



## MONTHLY REPORTING PERIOD - APRIL, 2022

### 1. SUMMARY

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

Source	Total (US Gals)	Total (Mega Litres)
Mission Creek	100,883,483	381.84
Well 4	3,395,905	12.85
Well 5	3,543,576	13.41
Scotty Creek (Irrigation Only)	0	0
Total	107,822,964	408.11

1. The BMID distribution system experienced a short-term spike of turbidity above 1.00 NTU at Booster 1 on April 25. This event was caused by a dramatic rise in system flows which stirred up any sediments in the water mains that had settled during winter. The turbidity readings reduced back to normal levels after the initial spike with the event only lasting less than 12 hours;
2. THM testing took place on April 11 at the UV plant and the Pearson Rd sample station. Both samples came back in the acceptable range. However, there was an issue with the HAA samples at the lab. HAAs will be retested in early May;
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 March 8<sup>th</sup> and remained in operation throughout April 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 11.18 NTU (average daily turbidity) on April 26. Average daily raw water turbidity for April was 3.21 NTU at the Mission Creek intake;
6. Turbidity levels at the Distribution Intake (end of Hadden Reservoir) high reading was 0.63 NTU on April 18 to April 20, 2022. Average clarified water turbidity for April was 0.57 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 1.25 NTU on April 25. Average monthly turbidity at the first customer was 0.57 NTU for April;
8. BMID's Ultraviolet Treatment Facility treated 381,855.6 m<sup>3</sup> of water, 554.6 m<sup>3</sup> of which was "Off-Spec" (0.145%). The "Off-Spec" portion of the water was caused by an instrumentation error in the on-line UVT meter. Adequate disinfection was maintained at all times during these events as the actual water quality remained acceptable throughout the month. Average UV Transmissivity was 91.5%. The average inlet chlorine residual level at the UV site was 1.26 mg/L. The average outgoing chlorine was 1.46 mg/L after the sodium hypochlorite top-up system;

9. BMID's Scotty Creek source, used for irrigation in the north-end, ran from May 25, 2021 until it was placed in bypass mode on August 21. The Scotty Creek source will remain in bypass mode until irrigation begins again in the late spring of 2022;
10. Well #4 resumed operations as a source for domestic water in the north-end of the distribution system on August 24, 2021 and will remain in operation until the spring of 2022 when Well #5 will be needed to meet demand;
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 activated on April 25 as irrigation demands in the north-end of the system increased. Well #5 will continue to operate until flows reduce in the fall;
12. Well #6, which supplies irrigation water to the twinned north-end water distribution systems, was placed in standby on August 21, 2021. 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 2022;
13. *E.Coli* levels at Mission Creek's Point-of-Diversion (creek intake prior to WTP) had low counts for early spring with the exception of the April 4 sample which had a peak count of 24. The three weekly samples in late April all had low counts with the monthly average *E.Coli* count of 7.25 based on 4 samples;
14. *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 zero counts on all 4 samples. 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;
15. 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 April;

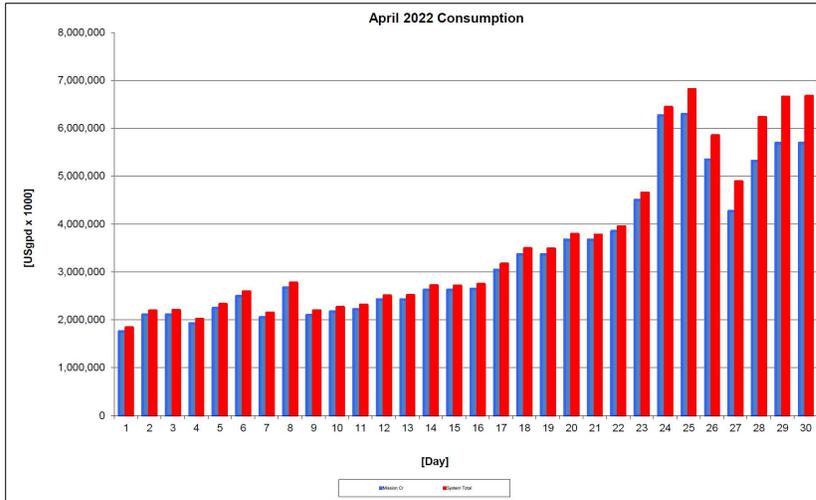
## 1.0 FLOWS - APRIL, 2022

The Maximum Daily Flow was on April 25, at 6,808,448 US gallons (25.77 ML)

