

2022
Annual
Water
Quality
Report



Executive Summary

The City of Chilliwack has a population of approximately 101,000 and provides water to nearly 94,000 of these residents. Residents not serviced by the City's water utility access their water from private wells or other water providers. The City of Chilliwack's water is sourced from 10 groundwater wells, 8 of those wells draw water from the Sardis-Vedder Aquifer and 2 wells draw from the Marble Hill Aquifer. The Sardis-Vedder Aquifer provides 99.93% of the water supplied to Chilliwack residents, with the Marble Hill Aquifer providing the remaining 0.07 %.

Under the *Drinking Water Protection Act*, the City of Chilliwack is required to continually monitor water quality and make a report available to the public summarizing the results of the monitoring program. This report summarizes the 2022 water quality testing and monitoring results for the City of Chilliwack.

In 2022, source water quality met the requirements of *British Columbia Drinking Water Protection Regulations* (BC DWPR) and the Guidelines for Drinking Water Quality (GCDWQ) for microbial parameters.

The City follows sampling guidelines as outlined in Schedule B of the BC DWPR and meets the requirements for total coliforms and e. coli with very high-quality water.

The City staff continue to seek improvement to the water supply and distribution systems. The City will continue to work closely with Fraser Health and the public to continue providing high quality water to our residents.

This report is available in hard copy at the City of Chilliwack's City Hall, 8550 Young Road, Chilliwack BC or in PDF on chilliwack.com/waterquality.

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1.0 Acronyms

AO: Aesthetic Objective

BC DWPR: British Columbia Drinking Water Protection Regulation

E. coli: Escherichia coli

GCDWQ: Guidelines for Canadian Drinking Water

MAC: Maximum Acceptable Concentration

Mg/L: Milligrams per liter

NTU: Nephelometric Turbidity Units

PPB: Parts Per Billion

PPM: Parts Per Million

PRV: Pressure Regulating Valve

SCADA: Supervisory Control and Data Acquisition

2.0 Introduction

The City of Chilliwack currently has a population of 101,700 residents, and supplies drinking water to approximately 93,920 of these residents. Residents not serviced by the City's water utility access their water from private wells or other water providers. The City of Chilliwack's water is sourced from 10 groundwater wells, 8 of those wells draw water from the Sardis-Vedder Aquifer and 2 wells draw from the Marble Hill Aquifer. The Sardis-Vedder Aquifer provides 99.93% of the water supplied to Chilliwack residents, with the Marble Hill Aquifer provides the remaining 0.07 %.

This report is available in hard copy at the City of Chilliwack's City Hall, 8550 Young Road, Chilliwack BC or in PDF on Chilliwack.com/waterquality. All water suppliers are required to produce and publish an annual water quality report under the *BC Drinking Water Protection Regulations* (DWPR). This report provides a summary of the City's drinking water system and water quality results from the comprehensive sampling program conducted annually.

3.0 System Description

The City of Chilliwack encompasses a 261 km² area bounded by the Fraser River on the north, Boundary Road and the Vedder Canal on the west, FVRD Area D and E to the east and Cultus Lake Park Board and FVRD Area H to the south. The City of Chilliwack also borders with Skwahla 2, Schelowat 1, Grass 15, Skowkale 10, Yakwekwioose 12, Tzeachten 13, Soowahlie 14, Skowkale 11, Skwali 3, Skwah 4, Shxwhá:y 5, Squiaala 8, Lackaway 2, Aitcheltich 9, Squiaala 7 and Kwaw-kwaw-a-pilt First Nations. The City provides water to many of these communities through servicing agreements. The City of Chilliwack does not provide water to the Yarrow Community, Yarrow Waterworks provides water services to the community of Yarrow.

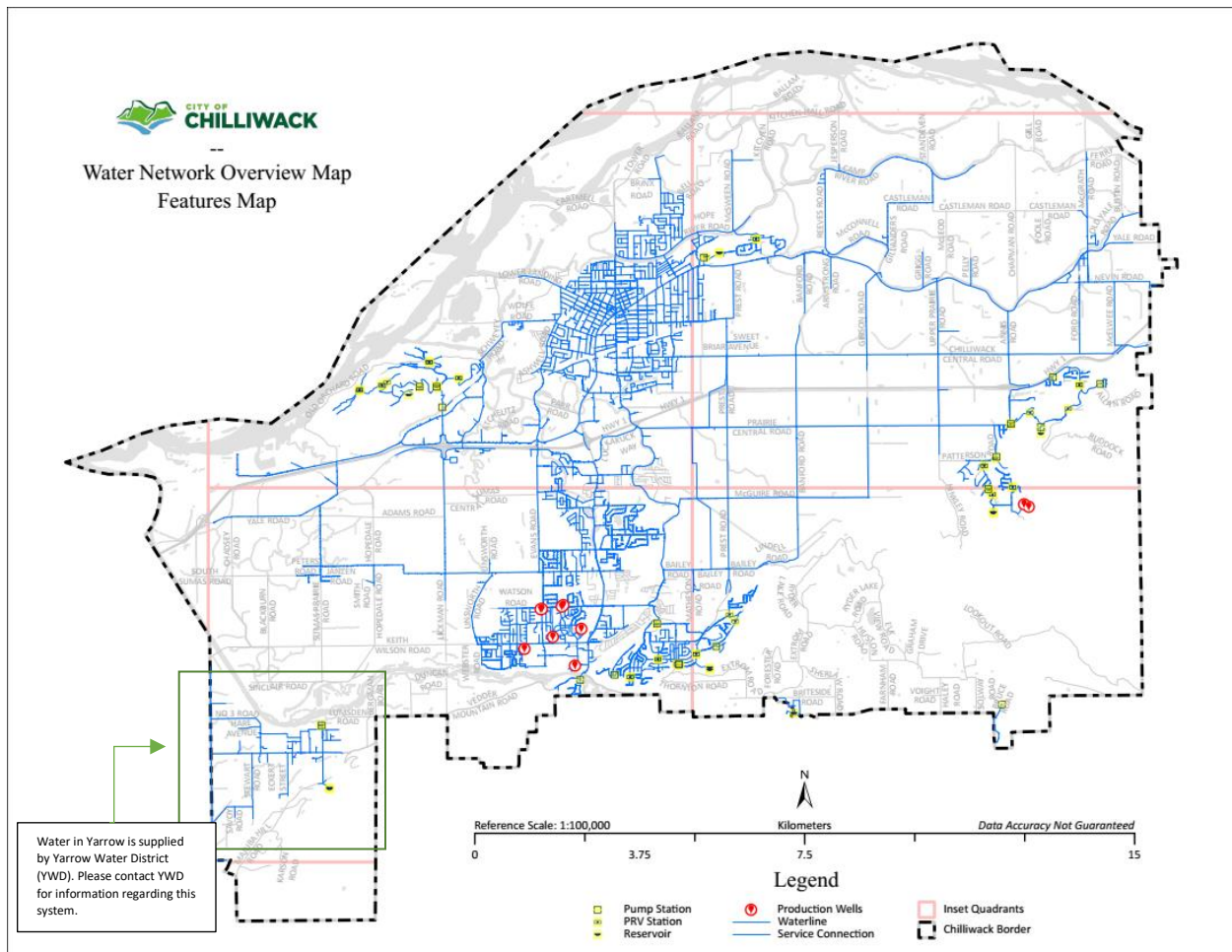


Figure 1: Map of Chilliwack’s Drinking Water System

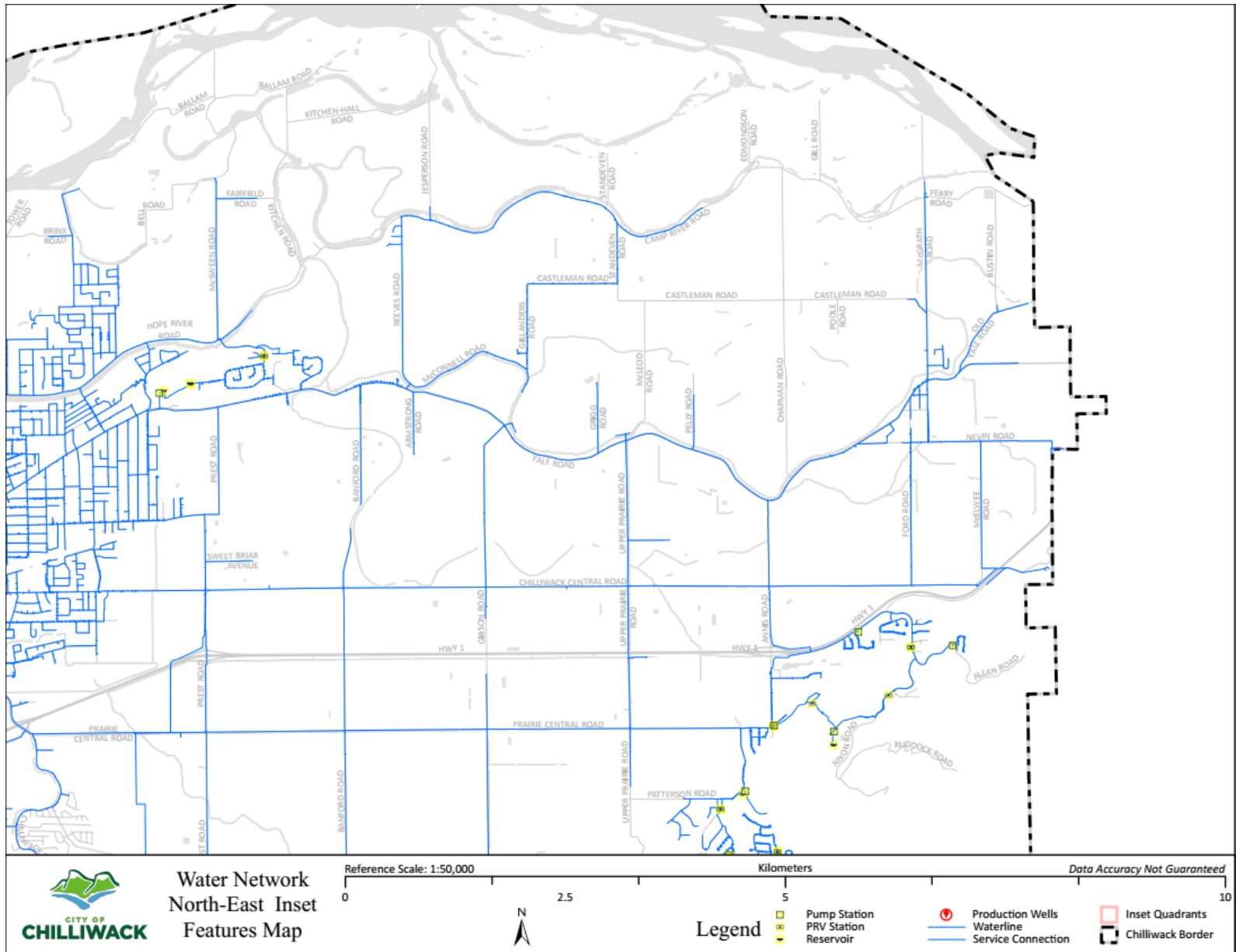


Figure 2: City of Chilliwack Water System (North East)

