Abbotsford Mission
Water & Sewer Services

ABBOTSFORD

DISTRICT OF Mission ON THE FRASER

Annual Water Quality Report
2019

EXECUTIVE SUMMARY

The City of Abbotsford and District of Mission receive domestic water from the Abbotsford Mission Water & Sewer Commission (AMWSC). The primary source of water is Norrish Creek, supplemented by Cannell Lake and several groundwater wells within the Abbotsford-Sumas Aquifer. The Norrish Creek source is filtered (either by slow sand or ultrafiltration membranes) and chloraminated prior to distribution. Cannell Lake water is treated by ultraviolet (UV) disinfection and chloramination. Chloramination is also practiced at most wells.

During 2019, the Norrish Creek Water Treatment Plant consistently delivered high quality water, within the limits recommended by the Guidelines for Canadian Drinking Water Quality (GCDWQ). Well water also met all health-related GCDWQ requirements.

Cannell Lake raw water quality was within the requirements. Cannell raw water was tested weekly for *E. coli. E. coli* was detected twice, but the result was only 1 count/100 ml, therefore the AMWSC remained in compliance with the filtration exemption criteria.

The AMWSC, Abbotsford and Mission tested more than 2000 treated water samples for microbiological parameters in 2019 as shown in Appendix H. *Total Coliforms* were detected in three of the regular weekly distribution samples as listed in Table 3-3. Each site was re-sampled upon receiving the result and no detectable coliforms were found in the follow-up samples.

The AMWSC system experienced three and eight positive *E. coli* samples on October 8 and October 16, respectively. A thorough investigation of the incident and results was conducted by a Qualified Professional who concluded that it is highly unlikely that the *E. coli* in the October 2019 samples originated from the Water System and that lab contamination was the likely source. This was further validated by the lab performing the original analysis. Furthermore, more than 900 extra samples collected from October to December throughout the system by staff and Fraser Health were all negative for *E. coli*.

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1 INTRODUCTION

The British Columbia Drinking Water Protection Act requires that all water suppliers produce an annual water quality report that is reviewed by the local Drinking Water Officer and published for public access. This report has been prepared for the Abbotsford-Mission Water and Sewer Commission (AMWSC) and Ministry of Health for this purpose.

2 WATER SYSTEM DESCRIPTION

Abbotsford & Mission receive domestic water from the Abbotsford Mission Water & Sewer Commission (AMWSC). The AMWSC draws water from three sources, provides treatment, and transmits the treated water to Abbotsford and Mission. The two municipalities distribute the water to consumers directly from transmission pipeline take-off points or through transmission end-point reservoirs. This water supply strategy is illustrated as Figure 2-1.

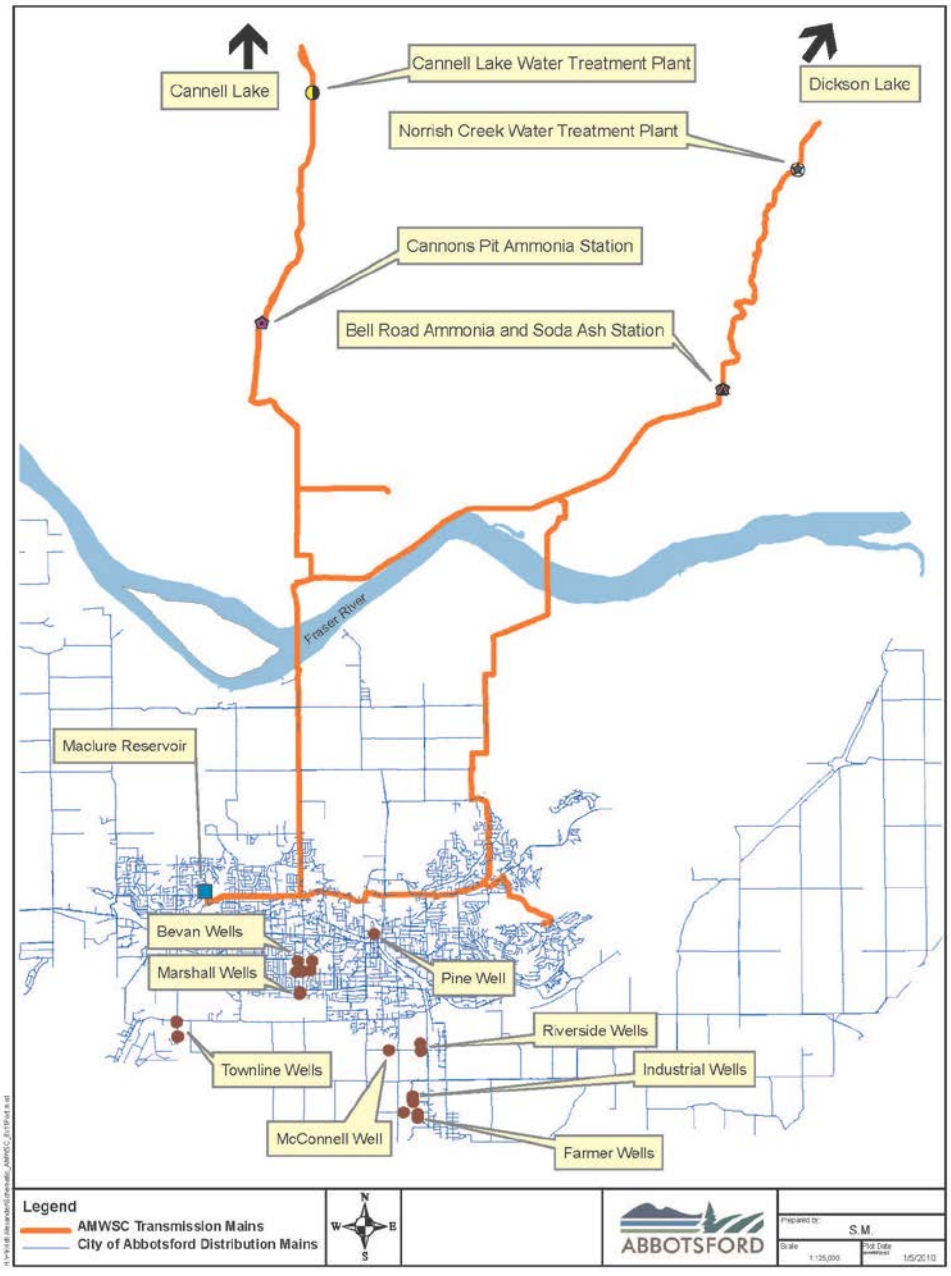

Figure 2-1: AMWSC Water Supply

2.1 Water Sources & Treatment

Norrish Creek

Norrish Creek, located northeast of Mission, sources from Dickson Lake and provides the bulk of Abbotsford and Mission's drinking water. Norrish water is filtered by slow sand or ultrafiltration membranes at the Norrish Creek Water Treatment Plant (NCWTP). The water is chlorinated at the plant outlet and then flows 7.5 km to the Bell Road Ammonia & Soda Ash Station, where aqueous ammonia is added to form chloramines for distribution system residual disinfection. Soda ash was not dosed in 2019.

Norrish Creek Water Treatment Plant

Cannell Lake

Cannell Lake, located north of Mission, supplies water to consumers located in the higher elevations of Mission. It also supplements supply to Abbotsford when demand is high or when the Norrish supply is off-line. Cannell Lake water is treated by ultraviolet (UV) disinfection and chlorinated 1 km downstream of the intake, then travels 7 km to the Cannons Pit Ammonia Station to form residual chloramines prior to entering the distribution networks.

Cannell Lake

Groundwater Wells

The AMWSC supplements times of high demand with groundwater from the Abbotsford-Sumas aquifer. Most well water is chloraminated prior to distribution.

Groundwater Well Head

Treated water travels through more than 95 km of pipeline from the water sources to Abbotsford and Mission. The water then either enters the municipalities' distribution systems via direct take-off points or after feeding through the Maclure and Mt. Mary Ann reservoirs. The volumes of water produced by Norrish, Cannell and the wells in 2019 (and the two year's prior) are summarized in Table 2.1.

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

Source [1]	2017 Total	2018 Total	2019 Total
Norrish Creek	17,896	17,302	16,864
Cannell Lake	3,801	3,463	3,385
Farmer #1 Well	552	763	419
Farmer #3 Well	30	8	2*
Industrial Well "A"	2	0	0
Industrial Well "B"	36	46	180
Industrial Well "C"	228	335	20
Marshall #1 Well	1	264	581
Marshall #3 Well	0	0	0
McConnell Well	114	189	48
Pine Well	12	40	3
Riverside #1 Well	16	112	133
Townline #1 Well	386	473	662
Townline #2 Well	170	226	212
Bevan #1 Well	270	360	425
Bevan #2 Well	285	425	280
Bevan #3 Well	272	420	601
Bevan #4 Well	395	550	629
Overall Total	**24,465**	**24,976**	**24,444**
Total Surface Water	**21,696**	**20,765**	**20,249**
Total Groundwater	**2,769**	**4,211**	**4,195**

1 – The following wells have been removed from the table since they have been out of service for more than 5-years and there are no plans to put them back into production: Farmer 2, Marshall 2 & Riverside 2. If any water quality results exist for these inactive wells, such can be obtained by contacting:eng-info@abbotsford.ca

* Farmer 3 did not produce water for distribution in 2019. This volume represents water sent to waste.

2.2 Distribution System

The Abbotsford distribution system includes 22 pump stations, 10 reservoirs, more than 20 pressure reducing stations (PRVs), and over 850 km of pipelines as shown in Figure 2-2. The Mission distribution system includes 23 PRVs and over 170 km of pipelines as shown in Figure 2-3.