The Minimum Daily Flow was on April 1, at 1,836,629 US gallons (6.95 ML)

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

**Figure 1.1 - Domestic Water System Flow**



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

Year	Mission Cr	Well #4	Well #5	System Total	System Total
2022	Usgpd	Usgpd	Usgpd	Usgpd	ML/Day
1-Apr	1,758,699	77,930	0	1,836,629	6.95
2-Apr	2,108,753	77,930	0	2,186,683	8.28
3-Apr	2,108,806	88,761	0	2,197,567	8.32
4-Apr	1,924,757	88,761	0	2,013,518	7.62
5-Apr	2,244,458	81,893	0	2,326,351	8.81
6-Apr	2,490,429	98,007	0	2,588,436	9.80
7-Apr	2,047,650	98,007	0	2,145,657	8.12
8-Apr	2,671,254	96,950	0	2,768,205	10.48
9-Apr	2,095,518	96,950	0	2,192,468	8.30
10-Apr	2,167,822	92,460	0	2,260,281	8.56
11-Apr	2,215,716	92,460	0	2,308,176	8.74
12-Apr	2,421,057	82,421	0	2,503,478	9.48
13-Apr	2,419,578	90,874	0	2,510,452	9.50
14-Apr	2,621,960	91,403	0	2,713,363	10.27
15-Apr	2,622,013	86,648	0	2,708,661	10.25
16-Apr	2,645,815	96,950	0	2,742,765	10.38
17-Apr	3,042,126	122,575	0	3,164,700	11.98
18-Apr	3,367,427	122,575	0	3,490,002	13.21
19-Apr	3,367,480	115,442	0	3,482,922	13.18
20-Apr	3,671,595	115,442	0	3,787,037	14.33
21-Apr	3,671,647	101,970	0	3,773,617	14.28
22-Apr	3,850,545	97,479	0	3,948,023	14.94
23-Apr	4,499,800	148,199	0	4,648,000	17.59
24-Apr	6,263,465	170,918	0	6,434,383	24.35
25-Apr	6,289,090	170,918	348,440	6,808,448	25.77
26-Apr	5,341,267	145,558	359,800	5,846,624	22.13
27-Apr	4,265,849	139,746	479,469	4,885,064	18.49
28-Apr	5,315,035	153,219	760,810	6,229,063	23.58
29-Apr	5,686,857	176,730	790,132	6,653,719	25.18
30-Apr	5,687,016	176,730	804,926	6,668,671	25.24
Totals Usgpd	100,883,483	3,395,905	3,543,576	107,822,964	408.11
Totals ML	381.84	12.85	13.41		
Avg's	3,362,783	12.73		3,594,099	13.60
Max	6,289,090	23.80		6,808,448	25.77
Min	1,758,699	6.66		1,836,629	6.95

