Abbotsford Mission
Water & Sewer Services

ABBOTSFORD

CITY OF MISSION ON THE FRASER

Annual Water Quality Report
2024

Norrish Creek Surface Source
New Coanda

Bevan Wellfield - Groundwater Source

EXECUTIVE SUMMARY

The regional water system serving the municipalities of Abbotsford and Mission delivers drinking water to an approximate population of 160,000, including homes, business, and institutions. The water supply is primarily drawn from Norrish Creek, which is treated by filtration and disinfection. The supply is augmented by secondary sources drawing from Cannell Lake and the Abbotsford-Sumas Aquifer which are treated by disinfection. Finished (i.e., treated) drinking water is conveyed through 95 km of transmission pipe and delivered within Abbotsford and Mission through distribution pipe networks of 850 km and 185 km of total pipe length, respectively. The water system is managed and operated by qualified and certified personnel to ensure that drinking water quality standards consistently meet or exceed applicable requirements.

A rigorous water quality monitoring program is in place to meet or exceed the requirements of British Columbia's *Drinking Water Protection Act* and *Drinking Water Protection Regulation*. Grab samples of finished water are collected from 55 dedicated sample stations throughout the transmission and distribution network of both municipalities to verify water quality compliance with Provincial regulatory requirements and the Guidelines for Canadian Drinking Water Quality (GCDWQ). Raw water samples from the surface and groundwater sources are also subjected to regular sampling and analysis. In addition to verification monitoring, continuous operational monitoring by online instrumentation is provided for key parameters to ensure that system performance remains within acceptable limits. A summary of verification and operational monitoring during 2024 is as follows:

Surface Water Source (Norrish Creek and Cannell Lake)

- ✓ Results of 33 physical and chemical raw water quality parameters routinely analyzed three times per year for each surface water source. All parameters were within applicable GCDWQ health-based limits.
- ✓ Continuous online monitoring of chlorine concentration (free and total) and pH of the treated water near the point of chlorine addition at the Cannell Lake and Norrish Creek water treatment plants (WTPs) as well as at the downstream points of ammonia addition at Cannon Pit and Bell Road stations, respectively.
- ✓ Continuous online turbidity monitoring of the raw, filtered, and finished water at multiple locations for water supplied by Norrish Creek and Cannell Lake, including downstream point of Bell Road and Cannon Pit.

Groundwater Source (11 Active Production Wells)

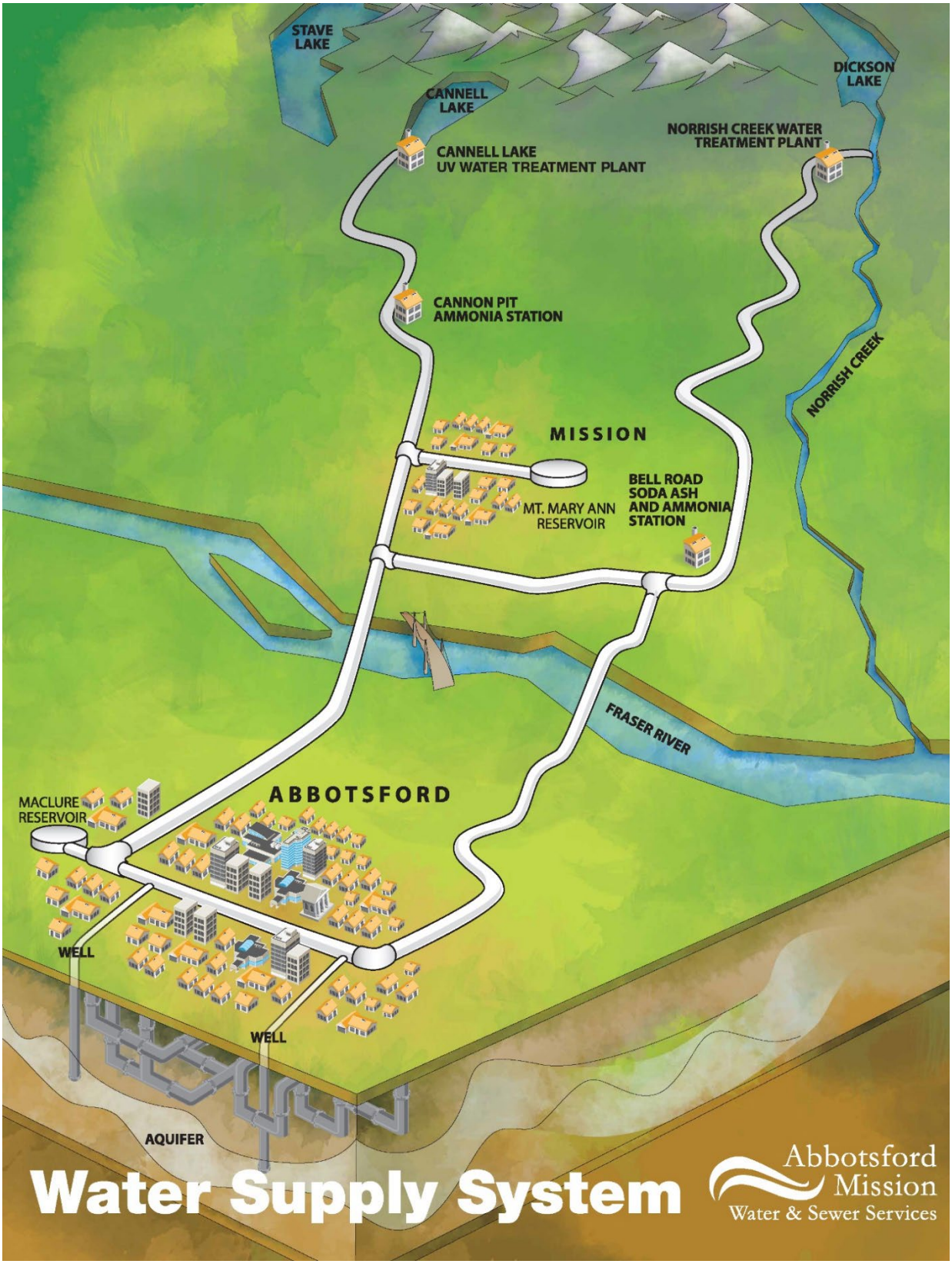
- ✓ Results of 44 physical and chemical water quality parameters, routinely analyzed monthly for the production wells. All parameters met the GCDWQ (where applicable), with the exception of manganese concentration for 5 production wells exceeding aesthetic objective (AO) of 0.02

mg/L, but not exceeding the health-based Maximum Acceptable Concentration (MAC) of 0.12 mg/L.

- ✓ Of the 63 raw water samples tested from 11 production wells prior to disinfection, all but one (98.4%) yielded negative results for total coliforms and 100% yielded negative for *Escherichia coli* (*E.coli*).
- ✓ Annual testing of all production wells for pesticides and herbicides yielded results below the detection limits for all parameters analyzed.

Transmission & Distribution (55 Designated Sample Stations)

- ✓ 2250 routine weekly grab samples of finished water subjected to bacteriological testing, all but six samples (99.7%) yielded negative for total coliforms and all samples tested negative for *E. coli*., in compliance with Provincial regulatory requirements specified in Schedule A of the *Drinking Water Protection Regulation*.
- ✓ 2254 routine weekly grab samples of finished water tested for turbidity; results indicate consistently low turbidity (i.e. < 1 NTU).
- ✓ 2253 routine weekly grab samples of finished water tested for disinfectant residual (free chlorine or total chlorine); results indicate that under normal operation a measurable residual is consistently maintained throughout the water system (i.e. > 0.5 mg/L).
- ✓ Of the 36 grab samples of finished water tested for disinfection by-products (trihalomethanes, haloacetic acids, and N-nitrosodimethlylamine), all results were within applicable GCDWQ limits.
- ✓ Of 126 grab samples of the finished water tested for metals, all results were within applicable GCDWQ health-based limits.


STAVE LAKE
CANNELL LAKE
DICKSON LAKE
CANNELL LAKE UV WATER TREATMENT PLANT
NORRISH CREEK WATER TREATMENT PLANT
CANNON PIT AMMONIA STATION
NORRISH CREEK
MISSION
MT. MARY ANN RESERVOIR
BELL ROAD SODA ASH AND AMMONIA STATION
FRASER RIVER
ABBOTSFORD
MACLURE RESERVOIR
WELL
WELL
AQUIFER
Water Supply System
Abbotsford Mission Water & Sewer Services

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1 INTRODUCTION

The City of Abbotsford and the City of Mission jointly own the regional water system (Joint System) that supplies potable water to the two communities. Under agreement, Abbotsford is the appointed Operator tasked with the operation and management of the Joint System. Internally, within each community, the distribution of potable water to customers is the responsibility of the respective municipality and its associated infrastructure (City Systems).

The Joint System and the City Systems are managed and operated by qualified personnel, including Environmental Operators Certification Program (EOCP) certified operators, to ensure that safe and reliable potable water is delivered to customers, as required by regulation and verified by routine water quality monitoring. Water supply systems in British Columbia are regulated under the Drinking Water Protection Act (DWPA) and the Drinking Water Protection Regulation (DWPR), which sets requirements and responsibilities to ensure that the water supplied is potable and meets all requirements specified in regulations or in the systems operating permits.

Section 15 of the DWPA requires a water supplier to make public the monitoring results required under the regulation, and Section 10 of the DWPR requires that this be done by publishing an annual report of such monitoring results within 6 months of the end of each calendar year. This Annual Water Quality Report fulfills this requirement for the Joint and City Systems of Abbotsford and Mission and is made available to the public by posting on Our Water Matters website: https://www.ourwatermatters.ca/water-quality.

The remainder of this report includes a description of the systems (Section 2), an overview of the water sampling and testing program (Section 3), and a summary of system maintenance work completed in 2024 and planned for 2025 (Section 4). Appendices include additional relevant information, including water quality test results (Appendices C through J).

2 DESCRIPTION OF WATER SYSTEMS

2.1 Joint System – Source, Treatment, and Transmission

The Joint System abstracts raw water from the environment, processes it to potable water standards in treatment facilities, and delivers it to the City Systems for distribution via its transmission pipelines and finished water storage facilities, supplying approximately 160,000 people. The Joint System consists of the following critical infrastructure:

- Norrish Creek intake and water treatment plant facilities
- Dickson Lake Reservoir, including dam and control structure
- Approximately 95 km of large diameter transmission pipeline, including two river crossings
- Two finished water storage facilities: Maclure (Abbotsford) and Mount Mary Ann (Mission)
- Two ammonia addition stations at Bell Road (Norrish water) and Cannons Pit (Cannell water)
- Eleven production wells across five wellfields, extracting groundwater from the Abbotsford-Sumas Aquifer, and associated chlorine and ammonia addition facilities

Norrish Creek

The Norrish Creek Watershed, located northeast of Mission, provides the bulk of Abbotsford and Mission's drinking water. Norrish Creek water is filtered by slow sand or ultrafiltration membranes at the Norrish Creek Water Treatment Plant (NCWTP). Filtered water is chlorinated at the plant outlet using chlorine gas before entering the transmission pipeline, flowing 7.5 km to the Bell Road Ammonia Station, where aqueous ammonia is added to form monochloramine as a residual disinfectant that will persist throughout the distribution system.

Norrish Creek Water Treatment Plant

Cannell Lake

Cannell Lake, located within northern Mission, supplies water to consumers located in the higher elevations of Mission. It also supplements lower parts of Mission and Abbotsford when the demand is high or when the Norrish supply is off-line or curtailed. Raw Cannell Lake water is conveyed 1 km downstream of the intake to the Cannell Lake Water Treatment Plant (CLWTP) where it is disinfected by ultraviolet light (UV) and sodium hypochlorite, which is generated on-site. Water then travels 7 km by transmission pipeline to the Cannons Pit

Cannell Lake

Ammonia Station to form monochloramine before continuing to the distribution system.

Groundwater Wells

Production Well

The Joint System supplements surface water supply with groundwater extracted by several production wells that draw from the Abbotsford-Sumas Aquifer (**Figure 2-2**). Chlorine and ammonia are added to extracted water to form monochloramine and facilitates blending of water from different sources. Chlorine and ammonia are added at disinfection stations located at the Bevan, Marshall, Townline, and Farmer wellfields.

As a transboundary aquifer with an approximate area of 161 km^2, the Abbotsford-Sumas aquifer extends across the Fraser Valley from southern Abbotsford and Langley on the Canadian side to northern Whatcom County in Washington State. The aquifer is classified by the Province of BC as an unconfined aquifer comprising sand and gravel sediments (glaciofluvial outwash), formed towards the end of the last glaciation (Fraser Glaciation). There are areas where the aquifer is confined (e.g., areas where the Bevan and Marshall wellfields are located). The aquifer is considered highly productive.

The Joint System configuration is illustrated is **Figure 2-1**. Groundwater sources supply Abbotsford's City system directly. For surface sources, the transition from Joint to City systems occurs at metered take-off points co-located at pressure reducing valve (PRV) stations or the outlet of the finished water storage facilities of Maclure (28.6 ML) in Abbotsford and Mount Mary Ann (6.8 ML) in Mission.