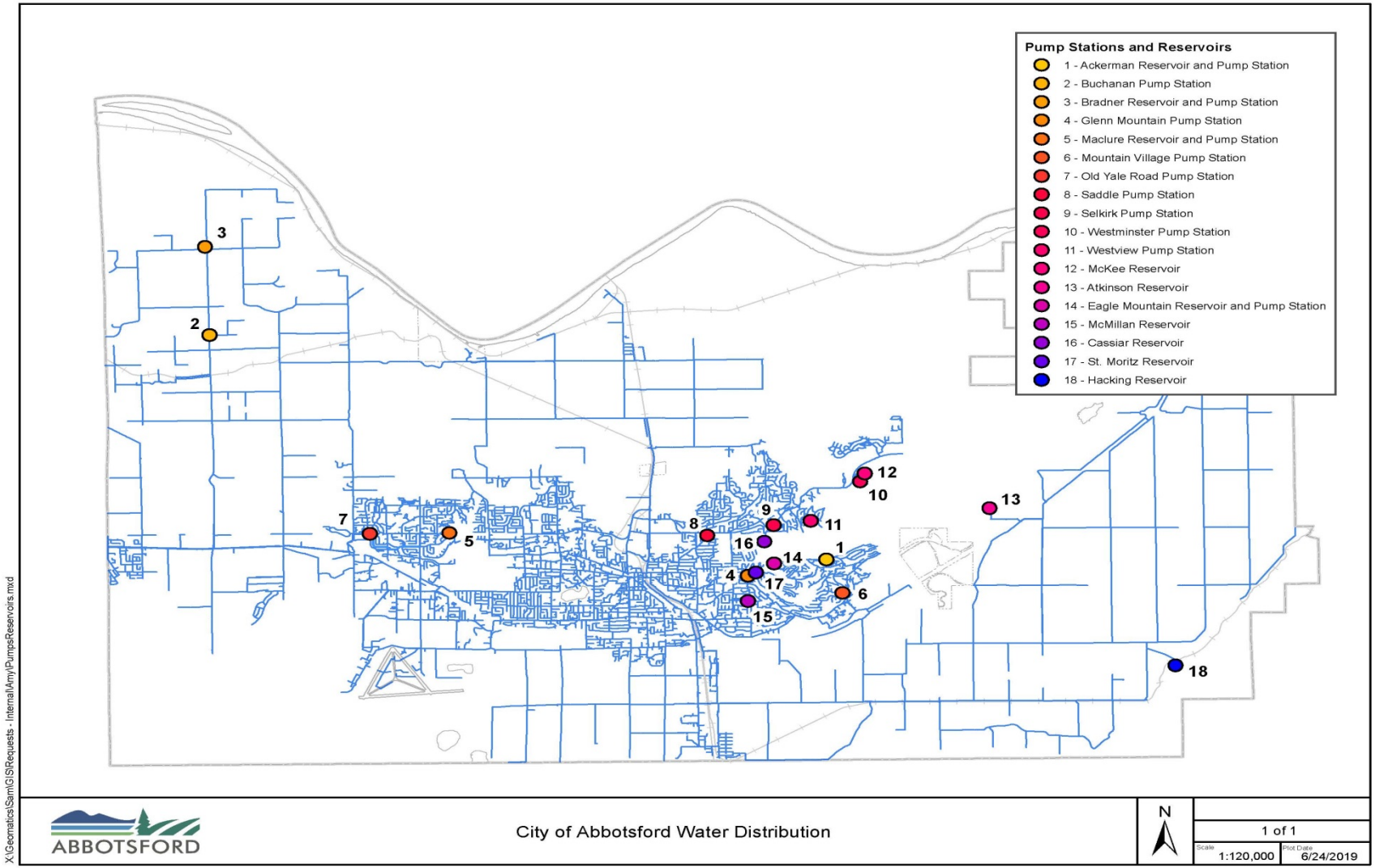

Figure 2-2: City of Abbotsford Water Distribution System

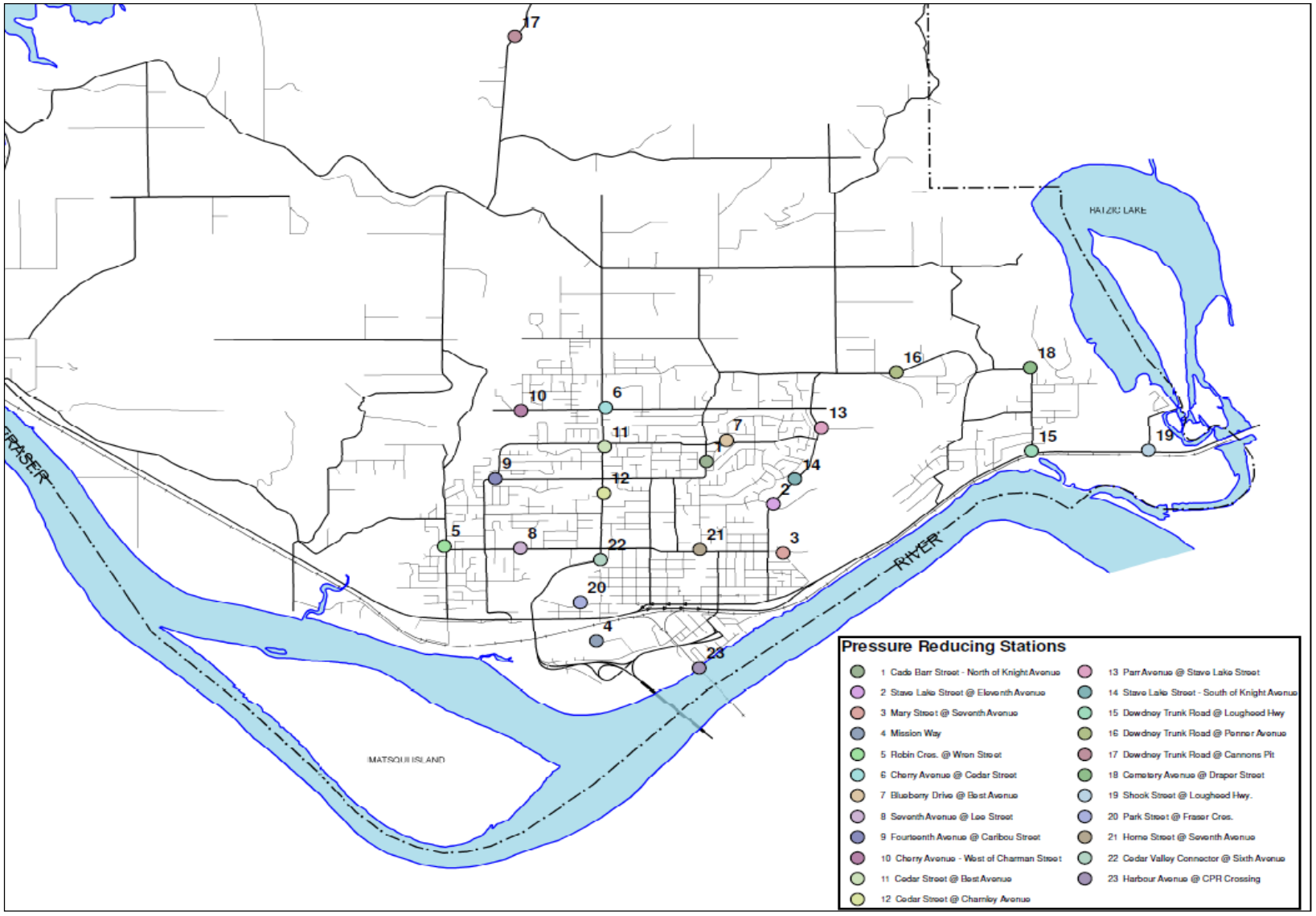

Figure 2-3: District of Mission Water Distribution System

3 WATER SAMPLING AND TESTING PROGRAM

Abbotsford and Mission work together to monitor drinking water quality according to the requirements of the BC Drinking Water Protection Act and Guidelines for Canadian Drinking Water Quality (GCDWQ). The AMWSC monitors source water quality and transmission system water quality to confirm effective water treatment. Mission and Abbotsford monitor their distribution network water quality to ensure that there has been no water quality deterioration during passage through their distribution pipelines. Table 3-1 summarizes the monitoring program and the following sections describe key water quality results from 2019 sampling programs.

Table 3-1: AMWSC, Abbotsford & Mission Water Quality Monitoring Program

Parameters	Raw Surface Water	Raw Well Water	Treated Water	Monitoring Purpose
Potability Scan (1)	Annually (2)	Annually	Quarterly	To characterize source and treated water quality and to track fundamental shifts in quality.
Nitrates & Metals	-	Monthly (3)	-	To proactively screen for aquifer contamination.
Pesticides/Herbicides		Annually		To proactively screen for aquifer contamination.
Various (4)	On-Line	On-Line	On-Line	Data required for effective control of the water treatment processes.
Coliforms	-	-	Weekly (42 locations)	To proactively screen for biological contamination of the distributed water.
Disinfection Monitoring (4)	-	-	Weekly (5) (42 locations)	To ensure that a disinfection residual is maintained through the distribution system.
Disinfection By-Products	-	-	Quarterly (4-5 locations)	To ensure that disinfection by-product levels remain below recommended limits.
Limnology	Monthly (Cannell)			To provide early indication of lake water quality changes and any changes that could arise from disturbances in the watershed, particularly those associated with climate change.
Various (6)	-	-	Annually (6)	Proactively screening for pipe deterioration.

(1) Potability scan typically includes: alkalinity, aluminum, antimony, arsenic, barium, boron, bicarbonate, calcium, carbonate, colour, conductivity, hardness, hydroxide, cadmium, chloride, chromium, copper, fluoride, iron, lead, magnesium, manganese, mercury, nitrate/nitrite, pH, potassium, silicon, selenium, sodium, sulphate, turbidity, total dissolved solids, uranium, and zinc. This list may vary slightly year over year.

(2) For Cannell Lake raw water, there are some additional parameters being monitored weekly (e.g. coliforms, colour, pH, UV-absorbance, iron and manganese) and monthly (e.g. organic carbon & protozoa) to manage the treatment process and to comply with filtration exemption.

(3) Monthly metal testing at the wells is not normally part of the water quality monitoring program. This data is being collected under a separate program related to an AMWSC environmental assessment certificate.

(4) There are various on-line water quality instruments throughout the system (e.g. for turbidity, chlorine, pH, and ultraviolet transmittance).

(5) Disinfection monitoring includes analyses of total and free chlorine, along with temperature, turbidity and pH. Alkalinity, ammonia, monochloramine and dichloramine are also monitored at 5 transmission system locations to ensure effective chloramination.

(6) In addition to weekly & quarterly treated water sampling, parameters such as benzo(a)pyrene, asbestos and vinyl chloride are checked annually or bi-annually at select points in the distribution systems to monitor for pipe deterioration.

The GCDWQ sets standards for safe levels of contaminants commonly found in municipal drinking water. However, some people with significantly weakened immune systems may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and some infants can be particularly at risk from infections. These people are urged to review the HealthLinkBC information sheet attached as Appendix A.

All customers should read Fraser Health's message about flushing taps that have not been used for six hours or longer. Please refer to Appendix B.

3.1 Raw Source Water Quality Monitoring

3.1.1 Surface Water

The quality of raw source water influences the level of treatment required to produce domestic water suitable for consumption. Outside of analytical measurements for managing the water treatment processes, both Norrish Creek and Cannell Lake raw water are tested annually for various physical and chemical characteristics in order to monitor if there are any fundamental changes in quality from year to year. Appendix C contains the results from these analyses for 2017 - 2019. In general, the raw source water quality has remained consistent for the past three years. Glyphosate monitoring was added to the Norrish Creek parameters in 2019 as it is an actively logged watershed and this herbicide may have been used historically. The results were non-detect.

Cannell Lake raw water is also monitored weekly and monthly for certain additional parameters, which is further discussed in Section 3.2.

3.1.2 Groundwater

Well water quality results from 2019 are provided in Appendices D through G. Parameters of particular note are further discussed below.

Arsenic

Arsenic can be found 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 supplies. Although levels are generally well below the guideline, elevated arsenic concentrations have been found in areas with natural sources.[1] The Maximum Allowable Concentration (MAC) is 10 μg/L. Industrial B and C are the only two wells that have historically contained arsenic that has been at or above the MAC. In 2019, neither well exceeded the MAC. Industrial B's average arsenic concentration was 6.96 μg/L and the maximum concentration was 8.70 μg/L. Similarly,

[1] Health Canada, December, 1978. 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

for Industrial C, the average and maximum concentrations were 6.95 & 8.35 μg/L, respectively. Note that all distribution system results for arsenic were not detectable or below 1μg/L as shown in Appendix I.

Iron

The presence of iron in natural waters can be attributed to the weathering of rocks and minerals, acidic mine water drainage, landfill leachates, sewage effluents and iron-related industries[2]. Elevated iron can lead to aesthetic issues such as coloured water or objectionable taste. The GCDWQ specifies an aesthetic guideline 300 μg/L. Two AMWSC wells (Townline 2 and Bevan 3) had results above the aesthetic guideline. The water from these wells is blended with water from other sources. All distribution results for iron in 2019 were well below the MAC or not detectable as shown in Appendix I.

Manganese

Manganese is a naturally occurring element in most water sources. High levels of manganese may cause fixture and laundry staining. The GCDWQ specifies an aesthetic guideline 20 μg/L for manganese and a health based MAC of 120 μg/L. Five AMWSC wells (Farmer 1, Industrial B, Industrial C, Pine and Townline 1) regularly produce water with manganese above the aesthetic guideline, but significantly below the MAC. The water from these wells is blended with water from other sources. All distribution results for manganese were below the health based MAC and only two sites, W8 and W9, occasionally yielded results above the aesthetic guideline as these sample locations are often served by the some of the wells listed above.

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 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[3]; higher levels may indicate contamination. The Abbotsford-Sumas aquifer is known to contain elevated levels of nitrate stemming from the application of agricultural fertilizer to the land above. The AMWSC thus monitors for nitrates and nitrites on a monthly basis in all wells. 2019 results are shown in Appendix E. No wells had nitrates in excess of the 10 mg/L MAC during 2019 and the last ten-years of data suggest a general downward trend in most wells.

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[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, 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

Pesticides & Herbicides

Pesticides and herbicides are tested annually in select wells to generally monitor for aquifer contamination. In 2019, 13 wells were tested and all results were non-detect. (The parameters tested are listed in Appendix G).

3.2 Cannell Filtration Exemption Monitoring

In 2005, Fraser Health adopted the "Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia". These standards generally require filtration for drinking water supplied from surface water sources. However, authorities may exclude such sources from filtration assuming compliance with four criteria. 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. The following describes the four filtration exemption criteria and notes how the AMWSC complied with each during 2019.

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.*

   AMWSC Compliance: As of December 2016, Cannell Lake water is treated with 2 disinfection processes: UV-disinfection and chlorination. In 2019, Cannell Lake's raw water was sampled for Cryptosporidium and Giardia 10 times. There were no viable counts in any of the samples.

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.*

   AMWSC Compliance: In 2019, Cannell raw water was tested weekly for *E. coli. E. coli* was detected twice, but the count was only 1/100mL for each sample, therefore the AMWSC remained in compliance with Criterion #2.

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.*

   AMWSC Compliance: The average daily turbidity reading at Cannell Lake was 0.14 NTU and the highest recorded value was 0.22 NTU in 2019.

4. *A watershed control program is maintained that minimizes the potential for fecal contamination in the source water.*

   AMWSC Compliance: Since 2014, the AMWSC has maintained a watershed program plan that monitors and mitigates the risk of lake fecal contamination. This program includes the following key components:

- Completing weekly visual checks at the lake for any signs of watershed contamination (e.g. human trespass, etc). During 2019 a few signs of hikers, dog walkers and quad tracks were noted, but no signs of contamination were observed.
- Maintaining watershed access gates & fences to discourage vehicular entry into the watershed. In 2019, all gates and fences were checked weekly and no sign of forced entry was apparent.
- Completing an annual helicopter inspection of the watershed to identify any changes that may increase contamination risk. In 2019, the helicopter inspection did not occur. There are plans to conduct one in 2020.
- Maintaining signs at watershed access points to alert the public that entry is restricted. There are two signs in place for this purpose as shown in the photographs below.
- Maintaining electronic surveillance devices to monitor human entry into the watershed. In December 2016, a camera was installed at the Cannell Lake WTP that monitors entry to the lake access road.

Cannell Lake Sign

Cannell Lake Gate Sign

- In 2019, the AMWSC introduced a limnology water quality monitoring program at Cannell Lake that will provide early indication of lake water quality changes and any changes that could arise from disturbances in the watershed, particularly those associated with climate change. In terms of outcomes important to downstream treated water quality, the limnology monitoring indicates that there does not appear to be a current concern about algal toxins in Cannell Lake.

- In 2019, the AMWSC updated the Cannell Lake Watershed Management Plan. The updated plan that can be found here: https://www.ourwatermatters.ca/files/Water%20System/2019%20-%20%28AMWSC%29%20Cannell%20Lake%20Watershed%20Control%20Program%20Plan.pdf

3.3 Distribution Water Quality Monitoring

Abbotsford and Mission's distribution systems are tested weekly for *E. coli*, *Total Coliforms*, chlorine residuals, turbidity, temperature and pH at 37 locations. The AMWSC analyzes these parameters at a further five locations along the transmission lines. A list of sample location codes is provided in Table 3-2. Maps of Abbotsford and Mission sampling sites are provided as Figure 3-1 and 3-2, respectively.

Table 3-2 Weekly Water Distribution Test Sites

City of Abbotsford Distribution Network	
W1 - 35041 Harris Rd.	**E2** – Old Yale & Arnold Rd.
W2 - Sandy Hill School	**E3** - 39189 Marion Rd. @ Wellsline Rd.
W3 - 35944 McKee Rd.	**E4** - Campbell Rd. & Tolmie Rd.
W4 - Bateman Park	**E5 -** #3 Rd. @ South Parallel Rd.
W5 - 3315 Gladwin Rd.	**E6** - Cole Rd. Across from 1024
W6 - 32961 South Fraser Way	**E7 -** #1 Rd. @ Tolmie Rd.
W7 - 32111 Joyce Ave.	**E8** - 3434 McDermott Rd.
W8 - King Works Yard	**E9** - Lower Sumas Mtn. Rd.
W9 - 515 Gladwin Rd.	**E10** - 36101 Regal Parkway
W11 - 5030 Lefeuvre Rd.	**E11** - St. Moritz North of Glen Mtn. Dr.
W13 - 7942 Bradner Rd.	**E12** - Beck Rd. @ Larch Park
W14 - Dunach School	**E13** - 2092 McMillan Rd.
W15 - 3154 Clearbrook Rd.	**E14** - Victory Blvd. @ Moulstade Rd.
W16 – 27875 Swensson Rd.	**E15** - 2195 Orchard Dr.
District of Mission Distribution Network	
M1 – Israel Avenue	**M8** – Laminman Avenue
M2 – Balsam Avenue	**M9** – Shook Street
M3 – Penner Avenue	**M10** – Miller Crescent
M5 – Hillcrest Avenue	
M6 – Cannell Booster Station	
M7 – Mary St. @ 4th Avenue	
AMWSC Transmission Pipelines	
Bell Rd.	Cannon Pit 400 & Cannon Pit 600
Ainsworth St.	Maclure Reservoir

Schedule B of the BC Drinking Water Protection Regulation establishes the guideline for water sampling frequency of microbiological contaminants. For water utilities serving more than 90,000 consumers, 90 samples plus 1 sample for every additional 10,000 persons is required per month. Thus, with a serviced population of approximately 170,000, a minimum of 98 samples per month are required. In 2019, the AMSWC, Abbotsford and Mission tested more than 184 samples per month, thereby exceeding requirements.