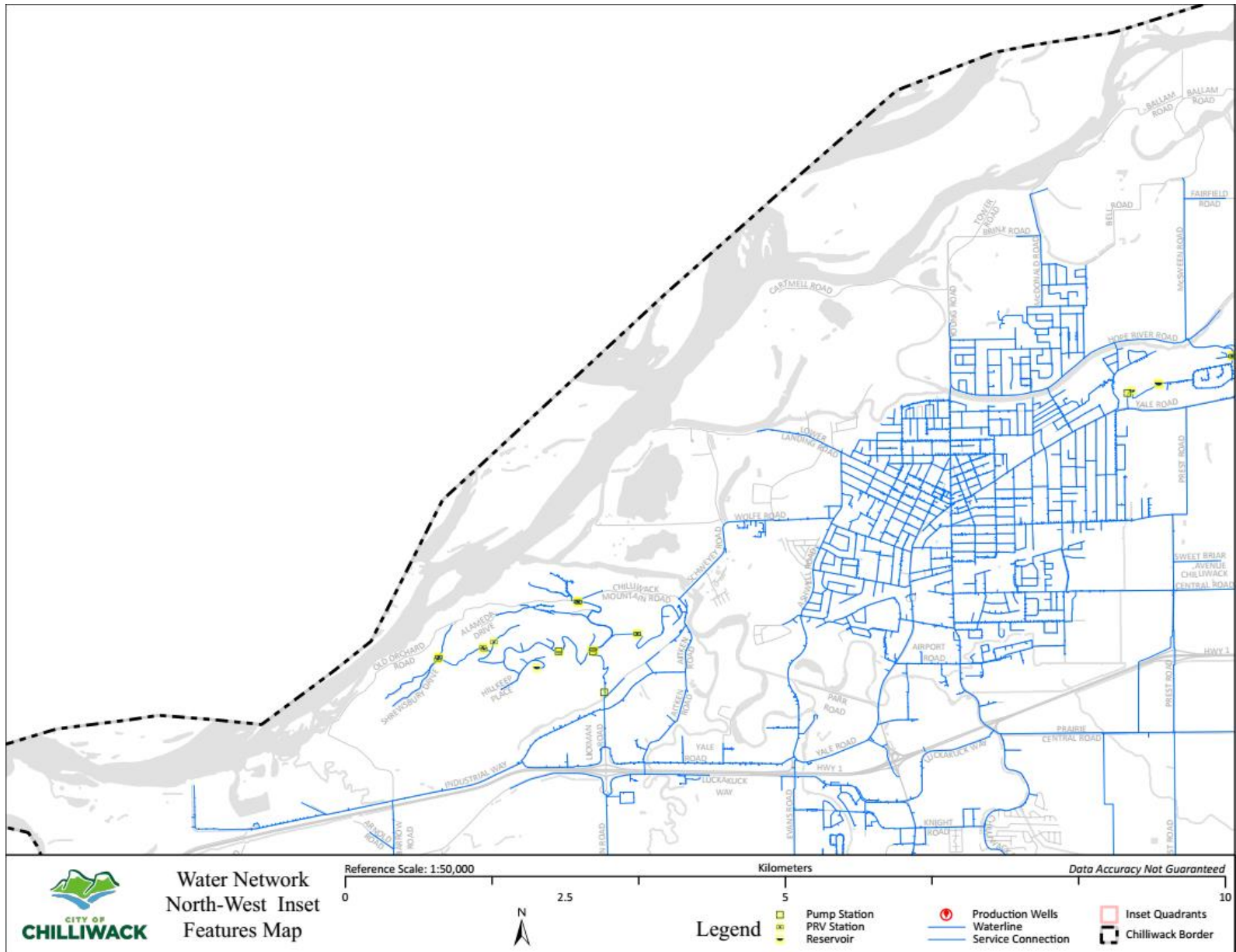


Figure 3: City of Chilliwack Drinking Water System (North West)

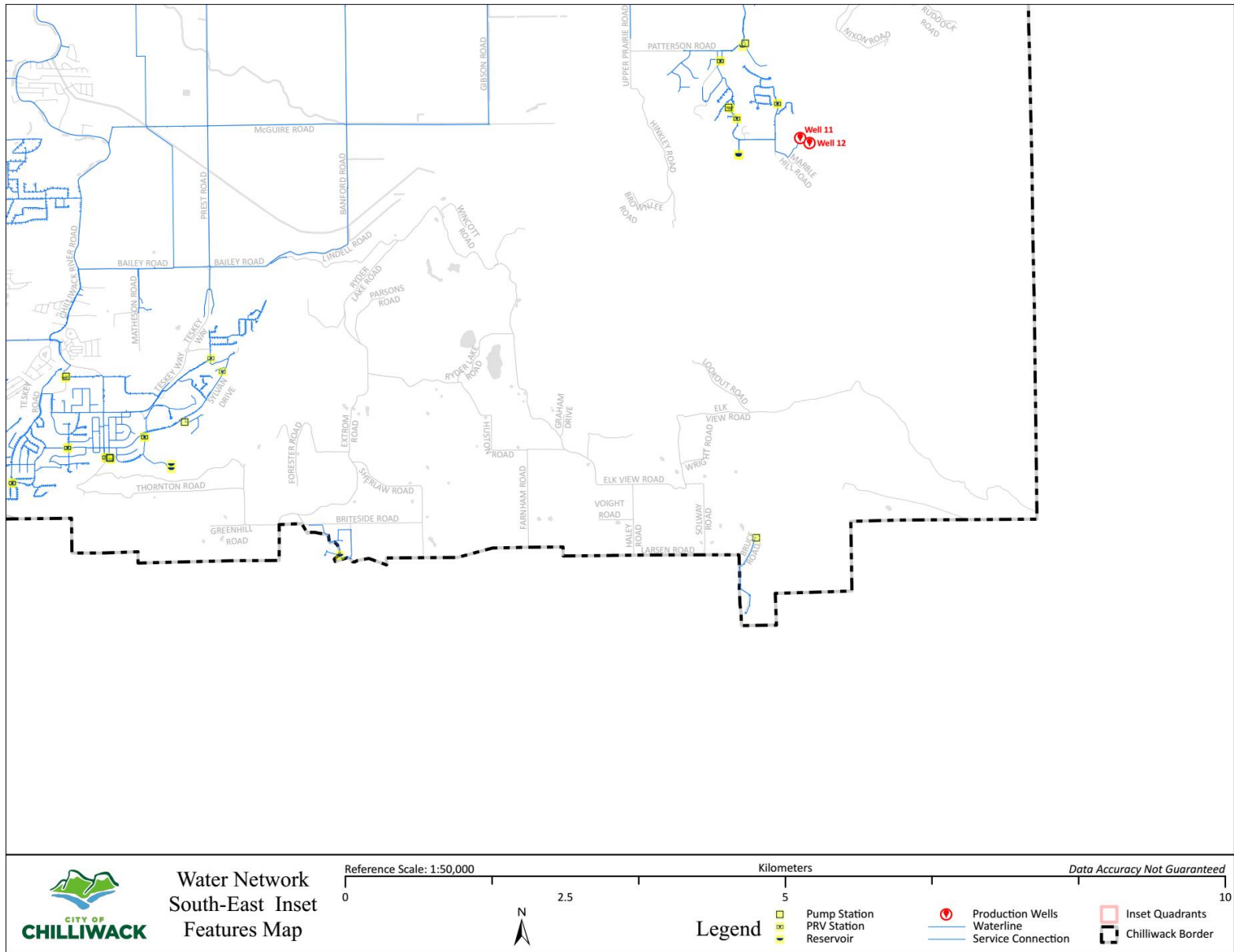


Figure 4: City of Chilliwack Drinking Water System (South East)

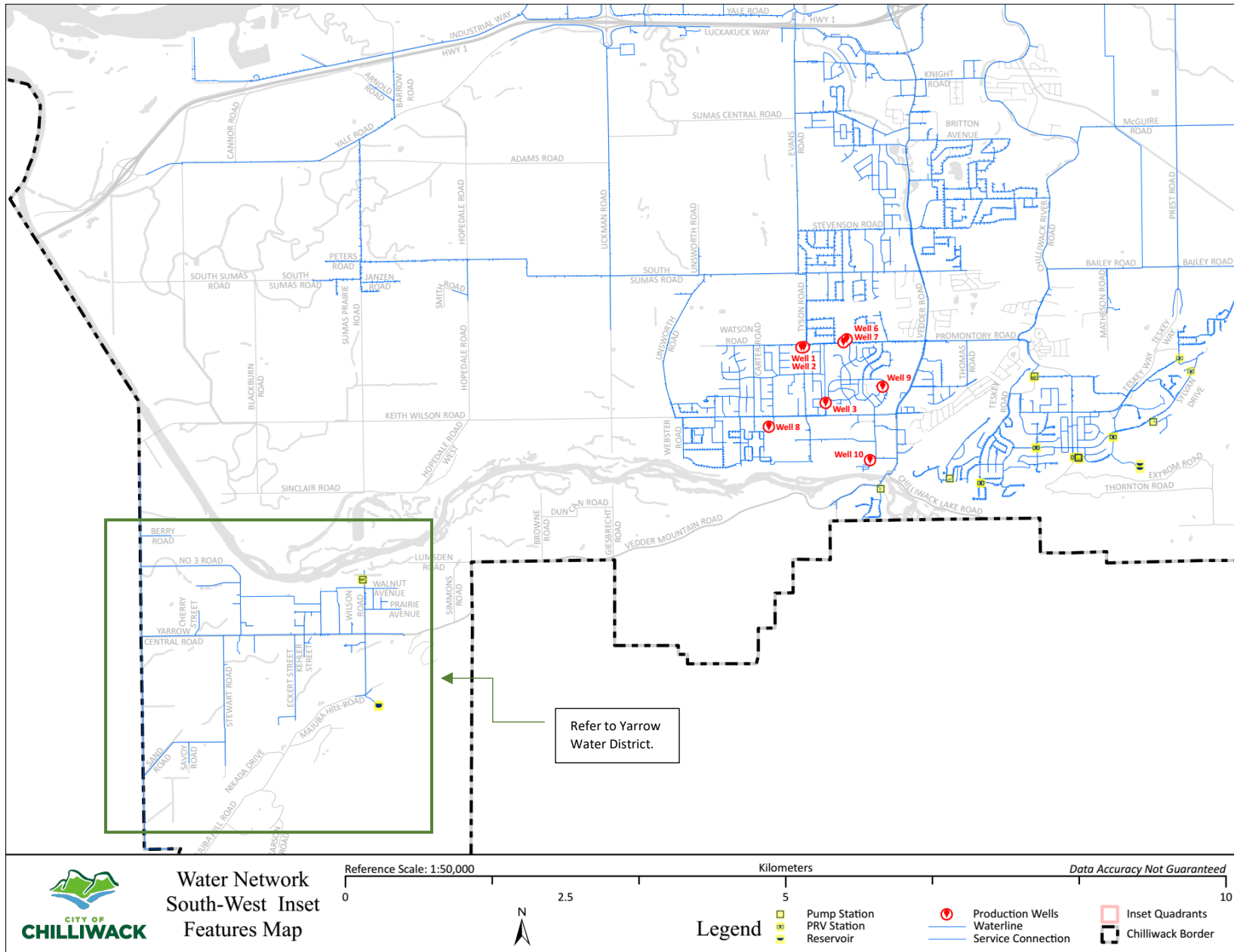


Figure 5: City of Chilliwack Drinking Water System (South West)

3.1 Source Water

The City of Chilliwack’s drinking water is obtained from the Sardis-Vedder Aquifer and the Marble Hill Aquifer, 99.93% of the source water comes from the Sardis-Vedder Aquifer, at present 0.07% of source water comes from the Marble Hill Aquifer.