During recent years (2019-2024), the annual contribution of the three sources to the volume of water supplied has been 66% (Norrish), 13% (Cannell), and 21% (Aquifer). While the contribution of Norrish tends to be consistent year-round, Cannell Lake and the Abbotsford-Sumas Aquifer provide seasonal supply augmentation and their contributions are seasonally dependent. The contribution from Cannell may decrease to about 10% during summer months and increase to 25% during winter, while the contribution from the aquifer may increase to nearly 30% in the summer months and decrease to less than 10% during the winter.

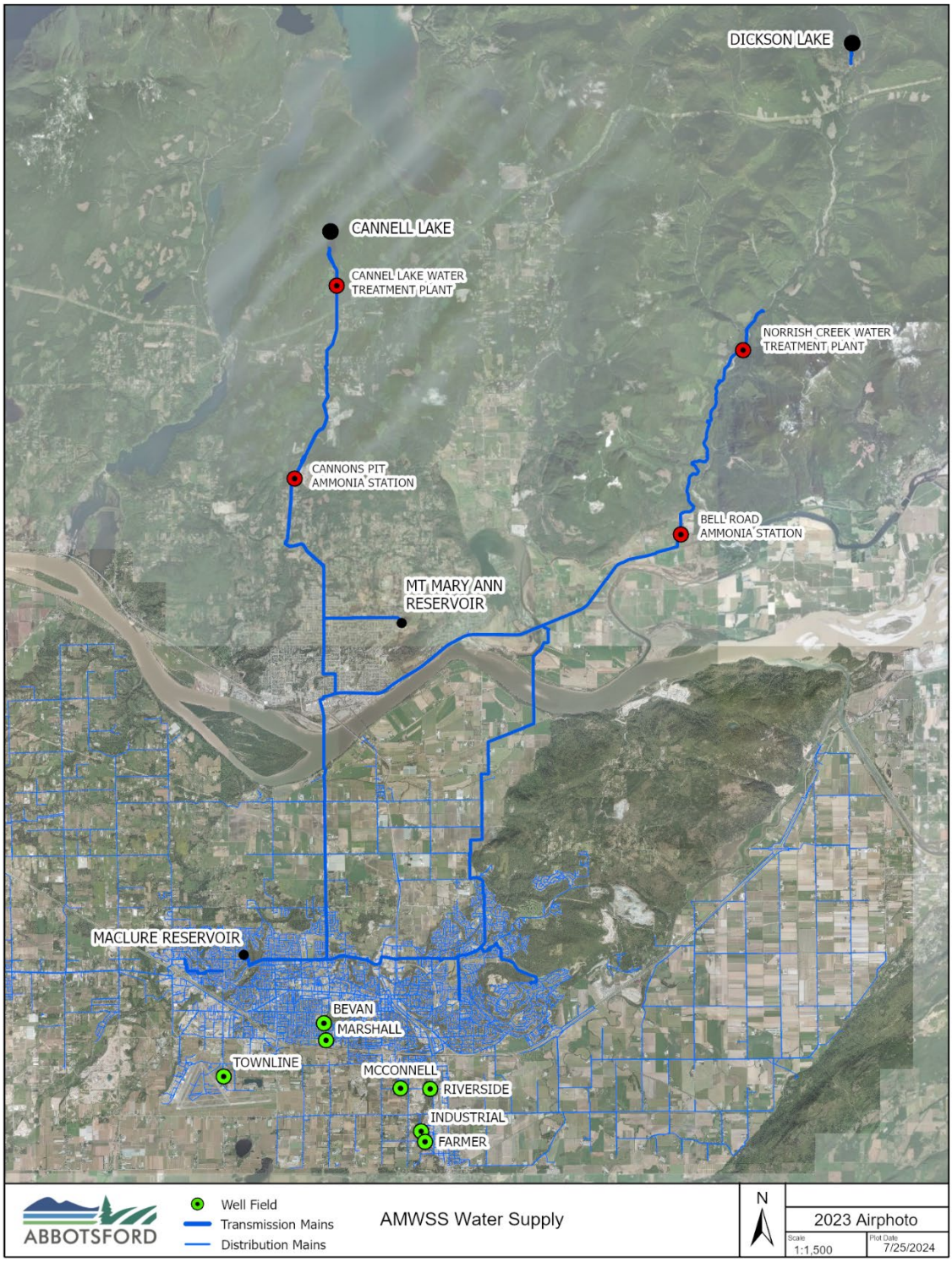

Figure 2-1: The Joint System serving water to Abbotsford and Mission.

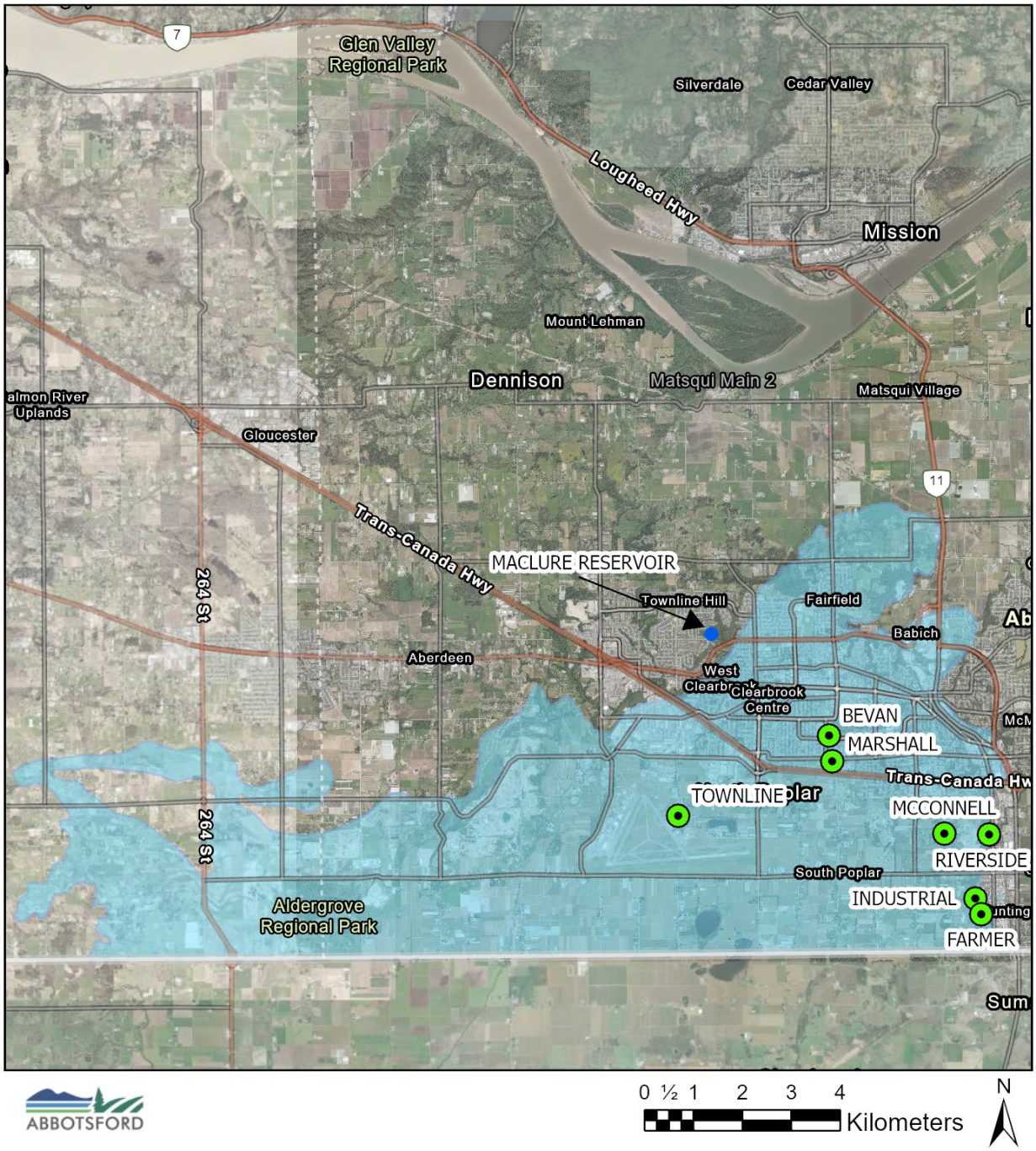

Figure 2-2. The approximate delineation of the Canadian portion of the Abbotsford – Sumas Aquifer (blue shaded area) and the wellfields.

2.2 City Systems – Distribution

The City of Abbotsford water distribution system consists of 25 pressure zones and approximately 850 km of pipe network, including 10 finished water storage facilities, 13 pump stations, 27 pressure reducing valve stations, and serves approximately 30,000 residential and non-residential customer connections. **Figure 2-3** show the City of Abbotsford Distribution System.

The City of Mission water distribution system consists of 9 pressure zones and approximately 235 km of pipe network, including 1 booster pump station, 27 pressure reducing valve stations, 2 pressure sustaining valve stations, and serves approximately 11,000 residential and non-residential customer connections. **Figure 2-4** show the City of Mission Distribution System.

VICARRO PUMP STATION,

Completed in 2022, located near the inter section of Wells Gray Avenue and McKinley Drive.

WATER MAIN – 150 MM DIAMETER,

The water main is exposed following the repair of a leak in 2024 (South Fraser Way).