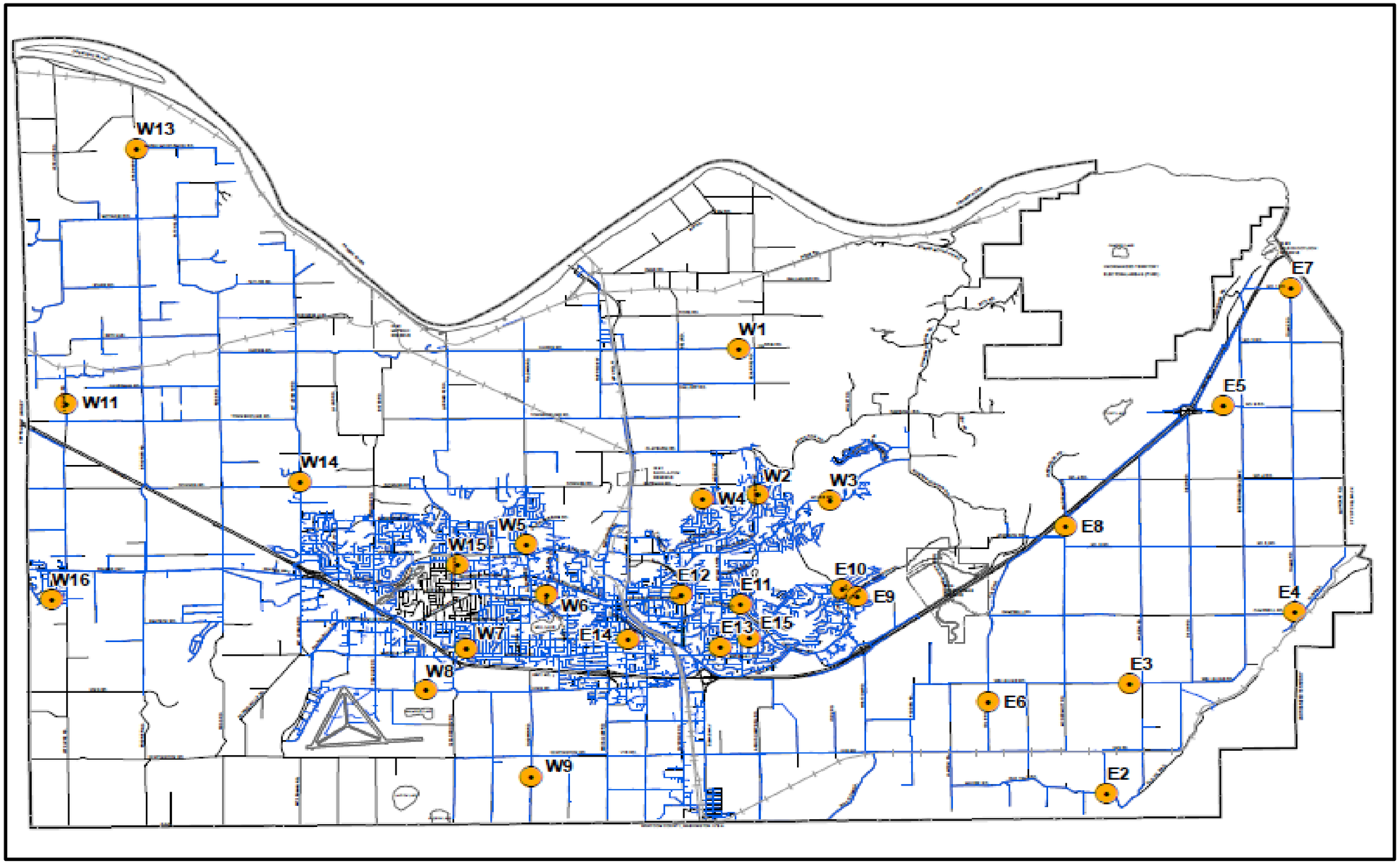

Figure 3-1: Abbotsford Water Distribution Network Sampling Locations

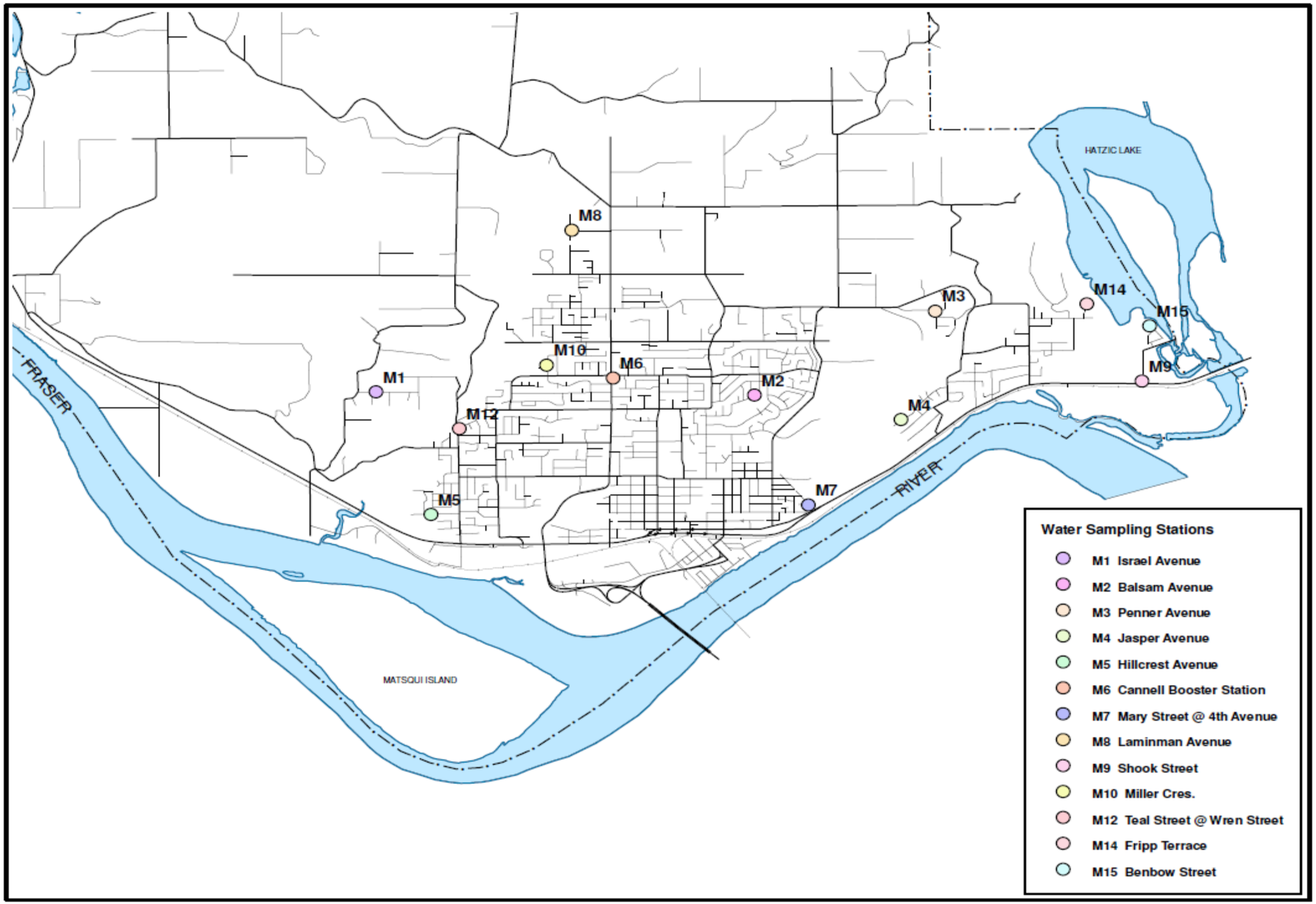

Figure 3-2: Mission Water Distribution Network Sampling Locations

3.3.1 E. coli and Total Coliform

Schedule A of the BC Drinking Water Protection Regulation contains standards for the bacteriological quality of potable water in the province:

- No sample should be positive for *E. coli*;
- No more than 10% of the samples in a 30-day period should be positive for *Total Coliform*; and
- No sample should contain more than 10 *Total Coliform* per 100 ml.

Total Coliforms are a group of bacteria that are generally free-living in the environment, but are also present in water contaminated with human and animal faeces. They 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 faecal contamination of the water and possible presence of intestinal disease-causing bacteria, viruses, and protozoa. The detection of *E. coli* triggers a protocol which involves immediate notification of health and municipal officials, re-sampling and a thorough investigation into the possible causes.

The AMWSC, Abbotsford and Mission tested more than 2000 treated water samples for microbiological parameters in 2019 as shown in Appendix H. The Abbotsford-Mission Water System experienced three and eight positive *E. coli* samples on October 8 and October 16, respectively. A thorough investigation of the incident and results was conducted by a Qualified Professional who concluded that it is highly unlikely that the *E. coli* in the October 2019 samples originated from the Water System and that lab contamination was the likely source. This was further validated by the lab performing the original analysis. Furthermore, more than 900 extra samples collected from October to December throughout the system by staff and Fraser Health were all negative for *E. coli*.

Total Coliforms were detected in three of the regular weekly distribution samples as listed in Table 3-3. Each site was re-sampled upon receiving the result and no detectable coliforms were found in the follow-up sample. All 2019 monthly reports can be found here: http://www.ourwatermatters.ca/water-quality.

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

Date	Location	Total Coliforms (ct/100 ml)
Sept 10	W5	2
Sept 10	M6	10
Sept 11	M6	1

Total Coliforms were detected along the Cannell transmission system in late August and early September during weekly monitoring. As a precaution, resamples were taken and no detectable coliforms were found in the follow-up samples. No *E. coli* were detected. *Total Coliforms* were detected at one Mission distribution site as indicated in Table 3-3. No detectable coliforms were found in the follow-up sample on September 12.

In addition to the AMWSC and municipal testing, Fraser Health also collected 390 audit samples in Abbotsford, 135 in Mission and 78 for the transmission and found no *E. coli* or *Total Coliforms* in 2019.

3.3.2 Disinfection Residuals

Disinfectants are added to potable water supplies to inactivate microorganisms, such as bacteria and viruses, which may be present in the water sources. Chlorine-based chemicals are the most widely used disinfecting agents. The AMWSC uses chloramines for residual disinfection. Chloramination has two distinct advantages over free chlorine: (i) the residual lasts longer, which ensures that disinfection is maintained to the extreme ends of Mission and Abbotsford's large distribution networks, (ii) research suggests that chloramines produce less disinfection by-products than chlorine.

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 4mg/L in the distribution system."[4] As the water travels through the distribution system, the concentration of chloramines declines. The AMWSC typically doses chloramines so that the water initially contains a total chlorine residual between 1.0 and 1.5 mg/L. This initial concentration range generally ensures that there are trace amounts of disinfectant at the far reaches of the pipe network.

The AMWSC, Abbotsford and Mission tested more than 2000 samples for total and free chlorine in 2019. (Aside: The difference between the total and free values approximates the total chloramine concentrations). Of these samples, more than 98% of Abbotsford samples and 99% of Mission samples had total chlorine results above 0.2 mg/L. Unless total coliforms begin to appear in the system, periodic low disinfection residuals are not a concern. The maximum total chlorine concentrations detected in the Abbotsford and Mission distribution systems during 2019 were 1.82 mg/L and 1.79 mg/L, respectively. Appendix H provides 2019 total chlorine residual statistics for the system and individual sampling locations.

[4] Health Canada, June, 2009. 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

3.3.3 Turbidity

Turbidity is a principal physical characteristic of water. It is caused by suspended matter or impurities that interfere with the clarity of the water. Excessive turbidity in drinking water is aesthetically unappealing, and may also represent a health concern since it can provide food and shelter for pathogens. Although turbidity is not a direct indicator of health risk, studies show a strong relationship between removal of turbidity and removal of pathogens.

The Guidelines for Canadian Drinking Water Quality (GCDWQ) specify that water filtration systems should target a treated water turbidity of less than 0.1 NTU. However, for slow sand filters, this guideline is 1.0 NTU[5]. Since the primary AMWSC source, Norrish Creek, is filtered by a combination of ultrafiltration and slow sand filters, it is expected this source will always provide a treated turbidity well less than 1.0 NTU. Similarly, as discussed earlier, Cannell Lake's natural turbidity is typically well below 1.0 NTU. All AMWSC wells also consistently produce water with very low turbidity. Considering all three sources, Abbotsford and Mission distribution systems should have turbidity consistently below 1.0 NTU. Higher values typically indicate a disturbance in the distribution system (e.g. a main break, etc).

In 2019, no Mission distribution sites had a result above 1.0 NTU and the average turbidity was 0.24 NTU. In Abbotsford only one site had one sample that exceeded 1.0 NTU and the average turbidity was 0.14 NTU. Appendix H includes more detailed turbidity results.

3.3.4 pH

The AMWSC monitors pH on-line following water treatment of the Norrish Creek and Cannell Lake sources. The average pH at these locations in 2019 was 6.6 and 6.9, respectively. Additionally, field testing for pH occurs weekly at each distribution system sample location. In Abbotsford, the 2019 median pH was 6.9. In Mission, the median pH was 7.2 [6].

3.3.5 Metals Testing

In 2019, the Abbotsford and Mission distribution systems were tested quarterly for metals to monitor for pipe corrosion and variations in treated water quality relative to that at the sources. Appendix I provides maximum and average values for total metals results collected under this program. In 2019, all distribution sampling locations met all the GCDWQ requirements.

[5] Health Canada, June 2019. Guidelines for Canadian Drinking Water Quality Summary Table. Retrieved from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

[6] Different testing instruments were used in Mission than in Abbotsford in 2019.

3.3.6 Disinfection By-Products

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are by-products of disinfection, created when chlorine reacts with organic matter dissolved in water. THMs and HAAs are suspected carcinogens and thus a human health concern. The GCDWQ recommend limits of 100 µg/L for Trihalomethanes and 80 µg/L for Haloacetic Acids[7].

The AMWSC tests quarterly for THMs and HAAs at the locations shown in Appendix J tables. All results were well below the recommended limits, with the highest results being 49 and 44 µg/L for total THMs and HAAs, respectively. These excellent results are partly attributed to the low organic content in the source waters. Chloramination also helps to suppress the level of disinfection by-products (i.e. chlorine preferentially bonds with the dosed ammonia rather than the organic matter).

In 2019, the AMWSC started testing for N-Nitrosodimethlyamine (NDMA). NDMA is considered highly likely to be carcinogenic to humans. The GCDWQ recommend limits of 40 ng/L[8]. All results were well below the recommended limits, with the highest result being 25.5 ng/L.

3.3.7 Pipe Deterioration Monitoring

The AMWSC tests for various indicators of pipe degradation on annual or bi-annual intervals at applicable system locations. In 2019, all benzo(a)pyrene and vinyl chloride results were non-detect. The asbestos count was zero for all sites and the concentration was non- detect.

[7] 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

[8] Health Canada, May 2008. Guidelines for Canadian Drinking Water. Retrieved from: https://www.canada.ca/content/dam/canada/health-canada/migration/healthy-canadians/publications/healthy-living-vie-saine/water-nitrosodimethylamine-eau/alt/water-nitrosodimethylamine-eau-eng.pdf

4 SYSTEM MAINTENANCE

The AMWSC, City of Abbotsford, and District of Mission have more than 40 staff assigned to engineering, operations management, maintenance, and light 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. Abbotsford & Mission have annual programs to replace aging pipe. Priority is given to pipes that are made of asbestos cement (AC), ductile iron in a known corrosive soil, and those that are approaching the end of their service life or have a history of problems. Abbotsford began using its new smart meters to identify leaks in its distribution system in 2010. Mission has developed a leak detection program which identifies system areas in need of upgrades or replacement.

4.1 Staff Certification & Training

The BC Environmental Operators Certification Program (EOCP) classifies water systems and certifies operators using ratings of I through IV. Higher numbers correspond to greater operational complexity and operators with more advanced training. The BC Drinking Water Protection Act requires that water system owners employ operators with a certification level numerically equivalent to the classification of the water system.

The AMWSC's Norrish Water Treatment Plant is classified as Level III and the transmission system is classified as Level IV. Abbotsford's water distribution system is classified as Level IV and Mission's is Level II. Abbotsford staff maintain and operate the sources, water treatment facilities, transmission system and Abbotsford's distribution system. The District of Mission operates the Mission distribution system.

The AMWSC Water Supply operations team includes 8 Operators. Of these, all have water treatment certificates with the highest being a Level IV Operator. All eight Operators have water distribution certificates; five have level II, two have Level III and one has Level IV.

The Abbotsford Water Distribution department consists of 17 full time positions, 15 of which are filled positions with full time staff, and 2 of which are temporarily filled by auxiliary labourers. There are an additional 2 temporary auxiliary labourers for a total of 19 staff. Of the 15 Operators, there are two Level IV Water Distribution (WD) Operators, three Level III WD Operators, five Level II WD Operators, one Level I WD operator, and 4 operators in training.