## 2.0 RAW WATER QUALITY - BACTERIOLOGICAL MONITORING

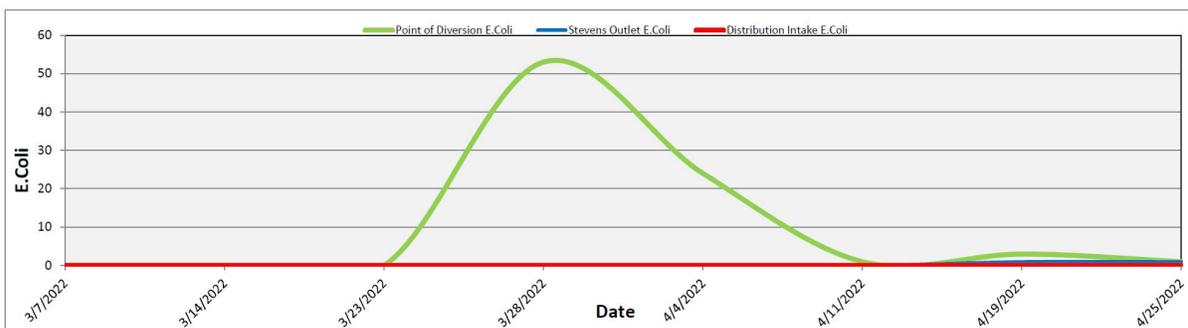
Raw water samples were taken at three points at BMID settling ponds before chlorination

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) March 2022 - April 2022**



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

Date	Point of Diversion E.Coli	Stevens Outlet E.Coli	Distribution Intake E.Coli
7-Mar-22	0	0	0
14-Mar-22	0	0	0
23-Mar-22	0	0	0
28-Mar-22	53	0	0
4-Apr-22	24	0	0
11-Apr-22	1	0	0
19-Apr-22	3	1	0
25-Apr-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.)

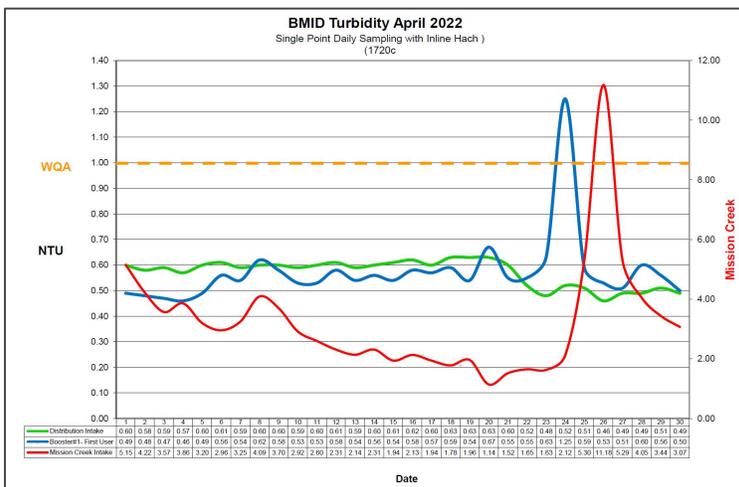
(Hadden Outlet = Distribution Intake - Point of Disinfection)

### 3.0 RAW AND TREATED WATER TURBIDITY

Through April 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 1.25 NTU on April 25, 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 April 2022			
Date	Mission Creek Intake	Distribution Intake	Booster#1- First User
	Daily Average [NTU]	Daily Average NTU	Daily Average NTU
1	5.15	0.60	0.49
2	4.22	0.58	0.48
3	3.57	0.59	0.47
4	3.86	0.57	0.46
5	3.20	0.60	0.49
6	2.96	0.61	0.56
7	3.25	0.59	0.54
8	4.09	0.60	0.62
9	3.70	0.60	0.58
10	2.92	0.59	0.53
11	2.60	0.60	0.53
12	2.31	0.61	0.58
13	2.14	0.59	0.54
14	2.31	0.60	0.56
15	1.94	0.61	0.54
16	2.13	0.62	0.58
17	1.94	0.60	0.57
18	1.78	0.63	0.59
19	1.96	0.63	0.54
20	1.14	0.63	0.67
21	1.52	0.60	0.55
22	1.65	0.52	0.55
23	1.63	0.48	0.63
24	2.12	0.52	1.25
25	5.30	0.51	0.59
26	11.18	0.46	0.53
27	5.29	0.49	0.51
28	4.05	0.49	0.60
29	3.44	0.51	0.56
30	3.07	0.49	0.50
AVG	3.21	0.57	0.57