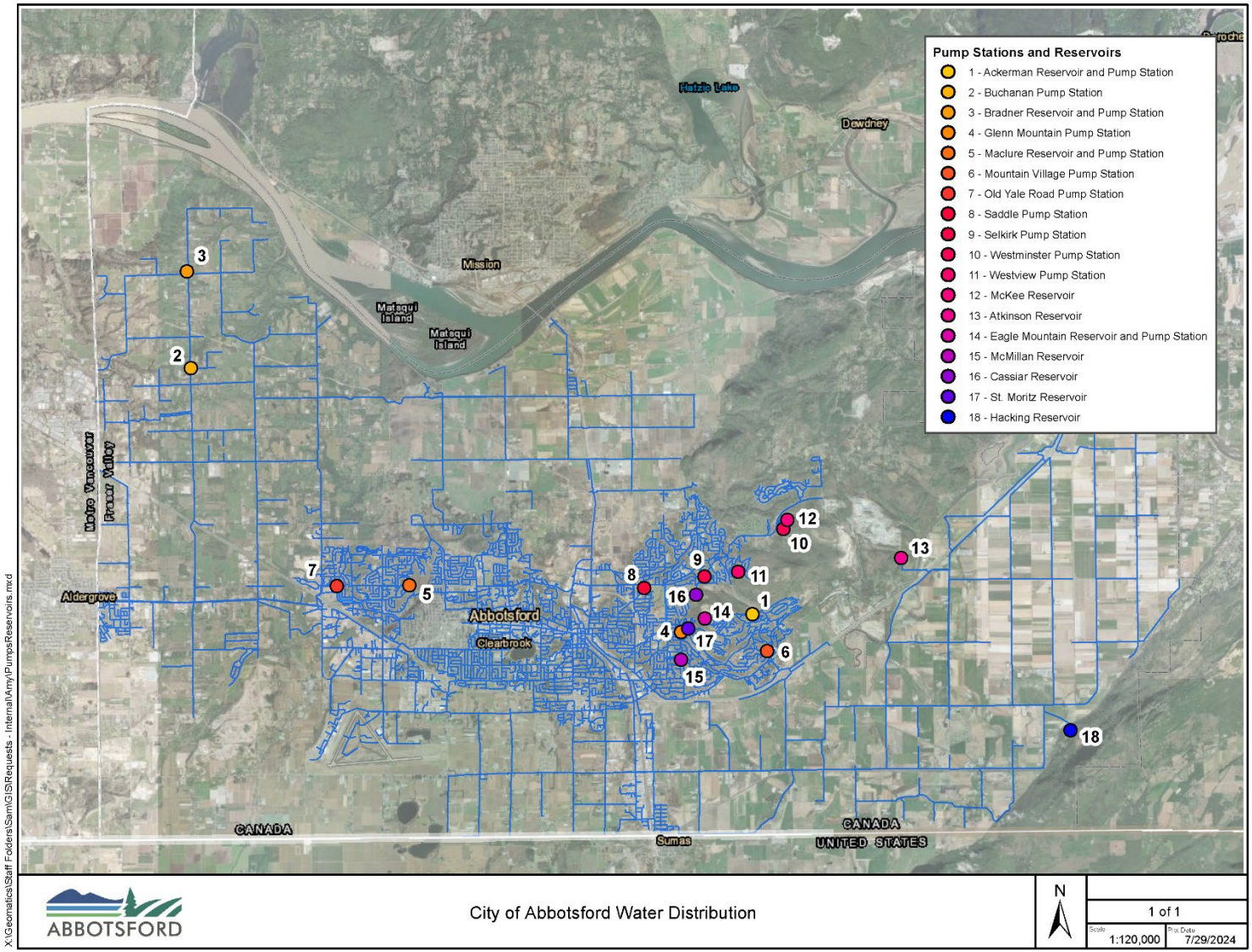

Figure 2-3: City of Abbotsford Water Distribution System

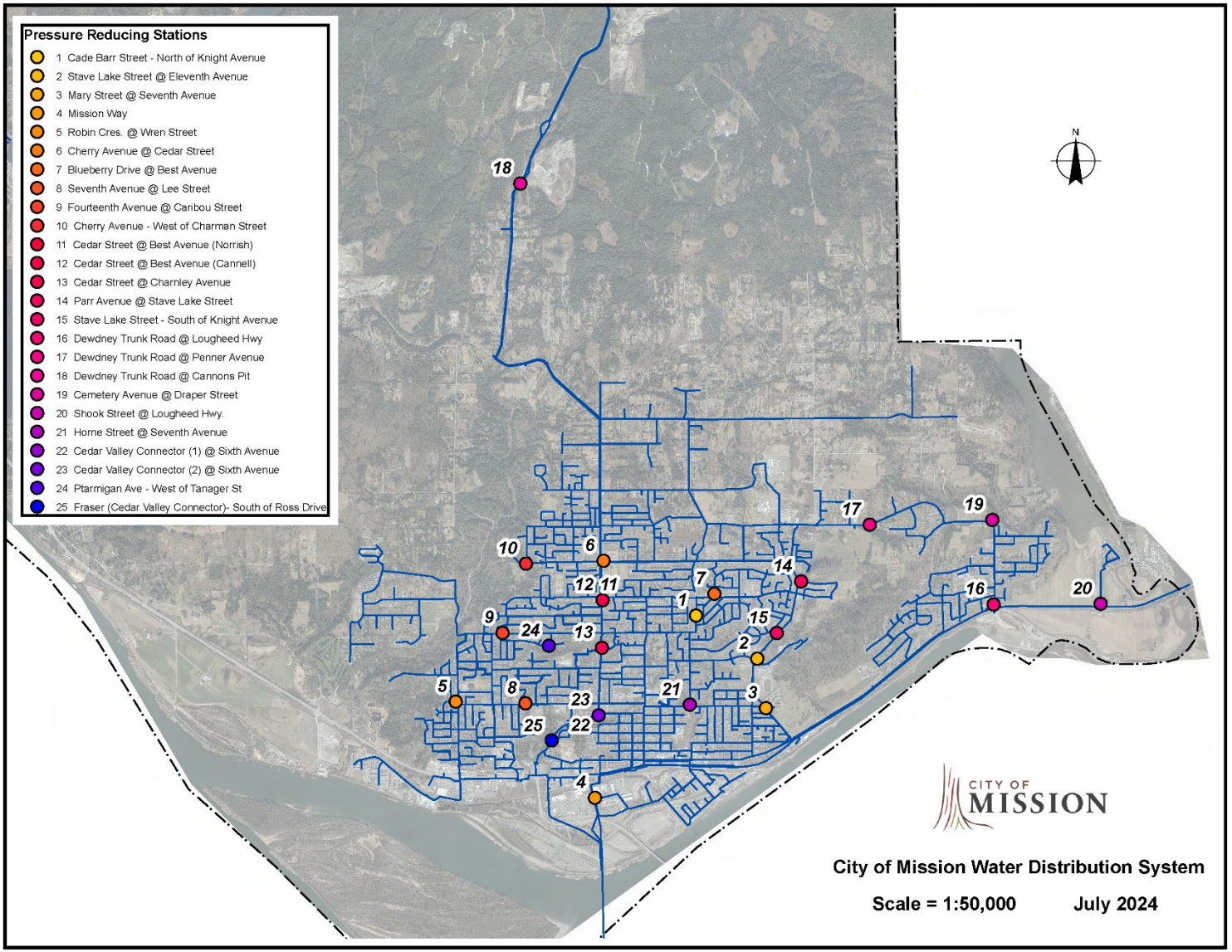

Figure 2-4: City of Mission Water Distribution System.

2.3 Volume of Water Produced by Source

The volumes of water supplied from all sources from 2020 to 2024 are summarized in **Table 2.1**. Total water production in 2024 was 26,248 ML, an increase of 1.4% relative to the five-year average (2020 to 2024) of approximately 25,880 ML and well below the population growth over this period. The contributions from surface water and groundwater sources in 2024, were 77% and 23%, respectively, comparable to the five-year average (2020 – 2024) of 78% and 22%.

Table 2-1: Annual Water Production in Megaliters (ML)

Source [1]	2020	2021	2022	2023	2024
	Total	Total	Total	Total	Total
Norrish Creek	16,305	16,530	16,892	16,480	18,015
Cannell Lake	3,745	4,575	3,556	2,984	2,152
Farmer #1 Well	47	278	1,056	980	738
Farmer #3 Well	0	145	0	158	584
Industrial Well "A"	121	183	18	0	0
Industrial Well "B"	140	259	205	13	0
Industrial Well "C"	494	468	486	100	323
Marshall #1 Well	350	360	547	523	416
Marshall #3 Well	223	1412	1119	1,093	1,469
McConnell Well	139	2	0	0	0
Riverside #1 Well	7	9	1	1	0
Townline #1 Well	478	0	0	236	985
Townline #2 Well	552	434	514	573	600
Bevan #1 Well	487	294	324	600	208
Bevan #2 Well	439	294	236	1,102	328
Bevan #3 Well	564	342	430	1,172	278
Bevan #4 Well	744	464	358	517	152
Total Production	**24,843**	**26,050**	**25,742**	**26,532**	**26,248**
Total Surface Water	**20,050**	**21,105**	**20,448**	**19,463**	**20,167**
Total Groundwater	**4,793**	**4,945**	**5,294**	**7,069**	**6,081**

[1] Note: Industrial 'A', Industrial 'B', McConnell, and Riverside #1 were not in production in 2024.

3 WATER QUALITY MONITORING PROGRAM

3.1 Overview

Abbotsford and Mission staff work in their respective roles to monitor drinking water quality according to regulatory requirements and drinking water industry best practice. The purpose of routine monitoring of water quality is to confirm that drinking water delivered to customers complies with the quality standards and guidelines for potable water (compliance monitoring) and to verify the system as a whole is functioning safety and within normal limits (verification monitoring).

Routine monitoring practices are based on the requirements of the Drinking Water Protection Act and Drinking Water Protection Regulation, and consist of discreet grab samples taken at various sampling locations throughout the system, including sources, transmission and distribution systems. Parameters analyzed and associated sampling frequencies are summarized in Table 3-1.

Table 3-1: Verification Water Quality Monitoring

Parameter		Raw Water		Finished Water
		Surface Sources	Wells	
Chemical	**Metals**	3 x per year	~Monthly	~Quarterly
	Herbicides & Pesticides	-	Annually	-
	Disinfection By-Products	-	-	3 x per year
Microbiological	**Total Coliform & *E. coli***	Weekly	Monthly	Weekly

The acceptable limits for chemical parameters in finished water are generally interpreted as the applicable health-based maximum acceptable concentrations (MAC) published by Health Canada in the GCDWQ, available at:

https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html.

Acceptable limits for microbiological parameters in finished water are specified in the Drinking Water Protection Regulation. The GCDWQ also provides non-health-based limits of aesthetic objectives (AO).

Analysis of samples for compliance monitoring are conducted at certified laboratories and typically require a period of days to weeks to receive results. In addition, operational monitoring is conducted of parameters that may be analyzed rapidly in the field, typically in seconds to minutes. Operational monitoring is performed either using discrete grab samples using handheld or portable instruments or continuously using automated online instrumentation. Operational monitoring allows for rapid detection of any deviations from normal operation and the timely use of corrective actions to restore system control or the activation of emergency response procedures. Water quality parameters typically used for operational monitoring include physical parameters (e.g. turbidity, temperature, conductivity, pH, UV transmittance etc.) and chemical parameters (e.g. chlorine residual, ammonia, nitrite).

Appendices C - H includes results for relevant water quality results. For additional water quality results and/or questions, please contact the City of Abbotsford Engineering Department (604-864-5514).

Presented water quality results:

- ✓ **Appendix C** – raw water quality (surface water).
- ✓ **Appendix D** – raw water quality (groundwater).
- ✓ **Appendix E** – microbiology (raw groundwater).
- ✓ **Appendix F** – pesticides and herbicides (raw groundwater).
- ✓ **Appendix G** –metals (distribution system).
- ✓ **Appendix H** – disinfection by-products (distribution system).

3.2 Source Water Quality Monitoring

3.2.1 Surface Water

The quality of raw source water may influence the level of treatment required to produce potable water satisfying all applicable standards. Both Norrish Creek and Cannell Lake raw water are tested annually for various physical and chemical parameters. In general, the water quality of the surface sources has remained consistent over the years. Cannell Lake raw water monitoring includes additional parameters related to the filtration exemption discussed in Section 3.3.

3.2.2 Groundwater

Raw groundwater quality results for 2024 are provided in **Appendices D - F**. Parameters of note are further discussed below.

Arsenic

Arsenic can be found naturally occurring in both surface water and groundwater sources, with levels generally higher in groundwater. Most provinces and territories across Canada report some areas where arsenic can be detected in drinking water sources. Although levels are generally below the guideline, elevated arsenic concentrations have been found in areas with natural sources.[1] The MAC is currently 10 μg/L, and as low as reasonably achievable (ALARA); although Health Canada recently has proposed lowering the MAC to 5 μg/L.

Production wells Industrial B (not in service) and Industrial C (in service) are the only two wells that have historically elevated total arsenic concentration in the groundwater that has been at or above the MAC. In 2024, production wells with elevated arsenic concentrations in the groundwater (*but below MAC*) are Farmer 3 (5.07 - 5.48 μg/L), Industrial C (7.27 – 7.59 μg/L), and Marshall 1 (4.74 – 5.51 μg/L), shown in **Appendix D**.

Iron

Iron in water is typically mainly attributed to the weathering of rocks and minerals, but can also originate as a consequence of acid mine drainage, landfill leachates, sewage effluents and iron-related industries[2]. Elevated iron can lead to aesthetic issues such as coloured water, objectionable taste, and the staining of plumbing. The GCDWQ originally specified an AO for total iron of 300 μg/L, but was reduced to 100 μg/L in 2025. The results of analysis of samples collected from the production wells suggest that the raw extracted water meets the newly established AO, with the exception of Bevan 3 (128 μg/L) and Bevan 4 (178 μg/L & 196 μg/L).

Manganese

Manganese is naturally occurring in most water sources. Moderate levels of manganese may cause plumbing and laundry staining; while high levels of prolonged exposure have been correlated to adverse neurological effects in young children[3]. The GCDWQ specifies an AO of 20 μg/L for manganese and a health-based MAC of 120 μg/L. In 2024, raw water from five (5) production wells (Farmer 1, Marshall 1, Industrial C, Townline 1 and Townline 2) exceeded the AO but not the MAC, with maximum values ranging from 20.5 μg/L (Marshall 1) to 94.5 μg/L (Farmer 1).

Nitrate & Nitrite

Nitrate itself is a relatively non-toxic substance. However, bacteria can convert nitrate to nitrite in the environment, in foods and in the human body. Nitrite can then interfere with the ability of red blood cells

[1] Health Canada, May 2006. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Arsenic Retrieved from: http://healthycanadians.gc.ca/publications/healthy-living-vie-saine/water-arsenic-eau/index-eng.php

[2] Health Canada, December, 1978. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Iron Retrieved from: http://healthycanadians.gc.ca/publications/healthy-living-vie-saine/water-iron-fer-eau/index-eng.php

[3] Health Canada, May, 2019. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Manganese Retrieved from: pub-manganese-0212-2019-eng.pdf (canada.ca)

to carry oxygen to the tissues of the body, producing a condition called methemoglobinemia. It is of greatest concern in infants.

Water naturally contains less than 1 milligram of nitrate-nitrogen[1]; higher levels may indicate anthropogenic influences (but not necessarily exceeding MAC). Selected areas "hotspots" of the Abbotsford-Sumas Aquifer contain elevated levels of nitrate likely due to agricultural activities, thus nitrate and nitrite are monitored at the wells. Results meet the MACs for nitrate and nitrite, of 10 and 1 mg/L, respectively (**Appendix D**).

Pesticides & Herbicides

Historically, pesticides and herbicides have been tested annually based on raw water samples collected from the production wells. Water samples were collected from the 11 active production wells on September 12, 2024. The pesticides and herbicides include 162 parameters, summarized in **Appendix F**. No concentrations above the detection limit were reported for any parameter (for any tested well) which is consistent with historical results for the tested wells. Moving forward the analysis will be completed every third year, with the next instances to be scheduled for 2027.