The District of Mission's team includes 12 Certified Operators with water distribution certificates; six have their Level II.

4.2 Water System Events of Note in 2019

The Abbotsford-Mission Water System experienced three and eight positive E. coli samples on October 8 and October 16, respectively. A thorough investigation of the incident and results was conducted by a Qualified Professional who concluded that it is highly unlikely that the E. coli in the October 2019 samples originated from the Water System and that lab contamination was the likely source. This was further validated by the lab performing the original analysis. Furthermore, more than 900 extra samples collected from October to December throughout the system by staff and Fraser Health were all negative for E. coli.

4.3 Operational Highlights for 2019

In 2019, the AMWSC, Abbotsford and Mission achieved the following significant works related to water quality:

AMWSC

- Updated Cannell Lake Watershed Management Plan;
- Cannell Lake limnology monitoring program started;
- Cleaned and installed liner on Upper Maclure Reservoir Cell #3; and
- Continued with investigative level studies for a future water source.

Abbotsford

- Met annual target teardown and rebuild of 1000 fire hydrants;
- Completed unidirectional flushing (UDF) program planning;
- Cleaned and inspected 4 reservoirs; and
- Overhauled water sampling process – new equipment purchased and standard operating procedure developed so as to test for more parameters with greater accuracy.

Mission

- Annual dead end water main flushing;
- Annual backflow test done on relief valves; and
- Continued third year of a UDF program, completing 20% of the system annually.

4.4 Works Planned for 2020

Key water system projects related to water quality scheduled for 2019 include the following:

AMWSC

- Continue new source investigative studies;
- Complete Marshall and Farmer Wellfields' infrastructure renewal project;
- Expand Cannell Lake limnology program;
- Complete a system pH & corrosion control study; and
- Complete 'Groundwater at Risk of Pathogens' (GARP) screening for each AMWSC well.

Abbotsford

- Reservoir cleaning (Cassiar, Bradner and Empress reservoirs);
- Plan update of water quality sampling network;
- Saddle Booster/PRV upgrade;
- Bradner Booster Station replacement;
- Purchase additional water quality analyzer unit to support monitoring for the broader flushing program;
- Develop a program to capture data directly from handheld water quality analyzer devices; and
- Start UDF program.

Mission

- Continue with the UDF program, completing 20% of the system annually.

4.5 Emergency Response

The AMWSC 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 District of Mission, where all engineering resources would be coordinated by the City's Emergency Operations Centre; the Plan is premised on Abbotsford staff taking the lead role on all emergencies related to the joint water 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 water service. The ERP contains checklists to prioritize risks and responses, indicators of problems, and restoration plans.

In the event of a positive test for contaminated water, or a case of field evidence indicating that the quality of the water system may be compromised, the City first isolates the affected section of the system to reduce the impact and then contacts Fraser Health to advise them of the situation. The City and the Medical Health Officer (MHO) then evaluate the need for a "Boil Water" or "Stop Water Use" advisory. If such an advisory is to be issued, the City will inform the public. The MHO determines when the advisory can be lifted.

Hard copies of the ERP manual are available for public perusal at Abbotsford's Engineering Department Reception (City Hall, 4th floor) and Mission's City Hall Reception.

5 CONCLUSIONS

Results from 2019 water quality monitoring demonstrate that the City of Abbotsford and District of Mission's drinking water is potable under the definition of the Drinking Water Protection Act & Regulation. AMWSC and municipal water engineers and operators continue to seek water system improvements to consistently provide quality potable water to customers. Monitoring and maintenance programs are designed to meet the challenges of distributing water while preserving public health and the environment and meeting all regulatory requirements. Working closely with Fraser Health and the public, the AMWSC, Abbotsford and Mission will continue to provide an aesthetically-pleasing, clean, and safe drinking water for all to enjoy.

APPENDICES

APPENDIX A – FRASER HEALTH HEALTHLINK

fraserhealth Better health. Best in health care.

March 16, 2010

Water Suppliers:

Re: HealthlinkBC File #56 - Persons with Compromised or Weakened Immune systems

In the Ombudsman's Special Report No. 32, June 2008, entitled "Fit to Drink: Challenges in Providing Safe Drinking Water in British Columbia", the Ombudsman recommended that adequate procedures need to be established by Fraser Health to notify people with compromised or weakened immune systems about the potential health risks associated with drinking water.

As part of our ongoing efforts to comply with the Ombudsman's recommendation, we are requesting all water suppliers to include the attached HealthlinkBC File # 56 with their annual report. Please make the report available to all your users. The information can also be found on the following web link:
www.healthlinkbc.ca/healthfiles/pdf/hfile56.pdf

If you have any questions about the above, please contact our office at 604-870-7900 (toll free: 1-866-749-7900) and one of our environmental health officers will gladly assist you.

Sincerely

Marc Zubel.

Marc Zubel, P.Eng.
Manager, Drinking Water Program
Health Protection

Enc.

MZ/cs

Public Health Protection
Fraser Health Authority

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BRITISH COLUMBIA
The Best Place on Earth

HealthLinkBC

Number 56
August 2009

Drinking Water and Those with Weakened Immune Systems

Some people with very weak immune systems may be at higher risk of water-borne infections. This file provides information about how to help prevent water-borne infections.

People who have significantly weakened immune systems and who are at higher risk of certain water-borne diseases include:

- People with HIV infection who have a CD4+ count of < 100 cells/mm^3.
- People with hematological malignancies (lymphoma or leukemia) who are being actively treated or have been in remission and off treatment for less than 1 year.
- Hematopoietic stem cell transplant recipients.
- 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 specialist how weak your immune system is, and whether you need to take extra precautions.

Diseases from drinking water

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 not built properly or if it draws on water from the surface of the ground, such as shallow wells or wells 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 wells potentially contaminated by surface water (for example, dug wells), unless the water has been treated to remove or inactivate at least 99.9% of parasites (protozoa), 99.99% of viruses and 100% of 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% reduction in infectious parasites. Furthermore, some water systems and many private supplies have no treatment at all. If the water you drink has not been disinfected, please refer to HealthLink BC File #49b How to Disinfect Drinking Water.

To further treat drinking water that has been disinfected, consider the methods listed below.

Options for water treatment

Boiling: If your water supply is disinfected you need only bring the water to a full boil to inactivate any *Cryptosporidium* parasites - a major concern for immunocompromised people, as there is no medical treatment for this parasite.

If the water is not yet disinfected, it's recommended you bring water to a full boil for at least one minute as the best way to kill or inactivate bacteria, viruses and parasites.

At elevations over 2,000 meters [6,500 feet], you should boil water for at least two minutes to disinfect it. In this situation, you should not drink or use tap water to brush your teeth, rinse your mouth, mix drinks or make ice cubes without boiling it first.

If you are preparing infant formula, please see HealthLink BC File #69b Formula Feeding Your Baby: Safely Preparing and Storing Formula. Please note that boiling water will get rid of viruses, bacteria and parasites but not chemicals which may be found in the water. For more information, please contact the environmental health officer or drinking water officer at your nearest public health unit.

Filters: 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. These are *not* suitable for removing bacteria and viruses and should *not* be used *unless* the water supply is at least disinfected first.

Jug-type filters, 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.

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 it 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.

Bottled water

If you do not want to drink water from the tap, you may also choose to buy bottled water that has been treated adequately. Most bottled water in B.C. has had RO treatment, but not all has been treated. You should check with the water bottler to find out what treatment it has had. You can still use tap water for cooking as long as you boil it. You can use bottled water treated by reverse osmosis for drinking, brushing teeth, making ice cubes and for recipes where water is used but not boiled such as cold soups or salad dressings.

For more information, including the level of treatment in your local water system, please contact your drinking water purveyor or supplier or the local environmental health officer or drinking water officer. Please also see the following HealthLink BC Files.

#49a Water-borne Diseases in BC

#49b How to Disinfect Drinking Water

BC Centre for Disease Control
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY

For more HealthLink BC File topics, visit www.HealthLinkBC.ca/healthfiles/index.stm or your local public health unit.

Click on www.HealthLinkBC.ca or call **8-1-1** for non-emergency health information and services in B.C.

For deaf and hearing-impaired assistance, call 7-1-1 in B.C.

Translation services are available in more than 130 languages on request.

APPENDIX B – METALS IN DRINKING WATER

fraserhealth Better health. Best in health care.

February 26, 2016

Water System Operators

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

Fraser Health has recently revised its metals at the tap "Flush" message and we are asking all water systems to please include the following health message with your next annual reports to your users.

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.

Sincerely,

Marc Zubel
Manager, Drinking Water Program
Health Protection

Public Health Protection
Fraser Health Authority
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APPENDIX C – ANNUAL RAW WATER SCAN (SURFACE WATER)

Parameter *	Units	GCDWQ[1]	Norrish Creek			Cannell Lake		
			2017 27-Sept	2018 26-Sept	2019 17-Oct	2017 27-Sept	2018 26-Sept	2019 17-Oct
Alkalinity (as $CaCO_3$)	mg/L	-	8.3	6.5	6.0	6.0	5.3	4.2
Aluminum (total)	µg/L	200	18.0	280	112	25	11	6.7
Antimony (total)	µg/L	6	ND	ND	ND	ND	ND	ND
Arsenic (total)	µg/L	10	ND	0.38	0.21	ND	0.13	0.14
Barium (total)	µg/L	1000	7.6	7.5	6.0	ND	2.6	2.8
Bicarbonate (as HCO_3)	mg/L	-	8.3	6.5	-	6.0	5.3	-
Boron (total)	µg/L	5000	16	ND	ND	8.1	ND	ND
Cadmium (total)	µg/L	5	ND	0.01	ND	ND	ND	ND
Calcium (total)	mg/L	-	2.6	2.3	2.2	1.5	1.4	1.4
Carbonate (as CO_3)	mg/L	-	ND	ND	-	ND	ND	-
Chloride	mg/L	≤ 250	0.6	ND	0.8	0.6	4.0	0.6
Chromium (total)	µg/L	50	ND	0.69	ND	ND	ND	ND
Colour (total)	TCU	≤ 15	ND	8.0	20	ND	ND	ND
Conductivity	microS/cm	-	24	18	17	14	26	12
Copper (total)	µg/L	≤ 1000	1.4	16	ND	6.2	4.0	3.6
Fluoride	mg/L	1.5	ND	ND	ND	ND	ND	ND
Glyphosate	µg/L	-	-	-	ND**	-	-	-
Hardness (as $CaCO_3$)	mg/L	-	8.2	6.9	7.1	4.3	4.2	4.5
Iron (total)	µg/L	≤ 300	ND	215	28	59	21	26
Lead (total)	µg/L	10	ND	2.2	ND	0.6	ND	0.1
Magnesium (total)	mg/L	-	0.3	0.3	0.3	0.2	0.2	0.2
Manganese (total)	µg/L	120	ND	9.3	0.70	29	6.0	7.6
Mercury (total)	µg/L	1	ND	ND	ND	ND	ND	ND
Nitrate (as N)	mg/L	10	0.13	0.16	0.11	ND	0.010	ND
Nitrite (as N)	mg/L	-	ND	ND	ND	ND	ND	ND
pH	-	7 – 10.5	6.34	6.99	6.98	6.63	6.93	6.87
Potassium (total)	µg/L	-	ND	97	90	ND	50	ND
Selenium (total)	µg/L	50	ND	ND	ND	ND	ND	0.05
Sodium (total)	µg/L	≤ 200000	1240	932	872	720	3420	725
Sulphate	mg/L	≤ 500	1.3	0.70	0.80	ND	0.80	1.3
Total Dissolved Solids	mg/L	≤ 500	ND	26	20	ND	30	14
Uranium (total)	µg/L	20	ND	0.05	0.04	ND	ND	ND
Zinc (total)	µg/L	≤ 5000	ND	19	ND	5.0	ND	8.1

ND = not detectable

- = Not Tested

* Parameters tested may vary slightly from year to year; this table provides results for those with GCDWQ specified limits and those that are more often of interest to certain customers (e.g. industries with processes sensitive to metal concentrations). Contact eng-info@abbotsford.ca to inquire about other results.

** Glyphosate tested only at Norrish because it is an actively logged watershed. Results are non-detect.

1 - These are treated water criteria and only shown for comparison to raw water results. (i.e. Water treatment will improve quality before water is sent into distribution system). Black text denotes health-based maximum acceptable concentrations (MAC); light grey text denotes aesthetic objectives (AO).

APPENDIX D – ANNUAL RAW WATER SCAN (WELLS)

(Page 1 of 3)

Parameter *	Units	GCDWQ[1]	Farmer 1			Farmer 3			Industrial A			Industrial B			Industrial C			McConnell		
			2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**
Alkalinity (as $CaCO_3$)	mg/L	-	64.4	62.4	67.1	Not Tested	Tested, but results not representative. [3]	Tested, but results not representative. [3]	Not Tested	Not Tested	Not Tested	86.9	87.5	98.6	99.1	92.6	Not Tested	76	74.5	78.6
Aluminum (total)	µg/L	200	ND	ND	ND							ND	ND	ND	ND	ND		7.0	ND	ND
Antimony (total)	µg/L	6	ND	ND	ND							ND	0.11	0.31	ND	0.21		0.22	0.19	0.28
Arsenic (total)	µg/L	10	ND	0.160	0.140							8.30	8.87	6.14	6.14	6.93		2.97	3.99	5.52
Barium (total)	µg/L	1000	9.7	12	11							22	28	24	29	33		26	27	26
Bicarbonate (as HCO_3)	mg/L	-	64.4	62.4	-							86.9	87.5	-	99.1	92.6		76.0	74.5	-
Boron (total)	µg/L	5000	28	24	22							28	24	17	11	ND		27	23	24
Cadmium (total)	µg/L	5	0.02	0.01	0.02							ND	ND	ND	ND	ND		ND	0.01	0.01
Calcium (total)	mg/L	-	27.5	31.6	31.8							24.2	30.0	34.1	36.8	40.4		32.4	34.2	33.0
Carbonate (as $CaCO_3$)	mg/L	-	ND	ND	-							ND	ND	-	ND	ND		ND	ND	-
Chloride	mg/L	≤ 250	9.57	9.84	9.85							11.9	11.2	13.5	14.1	13.7		11.7	11.6	12.6
Chromium (total)	µg/L	50	ND	0.37	0.27							ND	ND	ND	ND	ND		ND	ND	ND
Colour (Total)	TCU	≤ 15	ND	ND	ND							ND	ND	ND	ND	ND		ND	ND	ND
Conductivity	microS/cm	-	263	280	270							246	258	282	297	310		316	322	305
Copper (total)	µg/L	≤ 1000	9.62	6.77	6.31							1.12	0.570	ND	0.830	0.550		4.56	4.10	2.94
Fluoride	mg/L	1.5	ND	0.030	0.050							0.11	0.050	0.050	ND	0.030		ND	0.040	55
Hardness (as $CaCO_3$)	mg/L	-	104	113	123							86	95	132	125	133		115	117	119
Iron (total)	µg/L	≤ 300	ND	ND	ND							24	19	10	21	17		ND	12	29
Lead (total)	µg/L	10	0.85	0.55	0.54							ND	ND	ND	ND	ND		0.25	0.17	0.25
Magnesium (total)	mg/L	-	8.56	9.10	9.19							6.09	6.53	8.30	8.13	8.52		8.17	7.95	7.57
Manganese (total)	µg/L	≤ 120	41.0	59.5	61.1							35.4	43.6	51.0	52.7	57.3		12.7	15.9	20.6
Mercury (total)	µg/L	1	ND	ND	ND							ND	ND	ND	ND	ND		ND	ND	ND
pH	-	7 – 10.5	6.90	7.48	7.67							7.43	8.23	8.25	7.48	8.22		7.12	7.99	8.12
Potassium (total)	mg/L	-	1.34	1.52	1.55							2.72	3.15	3.30	2.31	2.64		2.30	2.66	3.01
Selenium (total)	µg/L	10	0.61	0.51	0.62							ND	ND	ND	ND	ND		1.3	0.48	0.25
Silicon (total)	µg/L	-	-	7860	8070							-	6750	6570	-	7360		-	7870	8030
Sodium (total)	mg/L	≤ 200	6.15	6.56	6.13							13.0	12.7	8.89	6.90	6.92		12.7	16.3	16.2
Sulphate	mg/L	≤ 500	33.4	34.6	40.4							27.2	28.5	38.0	44.7	46.4		54.7	65.9	67.2
Total Dissolved Solids	mg/L	≤ 500	161	191	199							781[2]	158	184	188	207		209	206	197
Turbidity	NTU	-	ND	0.11	ND							0.16	0.10	ND	ND	0.11		ND	ND	0.14
Uranium (total)	µg/L	20	0.020	0.030	0.040							0.37	0.41	0.63	0.19	0.27		0.15	0.21	0.31
Zinc (Total)	µg/L	≤ 5000	25	17	35							ND	3.4	ND	ND	ND		7.3	7.1	4.5