### 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 April, 2022.

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

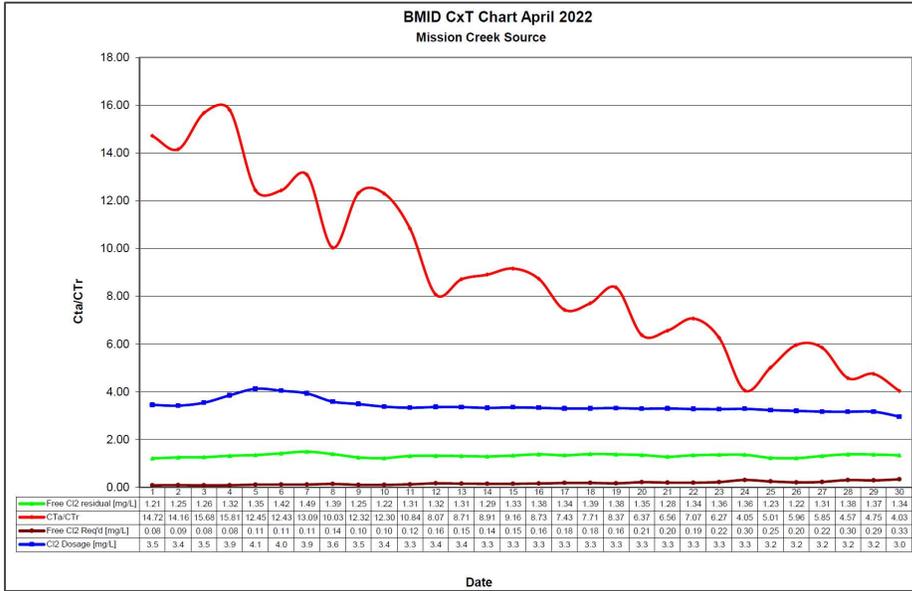


Table 4.2 - CT Table – Mission Creek Source

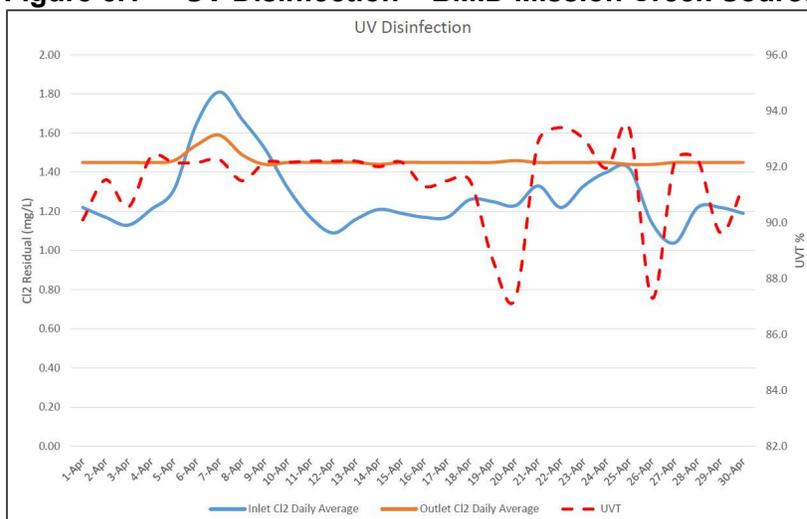
BMID April 2022													
Mission Creek Source													
DATE	pH (Average)	TEMP (Present)	PEAK FLOW	Free Cl2 residual	CT achieved	CT req'd	CTa/CTr	Free Cl2 Req'd	Cl2 Dosage	VOLUME TOTAL	TIME	FLOW Daily Average	CL2 DOSAGE Average
April		[°C]	[USgpm]	[mg/L]				[mg/L]	[mg/L]	[USgal]	[mins]	[USGPM]	[PPD]
1	7.17	11.0	1,890	1.21	1696.2	115.3	14.72	0.08	3.5	2649600	1402	1,239	51
2	7.17	10.8	1,992	1.25	1662.3	117.4	14.16	0.09	3.4	2649600	1330	1,485	61
3	7.18	11.2	1,855	1.26	1799.5	114.8	15.68	0.08	3.5	2649600	1428	1,316	56
4	7.21	11.8	1,973	1.32	1772.3	112.1	15.81	0.08	3.9	2649600	1343	1,355	63
5	7.22	11.1	2,424	1.35	1475.5	118.5	12.45	0.11	4.1	2649600	1093	1,577	78
6	7.23	12.6	2,801	1.42	1343.4	108.1	12.43	0.11	4.0	2649600	946	1,754	85
7	7.24	11.1	2,489	1.49	1586.5	121.2	13.09	0.11	3.9	2649600	1065	1,437	68
8	7.25	11.4	3,113	1.39	1183.1	117.9	10.03	0.14	3.6	2649600	851	1,882	81
9	7.26	12.0	2,406	1.25	1376.5	111.7	12.32	0.10	3.5	2649600	1101	1,483	62
10	7.26	11.6	2,296	1.22	1407.9	114.5	12.30	0.10	3.4	2649600	1154	1,534	62
11	7.29	11.0	2,626	1.31	1321.6	122.0	10.84	0.12	3.3	2649600	1009	1,484	59
12	7.32	10.5	3,390	1.32	1031.6	127.8	8.07	0.16	3.4	2649600	782	1,689	67
13	7.35	10.1	3,002	1.31	1156.2	132.7	8.71	0.15	3.4	2649600	883	1,697	69
14	7.36	9.9	2,848	1.29	1200.0	134.7	8.91	0.14	3.3	2649600	930	1,850	74