[4] Health Canada, June, 2013. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Nitrate and Nitrite Retrieved from: https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-nitrate-nitrite/page-2-guidelines-canadian-drinking-water-quality-guideline-technical-document-nitrate-nitrite.html#a2

3.3 Cannel Filtration Exemption Monitoring

In 2005, Fraser Health adopted the Ministry of Health's "Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia". These guidelines generally require filtration for drinking water supplied from surface water sources. However, authorities may exempt such sources from filtration conditional upon compliance with four (4) specific criteria:

1. *Overall inactivation is met using a minimum of two disinfection processes, providing 4-log reduction of viruses and 3-log reduction of Cryptosporidium and Giardia.*
2. *The number of E. coli in raw water does not exceed 20 counts/100 mL (or if E. coli data are not available, less than 100 counts/100 mL of Total Coliform) in at least 90% of the weekly samples from the previous six months. The treatment target for all water systems is to contain no detectable E. coli or Fecal Coliform per 100 ml. Total Coliform objectives are also zero based on one sample in a 30-day period. For more than one sample in a 30-day period, at least 90% of the samples should have no detectable Total Coliform bacteria per 100 ml and no sample should have more than 10 total coliform bacteria per 100 ml.*
3. *Average daily turbidity levels measured at equal intervals (at least every four hours) immediately before the disinfectant is applied are around 1 NTU, but do not exceed 5 NTU for more than two days in a 12-month period.*
4. *A watershed control program is maintained that minimizes the potential for fecal contamination in the source water.*

Fraser Health granted such 'filtration exemption' for Cannell Lake in 2013, under the conditions that: (i) UV-disinfection be added to the treatment process to comply with Criterion #1; (ii) raw water quality continues to satisfy Criteria #2 & #3; and (iii) a watershed control program is maintained as per Criterion #4.

In 2024, the requirements continued to be followed and opportunities for improvements identified:

1. Turbidity of the raw water is continuously monitored (at the WTP - *SCADA*).
2. Weekly raw water E. coli monitoring (at the WTP – 52 samples).
3. Through the watershed control program, the risk of lake fecal contamination is monitored and mitigated or prevented. The program includes: (i) completing weekly visual checks at the lake shore area for any signs of possible watershed contamination (e.g. human trespass); (ii) maintain gated access and signs to prohibit public access (**Figure 3-1**); and (iii) completing an annual helicopter inspection of the watershed.

In 2024, regular Cryptosporidium and Giardia analysis was discontinued due to the lack of sufficient sensitivity and specificity of the analytical methods commercially available to reliably detect oocysts and cysts in the water with such low levels. Efforts were instead focused on monitoring the performance of disinfection barriers to ensure they consistently provide sufficient inactivation.

Figure 3-1: Cannell Lake Watershed Delineation; restrictive access signs are placed at the gate to Cannell Lake.

3.4 Distribution Water Quality Monitoring

3.4.1 Overview

Abbotsford and Mission City distribution systems monitoring includes weekly testing of *E. coli*, total coliforms, chlorine residuals, turbidity, temperature and pH at selected sampling locations using dedicated sample stations. These parameters are also monitored along the transmission pipelines of the Joint System. The list of sample locations used in 2024 are provided in **Table 3-2** (next page).

Schedule B of the Drinking Water Protection Regulation establishes the minimum frequency of monitoring for bacteriological indicators total coliform and *E. coli*. For water utilities serving a population of 5,000 to 90,000 people, a monthly minimum of one sample per 1,000 people served is required. For systems serving more than 90,000 people, a monthly minimum of 90 samples plus one sample for every additional 10,000 persons is required. Based on a population of 160,000 people this would require 97 samples per month (1,164 samples per year). In 2024, 2,250 samples of finished water were analysed for bacteriological indicators, exceeding the minimum sampling requirements.

Table 3-2 Water Distribution Sample Stations

City of Abbotsford Distribution			
W01	35041 Harris Road	E02	310 Arnold Road
W02	3836 Old Clayburn Rd.	E07	6230 Tolmie Road
W03	35944 McKee Rd.	E08	3434 McDermott Road
W04	Bateman Park	E09	36232 Lower Sumas Mountain Road
W05	3315 Gladwin Rd.	E10	36101 Regal Parkway
W06	32961 South Fraser Way	E11	2598 St. Moritz Way
W07	32111 Joyce Ave.	E12	2691 Beck Road
W11	5030 Lefeuvre Rd.	E13	2087 McMillan Road
W13	7942 Bradner Road	E14	2211 Mouldstade Road
W15	3154 Clearbrook Rd.	E15	2215 Orchard Drive
W16	27875 Swensson Rd.	E16	2540 Eagle Mountain Drive
W19	4945 Mt. Lehman Rd.	E17	2720 St. Moritz Way
W21	2059 Peardonville Rd.	E18	36321 Vye Road
W23	3612 Blue Jay Street	E21	34694 5th Avenue
W34	926 Columbia Street	E23	36026 Village Knoll
City of Mission Distribution			
M01	Israel Avenue	M18	Blueberry
M02	Balsam	M19	Ferndale @Erikson
M03	Penner	M20	DTR & Cedar
M05	Hillcrest	M21	11th & Dunsmuir
M06	Cannell Boster Station	M22	Tunbridge @DTR
M07	Mary Street @4th Avenue	M23	4th @Alder
M09	Shook Street	M24	Moffat
M10	Miller Crescent	M25	11th & Grand
M16	Best @Barker	M26	Fennel
M17	TH Booster	M27	McRae & Hurd
Transmission Pipelines			
T01b	Bell Rd. (post-NH3)	T05b	Cannon's Pit 400 (post-NH3)
T03b	Maclure Reservoir	T06b	Cannon's Pit 6400 (post-NH3)
T04	Ainsworth Street		

3.4.2 Total Coliform and E. coli

Schedule A of the Drinking Water Protection Regulation specifies standards for the bacteriological quality of potable water in the Province:

- No detectible *E. coli* per 100 millilitres (mL).
- At least 90 percent (%) of samples have no detectable total coliform bacteria per 100 mL and no sample has more than 10 total coliform bacteria per 100 mL.

Total coliforms are a group of bacteria that are naturally found on plants, in soils and water in the environment, as well as in the intestines of humans and warm-blooded animals and in water contaminated with human and animal faeces. Total coliform bacteria generally do not cause human disease, but their presence in a water distribution system may indicate that the system is vulnerable to contamination or is experiencing bacterial re-growth.

E. coli is a member of the total coliform group and is found exclusively in the faeces of humans and other animals. Its presence in water indicates relatively recent faecal contamination has occurred and suggests the potential presence of infectious bacteria, viruses, and protozoa. The detection of *E. coli* triggers emergency procedures, immediate notification of health and municipal officials, re-sampling, and a thorough investigation into the possible causes.

In combination, the Joint and City systems tested 2250 finished water samples (from 55 sample stations) for bacteriological indicators in 2024 as part of compliance monitoring. While all samples returned negative for *E coli*, detectable levels of total coliforms were observed in six out of 2250 samples or 0.3% (**Table 3-3**). In all cases total coliform levels were well below the acceptability threshold of 10% in any given 30-day period and all subsequent follow up samples returned non-detectable. This suggests positive detections may have been either due to sampling errors (i.e. contamination) or due to a brief and temporary event.

Table 3-3 – Detectable Coliform Results in Weekly Monitoring (Distribution)

Date	Sample Location (ID)	Address / Descriptive Location	Total Coliforms CFU/100 mL
City of Abbotsford Distribution			
7-May-24	W34	926 Columbia St.	1
14-May-24	W04	Bateman Park	10
4-Jun-24	E17	2720 St. Moritz Way	1
City of Mission Distribution			
05-Mar-24	M06	Cannell Booster Station	1
05-Mar-24	M17	TH Booster	1
17-Sep-24	M20	DTR & Cedar	1

3.4.3 Disinfection Residuals

Disinfection is the most important treatment process used to produce potable water, providing a barrier to pathogenic or disease-causing microorganisms that may be present in the source water. Chlorine-based disinfectants are the most widely used disinfecting agents. After chlorine is added to water and has had sufficient time to inactivate microorganisms, any remaining or residual chlorine may persist in the distribution system to provide additional benefits. While it may provide limited protection against contaminant intrusion and suppression of bacterial growth on internal pipe and storage facility surfaces, its main benefit is as an easily measurable parameter for operational monitoring. Monitoring of a chlorine residual is rapid and can be performed in the field for grab samples or continuously at key locations using online instrumentation. The absence of a measurable disinfectant residual indicates a potential breach in system integrity and allows rapid corrective actions to be taken. As chlorine residuals decay with time, their concentrations may be depleted below measurable levels at the furthest ends of the distribution system or in larger storage facilities. Ammonia may be added to water downstream of the chlorine addition point such that it reacts with the remaining chlorine to form monochloramine, a more persistent disinfectant residual. Monochloramine is the disinfectant residual used in Abbotsford and Mission.

Health Canada's proposed guideline states that "*it is not considered necessary to establish a guideline for chloramines in drinking water based on low toxicity of monochloramine at concentrations found in drinking water, but most Canadian drinking water supplies maintain a chloramine residual below 4 mg/L in the distribution system.*"[1] Monochloramine also decays with time, albeit at a much lower rate relative to chlorine alone. In the Abbotsford-Mission water system, chlorine and ammonia are typically dosed to produce an initial concentration of 1.5 and 2.5 mg/L, measured as total chlorine with 70% or more typically composed of monochloramine and the remainder consisting largely of other chloramines. Such initial concentrations generally ensure that there are measurable levels of disinfectant at the far reaches of the system.

Furthermore, for verification monitoring, 2250 routine weekly grab samples of finished water tested for disinfectant residual (free chlorine, total chlorine, monochloramine). Results indicate that under normal operation a measurable residual is consistently maintained throughout the water system (transmission and distribution).

3.4.4 Turbidity

Turbidity is a key physical characteristic of water quality of system status due to the ease and sensitivity of its measurement. It is caused by suspended particulates that impede the light passage or clarity of water. While excessive turbidity in drinking water is aesthetically unappealing, the particulates causing the observed turbidity may or may not pose a direct health hazard. The value of turbidity as a water quality parameter is in its use for operational monitoring, including the monitoring of source water

[1] Health Canada, January, 2019. Guidelines for Canadian Drinking Water Quality - Chloramines. Retrieved from: https://www.canada.ca/content/dam/hc-sc/documents/programs/consultation-chloramines-drinking-water/chloramines-drinking-water-2018-eng.pdf

conditions, treatment process performance, and distribution system integrity. A sudden increase in observed turbidity may represents an abnormal condition such as challenging source water quality that could overwhelm treatment barriers, poor or inadequate treatment system performance, or potential distribution system failures resulting in contaminant intrusion. Generally, under normal operation the turbidity of finished water across the system will be consistently below 1.0 NTU.

While operational monitoring of finished water turbidity is performed continuously by online analyzers at the treatment facilities, turbidity is also measured in grab samples taken during routine monitoring. The turbidity was measured in the field for approximately 2254 compliance monitoring samples and the results confirm consistently low turbidity in the distribution systems with an average value of 0.26 NTU. In only one instance did turbidity reach the threshold at sample station E18 (1.0 NTU) on January 30, 2024.

3.4.5 pH

The finished water pH is measured by online analyzers at the Bell Road and Cannell Lake locations. Additionally, field testing (at the 55 sample stations) for pH occurs weekly at each transmission main and distribution system sample location. The average pH of treated water is 7.2.

3.4.6 Metals

In 2024, the Abbotsford and Mission distribution systems were tested approximately quarterly for metals. **Appendix G** summarizes the results. All samples met the GCDWQ health-based requirements. The Abbotsford sample stations (E02, E07, E08, W07, W11, W21, W34) experienced exceedances of the aesthetic objective for manganese in one or more samples.

3.4.7 Disinfection By-Products (DBPs)

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are by-products of chlorination formed following the addition of chlorine to water and its reaction with naturally occurring dissolved organic matter. The GCDWQ specifies MACs of 0.1 mg/L (100 µg/L) for THMs and 0.08 mg/L (80 µg/L) for HAAs are based on locational running annual averages of at least quarterly samples taken in the distribution system [1].

In May, August and November water samples for DBP analysis were taken from selected sample stations of the Joint transmission and City distribution systems.

Results are presented in **Appendix H** and all results were well below the respective MAC, predominantly below detection limits.

N-Nitrosodimethlylamine (NDMA) is a by-product often associated with the use of monochloramine. NDMA is considered likely to be carcinogenic to humans. The GCDWQ has established a MAC of 0.00004 mg/L (0.04 µg/L). All results for 2024 were below the detection limit (0.002 µg/L).

[1] Health Canada, July 2008. Guidelines for Canadian Drinking Water. Retrieved from: https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-haloacetic-acids.html

4 SYSTEM MAINTENANCE

4.1 Overview

Between the Joint and City Systems, there are more than 40 staff assigned to engineering, operations management, maintenance, and construction of the water utility system.

To maintain the quality of the water throughout the distribution system, Abbotsford and Mission utilize regular flushing programs. Flushing watermains is an integral part of a comprehensive water management program to prevent bacterial re-growth and stagnation in low circulation areas of the distribution system.