The City monitors the quality of the untreated water from these sources through an extensive water sampling and monitoring program. Details and results of the source water monitoring program are provided in Section 6. Raw water quality meets the guidelines and is protected by the City’s Groundwater Protection Plan which is enforced through the City’s *Zoning Bylaw 2020, No. 5000*. Within the Groundwater Protection Area shown in Figure 6 activities which pose a risk of groundwater contamination are restricted and development is required to take specified measures to protect the aquifer. The groundwater protection zone is based on the 60 day capture zone of the production wells. Figure 6 outlines the extent of the Sardis-Vedder Aquifer, which is approximately 57.7 km² in area. Figure 7 outlines the extend of the Marble Hill Aquifer, which is approximately 0.7 km² in area. Both aquifers are defined as unconfined sand and gravel aquifers.

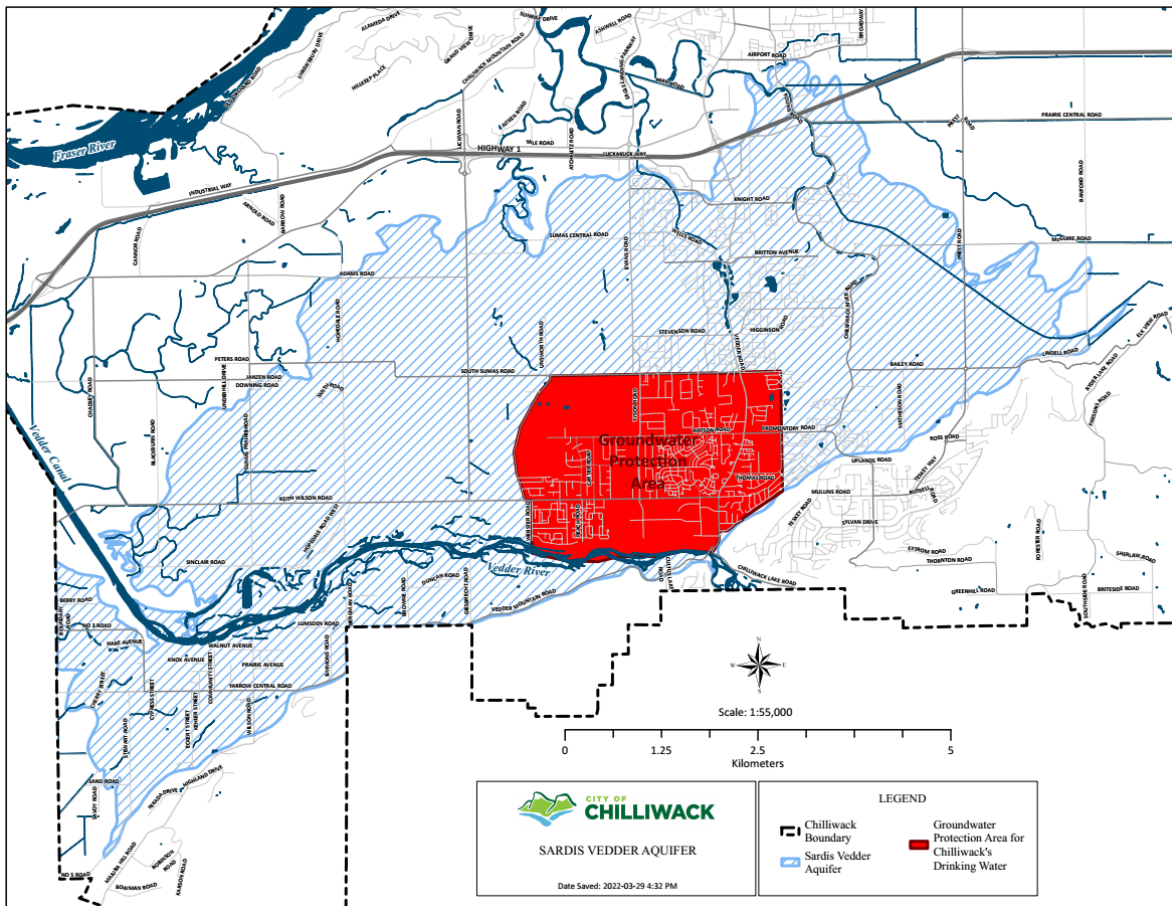


Figure 6: Map of Sardis-Vedder Aquifer

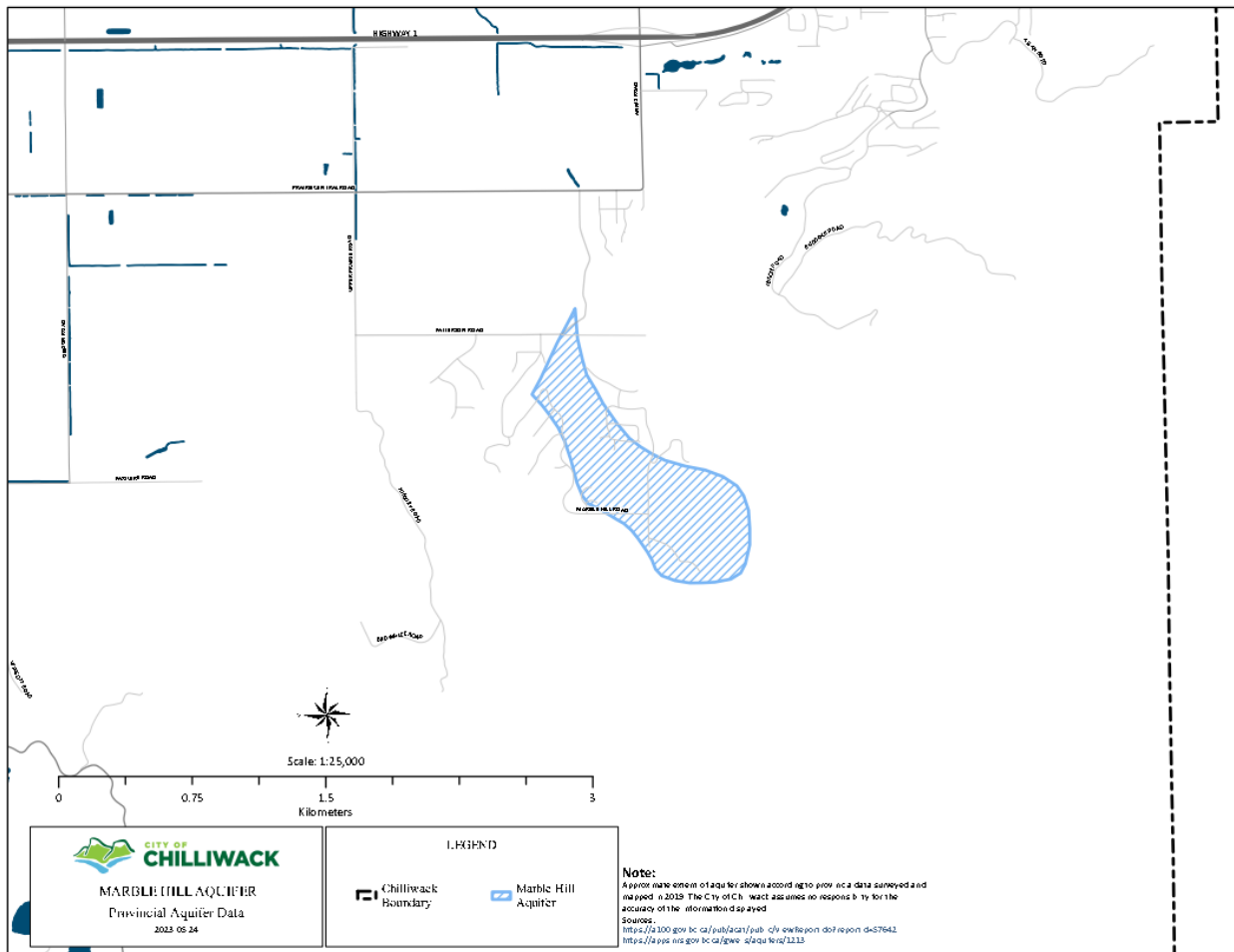


Figure 7: Map of Marble Hill Aquifer

3.2 Treatment System

The source water monitoring results show that the City’s source water does not require treatment to make it safe to drink. Sodium hypochlorite is added to the water at the production wells to protect the drinking water from microbial contamination as it travels through the distribution system. Since protective chlorine levels in the water drop the further the water has travelled the residual chlorine is monitored at 17 sampling locations. Continuous chlorine residual monitoring is tracked through SCADA software, City staff can log in remotely at any time to monitor residual chlorine levels.

3.3 Distribution System

The City of Chilliwack’s water distribution system consists of 10 production wells, 14 booster pump stations, 17 reservoirs, 482.6 km of water mains, 19 pressure reducing stations and over 5000 valves. The City obtains 39.7% of its drinking water from Wells #1, 2, 6 and 7.