ND = not detectable
Not Tested = well pumps were out-of-service, thus sampling could not be completed. Farmer 2, Riverside 2 and Marshall 2 results are not shown since the well has been out-of-service since 2010.
- = Not Tested
* Parameters tested may vary slightly from year to year; this table provides results for those with GCDWQ specified limits and those that are more often of interest to certain customers (e.g. industries with processes sensitive to metal concentrations). Contact eng-info@abbotsford.ca to inquire about other results.
1 -These are treated water criteria and only shown for comparison to raw water results. (i.e. Water treatment may improve quality before water is sent into distribution system). Black text denotes health-based maximum acceptable concentrations (MAC); light grey text denotes aesthetic objectives (AO).
2 -This result is considered an anomaly, likely due to lab error, since other parameters (.e.g conductivity) would show similar increases relative to previous years if there were an actual change in TDS.
3 - Farmer 3 had been out of service since Jul 2017. It is a well that requires extensive flushing after prolonged outages before water quality normalizes and water is sent to distribution. Its 2018 and 2019 sampling occurred before quality had normalized.

(Page 2 of 3)

Parameter	Units	GCDWQ	Marshall 1			Marshall 3			Riverside 1			Townline 1			Townline 2		
			2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**
Alkalinity (as $CaCO_3$)	mg/L	-	121	108	113	Not Tested	Not Tested	Not Tested	78.6	77.3	Not Tested	43.5	42.0	46.8	54.3	47.1	38.4
Aluminum (total)	µg/L	200	6.4	3.1	ND				ND	ND		ND	ND	ND	ND	ND	ND
Antimony (total)	µg/L	6	ND	0.13	0.18				ND	ND		ND	ND	ND	ND	ND	ND
Arsenic (total)	µg/L	10	1.69	1.76	2.00				0.55	0.63		ND	0.53	0.51	ND	0.41	0.28
Barium (total)	µg/L	1000	13.5	14.6	13.4				12.8	15.2		17.4	19.2	19.6	5.40	6.03	6.22
Bicarbonate (as HCO_3)	mg/L	-	121	108	-				78.6	77.3		43.5	42.0	-	54.3	47.1	-
Boron (total)	µg/L	5000	25	19	18				17	15		25	18	18	32	29	26
Cadmium (total)	µg/L	5	0.02	0.0	0.03				0.01	0.01		0.03	0.03	0.03	0.02	0.02	0.03
Calcium (total)	mg/L	-	38.9	39.1	39.3				30.8	36.1		19.1	20.3	21.1	21.1	21.6	20.1
Carbonate (as CO_3)	mg/L	-	ND	ND	-				ND	ND		ND	ND	-	ND	ND	-
Chloride	mg/L	≤ 250	31.8	29.5	28.7				21.3	22.1		10.6	9.84	13.5	12.9	6.03	7.23
Chromium (total)	µg/L	50	ND	ND	ND				0.52	0.50		ND	0.18	0.18	ND	0.22	0.24
Colour (total)	TCU	≤ 15	ND	ND	ND				ND	ND		ND	ND	ND	ND	ND	ND
Conductivity	microS/cm	-	348	350	326				294	301		181	185	194	189	178	165
Copper (total)	µg/L	≤ 1000	2.59	1.28	7.37				5.47	5.39		7.05	10.6	10.9	8.37	11.0	24.8
Fluoride	mg/L	1.5	ND	0.03	0.03				ND	0.02		ND	ND	0.02	ND	ND	ND
Hardness (as $CaCO_3$)	mg/L	-	133	135	147				116	121		66.4	68.3	78.3	73.0	70.1	71.8
Iron (total)	µg/L	≤ 300	138	42.0	170				0.01	ND		ND	17	14	35	145	1630[4]
Lead (total)	µg/L	10	0.58	0.14	0.30				ND	0.16		0.33	0.47	0.34	0.23	0.40	0.69
Magnesium (total)	mg/L	-	8.69	8.59	8.82				9.50	9.95		4.52	4.52	4.59	4.92	4.45	4.24
Manganese (total)	µg/L	≤ 120	10.3	7.02	6.53				ND	ND		71.4	77.4	85.2	0.850	2.06	11.2
Mercury (total)	µg/L	1	ND	ND	ND				ND	ND		ND	ND	ND	ND	ND	ND
pH	-	7 – 10.5	7.40	8.13	8.12				7.19	7.91		6.63	7.30	7.45	6.77	7.32	7.31
Potassium (total)	mg/L	-	2.44	2.48	2.68				1.49	1.72		2.72	2.93	2.79	0.99	1.02	0.95
Selenium (total)	µg/L	10	ND	ND	ND				ND	0.33		ND	0.15	0.13	ND	0.14	0.16
Silicon (total)	µg/L	-	-	6970	8010				-	10700		-	9400	9550	-	10100	10600
Sodium (total)	mg/L	≤ 200	15.1	14.9	14.1				7.50	8.11		6.63	5.97	6.89	6.02	5.74	5.36
Sulphate	mg/L	≤ 500	27.8	28.6	30.4				28.3	29.9		14.0	13.7	16.5	14.1	13.4	13.8
Total Dissolved Solids	mg/L	≤ 500	195	218	216				176	203		108	136	145	117	124	130
Turbidity	NTU	20	0.37	0.23	0.12				ND	ND		0.10	0.13	ND	0.19	0.93	1.69
Uranium (total)	µg/L	20	0.6	0.6	0.6				0.07	0.07		0.02	0.02	0.02	0.06	0.03	0.02
Zinc (total)	µg/L	≤ 5000	ND	5.7	18				7.7	6.4		4.9	14	18	7.2	8.8	10

ND = not detectable
- = Not Tested
Not Tested = well pumps were out-of-service, thus sampling could not be completed.
4 - Discussed in Section 3.1.2

(Page 3 of 3)

Parameter	Units	GCDWQ	Bevan 1			Bevan 2			Bevan 3			Bevan 4			Pine		
			2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**	2017 Sept 27	2018 Sept 26	**2019 17-Oct**
Alkalinity (as $CaCO_3$)	mg/L	-	51.3	46.3	43.6	65.3	47.8	49.8	53.3	45.6	43.1	49.3	42.2	39.3	73.4	72.1	
Aluminum (total)	µg/L	200	35.8	7.30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Antimony (total)	µg/L	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Arsenic (total)	µg/L	10	ND	0.27	6.1	ND	0.33	0.23	ND	0.27	0.32	ND	0.24	0.22	ND	0.20	
Barium (total)	µg/L	1000	ND	5.5	33	5.5	5.9	5.8	5.2	5.4	5.9	ND	5.1	5.1	13.4	13.9	
Bicarbonate (as HCO_3)	mg/L	-	51.3	46.3	-	65.3	47.8	-	53.3	45.6	-	49.3	42.2	-	73.4	72.1	
Boron (total)	µg/L	5000	21	13	17	12	11	13	12.	11	13	12	11	12	37	30	
Cadmium (total)	µg/L	5	0.02	0.02	ND	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.02	0.02	0.07	0.06	
Calcium (total)	mg/L	-	20.2	21.1	34.1	19.8	19.5	21.0	19.7	21.2	20.5	18.6	20.9	20.2	29.7	34.7	
Carbonate (as CO_3)	mg/L	-	ND	ND	-	ND	ND	-	ND	ND	-	ND	ND	-	ND	ND	
Chloride	mg/L	≤ 250	19.3	20.6	24.5	14.9	16.4	20.2	19.9	19.6	23.5	17.1	18.9	24.4	49.7	55.5	
Chromium (total)	µg/L	50	0.54	0.21	ND	0.54	0.26	0.20	ND	0.26	0.33	ND	0.24	0.20	ND	0.16	
Colour (total)	TCU	≤ 15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Conductivity	microS/cm	-	210	209	202	201	190	194	204	200	197	183	195	194	338	362	
Copper (total)	µg/L	≤ 1000	3.58	4.97	ND	3.70	6.69	8.15	9.17	5.25	13.1	38.6	7.74	6.47	40.1	36.0	
Fluoride	mg/L	1.5	ND	0.02	0.02	ND	0.03	0.03	ND	0.02	0.02	ND	0.02	0.02	ND	0.02	
Hardness (as $CaCO_3$)	mg/L	-	74.9	74.5	80.3	74.6	71.7	81.3	73.1	72.9	79.5	67.9	70.8	78.7	119	131	
Iron (total)	µg/L	≤ 300	16	31	10	ND	ND	52	ND	493[5]	49	12	13	32	65	34	
Lead (total)	µg/L	10	ND	0.18	ND	ND	ND	0.12	ND	0.25	0.13	0.27	0.05	0.06	0.61	0.78	
Magnesium (total)	mg/L	-	5.94	6.03	8.30	6.11	5.59	6.03	5.82	5.45	5.91	5.17	5.20	5.45	10.8	9.81	
Manganese (total)	µg/L	≤ 120	0.62	0.78	7.6	0.24	0.53	2.4	0.72	1.2	1.2	0.22	1.4	1.0	69	38	
Mercury (total)	µg/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
pH	-	7 – 10.5	6.99	7.66	7.56	7.02	7.70	7.66	6.93	7.62	7.57	6.89	7.5	7.47	6.83	7.41	
Potassium (total)	mg/L	-	0.96	1.1	1.1	0.99	1.0	1.1	0.97	1.0	1.1	0.95	1	1.1	1.7	1.4	
Selenium (total)	µg/L	10	ND	0.14	0.14	ND	0.19	0.15	ND	0.14	0.14	ND	0.13	0.17	ND	0.060	
Silicon (total)	µg/L	-	-	11700	12700	-	11800	12400	-	11200	11600	-	11100	12100	-	7960	
Sodium (total)	mg/L	≤ 200	7.16	8.16	7.98	6.59	6.79	6.49	7.52	7.59	6.85	7.04	7.55	7.23	20.2	14.7	
Sulphate	mg/L	≤ 500	15	11	11	12	9.4	10	13	10	10	11	11	11	18	18	
Total Dissolved Solids	mg/L	≤ 500	132	148	159	138	136	148	140	142	151	125	139	153	214	235	
Turbidity	NTU	20	0.26	0.45	0.62	ND	ND	0.71	0.1	3.79	0.45	0.65	0.17	0.45	0.39	0.23	
Uranium (total)	µg/L	20	ND	0.01	0.03	0.04	0.02	0.01	ND	0.01	0.03	ND	0.01	0.01	0.03	0.05	
Zinc (total)	µg/L	≤ 5000	4.8	9.3	18	ND	ND	18	ND	17	5.1	ND	7.8	6	9.6	21	

Not Tested

ND = not detectable
- = Not Tested
5 - Discussed in Section 3.1.2

APPENDIX E – MONTHLY WELL MONITORING (NITRATES)

(All results expressed in mg/L as Nitrogen)

Date **	Farmer 1	Farmer 3	Industrial A	Industrial B	Industrial C
10-Jan	5.9	-	-	ND	0.87
7-Feb	6.0	-	-	ND	-
7-Mar	6.9	-	-	ND	-
11-Apr	7.5	-	-	0.02	-
9-May	7.0	-	-	0.27	-
6-Jun	6.7	-	-	0.73	-
11-Jul	6.9	-	-	0.39	-
8-Aug	6.3	-	-	1.5	-
12-Sep	6.1	-	-	2.2	-
24-Oct	6.1	0.23	7.5	0.13	ND
7-Nov	6.0	0.28	7.2	0.01	ND
12-Dec	5.8	0.28	6.9	ND	ND

Date	McConnell	Riverside 1	Marshall 1	Townline 1	Townline 2
10-Jan	2.1	3.0	0.11	4.7	4.4
7-Feb	2.0	3.2	0.09	4.5	4.7
7-Mar	1.2	3.9	0.03	4.5	4.8
11-Apr	2.0	3.6	0.15	4.9	4.2
9-May	2.4	2.9	0.17	4.9	3.8
6-Jun	1.0	3.5	0.14	5.3	4.1
11-Jul	1.8	3.7	0.19	5.9	3.9
8-Aug	3.7	3.3	0.10	5.4	34
12-Sep	1.6	3.4	0.24	5.2	4.8
24-Oct	0.42	-	0.12	4.7	5.3
07-Nov	0.37	-	0.11	4.5	5.1
12-Dec	0.75	-	0.11	4.5	5.1

Date	Bevan 1	Bevan 2	Bevan 3	Bevan 4	Pine
10-Jan	3.6	3.1	-	3.1	1.3
7-Feb	3.4	3.1	2.1	3.1	1.1
7-Mar	3.5	3.1	3.2	3.2	1.3
11-Apr	3.3	3.0	3.1	3.1	1.4
9-May	3.0	2.7	2.9	3.0	1.3
6-Jun	2.9	2.6	2.7	2.9	1.4
11-Jul	2.8	2.9	2.9	3.1	1.5
8-Aug	2.6	2.4	2.2	2.8	1.5
12-Sep	2.5	2.7	2.6	3.0	1.5
24-Oct	3.9	3.1	3.1	3.1	1.5
7-Nov	3.7	3.1	3.1	3.0	1.4
12-Dec	3.7	3.0	3.0	3.0	1.3

ND = not detectable
- = not tested

APPENDIX F – MONTHLY WELL MONITORING (TOTAL METALS)