WATER MAIN FLUSHING THROUGH FIRE HYDRANTS

The first image show flushing as part of a Unidirectional Flushing Program (UDF) and the second images shows regular water main flushing.

Replacement of aging water pipes in Abbotsford and Mission is ongoing each year. Priority is given to pipes that are made of asbestos cement (AC), ductile iron in known corrosive soil, and those pipes that are approaching the end of their service life or have a history of problems. Abbotsford began using its new smart meters to identify potential leaks in its distribution system in 2010. Mission has developed and implements a leak detection program, which identifies system areas in need of repair, upgrades or replacement

4.2 Staff Certification & Training

The BC Environmental Operators Certification Program (EOCP) classifies water systems and certifies operators using ratings levels I through IV. Higher numbers correspond to systems of greater operational complexity and requirements of operators with more advanced training. The required level of operators needed corresponds to the classification of the facility level:

- ✓ The Norrish Water Treatment Plant is classified as **Level IV**
- ✓ The Cannell Lake Water Treatment Plant is classified as **Level III**
- ✓ Transmission system is classified as **Level IV**
- ✓ Well Supply System is classified as **Level 1**
- ✓ Abbotsford's water distribution system is classified as **Level IV**
- ✓ Mission's water distribution system is classified as **Level II**

The City of Abbotsford staff maintain and operate the Joint System (sources, water treatment facilities, transmission system) and Abbotsford's City System (distribution system). The City of Mission operates Mission's City System (distribution system).

The Joint System team includes nine (9) operators. Of these, all have completed their water treatment EOCP or WPI Certification[1] including 1 operator with Level IV certification, 5 operators with Level III certification, 2 operators with Level II certification, and 1 operator with Level 1 water treatment certification. All 9 operators also have water distribution certification (EOCP or WPI) including 2 operators with Level IV certification, 2 operators with Level III certification and 5 operators with Level II certification.

The Abbotsford City System has 18 certified operators and 1 millwright, including 3 operators with Level IV certification, 3 operators with Level III certification, 2 operators with Level II certification, 8 operators with Level I certification, one operator-in-training, and one vacant.

The City of Mission water distribution is operated by 16 certified operators, consisting of 2 operators with Level IV certification, 1 operator with Level III certification, 8 operators with Level II certification, and 5 operators with Level I certification.

[1] EOCP: Environmental Operators Certification Program (www.eocp.ca) – has a certification program for Water Treatment (WT) and Water Distribution (WD) operators; WPI: Water Professional International (www.professionaloperator.org) – has a certification program for water and waste water operators.

4.3 Capital Improvements and Operational Highlights for 2024

In 2024, the Joint and City Systems completed the following improvements:

Joint

- Bevan 1 and Bevan 2 replacement of submersible pumps and motors, started in 2024 finished in 2025. Bevan 3 submersible pump-motor assembly was further lowered in the well.
- Bevan and Farmer wellfields disinfection facilities – conversion from onsite generation to bulk hypochlorite delivery and decommissioning of onsite generation equipment.
- Townline 3 well construction completion – pitless adapter installation and downhole video inspection of the well.
- Well Rehabilitation – Farmer 1, Bevan 3, and Bevan 4.
- Best Avenue (Mission) Pump Station upgrades: (i) variable frequency drive (VFD) installation and optimization; (ii) Booster Pump 1 VFD running into to Pressure Zone 4 to reduce Cannell Lake flow; and (iii) Booster Pump 2 VFD going to Mary Anne Reservoir to split flow between (coming from) Norrish Creek and Cannell Lake going to Pressure Zone 3.
- Norrish Creek Water Treatment Plant – membrane replacement started (to be completed in 2025).
- Norrish Creek tank membrane relining.
- Norrish Creek Water Treatment Plan (WTP) chlorine rotameter replacement.
- Joint System and Distribution water quality monitoring enhancements: new sample stations were added and improvements to the water quality sampling and analysis program (routes, frequency, parameters).

Farmer 1 - Hydraulic Performance Testing

Farmer 1 - Well Rehabilitation (Re-Development) using Water Jetting

WELL REHABILITATOIN PROGRAM FOR FARMER 1 COMPLETED IN 2024.

Abbotsford City

- Connecting 6 pressure reducing valve (PRV) stations + 1 booster station to SCADA.
- P3 pump control rebuild/pump maintenance at Empress Booster.
- Hwy 11 PRV Station - low flow rebuild with new stainless-steel sensing lines.
- Reservoir cleaning (McMillan, St. Moritz and McKee).
- Locarno PRV Station low flow rebuild with stainless steel sensing lines.
- Setting up PRV reservoir and booster station asset databases w/ equipment specification and maintenance records.
- Uni-Directional Flushing in Zone 137; flushed 37.53 km of water main over 62 days.
- 598 fire flow hydrants were serviced (rebuilding using Original Equipment Manufacturer parts).
- Hydrant adapters lockable retrofits - to prevent theft and unwanted operation of hydrants.
- McKinley PRV full station rebuild (4 PRVs) – all stainless steel.
- Flow point automated bulk water fill station upgrades.
- Vicarro Pump Station – installation of stairs to eliminate confined space entry.
- Identifying and staking all zone valves.
- McTavish watermain relocate.
- Bowman Rd. watermain replacement (between Vye Rd and Old Yale Rd)
- Two 8-inch diameter valve inserts at Bradner Rd water main.
- Irrigation service line installations at Clearbrook Rd and McCallum Roundabout.
- Asbestos-cement (AC) water main replacement – 5km.

Mission City

- 7 new fire hydrants installed.
- SCADA path study completed.
- Antenna upgrade for improved SCADA communication.
- 79 water quality complaints investigated.

4.4 Works Planned for 2025

Key water system projects and programs scheduled for 2025 include:

Joint

- Norrish Creek WTP membrane replacement (continuation from 2024).
- Norrish WTP chlorine rotameter replacement (continuation from 2024).
- Telemetric communication system for Norrish WTP.
- Transmission main leak detection.
- Maclure Watermain ICCP system (*impressed current cathodic protection*)
- Creation of Bell Road Transmission spare pipe yard.
- Water supply building envelop improvements – Norrish Creek WTP roof.
- Generator replacement at Cannell Lake.
- Marshall and Townline wellfields disinfection facilities – conversion from onsite generation to bulk hypochlorite delivery and decommissioning of onsite generation equipment (Marshall Facility; completed at Townline facility).
- Bevan disinfection tank replacement.
- Development of an in-house limnology program for Cannell Lake.
- Well rehabilitation – Townline 2, Bevan 1, and Bevan 2.

Abbotsford City

- Unidirectional Flushing (16 weeks).
- Meter Replacement - Old meters beyond 20 years.
- Meter Replacement – failed meters.
- Reservoir Cleaning – Eagle Mt, Atkinson and Hacking.
- PRV Station Rebuilt Program - Latimer, Eagle Mt and McTavish.
- Adding a PRV pressure relief system (locations to be determined).
- Relocating the Vye Rd automatic control valve (ACV) station to above ground.
- CRD-34 electronic/remote pilot control installation (*continuation from 2024*).

Mission City

- Communications Security Establishment (CSE) system upgrades
- Annual AC Pipe - replacement program – Best Avenue & Viola Place
- SCADA system upgrade - awarded, begins June 2025
- Voluntary water meter program installations
- Fire hydrant servicing and painting program
- Unidirectional Flushing Program – Pressure Zone 4 (4A completed)
- Valve Maintenance Program (annual)
- Introduction of PFAS testing on a quarterly basis
- Loftus Village, Silverdale water system expansion.

4.5 Emergency Response Planning

The City of Abbotsford completed an Emergency Response Procedures Manual in 2009. The Emergency Response Plan (ERP) has been developed to addresses potential hazards such as earthquakes, floods, severe storms, volcanic eruption, and pandemic/staff illnesses. The ERP outlines procedures regarding the effect of hazards, including loss of water supply, loss of power, contamination/turbidity in the water system, or damage to water infrastructure. The ERP may be implemented as:

1. Part of a joint emergency between the City of Abbotsford and the City of Mission, where all engineering resources would be coordinated by the City's Emergency Operations Centre; the ERP is premised on Abbotsford staff taking the lead role on all emergencies related to the Joint System.
2. A stand-alone plan to deal with a water emergency, managed by water utility staff; or
3. In a limited response to a City-wide emergency, involving water utility staff as part of an emergency resource to address a specific situation.

Activation of the ERP occurs when information is received that an emergency exists, either through staff, public, media, or police/fire communications. Staff are directed to determine the location and nature of the event, eliminate the hazard, and ultimately restore normal operation. The ERP contains checklists to prioritize risks and responses, indicators of problems, and restoration plans.

In the unlikely event that **finished drinking water** tests positive for E. coli or evidence suggests potential system contamination has occurred, the City will isolate the affected section of the system if possible to reduce the impact and contact Fraser Health to advise them of the situation. The City and the Medical Health Officer (MHO) of Fraser Health will evaluate the need for a water quality advisory (i.e., *Boil Water*, *Do Not Consume*, *Do Not Use*). If a determination is made that such an advisory must be issued, the City will inform the public. The MHO determines when the advisory can be rescinded.

A summary of the ERPs is available to the public upon request at Abbotsford's Engineering Department Reception (City Hall, 4th floor) and Mission's City Hall Reception.

5 CONCLUSIONS

Results from 2024 water quality monitoring demonstrate that the drinking water supply system serving Abbotsford and Mission is potable under the definition of the Drinking Water Protection Act and Drinking Water Protection Regulation. Abbotsford and Mission engineers and operators continuously pursue water system improvements to provide high-quality potable water to customers. The Joint System and the City Systems have rigorous monitoring and maintenance programs in place to ensure the reliability and safety of the drinking water supply, protect public health, and meet all regulatory requirements.

APPENDICES

Appendix A – Message preventing water-borne infections

BRITISH COLUMBIA | HealthLinkBC

Number 56
January 2017

Preventing Water-Borne Infections For People with Weakened Immune Systems

Who is at higher risk from water-borne infections?

People with very weak immune systems who are at higher risk of certain water-borne diseases include those with:

- HIV infection who have a CD4+ count of less than 100 cells/mm^3;
- lymphoma or leukemia (hematological malignancies) who are being actively treated or have been in remission and off treatment for less than 1 year;
- hematopoietic stem cell transplant recipients; and
- people born with diseases that severely affect their immune systems.

Some people with weakened immune systems, such as those with certain types of cancers or taking certain medications, may not be at higher risk of severe water-borne diseases. These people do not need to take extra precautions with their drinking water.

Ask your doctor or nurse practioner how weak your immune system is, and whether you need to take extra precautions.

How can drinking water become contaminated?

Drinking water can contain different organisms, including bacteria, viruses and parasites, which can cause disease. These organisms can exist in the source water, such as lake water, and survive through treatment, or they can enter the water supply in the distribution system.

Well water can be contaminated if the well is located or constructed in a way that the groundwater it draws from is at risk of containing pathogens (germs) such as a shallow well or a well drilled in fractured rock.

Surface water, such as rivers, lakes and streams, can also contain disease-causing organisms from animal feces.

If you have a weak immune system, you should not drink water from surface sources or groundwater at risk of containing pathogens, unless the water has been treated to remove or inactivate at least 99.9 per cent of parasites (protozoa), 99.99 per cent of viruses and all harmful bacteria.

Most community water systems in B.C. have effective treatment, such as disinfection or chlorination, against bacteria and viruses. However, in many cases, treatment may not provide a 99.9 per cent reduction in infectious parasites. Some water systems and many private supplies have no treatment at all. If the water you drink has not been disinfected, please refer to HealthLinkBC File #49b Disinfecting Drinking Water.

How can I further treat disinfected water?

People with very weak immune systems should consult with their doctor or nurse practitioner and may need to take extra precautions with their drinking water.

Boiling: If your water supply has already been disinfected, bring the water to a full boil to inactivate any *Cryptosporidium* parasites - a major concern for people with weakened

immune systems. For more information, see HealthLinkBC File #48 *Cryptosporidium* Infection.

If the water has not already been disinfected, bring the water to a full boil for at least 1 minute. This will kill or inactivate bacteria, viruses and parasites. At elevations over 2,000 meters (6,500 feet), boil water for at least 2 minutes to disinfect it.

Do not drink or use tap water to brush your teeth, rinse your mouth, mix drinks or make ice cubes without boiling it first.

Please note that boiling water will get rid of viruses, bacteria and parasites but not chemicals which may be found in the water.

Reverse Osmosis (RO): RO is effective against all disease-causing organisms and many chemical contaminants. Unless it has a high capacity, it will only produce small amounts of water and waste a large volume. Speak to a water treatment specialist to see if this is the best option for you.

Ultraviolet (UV) Treatment: UV light will kill many disease-causing organisms, and is effective against almost all parasites. UV will not kill some bacterial spores and some viruses, so it should not be used unless the water supply is at least disinfected. UV treatment units should meet NSF Standard #55A.

Filters: Filters do not remove bacteria and viruses and should not be used unless the water supply is disinfected first.