Table 1: City Well Data

Well Number	Well Identification #	Year Drilled	Rated Capacity (L/s)	Depth (m)	Aquifers
Well #1	17295	1973	45	30.5	Sardis-Vedder
Well #2	17293	1977	190	29.87	Sardis-Vedder
Well #3	17292	1964	250	34.2	Sardis-Vedder
Well #6	17297	2006	100	57.9	Sardis-Vedder
Well #7	17298	2006	125	52.5	Sardis-Vedder
Well #8	17299	2006	75	59.5	Sardis-Vedder
Well #9	35054	2007	250	65.2	Sardis-Vedder
Well #10	17294	1975	60	45.1	Sardis-Vedder
Well #11	41520	2015	30	78.5	Marble Hill
Well #12	41548	2015	35	53.3	Marble Hill

The City of Chilliwack has 17 reservoirs in six different pressure zones. The holding capacity varies from 220 m³ to 19,000 m³. The total holding capacity of all the reservoirs combined is 39,139 m³.

Table 2: Reservoirs

Reservoirs	Location	Number of Tanks	Total Capacity (m ³)
Zone 1 Promontory	Uplands Road	1	4300
Zone 2 Promontory	Promontory Road	2	3160
Zone 3/4 Promontory	Goldspring Place	2	5500
Zone 1 Mt Shannon	Quarry Road	1	19,000
Zone 2 Mt Shannon	Swallow Place	2	1000
Zone 2 Chilliwack Mountain	Grandview Drive	3	2000
Zone 3 Chilliwack Mountain	Grandview Drive	1	260
Zone 4 Chilliwack Mountain	Braken Drive	1	260
Zone 2 Marble Hill	Marble Hill Road	2	274
Zone 3 Marble Hill	Marble Hill Road	2	1245
Balancing Reservoir	Patterson Road	1	1000
Falls Zone 1	Nixon Road	1	1600
Total			39,139

Table 3: Pressure Reducing Stations

Station Name	Location
Sunrise	Chilliwack Mountain Sunrise Drive (Maple Hills Strata)
Shrewsbury Lower	Chilliwack Mountain Shrewsbury Drive
Salmonberry	Chilliwack Mountain Salmonberry Drive
Honeysuckle	Chilliwack Mountain Honeysuckle Drive
Grandview Longthorn	Chilliwack Mountain Grandview Drive
Copper Ridge	Chilliwack Mountain Grandview Drive (Copper Ridge)
Promontory Rd	Promontory Hill Promontory Road – Zone 2 Reservoir
Bridlewood	Promontory Hill Teskey Road / Bridlewood Drive
Lutz	Promontory Hill Teskey Road / Lutz Road
Sylvan East	Promontory Hill Sylvan Drive
Sylvan West	Promontory Hill Sylvan Drive
Skyline	Promontory Jinkerson Road and Skyline Drive
Chartwell	Mount Shannon Chartwell Drive
Marble Hill Rd	Marble Hill Road and Dickson Place
Marble Hill Zone 3B	Marble Hill Road Above Mount Archibald Place
Annis	Annis Road and Prairie Central
Nixon East	Nixon Road
Nixon West	Nixon Road
Ramsay	Ramsay Place

4.0 Water Quality Sampling Program & Results

4.1 Source Water Quality

The source water quality monitoring program helps ensure that drinking water provided by the City continues to meet all drinking water quality standards.

As outlined in sections 4.2 and 4.3, the City of Chilliwack's source water is sampled on a weekly basis for microbial parameters and three times a year for routine parameters, biannually for total sulfides and annually for herbicides.

Health Canada publishes the Guidelines for Canadian Drinking Water Quality (GCDWQ), these guidelines are established in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water (CDW) and other federal government departments.

Each guideline was established on current, published scientific research related to health effects, aesthetic effects, and operational considerations. Health-based guidelines are established on the basis of comprehensive review of the known health effects associated with each contaminant, on exposure levels and on the availability of treatment and analytical technologies. These guidelines are systematically reviewed to assess the need to update them.

It should be noted that no samples collected during 2022 were outside of acceptable limits under the GCDWQG. The maximum allowable concentration (MAC) represents health related guidelines. Aesthetic objective (AO) applies to certain substances that may affect acceptance by consumers but are not a health concern, an example of parameters that have an AO are copper and manganese. As low as reasonably achievable (ALARA) is MAC within reasons.

4.2 Microbial Testing

The City of Chilliwack follows a water sampling and testing plan as set out in the BC DWPR to ensure the drinking water remains safe and of a high quality. Weekly water samples are collected by EOC certified Water Distribution Operations and are tested at ALS Environmental which is a Canadian Association for Laboratory Accreditation (CALA) certified lab. These weekly samples consist of microbiological parameters (Total Coliforms and E. coli).

Schedule B of the BC DWPR outlines the minimum number of water samples required based on the serviced population of 93,920. The City of Chilliwack is required to test the water supply for total coliform and E. Coli as set out in Schedule B (Table 5) as per the BC DWPR. The City of Chilliwack collected 1275 samples during 2022, with an average of 106 samples per month, this exceeds the required 91.

Table 4: Drinking Water Protection Regulations: Schedule A

Schedule A	
Parameter:	Standard:
Fecal coliform bacteria	No detectable fecal coliform bacteria per 100 ml
Escherichia coli (E. Coli)	No detectable E. Coli per 100 ml
Total coliform bacteria	
(a) 1 sample in a 30-day period	No detectable total coliform bacteria per 100 ml
(b) More than 1 sample in a 30-day period	At least 90% of the samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml

Table 5: Drinking Water Protection Regulations: Schedule B

Schedule B	
Frequency of Monitoring Samples for Prescribed Water Supply Systems	
Population Served by the Prescribed Water Supply System	Number of Samples Per Month:
Less than 5000	4
5,000 to 90,000	1 per 1,000 of population
More than 90,000	90 plus 1 per 10,000 of population in excess of 90,000

There is a total of 43 sample locations divided into the west side of the City and the east side of the city. The weekly sampling rotates between each water sampling region. The weekly sample are tested for the following parameters:

- Total Coliforms
- E. coli

During 2022, of the 1275 samples collected there was only one (1) sample that detected total coliforms which equates to 0.08% of the total samples collected.

Table 6: Summary of 2022 Microbial Results

Samples that contain total coliforms:	1	0.08% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of consecutive samples that contain total coliforms:	0	
Number of samples that contain total coliforms in last 30 days	0/0	
Total number of samples:	1275	

If / When E. coli or total coliforms are detected in a water sample, the following steps are taken:

- Immediately advise the following of the situation:
 - Utilities Superintendent Underground
 - Utilities Superintendent Electrical / Mechanical
- Immediately notify (by phone) the following of the existing situation, action being taken and potential impacts to health and environment
 - Drinking Water Officer (DWO)
 - Director of Utility Operations
- Immediately take two (2) sets of confirmatory samples at each of the following locations:
 - All locations with exceedances
 - Surrounding sections of the water distribution system based on discussions with the DWO
- Submit samples for detailed laboratory analysis to identify any:
 - Microbiological standard exceedances
 - Any other additional parameters as deemed appropriate (in consultation with the DWO)
- Inspect water for colour, odour and other visible contaminants

** All sampling and testing should be done in accordance with Standard Operating Procedures (SOP)*

When all test results confirm that E. coli and/or total coliforms counts are zero and any other parameter of concern is within acceptable standards, then notify:

- DWO
- Utilities Superintendent Underground
- Director of Utility Operations

The full water distribution system contamination (bacteriological) plan (ERP-W03) can be found in the City of Chilliwack's emergency response plan.

4.3 Routine Parameter Testing

Routine parameter testing is done three times per year to ensure the source water quality remains a high. Sampling is conducted at eight (8) locations, in January, May and September annually. These locations are included in Figure 7. In total, 22 samples are collected annually for the parameters outlined in Table 7.

Table 7: Water Sampling and Testing Schedule

Parameter	Frequency
Physical Tests	January, June, September
Anions and Nutrients	January, June, September
Total Sulfides	June, September
Non-Chlorinated Phenolics	January, June, September
Total Metals	January, June, September
Dissolved Metals	January, June, September
Volatile Organic Compounds / VOC -Dry-cleaning / VOC – Fuels / VOC – THMs	January, June, September
Hydrocarbons	January, June, September
Polycyclic Aromatic Hydrocarbons	January, June, September
Phenolics	January, June, September
Carbamate Pesticides	January, June, September
Herbicides	January, June, September

The City’s source water potable water quality analysis can be found in Appendix A. Samples are below the Maximum Allowable Concentrations (MAC) guidelines for all parameters sampled.