Parameter	Units	GCDWQ [1]	Farmer 1		Industrial B		Industrial C		McConnell		Marshall 1		Townline 1		Townline 2		Pine	
			Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg
Aluminum (total)	µg/L	200	ND	ND	6.1	0.56	ND	ND	ND	ND	4.0	0.87	4.4	0.40	ND	ND	ND	ND
Antimony (total)	µg/L	6	ND	ND	0.34	0.16	0.56	0.20	0.27	0.19	0.15	0.11	ND	ND	ND	ND	ND	ND
Arsenic (total)	µg/L	10	0.16	0.12	8.7	7.0	8.4	7.0	5.7	4.6	2.3	1.8	0.62	0.53	0.65	0.43	0.22	0.15
Barium (total)	µg/L	1000	12	9.4	43	32	40	30	29	27	14	8.9	59	19	20	6.0	15.4	11.7
Boron (total)	µg/L	5000	25	19	26	15	14	3.5	25	19	19	15	24	14	26	20	38	28
Cadmium (total)	µg/L	5	0.10	0.025	0.033	0.010	0.10	0.025	0.030	0.023	19	1.6	0.040	0.035	0.031	0.027	0.10	0.082
Chromium	µg/L	50	1.3	0.29	1.4	0.20	ND	ND	0.30	0.12	0.28	0.060	0.33	0.19	1.3	0.31	0.38	0.12
Copper (total)	µg/L	≤1000	13.1	8.96	2.28	0.562	1.57	0.898	6.08	4.10	7.40	1.99	28.6	19.7	43.9	12.8	99.4	56.7
Fluoride	mg/L	1.5	0.050	0.044	0.060	0.046	0.40	0.40	0.060	0.051	0.040	0.038	0.025	0.015	0.050	0.0050	0.040	0.032
Hardness (as $CaCO_3$)	mg/L	-	128	120	153	122	141	136	133	125	148	134	77.4	71.9	79.4	71.8	146	124
Iron (total)	µg/L	≤300	ND	ND	24.0	15.0	36.0	21.5	26.0	9.27	19.0	3.00	21.0	9.54	201	52.5	271	105
Lead (total)	µg/L	10	0.84	0.55	0.14	0.020	ND	ND	0.39	0.17	0.30	0.15	1.9	0.68	0.74	0.28	1.8	1.1
Magnesium (total)	mg/L	-	10.1	9.33	10.8	8.35	9.84	8.49	9.00	8.13	9.52	8.56	5.04	4.50	5.08	4.57	12.2	10.0
Manganese (total)	µg/L	≤120	68.5	61.1	68.6	53.1	64.1	59.4	19.5	16.8	6.87	5.68	88.7	74.4	83.8	9.71	115	82.9
Mercury (total)	µg/L	1	ND	ND	0.6	0.06	ND	ND	ND	ND	0.01	.001	0.01	ND	ND	ND	ND	ND
Selenium (total)	µg/L	10	0.82	0.66	0.080	0.010	0.070	0.020	0.80	0.62	ND	ND	0.21	0.13	0.24	0.20	0.11	0.054
Uranium (total)	µg/L	20	0.040	0.026	0.95	0.66	0.88	0.26	0.39	0.31	0.62	0.59	0.088	0.024	0.22	0.069	0.040	0.018
Zinc (total)	µg/L	≤ 5000	60.5	35.1	4.80	0.818	7.70	3.73	19.1	6.46	13.2	6.79	55.6	25.5	19.7	9.80	48.4	27.3

Parameter	Units	GCDWQ [1]	Bevan 1		Bevan 2		Bevan 3		Bevan 4		Riverside 1	
			Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg
Aluminum (total)	µg/L	200	5.8	4.9	ND	ND	ND	ND	ND	ND	ND	ND
Antimony (total)	µg/L	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (total)	µg/L	10	0.27	0.21	0.74	0.29	0.31	0.21	0.26	0.18	0.75	0.63
Barium (total)	µg/L	1000	5.7	4.4	7.2	5.2	5.8	4.4	5.3	4.1	15	13
Boron (total)	µg/L	5000	14	11	13	8.7	13	9.5	10	4.0	16	13
Cadmium (total)	µg/L	5	0.34	0.052	0.030	0.022	0.020	0.019	0.030	0.023	0.10	0.03
Chromium	µg/L	50	0.33	0.20	1.1	0.35	0.32	0.21	1.1	0.27	0.50	0.47
Copper (total)	µg/L	≤1000	8.38	5.99	14.6	8.13	19.7	7.77	75.3	25.1	424	59.2
Fluoride	mg/L	1.5	0.026	0.022	0.030	0.028	0.030	0.024	0.030	0.013	0.03	0.02
Hardness (as $CaCO_3$)	mg/L	-	87.9	79.4	101	81.4	83.5	75.8	76.2	71.0	135	128
Iron (total)	µg/L	≤300	63.0	22.8	59.0	15.5	828[2]	96.8	207	36.3	ND	ND
Lead (total)	µg/L	10	0.17	0.079	0.58	0.13	0.15	0.083	0.35	0.12	0.48	0.29
Magnesium (total)	mg/L	-	6.91	6.17	7.86	6.42	6.37	5.73	5.97	5.12	10.2	9.76
Manganese (total)	µg/L	≤120	11.7	4.89	4.58	1.94	4.01	1.40	11.2	1.97	0.25	0.064
Mercury (total)	µg/L	1	0.01	0.002	ND	ND	0.01	.002	ND	ND	0.01	.001
Selenium (total)	µg/L	10	0.28	0.17	0.22	0.19	0.23	0.17	0.19	0.15	0.29	0.24
Uranium (total)	µg/L	20	0.10	0.025	0.010	.0030	0.020	0.013	0.01	0.003	0.11	0.068
Zinc (total)	µg/L	≤ 5000	18.3	11.3	14.5	8.08	10.2	4.88	41.7	16.2	37.0	18.3

ND = not detectable
1 - These are treated water criteria and only shown for comparison to raw water results. (i.e. Water treatment may improve quality before water is sent into distribution system). Black text denotes health-based maximum acceptable concentrations (MAC); light grey text denotes aesthetic objectives (AO).
6 - Discussed in Section 3.1.2

APPENDIX G – WELL PESTICIDES & HERBICIDES SCAN

Parameters shown as blue text are those that have been collected in previous years. Black text denotes newly recorded this year.

Parameters Tested (all results non-detect)		
1,2-Dichlorobenzene	Benzo(ghi)perylene	Imazamethabenz-methyl
1,2,3-Trichlorobenzene	Benzo(k)fluoranthene	Imidacloprid
1,2,4-Trichlorobenzene	beta-BHC	Indeno(1,2,3-c,d)pyrene
1,3-Dichlorobenzene	beta-Endosulfan	Indole
1,4-Dichlorobenzene	Biphenyl	Iprodione
1-Chloronaphthalene	Bis(2-chloroethoxy)methane	Isophorone
1-Methylnaphthalene	Bis(2-chloroethyl)ether	Linuron
2,3,4,5-Tetrachlorophenol	Bis(2-chloroisopropyl)ether	Malathion
2,3,4,6-Tetrachlorophenol	Bis(2-ethylhexyl)phthalate	MCPA
2,3,4-Trichlorophenol	Boscalid	Mecoprop
2,3,5,6-Tetrachlorophenol	Bromacil	Metalaxyl
2,3,5-Trichlorophenol	Bromoxynil	Methoxychlor
2,4,5-T	Butylbenzyl phthalate	Methyl Parathion
2,4,5-TP	Camphene	Metolachlor
2,4,5-Trichlorophenol	Captan	Metribuzin
2,4,6-Trichlorophenol	Carbaryl	Metsulfuron-methyl
2,4-D	Carbofuran	Mirex
2,4-Dichlorophenol	Carboxin	Myclobutanil
2,4-Dimethylphenol	Chlorantraniliprole	Naphthalene
2,4-Dinitrophenol	Chlordane	Nitrobenzene
2,4-Dinitrotoluene	Chlorpyrifos	N-Nitroso-di-n-propylamine
2,4-DP	Chrysene	o,p-DDE
2,6-Dichlorophenol	cis-chlordane	op-DDD
2,6-Dinitrotoluene	Clothianidin	op-DDT
2-Chloronaphthalene	Cresols (total)	Oxychlordane
2-Chlorophenol	Cyanazine	p,p'-DDD
2-Methylnaphthalene	DCPMU	p,p'-DDE
2-Methylphenol	DDT + metabolites	p,p'-DDT
2-Nitrophenol	delta-BHC	Parathion
3&4-Methylphenol	Diazinon	Pentachloronitrobenzene
3,3'-Dichlorobenzidine	Dibenz(a,h)anthracene	Pentachlorophenol
4,6-Dinitro-2-methylphenol	Dibenzo(a,h)anthracene	Perylene
4-Bromophenyl phenyl ether	Dibenzofuran	Phenanthrene
4-Chloro-3-methylphenol	Dicamba	Phenol
4-Chloroaniline	Diclofop-methyl	Phorate
4-Chlorophenyl phenyl ether	Dieldrin	Picloram
4-Nitrophenol	Diethylphthalate	pp-DDD
5-Nitroacenaphthene	Dimethoate	pp-DDE
Acenaphthene	Dimethylphthalate	pp-DDT
Acenaphthylene	Di-n-butylphthalate	Prometon
a-chlordane	Di-n-octylphthalate	Prometryne

Alachlor	Dinoseb	Propachlor
Aldicarb	Diphenyl ether	Propanil
Aldrin	Diphenylamine	Propazine
Aldrin + Dieldrin	Diuron	Propiconazole
alpha-BHC	Endosulfan 1	Propoxur
Aldicarb	Endosulfan 2	Pyraclostrobin
Aldrin	Endosulfan Sulfate	Pyrene
Aldrin + Dieldrin	Endrin	Quinoline
alpha-BHC	Endrin Aldehyde	Quizalofop
alpha-Endosulfan	Eptam	Sethoxydim
Ametryn	Ethalfluralin	Simazine
Anthracene	Fenoxaprop	Tebuthiuron
Atrazine	Fludioxonil	Temephos
Atrazine Desethyl	Fluoranthene	Terbufos
Atrazine+Metabolites	Fluorene	Terbutryn
Atrazine+N-Dealkylated Metabolites	Gamma-BHC (Lindane)	Thifensulfuron-methyl
Atrazine-2-hydroxy	Gamma-hexachlorocyclohexane	Tralkoxydim
Atrazine-desethyl	g-chlordane	trans-chlordane
Atrazine-desethyl-desisopropyl	Heptachlor	trans-Nonachlor
Atrazine-desisopropyl	Heptachlor Epoxide	Triallate
Azinphos methyl	g-chlordane	Trifloxystrobin
Azoxystrobin	Heptachlor	Trifluralin
Bendiocarb	Heptachlor Epoxide	Triticonazole
Benzo(a)anthracene	Hexachlorobenzene	trans-Nonachlor
Benzo(a)pyrene	Hexachlorobutadiene	Triallate
Benzo(b&j)fluoranthene	Hexachlorocyclopentadiene	Trifloxystrobin
Benzo(b+j+k)fluoranthene	Hexachloroethane	Trifluralin
Benzo(g,h,i)perylene	Hexazinone	Triticonazole

APPENDIX H – WEEKLY DISTRIBUTION SYSTEM MONITORING

System Wide Statistics

	Overall							Transmission							Abbotsford							Mission						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)		# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)		# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)		# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg			Max	Avg	Median	Max	Avg			Max	Avg	Median	Max	Avg			Max	Avg	Median	Max	Avg
2017	2188	5	2.02	1.04	6.98	1.21	0.20	260	1	2.02	1.24	6.80	0.94	0.28	1458	2	1.56	0.83	7.01	0.79	0.16	470	2	1.63	1.08	6.82	1.21	0.28
2018	2054	6	1.97	1.14	7.48	1.54	0.22	249	4	1.97	1.32	7.18	0.81	0.24	1347	1	1.97	0.95	7.49	1.54	0.20	458	1	1.82	1.16	7.35	0.83	0.25
2019	**2208**	**7**	**2.07**	**1.12**	**6.97**	**1.06**	**0.17**	**257**	**4**	**2.07**	**1.38**	**7.00**	**0.57**	**0.25**	**1484**	**1**	**1.82**	**0.98**	**6.93**	**1.06**	**0.14**	**467**	**2**	**1.79**	**1.12**	**7.17**	**0.97**	**0.24**

Transmission System Sample Locations

	Ainsworth							Cannon 600							Cannon 400							Bell Road						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)		# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)		# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)		# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg			Max	Avg	Median	Max	Avg			Max	Avg	Median	Max	Avg			Max	Avg	Median	Max	Avg
2017	51	0	1.60	1.36	6.60	0.70	0.35	52	0	2.02	1.19	6.80	0.64	0.33	54	0	1.39	1.22	6.80	0.72	0.33	52	1	1.54	1.28	6.71	0.94	0.18
2018	50	1	1.93	1.49	7.25	0.81	0.33	51	1	1.94	1.26	7.65	0.72	0.31	51	2	1.97	1.38	7.23	0.59	0.31	51	0	1.60	1.30	6.42	0.29	0.08
2019	**51***	**1**	**2.07**	**1.58**	**7.10**	**0.57**	**0.30**	**51**	**0**	**1.89**	**1.32**	**7.39**	**0.55**	**0.29**	**51**	**3**	**1.98**	**1.48**	**7.35**	**0.55**	**0.28**	**52**	**0**	**1.82**	**1.38**	**6.66**	**0.35**	**0.11**

	Maclure						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	50	0	1.47	1.17	6.80	0.70	0.19
2018	50	0	1.40	1.17	7.12	0.52	0.18
2019	**52***	**0**	**1.62**	**1.13**	**7.02**	**0.64**	**0.17**

Mission Distribution Sample Locations

	M1						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	54	1	1.35	1.09	7.00	0.72	0.21
2018	51	0	1.49	1.13	7.19	0.48	0.17
2019	**52**	**0**	**1.59**	**1.1**	**7.16**	**0.41**	**0.16**

	M2						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	52	0	1.29	1.03	6.81	0.67	0.34
2018	51	0	1.45	1.08	7.35	0.61	0.29
2019	**52***	**0**	**1.32**	**0.97**	**7.12**	**0.81**	**0.31**

	M3						
	# Micro Samples	# with Tot. Col.	Total Cl (mg.L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	52	0	1.38	1.04	6.80	1.21	0.37
2018	51	1	1.57	1.22	7.14	0.70	0.30
2019	**52**	**0**	**1.56**	**1.17**	**7.16**	**0.86**	**0.32**

	M5						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	54	1	1.55	1.12	6.80	0.56	0.23
2018	51	0	1.36	1.06	7.31	0.47	0.21
2019	**52**	**0**	**1.58**	**1.11**	**7.26**	**0.48**	**0.18**

	M6						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	51	0	1.63	1.15	6.87	0.66	0.34
2018	50	0	1.76	1.24	7.27	0.60	0.29
2019	**51**	**2**	**1.78**	**1.11**	**7.11**	**0.97**	**0.30**

	M7						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	52	0	1.58	1.19	6.80	0.55	0.20
2018	51	0	1.53	1.26	7.23	0.59	0.19
2019	**52***	**0**	**1.65**	**1.26**	**6.95**	**0.84**	**0.18**

	M8						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	51	0	1.40	1.13	6.90	0.86	0.35
2018	51	0	1.82	1.28	7.63	0.62	0.30
2019	**52**	**0**	**1.50**	**1.22**	**7.46**	**0.82**	**0.26**

	M9						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	52	0	1.60	1.26	6.80	0.67	0.20
2018	51	0	1.56	1.32	6.69	0.83	0.19
2019	**51**	**0**	**1.79**	**1.32**	**6.80**	**0.51**	**0.17**

	M10						
	# Micro Samples	# with Tot. Col.	Total Cl (mg/L)		pH	Turbidity (NTU)	
			Max	Avg	Median	Max	Avg
2017	52	0	1.49	0.87	6.90	0.63	0.28
2018	51	0	1.19	0.87	7.81	0.54	0.28
2019	**51***	**0**	**1.31**	**0.84**	**7.55**	**0.53**	**0.25**

