peaked at 2.57 NTU (average daily turbidity) on September 3. Average daily raw water turbidity for September was 1.32 NTU the Mission Creek intake;
6. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.57 NTU on September 14, 2022. Average clarified water turbidity for September was 0.48 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 0.43 NTU on September 30. Average monthly turbidity at the first customer was 0.32 NTU for September;
8. The highest monthly turbidity daily average at the UV plant was 0.67 NTU on September 26. Average monthly turbidity at the UV plant was 0.48 NTU throughout the month;
9. BMID's Ultraviolet Treatment Facility treated 1,290,753.8 m<sup>3</sup> of water, with 633.9 m<sup>3</sup> of which was "Off-Spec" (0.0491%);

10. BMID's Scotty Creek source, used for irrigation in the north-end, resumed operations on May 27, 2022. The Scotty Creek source was placed in bypass mode on September 9<sup>th</sup> as irrigation demands in the north end reduced from peak flows earlier in summer;
11. Well #4, used as a source for domestic water in the north-end of the distribution system, was in operation periodically throughout the month depending on the domestic demand;
12. 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 in operation from September 9<sup>th</sup> until the end of the month as dictated by flows. Well #5 will continue to operate throughout early autumn;
13. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, resumed operations for the summer on May 26. Well #6 operated as required throughout September. The well was placed on stand-by mode on September 25 as irrigation flows began to reduce from the peak flows of August and early September, however the well is able to operate if flows increase;
14. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had normal counts for late summer/ early autumn. The peak count was on the September 20<sup>th</sup> sample with a count of 4 coliforms. The average monthly *E.Coli* was 2.75, based on 4 samples;
15. *E.Coli* levels in the raw water at the water distribution system intake at the east end of Hadden Reservoir, immediately prior to disinfection, had normal counts on all 4 samples. A peak count of 2 was sampled on September 6<sup>th</sup> and 12<sup>th</sup>. Average *E.Coli* results for the month indicated 1 *E.Coli* coliforms per sample. Reduction in *E.Coli* levels is credited to the clarification process and the further settling of particles in the water in Stevens and Hadden Reservoirs;
16. No *E.Coli* or *Total Coliforms* were found in treated water in the distribution system through third-party analysis. In addition, zero positive samples were detected by BMID's in-house presence/absence testing throughout September;

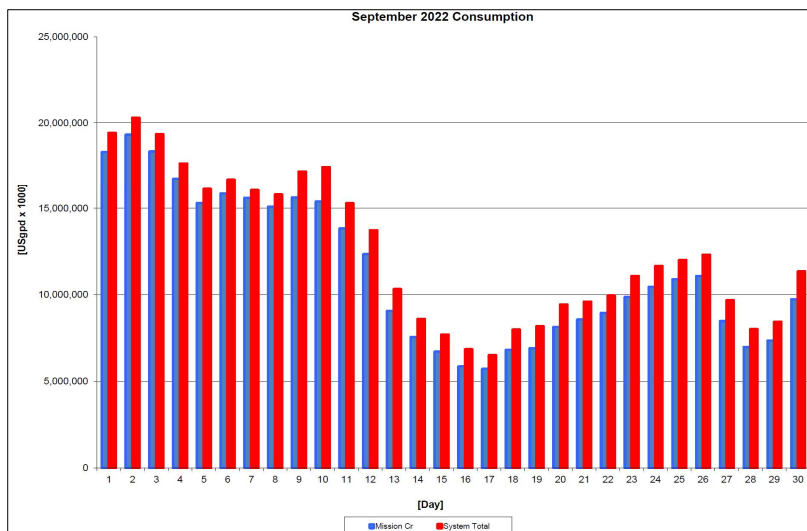
## 1.0 FLOWS - SEPTEMBER, 2022

The Maximum Daily Flow was on September 2, at 20,283,921 US gallons (76.77 ML)

The Minimum Daily Flow was on September 17, at 6,501,188 US gallons (24.61 ML)

Mission Creek provided 91% of domestic and irrigation flow throughout September.