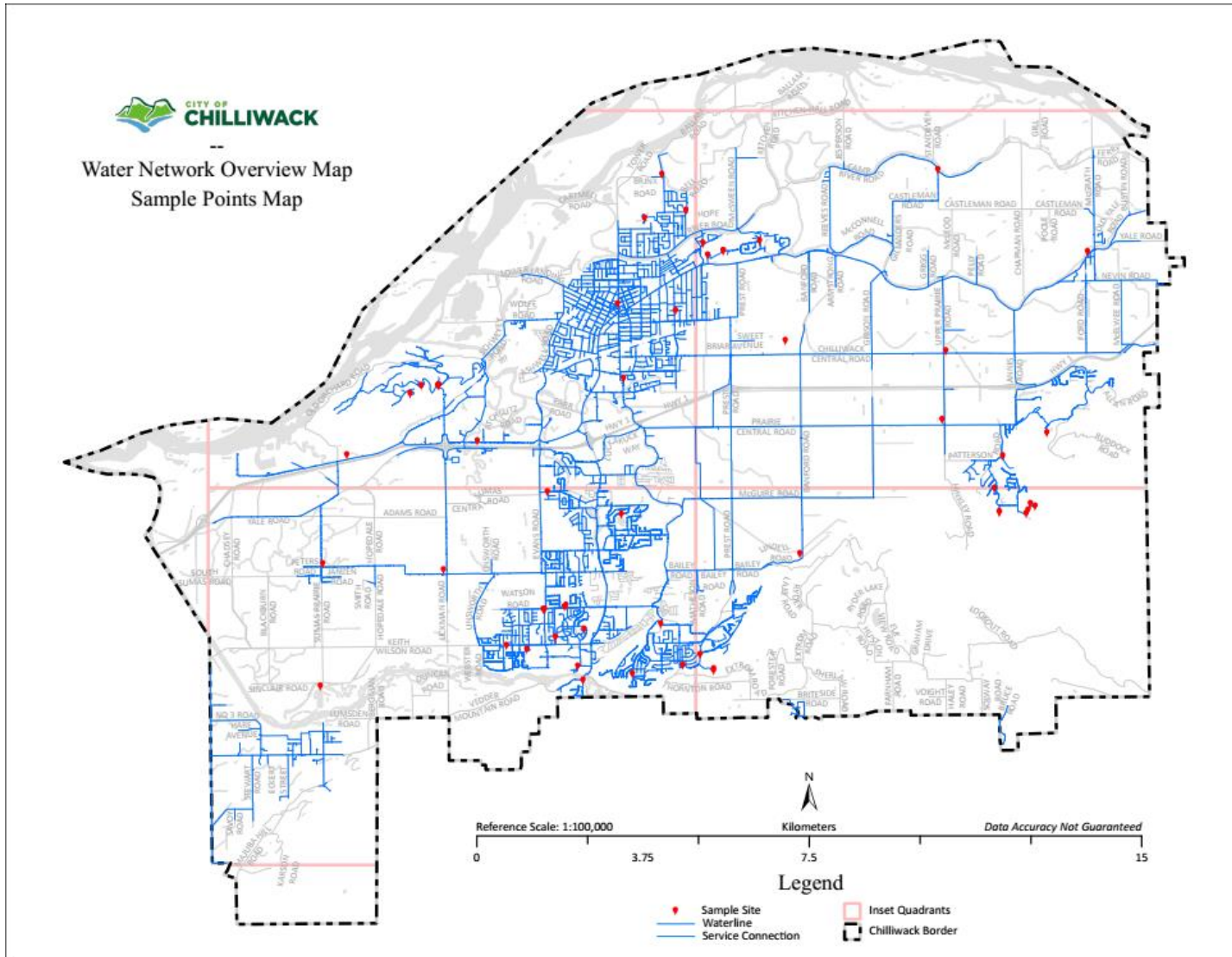


Figure 8: Map of Sampling Locations

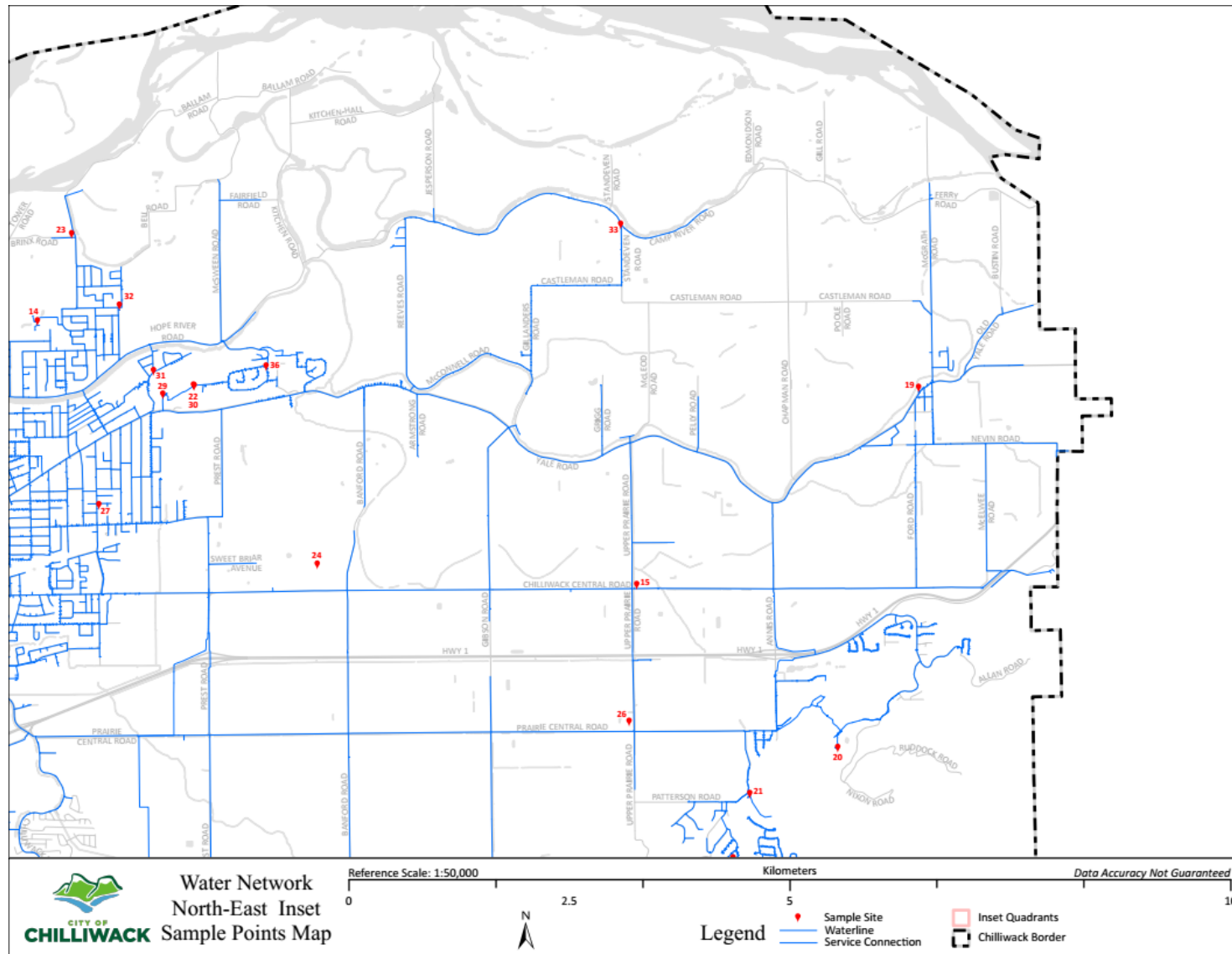


Figure 9: Map of Sample Points (North East)

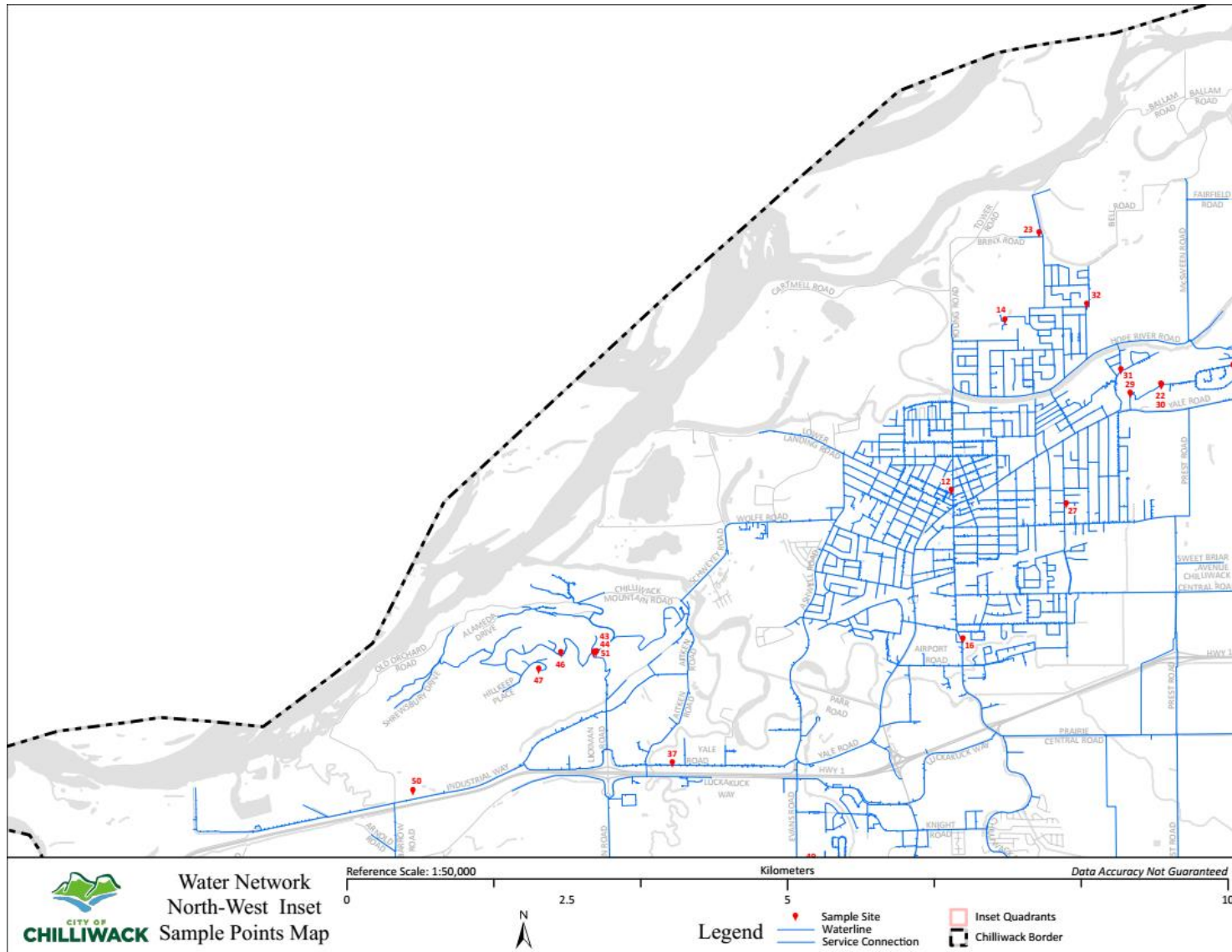


Figure 10: Map of Sampling Locations (North West)