Abbotsford West Distribution Sample Locations

W1

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.36	1.06	7.04	0.40	0.15
2018	50	0	1.44	1.13	7.56	0.46	0.18
2019	**53***	**0**	**1.57**	**1.06**	**6.95**	**0.38**	**0.15**

W2

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.38	1.13	7.09	0.49	0.16
2018	50	0	1.58	1.22	7.55	0.74	0.20
2019	**53**	**0**	**1.74**	**1.24**	**7.10**	**0.36**	**0.13**

W3

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.56	1.17	7.00	0.55	0.16
2018	50	0	1.74	1.28	7.48	0.48	0.18
2019	**53**	**0**	**1.76**	**1.27**	**7.02**	**0.39**	**0.13**

W4

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.35	0.89	6.90	0.48	0.17
2018	50	0	1.47	0.97	7.26	0.55	0.19
2019	**53**	**0**	**1.72**	**1.04**	**6.86**	**0.39**	**0.14**

W5

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	56	1	1.49	1.16	6.97	0.55	0.16
2018	50	0	1.81	1.33	7.45	0.72	0.21
2019	**53**	**1**	**1.81**	**1.35**	**6.90**	**0.39**	**0.13**

W6

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.47	1.09	6.90	0.49	0.16
2018	50	0	1.97	1.18	7.36	0.77	0.20
2019	**53**	**0**	**1.76**	**1.24**	**6.86**	**0.33**	**0.13**

W7

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.31	0.72	6.81	0.42	0.15
2018	50	0	1.54	0.82	7.14	0.84	0.19
2019	**53**	**0**	**1.63**	**0.86**	**6.68**	**0.29**	**0.11**

W8

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.23	0.47	6.85	0.64	0.18
2018	50	0	1.17	0.56	7.15	0.80	0.22
2019	**53**	**0**	**1.10**	**0.51**	**6.53**	**1.06**	**0.23**

W9

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	0.97	0.50	6.78	0.31	0.14
2018	50	0	1.60	0.65	7.20	0.72	0.18
2019	**53**	**0**	**1.26**	**0.64**	**6.66**	**0.40**	**0.14**

W11

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.34	0.96	7.15	0.70	0.18
2018	49	0	1.33	1.06	7.58	1.12	0.23
2019	**53**	**0**	**1.47**	**1.03**	**7.00**	**0.25**	**0.14**

W13

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.16	0.67	7.15	0.53	0.17
2018	50	0	1.21	0.75	7.59	0.35	0.20
2019	**53**	**0**	**1.43**	**0.69**	**6.95**	**0.27**	**0.13**

W14

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.09	0.64	7.10	0.45	0.17
2018	50	0	1.00	0.62	7.52	0.62	0.25
2019	**53***	**0**	**1.56**	**0.82**	**6.88**	**0.57**	**0.15**

W15

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.44	1.16	7.04	0.67	0.16
2018	50	0	1.77	1.27	7.40	1.54	0.20
2019	**53**	**0**	**1.77**	**1.28**	**6.90**	**0.41**	**0.13**

W16

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.33	0.96	7.20	0.79	0.18
2018	50	0	1.29	0.98	7.68	0.39	0.21
2019	**53***	**0**	**1.45**	**0.91**	**7.00**	**0.29**	**0.14**

Abbotsford East Distribution Sample Locations

E2

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	53	0	1.25	0.83	7.12	0.46	0.15
2018	50	0	1.38	0.85	7.52	0.41	0.20
2019	**53**	**0**	**1.68**	**0.97**	**6.95**	**0.34**	**0.14**

E3

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	53	0	1.30	0.77	7.07	0.46	0.17
2018	50	0	1.37	0.83	7.49	0.35	0.19
2019	**53**	**0**	**1.54**	**0.89**	**7.01**	**0.36**	**0.14**

E4

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.05	0.50	7.00	0.45	0.17
2018	50	0	1.23	0.65	7.47	0.88	0.20
2019	**53***	**0**	**1.30**	**0.80**	**7.00**	**0.31**	**0.13**

E5

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	0.91	0.34	6.82	0.39	0.16
2018	49	0	1.09	0.39	7.44	0.37	0.18
2019	**53**	**0**	**1.13**	**0.51**	**6.97**	**0.27**	**0.13**

E6

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	53	0	1.28	0.85	7.20	0.46	0.17
2018	50	0	1.42	0.86	7.48	0.59	0.22
2019	**53**	**0**	**1.44**	**0.98**	**7.00**	**0.47**	**0.15**

E7

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	0.95	0.28	6.95	0.43	0.16
2018	50	0	1.10	0.35	7.42	0.52	0.19
2019	**53**	**0**	**1.06**	**0.44**	**6.95**	**0.25**	**0.12**

E8

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	0.91	0.46	6.82	0.52	0.16
2018	50	0	1.26	0.64	7.44	1.02	0.21
2019	**53***	**0**	**1.40**	**0.69**	**7.10**	**0.43**	**0.16**

E9

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.41	1.02	7.12	0.45	0.16
2018	50	0	1.46	1.14	7.64	0.37	0.19
2019	**53**	**0**	**1.61**	**1.16**	**7.13**	**0.31**	**0.13**

E10

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.37	1.08	7.14	0.44	0.15
2018	50	0	1.48	1.22	7.67	0.43	0.19
2019	**53**	**0**	**1.57**	**1.18**	**7.06**	**0.26**	**0.13**

E11

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.38	1.12	7.08	0.43	0.15
2018	49	0	1.50	1.20	7.73	0.43	0.20
2019	**53**	**0**	**1.78**	**1.24**	**6.99**	**0.23**	**0.12**

E12

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.41	1.18	7.12	0.51	0.17
2018	50	0	1.69	1.31	7.66	0.39	0.19
2019	**53**	**0**	**1.81**	**1.31**	**6.93**	**0.44**	**0.13**

E13

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	56	1	1.37	1.13	7.21	0.49	0.16
2018	50	0	1.53	1.18	7.58	0.31	0.17
2019	**53**	**0**	**1.82**	**1.20**	**6.94**	**0.26**	**0.12**

E14

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	54	0	1.46	0.97	6.96	0.54	0.17
2018	50	0	1.48	0.92	7.42	0.55	0.19
2019	**53**	**0**	**1.75**	**1.10**	**6.69**	**0.25**	**0.12**

E15

	# Micro Samples	# with Tot. Col.	Total Cl (mg/L) Max	Total Cl (mg/L) Avg	pH Median	Turbidity (NTU) Max	Turbidity (NTU) Avg
2017	53	0	1.45	1.03	7.28	0.47	0.16
2018	50	0	1.51	1.17	7.65	0.36	0.20
2019	**53**	**0**	**1.56**	**1.13**	**6.97**	**0.28**	**0.12**

*****The Abbotsford-Mission Water System experienced three and eight positive *E. coli* samples on October 8 and October 16, 2019, respectively. Additional sampling in excess of 900 samples taken from October to December 2019 throughout the system by staff and Fraser Health was conducted and results were negative for *E.coli*. A thorough investigation of the incident and results was conducted by a Qualified Professional who concluded that it is highly unlikely that the *E. coli* in the October 2019 samples originated from the Water System and that lab contamination was the likely source. This was further validated by the lab performing the original analysis.

APPENDIX I – QUARTERLY DISTRIBUTION SYSTEM MONITORING (TOTAL METALS)

Abbotsford (page 1 of 2)

Parameter	Units	GCDWQ	W1		W2		W3		W4		W5		W6		W7		W8		W9		W11		W13		W14		W15		W16	
			Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg
Aluminum (total)	µg/L	100	60.40	29.67	50.20	26.70	49	25.82	51.60	22.74	50	24.86	49.70	23.66	48.50	18.76	26.50	12.28	38.70	12.98	52.70	26.98	47.10	26.38	49.90	25.42	49.50	25.96	52.50	25.82
Antimony (total)	µg/L	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (total)	µg/L	10	0.35	0.21	0.34	0.23	0.37	0.23	0.66	0.28	0.40	0.24	0.34	0.21	0.51	0.28	0.56	0.41	1.88	0.73	0.34	0.23	0.29	0.20	0.37	0.23	0.36	0.22	0.36	0.22
Barium (total)	µg/L	1000	6.16	5.14	5.87	4.92	6.29	4.89	11.8	6.39	6.94	5.02	6.69	4.84	9.76	5.80	15.4	9.77	20.9	10.4	5.95	4.66	9.57	6.18	8.35	5.80	5.39	4.69	7.90	5.76
Beryllium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bismuth (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (total)	µg/L	5000	10	2	ND	ND	10	2	15	5	11	2	12	2	13	5	20	0.2	23	10	ND	ND	ND	ND	11	2.2	10	2	11	2.2
Cadmium (total)	µg/L	50	ND	ND	ND	ND	ND	ND	0.01	.005	0.01	.002	0.01	.003	0.02	0.01	0.02	0.01	0.02	0.01	0.01	.002	ND	ND	0.01	.004	ND	ND	0.01	.001
Calcium (total)	µg/L	-	3450	2782	2870	2290	2860	2348	24000	8772	11800	4074	18700	5488	27000	11646	25700	16430	34300	17770	6910	3552	4830	3234	7400	4188	2850	2306	8650	4802
Chromium (total)	µg/L	50	0.11	0.03	ND	ND	0.18	0.04	0.24	0.13	0.16	0.03	0.16	0.03	1.39	0.39	0.28	0.17	0.29	0.20	0.18	0.09	0.33	0.09	0.17	0.03	0.18	0.06	0.54	0.19
Cobalt (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (total)	µg/L	≤1000	6.28	4.29	1.65	1.25	1.78	1.53	1.78	1.32	1.92	1.18	1.81	1.10	2.38	1.62	412	221	1.48	1.16	1.27	0.98	0.74	0.50	2.39	1.89	6.32	4.19	6.38	4.63
Hardness (as $CaCO_3$)	mg/L	-	9.99	8.09	8.54	6.84	8.51	6.99	86.3	30.1	41.1	13.4	68.1	18.9	95.6	40.6	89.8	55.6	63.3	126	23.1	11.3	16.1	10.3	24.8	13.5	8.57	6.92	29.1	15.5
Iron (total)	µg/L	≤300	35	18.2	11	2.20	ND	ND	14	7.20	ND	ND	23	10	14	7.20	31	23.4	22	7.80	13	5	29	22.6	15	6	ND	ND	14	10.4
Lead (total)	µg/L	10	ND	ND	0.05	0.01	0.10	0.05	ND	ND	ND	ND	0.05	0.01	ND	ND	1.06	0.79	ND	ND	ND	ND	ND	ND	0.11	0.07	0.21	0.08	0.07	0.03
Lithium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.10	0.22	1	0.40	1.40	0.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium (total)	mg/L	-	337	278	336	273	331	273	6420	2004	2710	774	5180	1256	6880	2794	6200	3529	9790	4589	1400	585	986	532	1550	746	355	283	1790	847
Manganese (total)	µg/L	≤120	2.62	1.20	0.9	0.50	0.32	0.21	10.7	2.66	0.97	0.33	1.36	0.52	2.12	1.17	51.6	23.4	51.9	20.6	1.90	1.33	8.20	4.87	16	8.07	0.34	0.23	12.9	4.71
Mercury (total)	µg/L	1	0.01	.001	ND	ND	ND	ND	ND	ND	ND	ND	0.01	.001	0.01	.001	0.01	.001	0.01	.001	ND	ND	ND	ND	0.01	.005	0.01	.002	ND	ND
Molybdenum (total)	µg/L	-	0.47	0.33	0.44	0.31	0.47	0.33	0.37	0.29	0.39	0.31	0.40	0.30	0.36	0.26	0.31	0.24	0.71	0.37	0.45	0.29	0.45	0.30	0.42	0.28	0.47	0.34	0.39	0.27
Nickel (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0.10	0.71	0.27	0.54	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phosphorus (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (total)	µg/L	-	116	91	115	87	112	86	1270	417	580	178	938	251	1340	590	2090	1224	2190	1094	353	163	308	173	717	312.	113	84	561	295
Selenium (total)	µg/L	10	ND	ND	ND	ND	ND	ND	0.20	0.06	0.09	0.02	0.18	0.04	0.21	0.07	0.19	0.09	0.33	0.17	0.09	0.02	0.05	0.01	ND	ND	ND	ND	0.06	0.02
Silicon (total)	µg/L	-	2930	2580	2920	2538	3290	2668	9540	4750	6480	3324	9650	3974	11500	6054	11100	7072	10600	6010	4370	2962	3580	2856	4550	3130	3010	2636	4910	3342
Silver (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (total)	µg/L	≤200000	1220	986	1280	1043	1210	972	8510	2363	4870	1713	7690	1177	10900	4689	10400	6210	10500	6178	2970	1664	2180	1485	3410	2004	1320	997	3590	2096
Strontium (total)	µg/L	-	9.27	7.33	8.82	6.85	8.57	6.99	120	39.91	55.4	16.2	94.9	24.4	132	55.5	152	89.8	162	83.9	31.3	13.1	25.2	13.3	47.4	20.9	9.13	7.11	43.1	22.4
Sulfur (total)	µg/L	-	ND	ND	ND	ND	ND	ND	6600	1750	2610	522	4350	870	5340	2132	6880	3440	1200	5048	1030	438	790	262	1600	522	ND	ND	1500	574
Tellurium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thorium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tin (total)	µg/L	-	0.9	0.04	ND	ND	ND	ND	ND	ND	0.12	0.02	ND	ND	ND	ND	0.11	0.02	0.13	0.03	ND	ND	ND	ND	0.25	0.05	0.17	0.03	0.14	0.03
Titanium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (total)	µg/L	20	0.03	0.02	0.03	0.02	0.03	0.02	0.13	0.04	0.04	0.03	0.06	0.03	0.11	0.05	0.08	0.05	0.36	0.12	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02
Vanadium (total)	µg/L	-	0.51	0.10	ND	ND	ND	ND	0.53	0.11	0.5	0.10	0.55	0.11	0.7	0.26	0.67	0.13	0.65	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc (total)	µg/L	≤5000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27.7	12.2	4	0.80	ND	ND	ND	ND	ND	ND	4.60	0.92	ND	ND
Zirconium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detectable

Abbotsford (page 2 of 2)