**Figure 1.1 - Domestic Water System Flow**



**Table 1.2 - September 2022 - Daily Consumption Report**

Year	Mission Cr	Well #4	Well #5	Well #6	Scotty Crk	System Total	System Total
2022	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Sep	18,296,341	247,263	0	784,344	79,060	19,407,009	73.46
2-Sep	19,314,751	258,887	0	628,584	81,700	20,283,921	76.77
3-Sep	18,341,937	262,585	0	646,272	85,740	19,336,534	73.19
4-Sep	16,748,056	233,526	0	560,736	77,840	17,620,158	66.69
5-Sep	15,303,827	262,585	0	473,088	68,920	16,108,420	60.97
6-Sep	15,858,060	274,473	0	486,024	64,600	16,683,157	63.15
7-Sep	15,598,749	209,751	0	154,440	74,120	16,037,060	60.70
8-Sep	15,094,048	221,903	0	390,456	73,320	15,779,727	59.73
9-Sep	15,624,030	196,014	668,086	553,344	116,090	17,157,564	64.94
10-Sep	15,378,192	166,691	1,315,302	555,984	0	17,416,170	65.92
11-Sep	13,830,250	0	1,348,060	93,192	0	15,271,501	57.80
12-Sep	12,348,456	0	1,302,886	57,288	0	13,708,630	51.89
13-Sep	9,066,172	0	1,191,143	57,288	0	10,314,602	39.04
14-Sep	7,563,112	0	1,033,697	0	0	8,596,809	32.54
15-Sep	6,719,717	0	967,126	0	0	7,686,843	29.09
16-Sep	5,864,407	0	978,486	0	0	6,842,893	25.90
17-Sep	5,721,358	0	779,830	0	0	6,501,188	24.61
18-Sep	6,824,355	0	1,138,837	16,104	0	7,979,296	30.20
19-Sep	6,914,385	0	1,239,750	16,104	0	8,170,239	30.92
20-Sep	8,144,211	0	1,273,564	9,768	0	9,427,543	35.68
21-Sep	8,571,510	0	1,011,243	9,768	0	9,592,520	36.31
22-Sep	8,962,299	0	962,635	21,384	0	9,946,319	37.65
23-Sep	9,879,082	46,230	962,635	181,632	0	11,069,579	41.90
24-Sep	10,455,479	46,230	968,711	181,632	0	11,652,052	44.10
25-Sep	10,896,408	113,329	961,579	20,592	0	11,991,908	45.39
26-Sep	11,084,578	124,952	1,097,362	0	0	12,306,892	46.58
27-Sep	8,477,306	70,533	1,123,779	0	0	9,671,618	36.61
28-Sep	6,994,482	70,533	937,275	0	0	8,002,291	30.29
29-Sep	7,361,179	70,533	995,128	0	0	8,426,841	31.90
30-Sep	9,744,275	80,308	1,511,317	0	0	11,335,899	42.91
Totals Usgpd	340,981,013	2,956,326	23,768,432	5,898,024	721,390	374,325,185	1,416.82
Totals ML	1,290.61	11.19	89.96	22.32	2.73		
Avg's	11,366,034	43.02				12,477,506	47.23
Max	19,314,751	73.11				20,283,921	76.77
Min	5,721,358	21.66				6,501,188	24.61