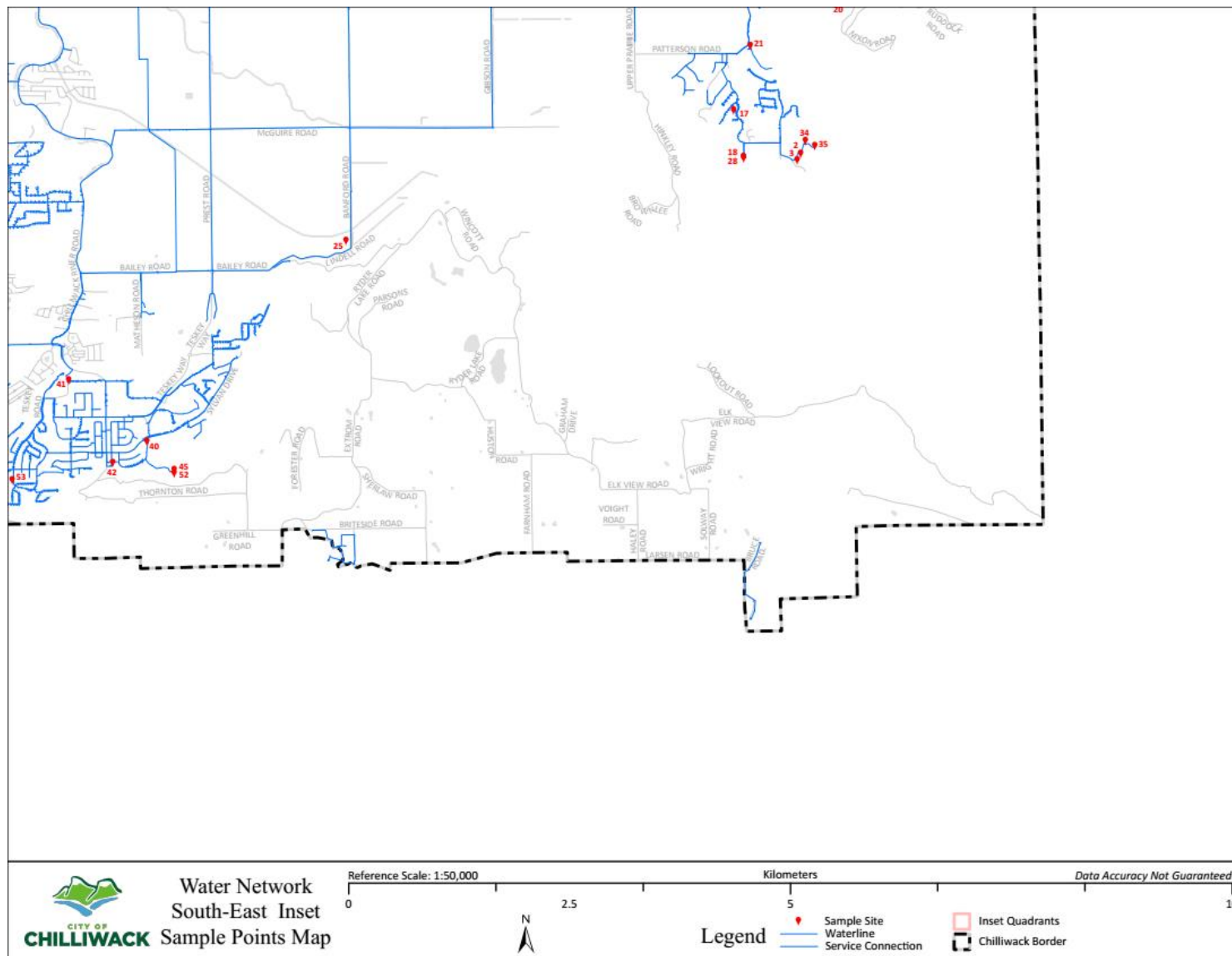


Figure 11: Map of Sampling locations (South East)

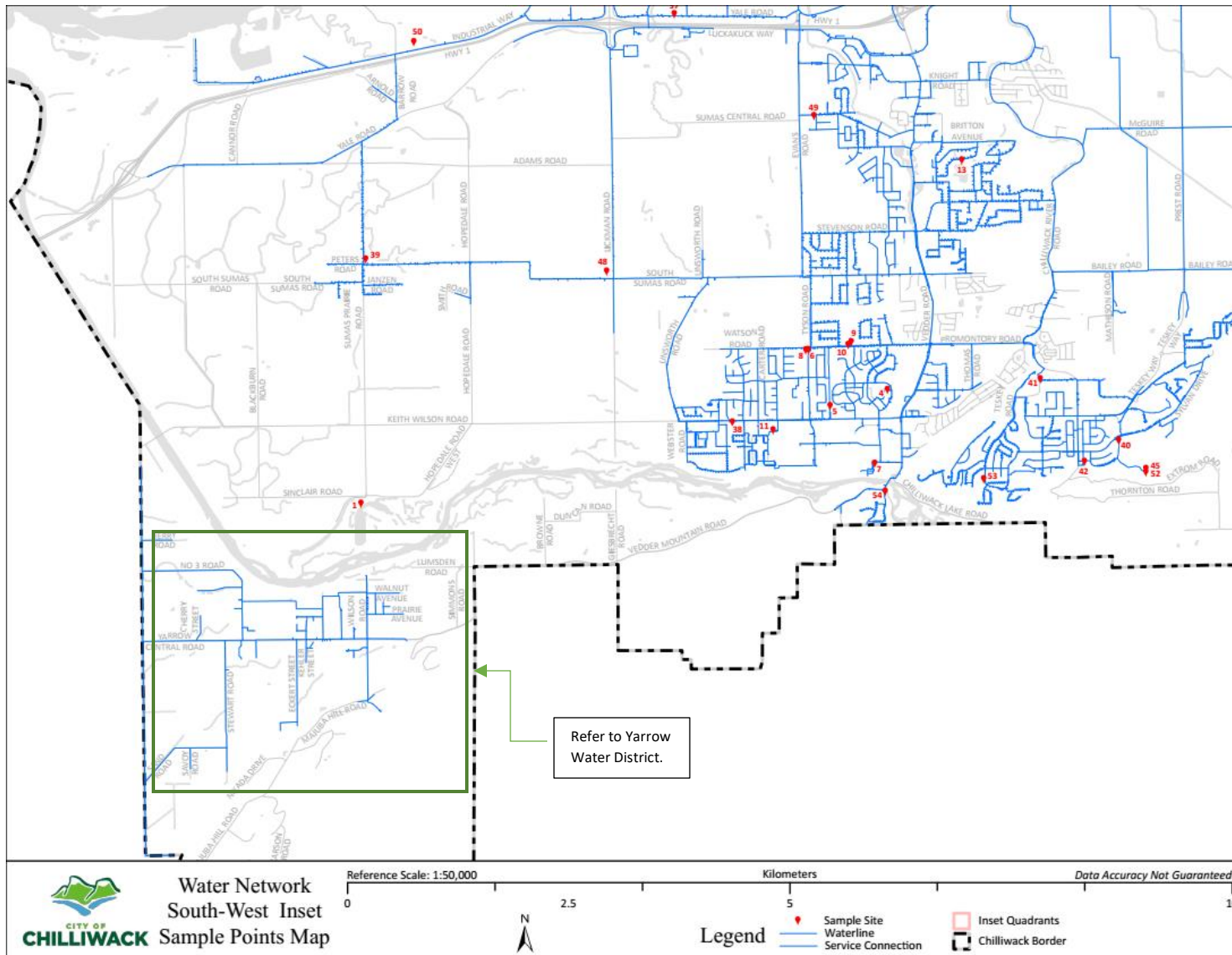


Figure 12: Map of Sampling Locations (South West)

5.0 Water Use & Water Conservation

5.1 Water Use

The City of Chilliwack is approaching 20,000 water service connections. Of those, 1,735 are Industrial, Commercial and Institutional (IC&I) and 17,768 are residential. The services range from ¾" to 12", and 100% of the water services are metered. In 2022, there were 199 new water service connections between all residential, industrial, commercial and institutional properties.

The average daily demand in 2022 was 34,796 m³ with a maximum daily demand of 54,792 m³ on July 28, 2022. The total consumption for water in 2022 was 12,700,643 m³, this includes all residential, industrial, commercial and institutional consumers. There are seasonal variations of water consumption across the City. The month with the lowest average daily demand was November 2022 at 29,852 m³ and the month with the highest average daily demand was August 2022 with an average of 46,615 m³. Table 8 below highlights the average daily demand, maximum daily demand and total volume of water consumed broken down by months.

Table 8: 2022 Water Production Table (Average, Maximum and Total)

Month	Average Daily Demand (m ³)	Maximum Daily Demand (m ³)	Sum of Total Volume (m ³)
January	31,685	40,216	982,227
February	30,029	32,967	840,807
March	30,379	33,710	941,749
April	31,149	37,915	934,467
May	31,517	34,917	977,026
June	34,638	46,565	1,039,136
July	43,415	54,792	1,345,863
August	46,615	51,278	1,445,055
September	41,226	48,036	1,236,785
October	35,728	40,681	1,107,569
November	29,852	32,258	895,572
December	30,787	39,446	954,387
Year (Average, Max, Sum)	34,796	54,792	12,700,643