15	7.37	9.7	2,792	1.33	1262.1	137.8	9.16	0.15	3.3	2649600	949	1,716	69
16	7.38	9.6	2,992	1.38	1222.2	140.0	8.73	0.16	3.3	2649600	886	1,864	75
17	7.40	9.6	3,403	1.34	1043.3	140.4	7.43	0.18	3.3	2649600	779	2,148	85
18	7.41	11.0	3,717	1.39	990.9	128.6	7.71	0.18	3.3	2649600	713	2,366	94
19	7.43	10.3	3,218	1.38	1136.4	135.8	8.37	0.16	3.3	2649600	823	2,043	81
20	7.45	11.4	4,442	1.35	805.2	126.3	6.37	0.21	3.3	2649600	596	2,584	102
21	7.45	11.5	4,154	1.28	816.5	124.5	6.56	0.20	3.3	2649600	638	2,250	89
22	7.44	12.1	4,195	1.34	846.4	119.8	7.07	0.19	3.3	2649600	632	2,719	107
23	7.43	12.6	4,976	1.36	724.1	115.5	6.27	0.22	3.3	2649600	532	3,170	125
24	7.42	12.6	6,985	1.36	466.6	115.1	4.05	0.30	3.3	2649600	379	4,433	175
25	7.41	12.6	5,757	1.23	566.0	113.0	5.01	0.25	3.2	2649600	460	3,741	145
26	7.42	12.7	4,825	1.22	670.0	112.5	5.96	0.20	3.2	2649600	549	2,700	104
27	7.45	12.5	5,093	1.31	681.6	116.5	5.85	0.22	3.2	2649600	520	3,027	115
28	7.45	12.2	6,670	1.38	548.2	119.9	4.57	0.30	3.2	2649600	397	3,758	143
29	7.44	11.7	6,188	1.37	586.6	123.6	4.75	0.29	3.2	2649600	428	4,019	153
30	7.43	11.9	7,275	1.34	488.0	121.0	4.03	0.33	3.0	2649600	364	3,536	126
Averages	7.34	11.3	3726	1.33	1095.55	122	9.05	0.171	3.403		832	2,261	90.84

## 5.0 ULTRAVIOLET DISINFECTION

Total Water Treated: 381,885.6 m<sup>3</sup> 100.00%  
 On-Spec Water: 381,331 m<sup>3</sup> 99.855%  
 Off-Spec Water: 554.6 m<sup>3</sup> 0.145%

Average monthly chlorine residual before UV Treatment was 1.28 mg/L  
 The average monthly chlorine residual after UV treatment and re-chlorination was 1.46 mg/L.