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

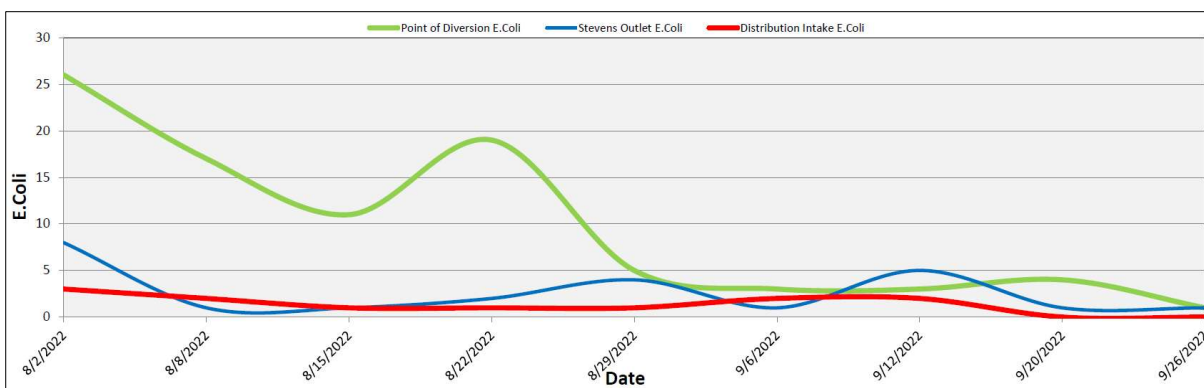
Raw water samples were taken at three points at BMID settling ponds before chlorination

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 2022 - September 2022**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
2-Aug-22	26	8	3
8-Aug-22	17	1	2
15-Aug-22	11	1	1
22-Aug-22	19	2	1
29-Aug-22	5	4	1
6-Sep-22	3	1	2
12-Sep-22	3	5	2
20-Sep-22	4	1	0
26-Sep-22	1	1	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.)

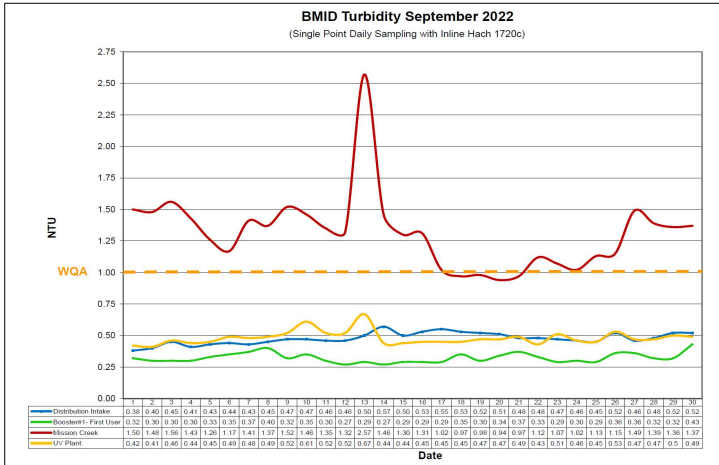
Hadden Outlet (Raw) - Sampling point after exiting 75,000 m<sup>3</sup> 2<sup>nd</sup> lower balancing reservoir (Hadden Res.)  
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through September 2022, 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 0.43 NTU on September 30, 2022.

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 2022				
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User	UV Plant
	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]	Daily Average [NTU]
1	1.50	0.38	0.32	0.42
2	1.48	0.40	0.30	0.41
3	1.56	0.45	0.30	0.46
4	1.43	0.41	0.30	0.44
5	1.26	0.43	0.33	0.45
6	1.17	0.44	0.35	0.49
7	1.41	0.43	0.37	0.48
8	1.37	0.45	0.40	0.49
9	1.52	0.47	0.32	0.52
10	1.46	0.47	0.35	0.61
11	1.35	0.46	0.30	0.52
12	1.32	0.46	0.27	0.52
13	2.57	0.50	0.29	0.67
14	1.46	0.57	0.27	0.44
15	1.30	0.50	0.29	0.44
16	1.31	0.53	0.29	0.45
17	1.02	0.55	0.29	0.45
18	0.97	0.53	0.35	0.45
19	0.98	0.52	0.30	0.47
20	0.94	0.51	0.34	0.47
21	0.97	0.48	0.37	0.49
22	1.12	0.48	0.33	0.43
23	1.07	0.47	0.29	0.51
24	1.02	0.46	0.30	0.46
25	1.13	0.45	0.29	0.45
26	1.15	0.52	0.36	0.53
27	1.49	0.46	0.36	0.47
28	1.39	0.48	0.32	0.47
29	1.36	0.52	0.32	0.5
30	1.37	0.52	0.43	0.49
Average	1.32	0.48	0.32	0.48