If you plan to install a drinking water filter in your home, you will need a system labeled as Absolute 1 micron or smaller, and labeled as meeting ANSI/NSF International Standard #53 for removal of parasites.

Jug-type filters, such as a Brita®, which sit in a jug and allow water to trickle through, and some tap-mounted and built-in devices are not an appropriate solution. The jug filter models are not effective in removing many disease-causing organisms.

Can I drink bottled water?

Bottled water in B.C. may or may not have been treated. If you have a very weak immune system, check with the bottling company to find out what treatment, if any, it has had. Bottled water that has been properly treated using one of the methods listed above can be used for drinking, brushing teeth, making ice cubes and for recipes where water is used but not boiled, such as cold soups.

For More Information

For more information, including the level of treatment in your local water system, contact your drinking water purveyor or supplier, or the local environmental health officer or drinking water officer. To find your health authority's drinking water contact visit www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/health-authority-contacts.

For more information about water-borne infections and how to safely disinfect your drinking water, see the following HealthLinkBC Files:

- HealthLinkBC File #49a Water-borne Infections in British Columbia
- HealthLinkBC File #49b Disinfecting Drinking Water
- HealthLinkBC File #69b Feeding Your Baby Formula: Safely Making and Storing Formula

Appendix B – Metals in Drinking Water

fraserhealth Better health. Best in health care.

January 25, 2025

Water System Operators

Re: Metals in Drinking Water – "Flush" Message in Annual Reports

Anytime the water in a particular faucet has not been used for six hours or longer, "flush" your cold-water pipes by running the water until you notice a change in temperature. *(This could take as little as five to thirty seconds if there has been recent heavy water use such as showering or toilet flushing. Otherwise, it could take two minutes or longer.)* The more time water has been sitting in your home's pipes, the more lead it may contain.

Use only water from the cold tap for drinking, cooking, and especially making baby formula. Hot water is likely to contain higher levels of lead.

The two actions recommended above are very important to the health of your family. They will probably be effective in reducing lead levels because most of the lead in household water usually comes from the plumbing in your house, not from the local water supply.

Conserving water is still important. Rather than just running the water down the drain you could use the water for things such as watering your plants.

If you have any questions, please contact our Drinking Water Program at 604-870-7903 or 1-866-749-7900.

Sincerely,

Alex Kwan
Acting Manager, Drinking Water Program
Fraser Health Authority
HPLand@fraserhealth.ca

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Appendix C – Raw Water Quality (Surface Water)

Analyte	Units	GCDWQ	Guideline	Cannell WTP Inlet (RAW)			Norrish WTP Inlet (RAW)		
				01-Feb-24	02-May-24	01-Aug-24	01-Feb-24	02-May-24	01-Aug-24
Aluminum (total)	µg/L	2900	MAC	11.8	9.0	6.9	108	44.8	29.1
Ammonia (total, as N)	mg/L			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Antimony (total)	µg/L	6	MAC	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic (total)	µg/L	10	MAC	0.12	<0.10	0.10	0.15	0.15	0.30
Barium (total)	µg/L	2000	MAC	2.8	2.6	2.6	3.9	4.5	6.5
Beryllium (total)	µg/L			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Boron (total)	µg/L	5000	MAC	<50	<50	<50	<50	<50	<50
Cadmium (total)	µg/L	7	MAC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calcium (total)	mg/L			1.32	1.27	1.41	1.34	1.73	2.65
Chloride	mg/L	250	AO	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium (total)	µg/L	50	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt (total)	µg/L			<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dissolved Inorganic Carbon	mg/L			3.1	<1.0	<1.0	2	<1.0	1.3
Copper (total)	µg/L	1000/2000	AO / MAC	1.37	1.24	1.22	0.3	<0.20	<0.20
Fluoride	mg/L	1500	MAC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Hardness (total, as CaCO3)	mg/L			3.97	3.82	4.22	4.04	5.21	7.84
Iron (total)	µg/L	300	AO	14.8	9	7.6	21.6	8.4	<5.0
Lead (total)	µg/L	5	MAC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium (total)	mg/L			0.166	0.159	0.174	0.168	0.218	0.297
Manganese (total)	µg/L	20/120	AO / MAC	6.3	4.1	2.7	<1.0	<1.0	<1.0
Mercury (total)	µg/L	1	MAC	<0.030	0.0025*	<0.0019*	<0.030	<0.0019*	<0.0019*
Molybdenum (total)	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel (total)	µg/L			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nitrate (as N)	mg/L	10	MAC	0.0153	0.0062	0.0066	0.0697	0.0691	0.0987
Nitrite (as N)	mg/L	1	MAC	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Potassium (total)	mg/L			0.060	0.052	0.056	0.075	0.070	0.091
Selenium (total)	µg/L	50	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Silicon (total, as Si)	µg/L			1390	1370	1290	1810	2280	2780
Sodium (total)	mg/L	200	AO	0.728	0.665	0.705	0.571	0.711	1.04
Sulphate	mg/L	500	AO	<1.0	<1.0	1.1	<1.0	<1.0	1.2
Total Organic Carbon / TOC	mg/L			1.1	1.2	1.3	2.1	1.4	1.2
Uranium (total)	µg/L	20	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc (total)	µg/L	5000	AO	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

*New analytical machine with a lower detection limit

<[value] = below detection limit.

Appendix D – Raw Water Quality – Selected Parameters (Groundwater)

Analyte:		Total Arsenic	Total Iron	Total Manganese	Total Lead	Total Calcium	Chloride	Nitrate (as N)	Nitrite (as N)	Potassium (total)	Total Sodium	Sulfur (total)	pH	Turbidity	Total Dissolved Solids	Hardness (as CaCO3)
Units		µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	-	NTU	mg/L	mg/L
Guideline Limit (GCDWQ 2022)																
MAC		10.0	n/a	120	5	n/a	n/a	10	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AO		n/a	300	20	n/a	n/a	250	n/a	n/a	n/a	200	n/a	n/a	n/a	500	n/a
OG		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7.0 - 10.5	0.1	n/a	n/a
Water source	**Sample Size**	**Values (Raw Water Samples)**														
Bevan 1																
Min.	5	0.18	10.2	<1.0	<0.20	21.4	28.0	3.11	<0.0020	1.1	8.55	3.8	6.63	0.11	170	79.2
Max.	5	0.24	233.0	4.70	1.65	26.0	36.0	3.93	<0.0020	1.23	8.97	4.20	6.90	1.70	210	93
Avg.	5	0.21	78.0	3.57	1.65	24.5	31.8	3.44	<0.0020	1.18	8.79	4.04	6.78	0.70	186	88.2
Bevan 2																
Min.	6	0.23	7.2	<1.0	<0.20	22.3	28.0	2.75	<0.0020	1.13	7.02	3.10	6.70	0.12	160	80.7
Max.	6	0.30	55.6	2.90	0.24	24.3	32.0	2.99	<0.0020	1.24	7.77	4.00	7.18	0.85	180	88
Avg.	6	0.27	23.4	2.25	0.24	23.3	29.7	2.89	<0.0020	1.19	7.46	3.53	6.89	0.36	165	84.3
Bevan 3																
Min.	4	0.16	<5.0	<1.0	<0.20	22.0	31.0	2.96	<0.0020	1.11	8.64	<3.0	6.71	0.10	170	78.9
Max.	4	0.25	196.0	5.20	<0.20	24.5	37.0	3.18	<0.0020	1.26	9.09	4.10	6.90	0.79	200	87.7
Avg.	4	0.21	115.3	2.87	<0.20	23.7	33.8	3.09	<0.0020	1.19	8.93	3.73	6.84	0.40	180	84.5
Bevan 4																
Min.	3	0.14	8.2	1.30	<0.20	21.4	31.0	2.92	<0.0020	1.06	8.19	3.40	6.60	0.36	160	74.7
Max.	3	0.20	196.0	3.8	3.36	24.1	35.0	3.10	<0.0020	1.13	9.02	3.60	6.8	1.90	180	82.7
Avg.	3	0.16	127.4	2.6	3.36	23.0	33.0	3.02	<0.0020	1.09	8.72	3.53	6.71	1.02	170	79.7
Farmer 1																
Min.	6	<0.10	<5.0	**62.6**	<0.20	31.8	12.0	4.82	<0.0020	1.57	7.02	9.10	7.00	<0.10	180	116
Max.	6	0.16	<5.0	**94.5**	<0.20	35.8	15.0	6.45	<0.0020	1.62	7.50	11.50	7.50	0.27	220	128
Avg.	6	0.15	<5.0	**78.6**	<0.20	33.4	13.8	5.68	<0.0020	1.59	7.26	10.58	7.27	0.18	197	121

<[value] = below detection limit.
Selected results are presented; contact eng-info@abbotsford.ca to inquire about other results.

Appendix D – Raw Water quality – Selected Parameters (Groundwater), Cont'd

Analyte:		Total Arsenic	Total Iron	Total Manganese	Total Lead	Total Calcium	Chloride	Nitrate (as N)	Nitrite (as N)	Potassium (total)	Total Sodium	Sulfur (total)	pH	Turbidity	Total Dissolved Solids	Hardness (as CaCO3)
Units		µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	-	NTU	mg/L	mg/L
Guideline Limit (GCDWQ 2022)																
MAC		10.0	n/a	120	5	n/a	n/a	10	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AO		n/a	300	20	n/a	n/a	250	n/a	n/a	n/a	200	n/a	n/a	n/a	500	n/a
OG		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7.0 - 10.5	0.1	n/a	n/a
Water source	**Sample Size**	**Values (Raw Water Samples)**														
Farmer 3																
Min.	5	5.07	<5.0	1.90	<0.20	44.7	9.5	1.79	<0.0020	1.90	5.56	15.30	7.72	<0.10	200	149
Max.	5	5.48	11.2	2.7	<0.20	47.9	14.0	3.70	0.0036	2.10	5.85	17.90	8.00	0.48	230	158
Avg.	5	5.26	11.2	2.3	<0.20	46.5	10.6	3.23	0.0036	2.00	5.69	16.42	7.90	0.27	216	153
Industrial C																
Min.	5	7.27	<5.0	**54.0**	<0.20	37.8	10.0	0.20	0.029	2.90	6.92	14.70	8.01	<0.10	180	132
Max.	5	7.59	13.30	**61.9**	<0.20	41.5	13.0	0.78	0.108	3.20	7.87	16.10	8.35	0.18	200	145
Avg.	5	7.41	9.40	**57.7**	<0.20	39.6	11.2	0.50	0.072	3.07	7.39	15.52	8.13	0.17	192	138
Marshall 1																
Min.	6	4.74	<5.0	19.3	<0.20	42.5	27.0	0.0020	<0.0020	3.16	18.30	14.00	7.92	<0.10	230	142
Max.	6	5.51	<5.0	**26.9**	<0.20	48.5	31.0	0.0251	<0.0020	3.38	19.50	15.40	8.02	0.45	240	159
Avg.	6	5.16	<5.0	**22.2**	<0.20	45.3	28.7	0.0096	<0.0020	3.27	18.80	14.68	7.99	0.28	237	150
Marshall 3																
Min.	5	1.46	<5.0	6.40	<0.20	39.3	28.0	0.09	<0.0020	2.25	13.7	10.40	7.58	<0.10	200	135
Max.	5	2.33	<5.0	12.0	<0.20	44.0	32.0	0.3	<0.0020	2.75	18.2	13.40	7.9	0.2	230	147
Avg.	5	1.70	<5.0	10.1	<0.20	40.9	29.8	0.2	<0.0020	2.39	14.9	11.40	7.8	0.1	214	139
Townline 1																
Min.	6	0.41	16.7	**83.8**	<0.20	21.9	20.0	2.95	<0.0020	2.65	6.78	4.40	6.45	<0.10	140	75.5
Max.	6	0.48	24	**92.9**	0.69	23.4	24.0	3.65	<0.0020	3.08	8.04	6.00	7.62	0.18	180	79.2
Avg.	6	0.45	20.7	**88.0**	0.40	22.8	21.5	3.34	<0.0020	2.84	7.58	5.33	6.88	0.16	153	77.1
Townline 2																
Min.	6	0.57	<5.0	**20.5**	0.20	19.4	13.0	2.66	<0.0020	1.12	6.29	3.70	6.60	<0.10	130	66.0
Max.	6	0.65	<5.0	**24.4**	1.15	21.4	19.0	2.83	<0.0020	1.25	7.65	5.00	7.07	0.32	140	72.0
Avg.	6	0.60	<5.0	**21.9**	0.49	20.4	15.2	2.75	<0.0020	1.18	7.24	4.63	6.83	0.18	133	69.4

Appendix E – Microbiology (Raw Groundwater)