Parameter	Units	GCDWQ	E2		E3		E4		E5		E6		E7		E8		E9		E10		E11		E12		E13		E14		E15	
			Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg
Aluminum (total)	µg/L	100	46.3	24.3	45	25.7	27.1	19.6	32	21.1	44.3	24.0	29.6	21.7	44.3	27.6	54.9	29.1	53.4	28.9	49.4	28.5	49.3	27.2	50.4	27.7	50.4	23.2	50	27.6
Antimony (total)	µg/L	6	ND	ND	ND	ND	0.12	0.02	0.18	0.04	ND	ND	0.15	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.14	0.03	ND	ND
Arsenic (total)	µg/L	10	0.47	0.33	0.47	0.35	1.72	0.64	2.87	0.89	0.48	0.34	2.14	0.74	0.48	0.04	0.33	0.24	0.37	0.23	0.35	0.23	0.37	0.24	0.36	0.23	1.31	0.42	0.33	0.22
Barium (total)	µg/L	1000	8.86	5.92	6.43	5.42	11.8	7.62	17.1	8.63	8.76	5.78	13.8	8.80	7.77	6.09	5.57	4.87	5.48	4.68	5.72	4.81	6.30	4.87	5.55	4.68	15.6	6.67	5.51	4.64
Beryllium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bismuth (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (total)	µg/L	5000	11	4	10	2	11	2	ND	ND	10	4	ND	ND	11	2.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18	3.60	ND	ND
Cadmium (total)	µg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	0.01	.001	ND	ND	ND	ND	0.01	.003	ND	ND	ND	ND	0.01	.002	ND	ND	0.01	.005	ND	ND
Calcium (total)	µg/L	-	14900	5632	5300	4194	12800	7856	19000	9282	12800	5360	16200	9272	10500	5438	2730	2364	2750	2266	2840	2272	2680	2230	2790	2258	25300	8688	2980	2412
Chromium (total)	µg/L	50	0.23	0.08	0.18	0.04	0.15	0.08	0.16	0.09	0.54	0.13	0.17	0.06	0.14	0.05	0.16	0.06	0.26	0.08	0.24	0.05	0.27	0.05	0.26	0.05	0.34	0.10	2.91	0.65
Cobalt (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (total)	µg/L	≤1000	2.92	2.31	2.64	2.16	2.53	1.95	2.48	1.67	3.80	2.35	2.84	1.77	2.77	1.84	2.52	2.10	2.36	1.99	1.54	1.18	4.19	3.26	3.46	2.24	1.9	1.38	1.9	1.66
Hardness (as CaCO3)	mg/L	-	48.6	18.8	17.6	13.6	43.6	26.1	66.6	32.1	45.3	18.1	55.8	31.7	35.7	18.1	8.08	7.12	8.18	6.74	8.42	6.79	8.03	6.69	8.28	6.73	92.4	30.5	8.74	7.09
Iron (total)	µg/L	≤300	ND	ND	12	2.40	15	5.20	19	11.6	ND	ND	28	17.6	14	5.20	12	2.40	ND	ND	11	2.20	ND	ND	ND	ND	ND	ND	16	5.20
Lead (total)	µg/L	10	0.07	0.04	ND	ND	0.06	0.01	0.06	0.02	0.08	0.03	0.07	0.01	0.07	0.01	0.09	0.06	0.07	0.04	ND	ND	0.09	0.06	0.07	0.03	0.05	0.01	0.07	0.04
Lithium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	1.2	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium (total)	mg/L	-	3300	1152	1070	770	2830	1575	4640	2134	3270	1133	3720	2075	2290	1077	310	296	320	265	320	271	323	272	318	266	7110	2132	315	260
Manganese (total)	µg/L	≤120	5.43	4.70	5.51	4.86	9.08	5.22	18.9	8.84	6.07	4.63	15.4	8.45	7.57	6.41	0.94	0.55	0.97	0.49	1.35	0.58	1.18	0.29	1.64	0.57	31.2	6.67	0.86	0.56
Mercury (total)	µg/L	1	ND	ND	0.01	.001	0.01	.001	0.01	.003	ND	ND	ND	ND	0.01	.001	ND	ND	ND	ND	ND	ND	0.01	.001	ND	ND	ND	ND	ND	ND
Molybdenum (total)	µg/L	-	0.46	0.31	0.43	0.31	0.51	0.36	0.69	0.38	0.45	0.31	0.70	0.38	0.43	0.29	0.44	0.32	0.44	0.30	0.45	0.32	0.46	0.32	0.43	0.30	0.65	0.35	0.47	0.34
Nickel (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.16	0.23	ND	ND	ND	ND	ND	ND	0.63	0.13
Phosphorus (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (total)	µg/L	-	686	267	298	20	777	402	1190	512	674	265	1050	507	517	266	117	96	114	89	116	94	110	86	113	88	1530	470	112	89
Selenium (total)	µg/L	10	0.10	0.03	ND	ND	0.08	0.06	0.11	0.06	0.10	0.02	0.10	0.06	0.06	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.27	0.07	ND	ND
Silicon (total)	µg/L	-	5530	3320	4030	3078	4960	3515	4540	3704	5410	3330	4360	3744	4280	3116	2810	2594	2880	2532	2900	2572	3060	2622	2830	2534	7020	4244	2860	2562
Silver (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (total)	µg/L	≤200000	3920	1923	2310	1783	3440	2576	4420	2892	3970	1900	3840	2968	3120	1971	1240	1069	1290	1109	1370	1109	1280	1094	1490	1121	7140	3014	1250	1096
Strontium (total)	µg/L	-	51.2	20.6	21.2	15.6	42.9	28.5	66.1	34.1	48.5	19	52.9	32.9	39.7	20.1	8.19	7.28	8.27	6.81	8.29	6.86	8.13	6.65	8.75	6.95	114	38	9.17	7.55
Sulfur (total)	µg/L	-	3610	1214	1430	742	3960	2006	6310	2604	3290	1038	5600	2552	2540	1110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9500	2336	ND	ND
Tellurium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thorium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tin (total)	µg/L	-	0.3	0.08	0.11	0.02	ND	ND	ND	ND	0.13	0.03	0.16	0.03	0.22	0.07	ND	ND	ND	ND	ND	ND	0.24	0.05	ND	ND	ND	ND	0.13	0.03
Titanium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.47	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (total)	µg/L	20	0.05	0.03	0.04	0.03	0.14	0.05	0.25	0.08	0.05	0.03	0.26	0.08	0.06	0.04	0.04	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.26	0.07	0.03	0.02
Vanadium (total)	µg/L	-	0.52	0.10	ND	ND	ND	ND	ND	ND	0.52	0.10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.53	0.11	ND	ND
Zinc (total)	µg/L	≤5000	3.10	0.62	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.9	0.78	ND	ND	ND	ND	ND	ND	ND	ND	3.20	0.64	ND	ND
Zirconium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detectable

Mission & Transmission (page 1 of 1)

Parameter	Units	GCDWQ	M1		M2		M3		M5		M6		M7		M8		M9		M10		Ainsworth		Bell Road		Cannon Pit 400		Cannon Pit 600		MacLure Reservoir	
			Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg
Aluminum (total)	µg/L	100	46.2	33.0	12.4	11.8	23.5	15.0	42.3	31.8	10.4	9.78	42.7	34.3	41.8	29.3	44.2	34.3	41.6	29.4	12.6	10.9	40.2	33.1	11.6	9.90	12.3	10.3	36.5	29.5
Antimony (total)	µg/L	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (total)	µg/L	10	0.30	0.23	0.13	0.09	0.14	0.10	0.31	0.24	0.13	0.13	0.32	0.25	0.14	0.13	0.36	0.26	0.16	0.15	0.14	0.13	0.37	0.27	0.14	0.12	0.15	0.13	0.31	0.27
Barium (total)	µg/L	1000	5.49	5.24	9.11	8.54	4.46	3.81	7.21	5.51	9.92	8.25	5.97	5.02	1.99	1.73	5.40	4.69	8.98	8.44	2.75	2.62	5.57	4.61	2.77	2.59	7.37	7.01	6.21	5.47
Beryllium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bismuth (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (total)	µg/L	5000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	2.50	ND	ND	ND	ND	ND	ND
Cadmium (total)	µg/L	50	0.04	0.01	0.01	ND	0.01	ND	0.03	0.01	0.02	ND	0.03	0.01	ND	ND	0.07	0.02	ND	ND	0.01	ND	0.01	ND	0.02	ND	0.01	ND	ND	ND
Calcium (total)	µg/L	-	2990	2633	1640	1485	2120	1860	3670	3138	1470	1365	2790	2496	2440	2203	2750	2458	2910	2358	1490	1380	2720	2430	1580	1453	1510	1398	2970	2625
Chromium (total)	µg/L	50	0.16	0.05	0.11	0.03	0.13	0.03	0.14	0.09	ND	ND	0.11	0.03	0.15	0.04	0.15	0.04	0.19	0.05	0.13	0.03	0.10	0.03	0.12	0.03	0.11	0.03	0.11	0.06
Cobalt (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (total)	µg/L	≤1000	4.26	1.77	1.13	0.81	1.35	0.34	4.68	1.80	2.10	1.75	2.65	2.03	0.53	0.13	25.9	15.4	2.57	1.07	9.73	7.72	1.87	1.53	1.10	0.59	0.76	0.50	1.37	1.18
Hardness (as CaCO3)	mg/L	-	8.51	7.44	4.87	4.43	5.84	5.22	10.2	8.80	4.45	4.14	8.28	7.44	6.47	5.91	8.18	7.33	8.01	6.50	4.51	4.17	8.13	7.29	4.71	3.59	4.52	4.23	9.15	8.05
Iron (total)	µg/L	≤300	23	15	24	20	34	24	19	16	38	32	37	23	18	15	ND	ND	37	30	16	ND	24	9	16	7	20	12	ND	ND
Lead (total)	µg/L	10	0.14	0.03	ND	ND	ND	ND	0.11	0.03	ND	ND	0.06	0.01	ND	ND	0.15	0.07	ND	ND	0.08	0.04	0.09	0.05	ND	ND	0.06	0.01	ND	ND
Lithium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium (total)	mg/L	-	254	210	191	176	153	140	257	234	187	178	321	291	113	99	322	291	181	150	192	176	327	295	185	172	194	181	421	351
Manganese (total)	µg/L	≤120	1.87	0.90	3.28	2.78	2.19	1.92	1.37	0.84	3.24	2.58	0.87	0.43	1.65	1.38	0.24	0.09	2.26	1.96	3.27	2.85	0.42	0.22	2.79	2.12	2.76	2.27	1.31	0.72
Mercury (total)	µg/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (total)	µg/L	-	0.40	0.23	0.08	0.07	0.08	0.07	0.39	0.27	0.09	0.07	0.45	0.31	0.08	0.07	0.43	0.31	0.15	0.10	0.08	0.07	0.42	0.30	0.08	0.06	0.07	0.07	0.36	0.34
Nickel (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phosphorus (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (total)	µg/L	-	102	84.3	53	25.8	56	27.8	107	91.8	53	26.3	97	89.5	61	29.5	96	88.8	68	47	57	14.3	96	89.8	57	14.3	54	26.3	105	97
Selenium (total)	µg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.01	ND	ND	ND	ND	ND	ND
Silicon (total)	µg/L	-	2770	2228	1460	1365	1470	1413	2890	2460	1380	1345	2910	2555	1710	1603	2900	2540	2180	1675	1420	1333	2910	2578	1440	1370	1440	1368	2530	2420
Silver (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (total)	µg/L	≤200000	2650	1478	2870	2685	2930	2730	2020	1328	2800	2800	1230	1049	3030	2753	1220	1027	2850	2410	3110	2743	1190	1015	3180	2783	3130	2755	1730	1395
Strontium (total)	µg/L	-	8.24	7.27	5.57	5.04	6.7	6.26	8.86	7.93	5.19	4.82	7.80	7.05	7.63	7.08	7.73	7.03	8.18	7.05	5.31	4.81	7.87	6.90	5.77	5.31	5.24	4.90	9.66	8.16
Sulfur (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	510	255
Tellurium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thorium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tin (total)	µg/L	-	0.32	0.08	ND	ND	0.11	0.06	0.23	0.06	0.10	0.03	0.54	0.23	ND	ND	0.27	0.10	ND	ND	0.16	0.04	ND	ND	0.16	0.04	0.22	0.06	ND	ND
Titanium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Uranium (total)	µg/L	20	0.03	0.02	ND	ND	ND	ND	0.03	0.02	ND	ND	0.03	0.02	ND	ND	0.03	0.03	0.02	0.01	ND	ND	0.03	0.03	ND	ND	ND	ND	0.03	0.02
Vanadium (total)	µg/L	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc (total)	µg/L	≤5000	4.40	1.10	ND	ND	ND	ND	3.30	0.83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zirconium (total)	µg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detectable

APPENDIX J – QUARTERLY DISTRIBUTION SYSTEM MONITORING (DBP)

Trihalomethanes (µg/L)

Date	Location	A Chloroform	B Bromoform	C Bromodichloro-methane	D Dibromochloro-methane	Total (A + B + C + D)
21-Mar-19	Maclure Reservoir	9	ND	ND	ND	**9.0**
	E4	6.4	ND	ND	ND	**6.4**
	W9	ND	ND	ND	ND	**ND**
	W11	8.7	ND	ND	ND	**8.7**
	M7	14.2	ND	ND	ND	**14**
20-Jun-19	Maclure Reservoir	11.7	ND	ND	ND	**12**
	E4	11.7	ND	ND	ND	**12**
	W9	2.6	ND	ND	ND	**2.6**
	W11	10.4	ND	ND	ND	**10**
	M7	11	ND	ND	ND	**11**
25-Sept-19	Maclure Reservoir	37.8	ND	ND	ND	**38**
	E4	26.8	ND	ND	ND	**27**
	W9	ND	ND	ND	ND	**ND**
	W11	31.6	ND	ND	ND	**32**
	M7	49.4	ND	ND	ND	**49**
19-Dec-19	Maclure Reservoir	9	ND	ND	ND	**9.0**
	E4	21.1	ND	ND	ND	**21**
	W9	7.7	ND	ND	ND	**7.7**
	W11	16.9	ND	ND	ND	**17**
	M7	10.5	ND	ND	ND	**11**

Haloacetic Acids (µg/L)

Date	Location	A Monobromo-acetic acid	B Dibromo-acetic acid	C Monochloro-acetic acid	D Dichloro-acetic acid	E Trichloro acetic acid	Total (A + B + C + D + E)
21-Mar-19	Cannons Pit 400	ND	ND	ND	6.8	7.8	**15**
	Cannons Pit 600	ND	ND	ND	7.1	9.6	**17**
	Shook	ND	ND	ND	11.4	8.6	**20**
	Maclure Reservoir	ND	ND	ND	6.9	4.3	**11**
20-Jun-19	Cannons Pit 400	4	ND	ND	6.5	6.7	**17**
	Cannons Pit 600	3.7	ND	ND	7.8	8.7	**20**
	Shook	3.8	ND	ND	7.2	4.6	**16**
	Maclure Reservoir	1.8	ND	ND	8.8	5.9	**17**
25-Sept-19	Cannons Pit 400	2.8	ND	ND	7	8.2	**15**
	Cannons Pit 600	5.4	ND	ND	8.6	13.8	**22**
	Shook	ND	ND	ND	23.6	20.7	**44**
	Maclure Reservoir	ND	ND	ND	19.8	15.5	**35**
19-Dec-19	Cannons Pit 400	ND	ND	ND	6.1	6.6	**13**
	Cannons Pit 600	ND	ND	ND	4.7	3.4	**8**
	Shook	1.2	ND	ND	5.6	4.1	**10**
	Maclure Reservoir	ND	ND	ND	14.6	10.5	**25**

ND = not detectable

n-Nitrodimethlamine (ng/L)

Date	Location	NDMA (ng/l)
21-Mar-19	Maclure Reservoir	**12.6**
21-Mar-19	E4	**3.75**
21-Mar-19	W9	**5.28**
21-Mar-19	W11	**25.5**
21-Mar-19	M7	**7.66**
20-Jun-19	Maclure Reservoir	**2.50**
20-Jun-19	E4	**1.99**
20-Jun-19	W9	**1.23**
20-Jun-19	W11	**1.89**
20-Jun-19	M7	**1.16**
10-Sep-19	Maclure Reservoir	**17.6**
10-Sep-19	E4	**1.67**
10-Sep-19	W9	**3.10**
10-Sep-19	W11	**17.3**
10-Sep-19	M7	**1.70**
19-Dec-19	Maclure Reservoir	**1.54**
19-Dec-19	E4	**1.53**
19-Dec-19	W9	**1.31**
19-Dec-19	W11	**ND**
19-Dec-19	M7	**2.09**