#### 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, 2022.

Figure 4.1 - CT Trending – BMID Mission Creek Source – September 2022

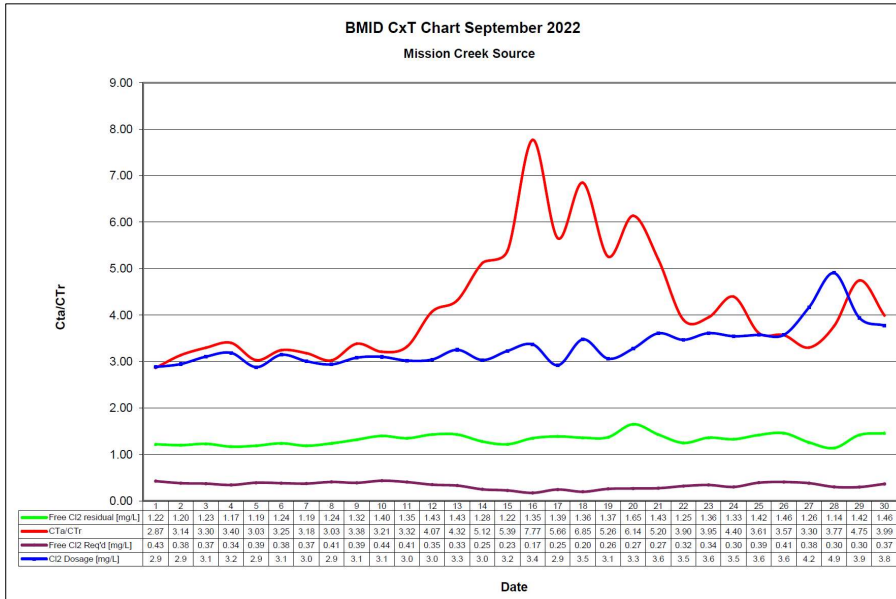


Table 4.2 - CT Table – Mission Creek Source

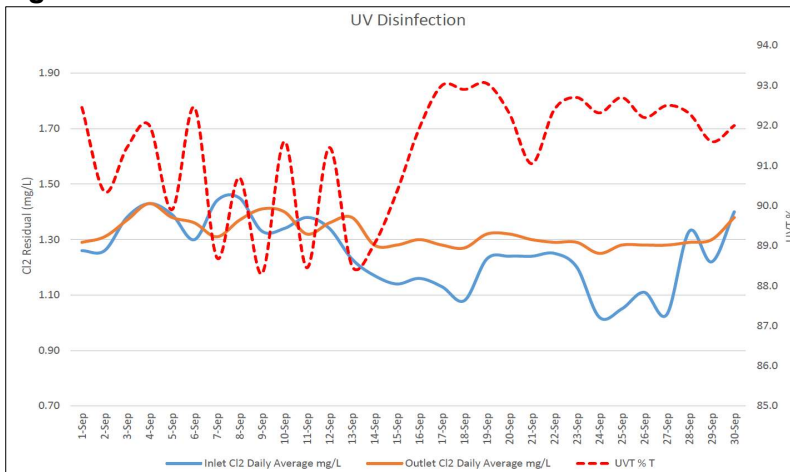
BMID September 2022													
Mission Creek Source													
DATE	pH (Average)	TEMP (Present) [°C]	PEAK FLOW [USgpm]	Free Cl2 residual [mg/L]	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd [mg/L]	Cl2 Dosage [mg/L]	VOLUME TOTAL [USgal]	TIME [mins]	FLOW Daily Average [USGPM]	CL2 DOSAGE Average [PPD]
September													
1	7.45	19.7	16120	1.22	200.5	70.0	2.87	0.43	2.9	2649600	164	13647	473
2	7.43	19.8	14725	1.20	215.9	68.8	3.14	0.38	2.9	2649600	180	12981	460
3	7.44	19.3	13774	1.23	236.6	71.8	3.30	0.37	3.1	2649600	192	11856	443
4	7.45	19.7	13108	1.17	236.5	69.5	3.40	0.34	3.2	2649600	202	10810	414
5	7.46	19.4	14566	1.19	216.5	71.4	3.03	0.39	2.9	2649600	182	11222	388
6	7.48	19.0	13600	1.24	241.6	74.4	3.25	0.38	3.1	2649600	195	11016	417
7	7.44	17.7	12427	1.19	253.7	79.8	3.18	0.37	3.0	2649600	213	10667	386
8	7.38	17.8	13917	1.24	236.1	78.0	3.03	0.41	2.9	2649600	190	11396	403
9	7.37	17.5	12902	1.32	271.1	80.1	3.38	0.39	3.1	2649600	205	10794	400
10	7.36	16.3	13203	1.40	280.9	87.5	3.21	0.44	3.1	2649600	201	10588	395
11	7.35	15.1	11428	1.35	313.0	94.2	3.32	0.41	3.0	2649600	232	9780	355
12	7.34	15.9	10382	1.43	365.0	89.6	4.07	0.35	3.0	2649600	255	8480	310
13	7.33	15.3	9431	1.43	401.8	93.1	4.32	0.33	3.3	2649600	281	5770	226
14	7.32	16.0	7624	1.28	444.8	86.9	5.12	0.25	3.0	2649600	348	5262	192