Analyte:			Total Coliforms	E. coli	Analyte:			Total Coliforms	E. coli	Analyte:			Total Coliforms	E. coli	Analyte:			Total Coliforms	E. coli
Units:			CFU/100mL					CFU/100mL					CFU/100mL					CFU/100mL	
Water source	Sample Date	Raw / Treated	Values		Water source	Sample Date	Raw / Treated	Values		Water source	Sample Date	Raw / Treated	Values		Water source	Sample Date	Raw / Treated	Values	
Bevan 1	25-Jan-24	Raw	0	0	Bevan 4	25-Jan-24	Raw	0	0	Industrial C	09-Jan-24	Raw	0	0	Townline 1	25-Jan-24	Raw	0	0
Bevan 1	23-May-24	Raw	0	0	Bevan 4	22-Aug-24	Raw	0	0	Industrial C	11-Jan-24	Raw	0	0	Townline 1	23-May-24	Raw	0	0
Bevan 1	20-Jun-24	Raw	0	0	Bevan 4	19-Dec-24	Raw	0	0	Industrial C	12-Jan-24	Raw	0	0	Townline 1	20-Jun-24	Raw	0	0
Bevan 1	18-Jul-24	Raw	0	0						Industrial C	15-Jan-24	Raw	0	0	Townline 1	18-Jul-24	Raw	0	0
Bevan 1	22-Aug-24	Raw	0	0						Industrial C	25-Jan-24	Raw	0	0	Townline 1	22-Aug-24	Raw	0	0
										Industrial C	22-Feb-24	Raw	0	0	Townline 1	19-Dec-24	Raw	0	0
										Industrial C	18-Jun-24	Raw	0	0					
										Industrial C	27-Jun-24	Raw	0	0					
										Industrial C	18-Jul-24	Raw	0	0					
Bevan 2	25-Jan-24	Raw	0	0	Farmer 1	25-Jan-24	Raw	0	0	Marshall 1	25-Jan-24	Raw	0	0	Townline 2	25-Jan-24	Raw	0	0
Bevan 2	22-Feb-24	Raw	0	0	Farmer 1	22-Feb-24	Raw	0	0	Marshall 1	23-May-24	Raw	0	0	Townline 2	23-May-24	Raw	0	0
Bevan 2	23-May-24	Raw	0	0	Farmer 1	17-Jun-24	Raw	0	0	Marshall 1	20-Jun-24	Raw	0	0	Townline 2	20-Jun-24	Raw	0	0
Bevan 2	20-Jun-24	Raw	0	0	Farmer 1	18-Jul-24	Raw	0	0	Marshall 1	27-Jun-24	Raw	4.0	0	Townline 2	18-Jul-24	Raw	0	0
Bevan 2	18-Jul-24	Raw	0	0	Farmer 1	22-Aug-24	Raw	0	0	Marshall 1	18-Jul-24	Raw	0	0	Townline 2	22-Aug-24	Raw	0	0
Bevan 2	22-Aug-24	Raw	0	0	Farmer 1	19-Dec-24	Raw	0	0	Marshall 1	22-Aug-24	Raw	0	0	Townline 2	19-Dec-24	Raw	0	0
										Marshall 1	19-Dec-24	Raw	0	0					
Bevan 3	25-Jan-24	Raw	0	0	Farmer 3	25-Jan-24	Raw	0	0	Marshall 3	25-Jan-24	Raw	0	0					
Bevan 3	18-Jul-24	Raw	0	0	Farmer 3	20-Jun-24	Raw	0	0	Marshall 3	23-May-24	Raw	0	0					
Bevan 3	22-Aug-24	Raw	0	0	Farmer 3	18-Jul-24	Raw	0	0	Marshall 3	20-Jun-24	Raw	0	0					
Bevan 3	19-Dec-24	Raw	0	0	Farmer 3	22-Aug-24	Raw	0	0	Marshall 3	27-Jun-24	Raw	0	0					
					Farmer 3	19-Dec-24	Raw	0	0	Marshall 3	18-Jul-24	Raw	0	0					
										Marshall 3	22-Aug-24	Raw	0	0					

APPENDIX F – PESTICIDES AND HERBICIDES (RAW GROUNDWATER)

Parameters Tested (All Results Below Detection Limit)		
2,3,4,6-Tetrachlorophenol	Bromoxynil	Dicrotophos
2,4,5-Trichlorophenoxyacetic acid / 2,4,5-T	Butylate	Dieldrin
2,4,6-Trichlorophenol	Captan	Dimethoate
2,4'-DDT and 4,4'-DDD	Carbaryl	Dinoseb
2,4-Dichlorophenol	Carbofuran	Dioxathion
2,4-Dichlorophenoxyacetic acid / 2,4-D	Carbophenothion - solids (wet wei	Diphenylamine
2-Methylnaphthalene	Chlorbenside	Disulfoton
4,4-DDE	Chlorfenson	Endosulfan I
4,4'-DDT (pp-DDT)	Chlorfenvinphos	Endosulfan II
4,4-Methoxyclor	Chlorfenvinphos (e)	Endosulfan sulfate
Acenaphthene	Chlormephos	Endrin
Acenaphthylene	Chlorothalonil	Endrin aldehyde
a-Chlordane	Chlorpropham	Endrin ketone
Acridine	Chlorpyrifos	EPN
Alachlor	Chlorpyrifos-methyl	Eptam
Aldicarb	Chlorthal-dimethyl (Dacthal)	Ethalfluralin
Aldrin	Chlorthiophos	Ethion
alpha-BHC	Chrysene	Fenchlorphos
Anthracene	Cyanazine	Fenitrothion
Aspon	Cyanophos	Fensulfothion
Atrazine	delta-BHC	Fenthion
Atrazine+Metabolites	Demeton-O	Fluoranthene
Atrazine-desethyl (DEA)	Demeton-S	Fluorene
Azinphos-ethyl	Desmetryn	Folpet
Azinphos-methyl	Diallate	Fonofos
Bendiocarb	Diallate Z	gamma-BHC
Benfluralin	Diazinon	Heptachlor
Benzo(a)anthracene	Dibenzo(a,h)anthracene	Heptachlor epoxide
Benzo(a)pyrene	Dicamba	Hexachlorobenzene
Benzo(b,j)fluoranthene	Dichlobenil	Hexazinone
Benzo(g,h,i)perylene	Dichlofenthion	Indeno(1,2,3-c,d)pyrene
Benzo(k)fluoranthene	Dichlofluanid	Iodofenphos
beta-BHC	Dichloran	Iprodione
Bromacil	Dichlorvos and Naled	Isofenphos
Bromophos	Diclofop-methyl	Lindane
Bromophos-ethyl	Dicofol	Malaoxon

Appendix F – Pesticides and Herbicides (Raw Groundwater), Cont'd.

Parameters Tested (All Results Below Detection Limit)		
Malathion	Phorate	Quinalphos
Metalaxyl	Phosalone	Quinoline
Methidathion	Phosmet	Simazine
Methyl parathion	Phosphamidon E	Sulfotep
Metolachlor	Phosphamidon Z	Tecnazene
Metribuzin	Picloram	Terbufos
Mevinphos	Pirimicarb	Terbuthylazine
Mirex	Pirimiphos-ethyl	Terbutryn
Naphthalene	Pirimiphos-methyl	Tetrachlorvinphos (Stirophos)
Nitrofen	Procymidone	Tetradifon
o,p-DDD	Profenofos	Tolylfluanid
o,p-DDE	Profluralin	Total HMW PAH
Omethoate	Prometryn	Total LMW PAH
Parathion	Pronamide	Total PAH
Pentachloronitrobenzene / PCNB	Propazine	Triadimefon
Pentachlorophenol / PCP	Propiconazole	Triallate
Permethrin	Pyrazophos	Trifluralin
Phenanthrene	Pyrene	Vinclozolin

Appendix G – Finished Water Quality Results – Metals (Distribution System)

Abbotsford Distribution

Analyte	Units	Analyzed Concentrations				Remarks	Guideline Limits		
		Minimum	Maximum	Average	Median		AO	MAC	OG
Aluminum (total)	µg/L	<3.0	61.1	30.3	34.4		-	2900	100
Antimony (total)	µg/L	<0.50	<0.50	-	-		-	6	-
Arsenic (total)	µg/L	0.11	3.53	0.44	0.20		-	10	-
Barium (total)	µg/L	2.7	23.6	7.4	4.6		-	2000	-
Beryllium (total)	µg/L	2.7	23.6	7.4	4.6		-	-	-
Bismuth (total)	µg/L	<1.0	<1.0	-	-		-	-	-
Boron (total)	µg/L	<50	<50	-	-		-	5000	-
Cadmium (total)	µg/L	<0.010	0.05	0.02	0.02		-	7	-
Calcium (total)	mg/L	1.64	39.8	8.32	2.68		-	-	-
Chromium (total)	µg/L	<1.0	<1.0	-	-		-	50	-
Cobalt (total)	µg/L	<0.20	<0.20	-	-		-	-	-
Copper (total)	µg/L	0.46	16.1	4.4	2.025		1000	2000	-
Iron (total)	µg/L	<5.0	28.3	11.3	8.85		300	-	-
Lead (total)	µg/L	<0.20	0.58	0.32	0.26		-	5	-
Magnesium (total)	mg/L	0.19	9.56	1.69	0.31		-	-	-
Manganese (total)	µg/L	<1.0	83.2	22.3	8.8	14 samples > AO	20	120	-
Mercury (total)	µg/L	<0.0019	0.0038	0.0024	0.0020		-	1	-
Molybdenum (total)	µg/L	<1.0	1.3	1.1	1.1		-	-	-
Nickel (total)	µg/L	<1.0	<1.0	-	-		-	-	-
Potassium (total)	mg/L	0.068	2.930	0.500	0.105		-	50	-
Selenium (total)	µg/L	<0.10	0.45	0.25	0.28		-	500	-
Silicon (total, as Si)	µg/L	1850	10900	3715	2685		-	-	-
Siver (totol)	µg/L	<0.020	<0.020	-	-		-	-	-
Sodium (total)	mg/L	0.647	15.1	3.0	1.1		200	-	-
Strontium (total)	µg/L	4.5	171	36	7.45		7000	-	-
Thallium (total)	µg/L	<0.010	<0.010	-	-		-	-	-
Tin (total)	µg/L	<5.0	<5.0	-	-		-	-	-
Titanium (total)	µg/L	<5.0	<5.0	-	-		-	-	-
Uranium (total)	µg/L	<0.10	0.38	0.20	0.17		-	20	-
Vanadium (total)	µg/L	<5.0	<5.0	-	-		-	-	-
Zinc (total)	µg/L	<5.0	6	All <5.0 except one		W03 - 17/9/24	-	5000	-
Ziconium (total)	µg/L	0.12	0.24	0.18	0.18		-	-	-

Note: sample size of each analyte is 92.

Mission Distribution

Analyte	Units	Analyzed Concentrations				Remarks	Guideline Limits		
		Minimum	Maximum	Average	Median		AO	MAC	OG
Aluminum (total)	µg/L	9.3	63.4	25.0	14.8		-	2900	100
Antimony (total)	µg/L	<0.50	<0.50	-	-		-	6	-
Arsenic (total)	µg/L	<0.10	0.34	0.18	0.17		-	10	-
Barium (total)	µg/L	2.5	14.0	6.1	5.1		-	2000	-
Beryllium (total)	µg/L	<0.10	<0.10	-	-		-	-	-
Bismuth (total)	µg/L	<1.0	<1.0	-	-		-	-	-
Boron (total)	µg/L	<50	<50	-	-		-	5000	-
Cadmium (total)	µg/L	<0.010	<0.010	-	-		-	7	-
Calcium (total)	mg/L	1.45	3.21	2.16	1.93		-	-	-
Chromium (total)	µg/L	<1.0	<1.0	-	-		-	50	-
Cobalt (total)	µg/L	<0.20	<0.20	-	-		-	-	-
Copper (total)	µg/L	0.29	38.7	5.7	1.6		1000	2000	-
Iron (total)	µg/L	<5.0	52.7	17.7	15.6		300	-	-
Lead (total)	µg/L	<0.20	0.23	All <0.20 except one		M07 -5/3/24	-	5	-
Magnesium (total)	mg/L	0.128	0.357	0.211	0.194		-	-	-
Manganese (total)	µg/L	<1.0	5.3	2.8	3.0		20	120	-
Mercury (total)	µg/L	0.0019	0.0021	0.0020	0.0020		-	1	-
Molybdenum (total)	µg/L	<1.0	<1.0	-	-		-	-	-
Nickel (total)	µg/L	<1.0	<1.0	-	-		-	-	-
Potassium (total)	mg/L	0.051	0.119	0.078	0.071		-	50	-
Selenium (total)	µg/L	<0.10	<0.10	-	-		-	500	-
Silicon (total, as Si)	µg/L	1240	2990	2047	1950		-	-	-
Siver (totol)	µg/L	<0.020	<0.020	-	-		-	-	-
Sodium (total)	mg/L	0.67	5.63	2.55	1.40		200	-	-
Strontium (total)	µg/L	4.3	9	6.3	5.7		7000	-	-
Thallium (total)	µg/L	<0.010	<0.010	-	-		-	-	-
Tin (total)	µg/L	<5.0	<5.0	-	-		-	-	-
Titanium (total)	µg/L	<5.0	<5.0	-	-		-	-	-
Uranium (total)	µg/L	<0.10	<0.10	-	-		-	20	-
Vanadium (total)	µg/L	<5.0	<5.0	-	-		-	-	-
Zinc (total)	µg/L	<5.0	<5.0	-	-		-	5000	-
Ziconium (total)	µg/L	<0.10	<0.10	-	-		-	-	-

Note: sample size of each analyte is 29.