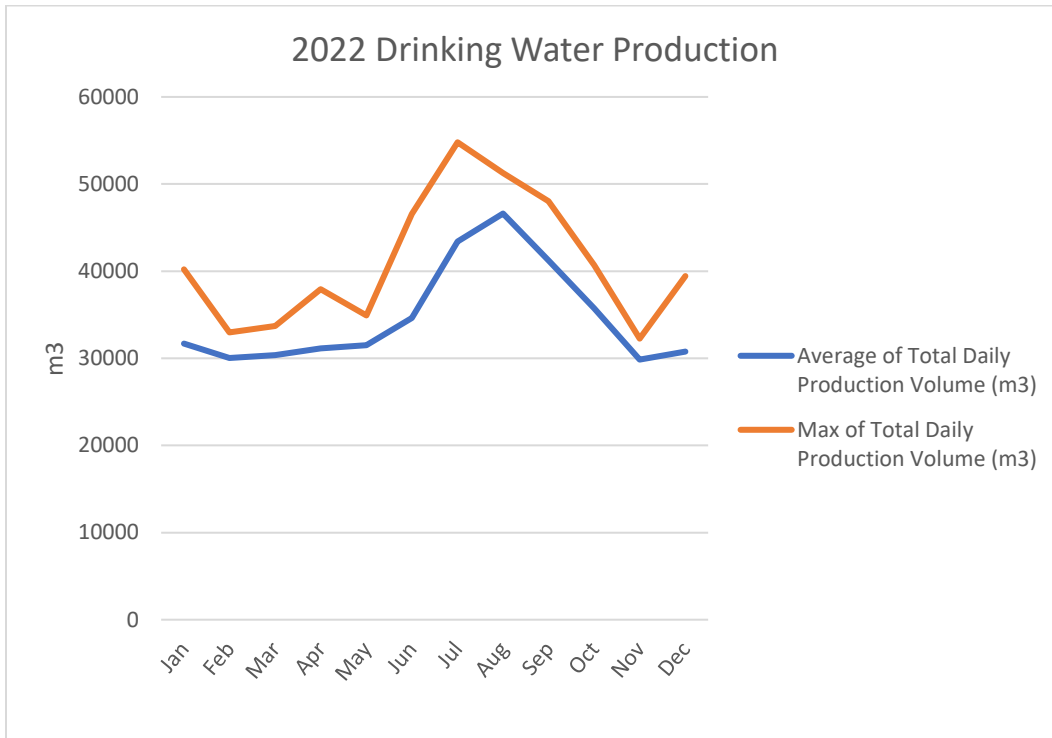


Figure 13: 2022 Drinking Water Production

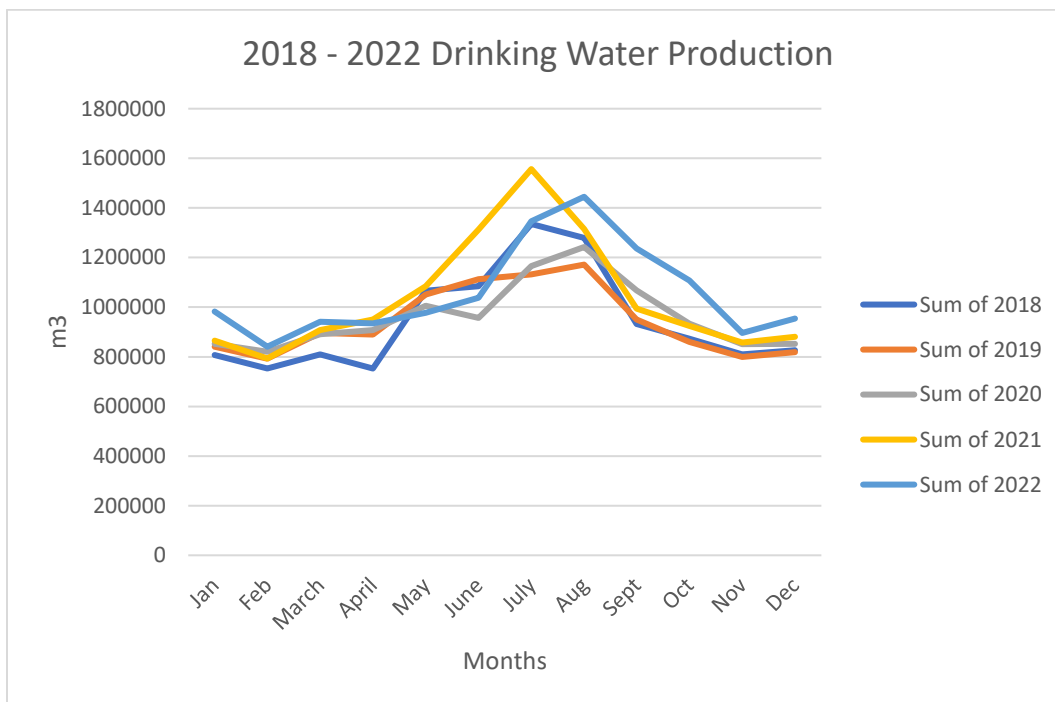


Figure 14: 2018 – 2022 Drinking Water Production Trend

5.2 Water Conservation

Like all other municipalities in the Lower Mainland and most municipalities in BC, Chilliwack continues to enhance water efficiency during the summer months by implementing water restrictions.

Every year, the City of Chilliwack implements water restrictions from June 1st to September 30th to promote water conservation. During these restrictions, lawn sprinkling is only permitted between 05:00 and 08:00 or between 19:00 and 22:00 with even numbered address only permitted to sprinkle their lawns on Wednesday and Saturdays and odd numbered addresses on Thursday and Sunday. There are additional water restrictions which are part of the water conservation plan. The higher levels of restrictions are implemented at the discretion of the Director of Engineering, the full list of restrictions included in the Water Conservation Plan can be found in Appendix B.

In addition to these restrictions the City promotes water conservation through the rain barrel and toilet rebate programs. The rain barrel program covers 50% of the cost of a new rain barrel up to a maximum rebate value of \$80.00. The toilet rebate program, encourages residents to replace toilets with a flushing volume of 13 L or greater to a toilet that does not exceed 6 L per flush. There is a maximum of 2 rebates per household.

Subsidized water conservation kits can also be purchase from the City. The outdoor water conservation kit includes the following: garden spray nozzle, hose timer and a moisture meter.

The City of Chilliwack actively promotes water conservation through advertisements (City website, social media, billboards, City facility display boards and canvassing).



Figure 15: Watering Restriction Advertisement

6.0 Source Water Protection

The City of Chilliwack has a Groundwater Protection Plan that was developed in 1997. This plan includes a list of recommendations that the City of Chilliwack has implemented to help provide source water protection. The City protects the aquifer through the *Zoning Bylaw 2020, No. 5000*, the RS-CWA (community water supply area) zone provides specific regulations which requires approval by the City Engineering department for residential use or for an accessory dwelling unit to be constructed. In addition to the zoning bylaw, the Groundwater Protection Zone is part of Development Permit Area No.1, the objective of this is to protect the City's sources of water supply from contamination, flow reduction and quality degradation. The Development Permit Area No. 1 outlines the requirements for developments occurring within the RS-CWA zone.

The City of Chilliwack actively follows the recommendations outlined in the groundwater protection plan. Public education is ongoing and delivered through multiple channels including but not limited to the City's website and through presentations to school groups. The City of Chilliwack has signage around the groundwater protection zone helping highlight to residents that it is important to protect the groundwater in this region. Household hazardous waste day is held annually in October, additionally many hazardous items can be returned to bottle depots under the Product Care program, therefore there are options for people to responsibly dispose of their hazardous waste. Additional recommendations outlined in the groundwater protection plan are addressed as requirements in the Development Permit Area No. 1.

6.1 Cross Connection Control (CCC) Program

The City of Chilliwack's Cross Connection Control Program is intended to eliminate actual and/or potential cross connections within the City's water distribution system to maintain water quality. The program aids in protecting the public water system by requiring the installation of approved backflow prevention devices on private and/or public properties.

Currently the City is in the process of assessing all water service connections to determine their backflow requirements as well as the property owner's installation obligations.

To aid in accomplishing the goals of the CCC Program, the City of Chilliwack has developed a unique strategy for existing facilities. The City will cost share the expense of retro-fitting plumbing in order to bring the facility into compliance with the City's *Waterworks Regulation Bylaw 2004, No. 2995*.

7.0 Emergency Response and Contingency Plan Summary

The key elements of the City of Chilliwack's Water System Emergency Response Plan are:

- A list of potential emergency situations and events that may result in a significant service disruption;
- Procedures for responding to and recovering from the emergency situations so that operation of the water system is back to normal;
- Roles and responsibilities of water system staff and external support personnel. This includes identifying the lead person (Water Incident Commander);
- References and links to established procedures (such as building fire evacuation procedures) as required and Chilliwack's corporate emergency response plan;
- Identification of clean lines of communication and notifications to the public;
- Identification of external resources (e.g. contractors) available to the water system staff;
- An up-to-date list of contacts with contact information;
- Staff training and orientation related to the Emergency Response Procedures;
- Testing of procedures to ensure that they are appropriate; and,
- A mechanism for updating the plan.

Emergency response procedures are for situations that require actions above and beyond standard operating procedures (SOPs) for normal operations. This plan outlines steps to take in events such as flooding and other major natural disasters.

8.0 Operations and Maintenance Program

Operation and maintenance are an important aspect of keeping the drinking water system operating efficiently. The City of Chilliwack performs systematic flushing of the water distribution system annually and flushes most dead-end water mains every 12 to 18 weeks. Flushing is a process of sending a rapid flow of water through the mains to clean them. This helps maintain water quality by removing sediment and stale water from the distribution system. The City also encourages water distribution mains to be looped to maintain water quality (reduce dead-ends). The *Land Development Bylaw 2014, No. 3055* Section 2.2.5 outlines Hydraulic Network Considerations.

The City of Chilliwack has 32 EOCP Certified Utilities Operators responsible for the operation and maintenance of the City's water transmission and distribution systems. Their EOCP certification levels are outlined in the table below.

Table 9: EOCP Water Distribution – Certified Utility Operators

Certification Level	Number of Staff
Level 1	12
Lever 2	9
Level 3	6
Level 4	5
Total Qualified Staff	32



Figure 16: Hydrant Flushing

9.0 2022 to 2032 Water System Capital Plan

Each year the City of Chilliwack prepares a 10-year Comprehensive Municipal Plan (CMP). The CMP identifies funds needed to: maintain and reinvest in the City’s infrastructure; to maintain or enhance service levels; to respond to the needs of the growing community; and, to fund all capital priorities without debt. The operating and capital programs for the water system are funded through the dedicated Water Fund with revenues from water system user fees and development cost charges. Water system user fees are set through the *Waterworks Regulation Bylaw No. 2995* and the *Development Cost Charge Bylaw 2000, No. 2689* which are reviewed annually. The Water System Capital Program for 2022 to 2032 (see Appendix C) identifies the capital investments planned for the City’s water supply, distribution, storage and, pressure management infrastructure as well as capital investments needed to support ongoing operations. In 2022, the City replaced nearly 2.5 kilometres of water mains and upgraded the Chilliwack Mountain Zone 3 booster pump station.

References

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

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Appendix A: 2022 Potable Water Quality Analysis

2022 Potable Water Quality Analysis

PARAMETER	Canadian Guideline Limit	Reason Guideline Established		PW77-2 Well 1/2			PW64-3 Well 3			PW99-6 Well 6/7			PW99-8 Well 8			PW07-9 Well 9			PW75-10 Well 10		
				Feb	May	Sept	Feb	May	Sept	Feb	May	Sept	Feb	May	Sept	Feb	May	Sept	Feb	May	Sept
pH	6.5-8.5	AO	Conventional Parameters in Water	7.46	7.74	7.71	7.55	7.80	7.76	7.94	7.89	7.95	7.99	7.86	7.87	8.00	7.94	7.96	7.80	7.90	7.92
Conductivity (uS/cm)	-			135	145	118	113	108	106	103	122	130	127	108	106	133	137	136	113	123	124
True Colour (Col. Unit)	15	AO	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
Turbidity (NTU)	1.0	OG	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Hardness	-		53.5	56.3	52.3	47.5	48.4	48	43.8	53.9	60.2	55.2	49.1	51.5	57.4	61.6	64.3	50.2	55.9	58.2	
Total Dissolved Solids	500	AO	90	94	80	70	74	80	59	88	90	80	76	78	80	85	88	70	80	86	
Alkalinity as CaCO3	-		43.6	43.3	45.8	41.6	40.9	44.2	43.0	49.0	54.6	51.7	44.0	46.8	53.6	54.3	57.4	48.5	50.6	55.6	
Chloride	250	AO	8.32	10.3	3.89	3.59	2.2	1.55	0.74	1	1.38	1.17	0.82	0.8	1.54	1.8	1.76	0.96	1.49	1.3	
Sulphate	500	AO	7.58	7.86	7.22	6.93	6.87	6.8	6.67	8.92	8.86	9.56	6.79	6.86	9.07	9.36	8.97	6.26	6.84	6.18	
Ammonia	-		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Nitrate	10	MAC	0.674	0.339	0.208	0.311	0.203	0.164	0.141	0.12	0.164	0.159	0.144	0.134	0.239	0.22	0.222	0.125	0.16	0.132	
Nitrite	3.2	MAC	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Fluoride	1.5	MAC	0.021	0.026	0.026	0.025	0.03	0.026	0.026	0.033	0.031	0.03	0.029	0.029	0.028	0.03	0.028	0.027	0.029	0.028	
Aluminum	0.1	OG	<0.0030	<0.0030	0.0058	0.0038	0.0034	0.0067	0.0114	0.0064	0.0093	0.0064	0.0104	0.0148	0.0068	0.0066	0.01	0.0052	0.0052	0.0079	
Antimony	0.006	MAC	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic	0.01	MAC	0.00024	0.00036	0.00026	0.00021	0.00022	0.00023	0.00066	0.00211	0.00169	0.00164	0.00075	0.00074	0.00033	0.00038	0.00038	0.00022	0.00023	0.00024	
Barium	1.0	MAC	0.0132	0.015	0.0115	0.0109	0.0111	0.0113	0.00827	0.0115	0.0136	0.0111	0.00896	0.00949	0.0106	0.0119	0.0115	0.00967	0.0106	0.0109	
Boron	5.0	MAC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	0.011	0.012	
Cadmium	0.005	MAC	<0.0000050	0.0000075	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium	-		18.6	19.5	18.3	16.7	17	16.9	15.5	18.8	21.1	19.4	17.4	18.3	20.4	21.8	22.9	17.6	19.6	20.4	
Chromium	0.05	MAC	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Copper	1.0	AO	0.00121	0.00206	0.00529	0.00359	0.00215	0.00213	0.00155	0.00171	0.00148	0.00076	<0.00050	<0.00050	0.00101	0.00058	0.00056	0.00167	0.00099	0.00178	
Iron	0.3	AO	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Lead	0.01	MAC	0.000054	0.000173	0.000082	0.00012	0.000061	0.000064	0.000053	0.000564	<0.000050	<0.000050	<0.000050	<0.000050	0.00006	0.000072	0.000069	<0.000050	<0.000050	<0.000050	
Magnesium	-		1.72	1.85	1.6	1.42	1.44	1.41	1.23	1.68	1.83	1.65	1.37	1.4	1.57	1.74	1.51	1.7	1.76	1.76	
Manganese	0.05	AO	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Mercury	0.001 mg/L	MAC	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Nickel	-		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Phosphorus	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Potassium	-		0.79	0.902	0.779	0.642	0.677	0.696	0.572	0.9	0.934	0.822	0.63	0.686	0.682	0.743	0.781	0.688	0.758	0.791	
Selenium	0.01	MAC	0.000322	0.000275	0.000326	0.000191	0.000294	0.000232	0.000249	0.00046	0.000482	0.000488	0.000268	0.000302	0.000352	0.000458	0.000364	0.000188	0.000213	0.000219	
Silicon	-		4.13	4.2	4.16	3.48	3.76	3.73	3.28	4.45	4.47	4.18	3.68	3.67	3.69	4.17	4.16	3.97	4.08	4.09	
Silver	-		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium	200	AO	3	4.29	2.74	1.89	2	2.11	1.22	1.65	1.68	1.54	1.43	1.41	1.58	1.76	1.72	1.97	2.24	2.21	
Uranium	0.02	MAC	0.000027	0.000038	0.000034	0.000037	0.000038	0.000042	0.000029	0.000115	0.000126	0.000122	0.000034	0.000034	0.000057	0.000061	0.000061	0.000051	0.000061	0.000066	
Zinc	5	AO	<0.0030	0.0069	<0.0030	0.0058	0.0038	0.0045	<0.0030	0.0038	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	
Dicamba	110 ug/L	MAC	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	