15	7.30	15.8	6911	1.22	467.8	86.8	5.39	0.23	3.2	2649600	383	4549	177
16	7.28	18.2	6213	1.35	575.7	74.1	7.77	0.17	3.4	2649600	426	3947	160
17	7.29	17.5	8306	1.39	443.4	78.4	5.66	0.25	2.9	2649600	319	4502	158
18	7.30	16.1	6087	1.36	592.0	86.4	6.85	0.20	3.5	2649600	435	4502	188
19	7.32	16.0	7862	1.37	461.7	87.8	5.26	0.26	3.1	2649600	337	5167	190
20	7.33	16.0	7862	1.65	556.1	90.6	6.14	0.27	3.3	2649600	337	5849	230
21	7.35	15.5	7878	1.43	481.0	92.5	5.20	0.27	3.6	2649600	336	6055	263
22	7.36	14.9	8955	1.25	369.8	94.8	3.90	0.32	3.5	2649600	296	6546	273
23	7.37	14.9	9463	1.36	380.8	96.4	3.95	0.34	3.6	2649600	280	6942	301
24	7.39	15.4	8575	1.33	411.0	93.5	4.40	0.30	3.5	2649600	309	7497	320
25	7.40	14.6	10398	1.42	361.8	100.1	3.61	0.39	3.6	2649600	255	7719	332
26	7.47	14.1	10160	1.46	380.7	106.7	3.57	0.41	3.6	2649600	261	7814	336
27	7.58	14.5	9574	1.26	348.7	105.6	3.30	0.38	4.2	2649600	277	5865	294
28	7.60	14.3	7545	1.14	400.3	106.3	3.77	0.30	4.9	2649600	351	4184	247
29	7.53	14.7	7608	1.42	494.5	104.2	4.75	0.30	3.9	2649600	348	5785	274
30	7.53	14.7	9257	1.46	417.9	104.6	3.99	0.37	3.8	2649600	286	6673	303
Averages	7.40	16.52	10329	1.33	368.579	87.5	4.20	0.33	3.34				

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated:	1,290,754 m <sup>3</sup>	100.00%
On-Spec Water:	1,290,120 m <sup>3</sup>	99.95%
Off-Spec Water:	634 m <sup>3</sup>	0.05%

Average monthly chlorine residual before UV Treatment was 1.25 mg/L  
The average monthly chlorine residual after UV treatment and re-chlorination was 1.32 mg/L.