Appendix H – Disinfection By-Products (DBP) Distribution System (Finished Water)

Trihalomethanes – THMs

Sample Location	Analyte (THMS)	Units	Sample Date			CDWQ Guideline
			29-May-2024	29-Aug-2024	28-Nov-2024	
Transmission Stations						
T01a - Bell Road (pre-NH3)	Bromodichloromethane	µg/L	<1.0	<1.0	1.1	16 (MAC)
T01a - Bell Road (pre-NH3)	Bromoform	µg/L	<1.0	<1.0	<1.0	
T01a - Bell Road (pre-NH3)	Chloroform	µg/L	18	30	34	100 (MAC)
T01a - Bell Road (pre-NH3)	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
T01a - Bell Road (pre-NH3)	**Total THMs**		**18**	**30**	**35.1**	**100 (MAC)**
T03b - MacLure Reservoir Cell 1/2 outlet	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
T03b - MacLure Reservoir Cell 1/2 outlet	Bromoform	µg/L	<1.0	<1.0	<1.0	
T03b - MacLure Reservoir Cell 1/2 outlet	Chloroform	µg/L	20	21	16	100 (MAC)
T03b - MacLure Reservoir Cell 1/2 outlet	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
T03b - MacLure Reservoir Cell 1/2 outlet	**Total THMs**		**20**	**21**	**16**	**100 (MAC)**
T05a - Cannon's Pit 400 (pre-NH3)	Bromodichloromethane	µg/L	1.2	1.3	2.1	16 (MAC)
T05a - Cannon's Pit 400 (pre-NH3)	Bromoform	µg/L	<1.0	<1.0	<1.0	
T05a - Cannon's Pit 400 (pre-NH3)	Chloroform	µg/L	18	28	37	100 (MAC)
T05a - Cannon's Pit 400 (pre-NH3)	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
T05a - Cannon's Pit 400 (pre-NH3)	**Total THMs**		**19.2**	**29.3**	**39.1**	**100 (MAC)**
City of Abbotsford Distribution						
W03 - 35944 McKee Road	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
W03 - 35944 McKee Road	Bromoform	µg/L	<1.0	<1.0	<1.0	
W03 - 35944 McKee Road	Chloroform	µg/L	20	19	17	100 (MAC)
W03 - 35944 McKee Road	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
W03 - 35944 McKee Road	**Total THMs**		**20**	**19**	**17**	**100 (MAC)**
W13 - 7942 Bradner Road	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
W13 - 7942 Bradner Road	Bromoform	µg/L	<1.0	<1.0	<1.0	
W13 - 7942 Bradner Road	Chloroform	µg/L	22	17	22	100 (MAC)
W13 - 7942 Bradner Road	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
W13 - 7942 Bradner Road	**Total THMs**		**22**	**17**	**22**	**100 (MAC)**
W16 - 27875 Swensson Avenue	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
W16 - 27875 Swensson Avenue	Bromoform	µg/L	<1.0	<1.0	<1.0	
W16 - 27875 Swensson Avenue	Chloroform	µg/L	22	21	15	100 (MAC)
W16 - 27875 Swensson Avenue	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
W16 - 27875 Swensson Avenue	**Total THMs**		**22**	**21**	**15**	**100 (MAC)**
E07 - 6230 Tolmie Road	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
E07 - 6230 Tolmie Road	Bromoform	µg/L	<1.0	<1.0	<1.0	
E07 - 6230 Tolmie Road	Chloroform	µg/L	13	11	4.2	100 (MAC)
E07 - 6230 Tolmie Road	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
E07 - 6230 Tolmie Road	**Total THMs**		**13**	**11**	**4.2**	**100 (MAC)**
E17 - 2720 St. Moritz Way	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
E17 - 2720 St. Moritz Way	Bromoform	µg/L	<1.0	<1.0	<1.0	
E17 - 2720 St. Moritz Way	Chloroform	µg/L	19	22	19	100 (MAC)
E17 - 2720 St. Moritz Way	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
E17 - 2720 St. Moritz Way	**Total THMs**		**19**	**22**	**19**	**100 (MAC)**

Trihalomethanes – THMs

Sample Location	Analyte (THMS)	Units	Sample Date			CDWQ Guideline
			29-May-2024	29-Aug-2024	28-Nov-2024	
City Of Mission Distribution						
M01 - Israel	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
M01 - Israel	Bromoform	µg/L	<1.0	<1.0	<1.0	
M01 - Israel	Chloroform	µg/L	24	22	20	100 (MAC)
M01 - Israel	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
M01 - Israel	**Total THMs**		**24**	**22**	**20**	**100 (MAC)**
M03 - Penner	Bromodichloromethane	µg/L	1.4	<1.0	1	16 (MAC)
M03 - Penner	Bromoform	µg/L	<1.0	<1.0	<1.0	
M03 - Penner	Chloroform	µg/L	22	25	21	100 (MAC)
M03 - Penner	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
M03 - Penner	**Total THMs**		**23.4**	**25**	**22**	**100 (MAC)**
M09 - Shook	Bromodichloromethane	µg/L	<1.0	<1.0	<1.0	16 (MAC)
M09 - Shook	Bromoform	µg/L	<1.0	<1.0	<1.0	
M09 - Shook	Chloroform	µg/L	21	17	13	100 (MAC)
M09 - Shook	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
M09 - Shook	**Total THMs**		**21**	**17**	**13**	**100 (MAC)**
M10 - Miller	Bromodichloromethane	µg/L	1.1	1.1	<1.0	16 (MAC)
M10 - Miller	Bromoform	µg/L	<1.0	<1.0	<1.0	
M10 - Miller	Chloroform	µg/L	21	24	19	100 (MAC)
M10 - Miller	Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	
M10 - Miller	**Total THMs**		**22.1**	**25.1**	**19**	**100 (MAC)**

Haloacetic Acids (HAAs)

Sample Location	Analyte (THMS)	Units	Sample Date			CDWQ Guideline
			29-May-2024	29-Aug-2024	28-Nov-2024	
Transmission Stations						
T01a - Bell Road (pre-NH3)	Dibromoacetic acid	µg/L	<5.0	<5.0	6.4	
T01a - Bell Road (pre-NH3)	Dichloroacetic acid	µg/L	15	13	7.9	
T01a - Bell Road (pre-NH3)	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
T01a - Bell Road (pre-NH3)	Trichloroacetic acid	µg/L	11	13	8.3	
T01a - Bell Road (pre-NH3)	**Total HAAs**		**26**	**26**	**22.6**	**80 (MAC)**
T03b - MacLure Reservoir Cell 1/2 outlet	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
T03b - MacLure Reservoir Cell 1/2 outlet	Dichloroacetic acid	µg/L	17	16	9.8	
T03b - MacLure Reservoir Cell 1/2 outlet	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
T03b - MacLure Reservoir Cell 1/2 outlet	Trichloroacetic acid	µg/L	13	12	9.4	
T03b - MacLure Reservoir Cell 1/2 outlet	**Total HAAs**		**30**	**28**	**19.2**	**80 (MAC)**
T05a - Cannon's Pit 400 (pre-NH3)	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
T05a - Cannon's Pit 400 (pre-NH3)	Dichloroacetic acid	µg/L	7.6	9.5	9.2	
T05a - Cannon's Pit 400 (pre-NH3)	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
T05a - Cannon's Pit 400 (pre-NH3)	Trichloroacetic acid	µg/L	12	15	15	
T05a - Cannon's Pit 400 (pre-NH3)	**Total HAAs**		**19.6**	**24.5**	**24.2**	**80 (MAC)**
City of Abbotsford Distribution						
W03 - 35944 McKee Road	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
W03 - 35944 McKee Road	Dichloroacetic acid	µg/L	17	14	11	
W03 - 35944 McKee Road	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
W03 - 35944 McKee Road	Trichloroacetic acid	µg/L	11	10	10	
W03 - 35944 McKee Road	**Total HAAs**		**28**	**24**	**21**	**80 (MAC)**
W13 - 7942 Bradner Road	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
W13 - 7942 Bradner Road	Dichloroacetic acid	µg/L	15	13	14	
W13 - 7942 Bradner Road	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
W13 - 7942 Bradner Road	Trichloroacetic acid	µg/L	12	9.7	12	
W13 - 7942 Bradner Road	**Total HAAs**		**27**	**22.7**	**26**	**80 (MAC)**
W16 - 27875 Swensson Avenue	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
W16 - 27875 Swensson Avenue	Dichloroacetic acid	µg/L	17	16	8.6	
W16 - 27875 Swensson Avenue	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
W16 - 27875 Swensson Avenue	Trichloroacetic acid	µg/L	12	11	7.4	
W16 - 27875 Swensson Avenue	**Total HAAs**		**29**	**27**	**16**	**80 (MAC)**
E07 - 6230 Tolmie Road	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
E07 - 6230 Tolmie Road	Dichloroacetic acid	µg/L	9.7	9.1	<5.0	
E07 - 6230 Tolmie Road	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
E07 - 6230 Tolmie Road	Trichloroacetic acid	µg/L	5.9	5.7	<5.0	
E07 - 6230 Tolmie Road	**Total HAAs**		**15.6**	**14.8**	**<5.0**	**80 (MAC)**
E17 - 2720 St. Moritz Way	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
E17 - 2720 St. Moritz Way	Dichloroacetic acid	µg/L	18	18	12	
E17 - 2720 St. Moritz Way	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
E17 - 2720 St. Moritz Way	Trichloroacetic acid	µg/L	11	13	10	
E17 - 2720 St. Moritz Way	**Total HAAs**		**29**	**31**	**22**	**80 (MAC)**

Haloacetic Acids (HAAs)

Sample Location	Analyte (THMS)	Units	Sample Date			CDWQ Guideline
			29-May-2024	29-Aug-2024	28-Nov-2024	
City Of Mission Distribution						
M01 - Israel	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M01 - Israel	Dichloroacetic acid	µg/L	17	17	11	
M01 - Israel	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M01 - Israel	Trichloroacetic acid	µg/L	11	13	12	
M01 - Israel	**Total HAAs**		**28**	**30**	**23**	**80 (MAC)**
M03 - Penner	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M03 - Penner	Dichloroacetic acid	µg/L	8	16	10	
M03 - Penner	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M03 - Penner	Trichloroacetic acid	µg/L	10	14	12	
M03 - Penner	**Total HAAs**		**18**	**30**	**22**	**80 (MAC)**
M09 - Shook	Dibromoacetic acid	µg/L	<5.0	<5.0	5.9	
M09 - Shook	Dichloroacetic acid	µg/L	18	14	8.4	
M09 - Shook	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M09 - Shook	Trichloroacetic acid	µg/L	13	13	7.9	
M09 - Shook	**Total HAAs**		**31**	**27**	**22.2**	**80 (MAC)**
M10 - Miller	Dibromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M10 - Miller	Dichloroacetic acid	µg/L	11	15	11	
M10 - Miller	Monobromoacetic acid	µg/L	<5.0	<5.0	<5.0	
M10 - Miller	Trichloroacetic acid	µg/L	12	17	14	
M10 - Miller	**Total HAAs**		**23**	**32**	**25**	**80 (MAC)**

N-Nitrosodimethylamine (µg/L)

Sample Location	Analyte	Unit	Sample Date			CDWQ Guideline
			29-May-2024	29-Aug-2024	28-Nov-2024	
Transmission Stations						
T01a - Bell Road (pre-NH3)	NDMA	ng/L	<2.0	<2.0	<1.8	40
T03b - MacLure Reservoir Cell 1/2 outlet		ng/L	<2.0	<1.9	<2.0	40
T05a - Cannon's Pit 400 (pre-NH3)		ng/L	<2.0	<2.0	<2.0	40
City of Abbottsford Distribution						
W03 - 35944 McKee Road	NDMA	ng/L	<2.0	<2.0	<1.8	40
W13 - 7942 Bradner Road		ng/L	<2.0	<2.0	<1.8	40
W16 - 27875 Swensson Avenue		ng/L	<2.0	<2.0	<1.8	40
E07 - 6230 Tolmie Road		ng/L	<2.0	<2.0	<2.0	40
E17 - 2720 St. Moritz Way		ng/L	<2.0	<2.0	<2.0	40
City Of Mission Distribution						
M01 - Israel	NDMA	ng/L	<2.1	<2.0	<1.8	40
M03 - Penner		ng/L	<2.0	<2.0	3.6	40
M09 - Shook		ng/L	<2.0	<2.0	<1.8	40
M10 - Miller		ng/L	2.8	2.8	4.1	40