NOTES:
 Measurements are in mg/L unless otherwise indicated
 Empty fields were not contained in analytical record.
 MAC = Maximum Acceptable Concentration
 AO = Aesthetic Objective
 OG = Operational Guideline
 GBHNR = Great Blue Heron Nature Reserve
 Exceeds limits

Appendix B: Water Conservation Plan

Water Using Activity	2020 - 2022 Current Public Water Conservation Plan			
	Stage 1	Stage 2 - Normal June 1 - September 30	Stage 3 - Precautionary At Discretion of Engineer	Stage 4 - Dry At Discretion of Engineer
1. Lawn Sprinkling	No restrictions, but use of rain barrels, low flow fitting encouraged. (Oct 1 to May 31)	Even addresses – Wednesday & Saturday Odd addresses – Thursday & Sunday 5 - 8am or 7 - 10pm	Even addresses – Wednesday Odd addresses – Thursday 5 - 8am only	Prohibited: All forms of lawn watering using treated drinking water are prohibited.
2. New Unestablished Lawns		Permits Allowed (1 month) (5-8am or 7-10pm)	Permits Allowed (for 2 weeks) 5-8am only	Prohibited: No new permits issued or renewed. All forms of lawn watering using treated drinking water are prohibited.
3. Flowers, vegetables, trees and shrubs		Any time of day, watering using a hand-held container, hose with a spring-loaded shutoff nozzle, soaker hose or drip irrigation.	Watering using a hand-held container, or hose with a shut off device or soaker.	Only vegetable gardens with hand-held container or spring-loaded shut off device
4. Private Pools, Spas and Garden Ponds Filling/Refilling		No restrictions	No restrictions	Prohibited: All filling or topping up of pools, spas, or garden ponds using treated drinking water is prohibited.
5. Impermeable surface washing		Must use handheld container or a hose with a spring-loaded shutoff nozzle	Washing for aesthetic purposes is prohibited, use of handheld container or hose with shutoff device can be used for painting, or health and safety.	Prohibited: All forms of impermeable surface washing are prohibited unless required to comply with health regulations.
6. Fountains and Water Features		No restrictions	All use of non-recirculating water features using treated water is prohibited. Recirculating features can be used normally	Prohibited: All use of fountains and water features using treated drinking water is prohibited.

<p>7. Outdoor Washing vehicles and boats</p>	<p></p>	<p>Must use handheld container or hose equipped with spring-loaded shutoff nozzle. Recommend washing vehicles and boats over grass or gravel.</p>	<p>Must use handheld container or hose equipped with spring-loaded shutoff nozzle. Recommend washing vehicles and boats over grass or gravel.</p>	<p>Prohibited: All forms of impermeable surface washing are prohibited unless required to comply with health regulations.</p>
<p>8. Golf Courses</p>		<p>No restrictions</p>	<p>Water tee and green areas normally, fairway watering should be minimized to a maximum of two days per week.</p>	<p>Use of treated drinking water at the discretion of the City. No fairway watering.</p>
<p>9. Commercial Flower & Vegetable Farms (in urban area)</p>		<p>No restrictions</p>	<p>Limit use to minimal levels</p>	<p>Use of treated drinking water at the discretion of the City.</p>

Appendix C: 2022 to 2032 Water System Capital Plan

2022 Utilities CMP 10 Year Projections Section

Projects	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
4 - Water Capital	\$ 15,267,500	\$ 7,002,000	\$ 4,667,000	\$ 5,622,000	\$ 5,857,000	\$ 5,487,000	\$ 3,862,000	\$ 4,212,000	\$ 5,167,000	\$ 5,012,000	\$ 3,187,000
Water Supply	\$ 5,085,000		\$ 260,000			\$ 2,000,000		\$ 1,025,000	\$ 3,080,000		
Well #5								\$ 1,025,000	\$ 3,080,000		
Well #5 Noise Abatement	\$ 70,000										
Chlorination System	\$ 250,000		\$ 260,000								
UV System - Production Wells						\$ 2,000,000					
E.Hillside Ground Water Invest	\$ 410,000										
Sardis Vedd Aquifer Model Updt	\$ 15,000										
Nixon Rd Production Well 14	\$ 650,000										
Nixon Rd Production Well 13	\$ 1,490,000										
Monitoring Wells	\$ 150,000										
Vedder Mtn Production Well	\$ 2,050,000										
Petawawa Rd. Production Well											
Transmission Mains		\$ 1,750,000									
ECTM-Ph 4, Chwk Cent-Mt.Shan											
Wiltshire Area Main Replacemen		\$ 1,750,000									
Greendale Watermain Ph2&3											
Distribution Mains	\$ 3,650,000	\$ 3,175,000	\$ 905,000	\$ 1,875,000	\$ 2,550,000	\$ 1,875,000	\$ 2,550,000	\$ 1,875,000	\$ 775,000	\$ 2,550,000	\$ 1,875,000
Distribution Main Upgrading	\$ 2,065,000	\$ 1,100,000		\$ 1,100,000	\$ 1,100,000	\$ 1,100,000	\$ 1,100,000	\$ 1,100,000		\$ 1,100,000	\$ 1,100,000
Air Valve Replacement	\$ 73,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000
Distribution Main Upgrading	\$ 2,065,000	\$ 1,100,000		\$ 1,100,000	\$ 1,100,000	\$ 1,100,000	\$ 1,100,000	\$ 1,100,000		\$ 1,100,000	\$ 1,100,000
Eastern Hillside Trunk Waterm											
Meter Replacement	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000
Chwk Mtn Rd WM Looping			\$ 130,000								
Water Meters	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000	\$ 425,000
Bulk Meter Upgrades	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000
Main St. Watermain Upgrade		\$ 625,000									
Webb Ave. WM Looping	\$ 100,000										
Air Valve Replacement	\$ 73,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000
Water - Developer Projects	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000
	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000
Pump Stns, Storage, PRVs	\$ 4,642,500	\$ 415,000	\$ 1,505,000	\$ 1,600,000	\$ 1,800,000					\$ 1,150,000	
Annis Road Pump Station											
Prom Zone 3 & 4 BPS Relocation	\$ 1,645,000										
Chwk Mnt	\$ 500,000										
Hack Brown Booster PS Pump	\$ 120,000										
Marble Hill Zone 2 RDS		\$ 130,000	\$ 1,165,000								
Marble Hill Storage Reservoir											
Chwk Mtn Zone 1 Reservoir	\$ 32,500		\$ 150,000	\$ 1,600,000	\$ 1,800,000						
Chwk Mtn Zone 3 Reservoir										\$ 1,150,000	
Promontory Zone 3/4 RDS Kiosk	\$ 105,000										
Marble Hill Well Connection	\$ 1,450,000										
Promontory Zone 1 Chamber	\$ 570,000										
Shrewsbury Dr PRV	\$ 20,000	\$ 190,000									
Sunrise Dr PRV		\$ 20,000	\$ 190,000								
Honeysuckle PRV	\$ 200,000										
WDS 60 Genset		\$ 75,000									
Operations	\$ 690,000	\$ 462,000	\$ 797,000	\$ 947,000	\$ 307,000	\$ 412,000	\$ 112,000	\$ 112,000	\$ 112,000	\$ 112,000	\$ 112,000
PC Purchases	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000
Finance Systems (1/3)	\$ 153,000										
New Vehicles / Equipment	\$ 70,000	\$ 100,000	\$ 310,000	\$ 335,000	\$ 295,000	\$ 400,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Water Meter AMI Equipment	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000							
South Side Storage Building			\$ 250,000								
OC Improvements	\$ 10,000		\$ 25,000								
Covered Storage - Ops Yard	\$ 15,000										
Ops Centre Plotter	\$ 30,000										
Water Filling Station		\$ 150,000									
Fibre Optic Ntwk Expan 1/3				\$ 400,000							
Wolfe Rd Pump Station Encroach	\$ 200,000										

Appendix D: Metals in Drinking Water – “Flush” Message in Annual Reports



fraserhealth

Better health.
Best in health care.

May 20, 2020

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,

Blair Choquette
Health Protection Manager
Drinking Water Program

Fraser Health Authority
Health Protection

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