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



**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-Apr	1.22	1.45	90.1		6657.4	0	0.00%
2-Apr	1.17	1.45	91.5		7982.5	0	0.00%
3-Apr	1.13	1.45	90.6		7982.7	0	0.00%
4-Apr	1.21	1.45	92.4		7286.0	0	0.00%
5-Apr	1.31	1.46	92.2		8496.2	0	0.00%
6-Apr	1.65	1.54	92.2		9427.3	0	0.00%
7-Apr	1.81	1.59	92.3		7751.2	0	0.00%
8-Apr	1.67	1.49	91.5		10111.8	0	0.00%
9-Apr	1.52	1.44	92.2		7932.4	0	0.00%
10-Apr	1.32	1.45	92.2		8206.1	0	0.00%
11-Apr	1.17	1.45	92.2		8206.3	181.1	2.21%
12-Apr	1.09	1.45	92.2		8983.6	181.1	2.02%
13-Apr	1.16	1.45	92.2		9159.1	0	0.00%
14-Apr	1.21	1.44	92.0		9925.2	0	0.00%
15-Apr	1.19	1.45	92.2		9925.4	0	0.00%
16-Apr	1.17	1.45	91.3		10015.5	0	0.00%
17-Apr	1.17	1.45	91.5		11515.7	0	0.00%
18-Apr	1.26	1.45	91.5		12747.1	0	0.00%
19-Apr	1.25	1.45	88.7		12747.3	0	0.00%
20-Apr	1.23	1.46	87.3		13898.5	0	0.00%
21-Apr	1.33	1.45	92.9		13898.7	0	0.00%
22-Apr	1.22	1.45	93.4		14575.9	0	0.00%
23-Apr	1.33	1.45	93.0		17033.6	0	0.00%
24-Apr	1.40	1.45	92.0		23709.8	0	0.00%
25-Apr	1.42	1.44	93.4		23710.6	96.2	0.41%
26-Apr	1.14	1.44	87.3		20122.7	96.2	0.48%
27-Apr	1.04	1.45	92.2		16148.0	0	0.00%
28-Apr	1.22	1.45	92.3		20119.6	0	0.00%
29-Apr	1.22	1.45	89.6		21527.1	0	0.00%
30-Apr	1.19	1.45	91.3		21527.7	0	0.00%
<b>Average</b>	<b>1.28</b>	<b>1.46</b>	<b>91.5</b>	<b>Total</b>	<b>381331</b>	<b>554.6</b>	<b>0.145%</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
- 25 samples were found to be absent of Coliforms.
- 25 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 #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
2-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Mar-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-Apr-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Apr-22	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 10 samples were found to be absent of both *Total Coliforms* and *E. Coli*.

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

Location	4/4/2022				4/12/2022				4/19/2022				4/26/2022			
	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.	Cl2	Temp.	Pres.	Abs.
Sylvania Cres	0.90	9.2	-	X									0.52	10.2	-	X
170 Kneller Rd	0.89	8.8	-	X									0.82	9.6	-	X
2105 Morrison Staymen Rd									1.00	10.8	-	X				
260 Campion Rd					0.55	11.8	-	X	0.88	9.6	-	X				
Fenwick Rd					0.67	14.4	-	X								
Solly Ct	0.94	10.2	-	X									1.02	10.6	-	X

**Table 6.3 - BMID Disinfection By-products – CARO Independent Lab Testing**

11-Apr-22		
Location	THM (mg/L)	HAA (mg/L)
UV Plant	0.0568	-
Pearson School	0.0743	-

- THM results are acceptable on both samples (<0.10 mg/L)
- HAA testing will take place in early May

- 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) = 10
- Total tests sampled by BMID and tested by Caro Labs 25
- Total tests sampled in BMID treated distribution system = 35