**Figure 5.1 - UV Disinfection – BMID Mission Creek Source – September 2022**



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

Date	Inlet Cl2	Outlet Cl2	UVT	Turbidity		In Spec Water	Off Spec	Off Spec %
	Daily	Daily				Volume	Water	of Water
	mg/L	mg/L	% T	NTU		Cubic Meters	Cubic Meters	Percentage
1-Sep	1.26	1.29	92.5	0.42		69,132	127	0.18%
2-Sep	1.26	1.31	90.4	0.41		72,987	127	0.17%
3-Sep	1.38	1.37	91.5	0.46		69,432	0	0.00%
4-Sep	1.43	1.43	92.0	0.44		63,398	0	0.00%
5-Sep	1.39	1.38	89.9	0.45		57,931	0	0.00%
6-Sep	1.30	1.36	92.5	0.49		60,029	0	0.00%
7-Sep	1.44	1.31	88.7	0.48		58,963	85	0.14%
8-Sep	1.45	1.37	90.7	0.49		57,052	85	0.15%
9-Sep	1.33	1.41	88.3	0.52		59,047	96	0.16%
10-Sep	1.34	1.40	91.6	0.61		58,208	5	0.01%
11-Sep	1.38	1.32	88.5	0.52		52,353	0	0.00%
12-Sep	1.34	1.36	91.5	0.52		46,744	0	0.00%
13-Sep	1.23	1.38	88.5	0.67		34,319	0	0.00%
14-Sep	1.17	1.28	89.1	0.44		28,630	0	0.00%
15-Sep	1.14	1.28	90.4	0.44		25,375	62	0.24%
16-Sep	1.16	1.30	91.9	0.45		22,196	3	0.01%
17-Sep	1.13	1.28	93.0	0.45		21,658	0	0.00%
18-Sep	1.08	1.27	92.9	0.45		25,833	0	0.00%
19-Sep	1.23	1.32	93.1	0.47		26,174	0	0.00%
20-Sep	1.24	1.32	92.3	0.47		30,829	0	0.00%
21-Sep	1.24	1.30	91.1	0.49		32,447	0	0.00%
22-Sep	1.25	1.29	92.4	0.43		33,926	0	0.00%
23-Sep	1.20	1.29	92.7	0.51		37,396	0	0.00%
24-Sep	1.02	1.25	92.3	0.46		39,578	0	0.00%
25-Sep	1.05	1.28	92.7	0.45		41,247	0	0.00%
26-Sep	1.11	1.28	92.2	0.53		41,960	0	0.00%
27-Sep	1.03	1.28	92.5	0.47		32,048	42	0.13%
28-Sep	1.33	1.29	92.3	0.47		26,475	2	0.01%
29-Sep	1.22	1.30	91.6	0.50		27,865	0	0.00%
30-Sep	1.40	1.38	92.0	0.49		36,886	0	0.00%
<b>Average</b>	<b>1.25</b>	<b>1.32</b>	<b>91.36</b>	<b>0.48</b>	<b>Total</b>	<b>1,290,119.90</b>	<b>633.9</b>	<b>0.049%</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	2921 Belgo Rd		Booster 1		Elison Blow-Off		Elison School		3976 Highway 97		Prospect Reservoir		Tower Reservoir		Well #5		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	Coliforms	E.coli
2-Aug-22			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Aug-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-Aug-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Aug-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-Aug-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-Aug-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Sep-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-Sep-22	0	0	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 9 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

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

Location	9/6/2022				9/12/2022				9/20/2022				9/26/2022			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres					1.00	21.2	-	X								
170 Kneller Rd					0.86	20.8	-	X								
2105 Morrison	1.15	20.2	-	X									0.96	19.4	-	X
Staymen Rd	0.64	19.7	-	X									1.13	20.2	-	X
260 Campion Rd									0.07	21.2	-	X				
Fenwick Rd									0.18	20.8	-	X				
Solly Ct					0.91	19.8	-	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
- 0 Positive E.Coli and Total Coliform Samples