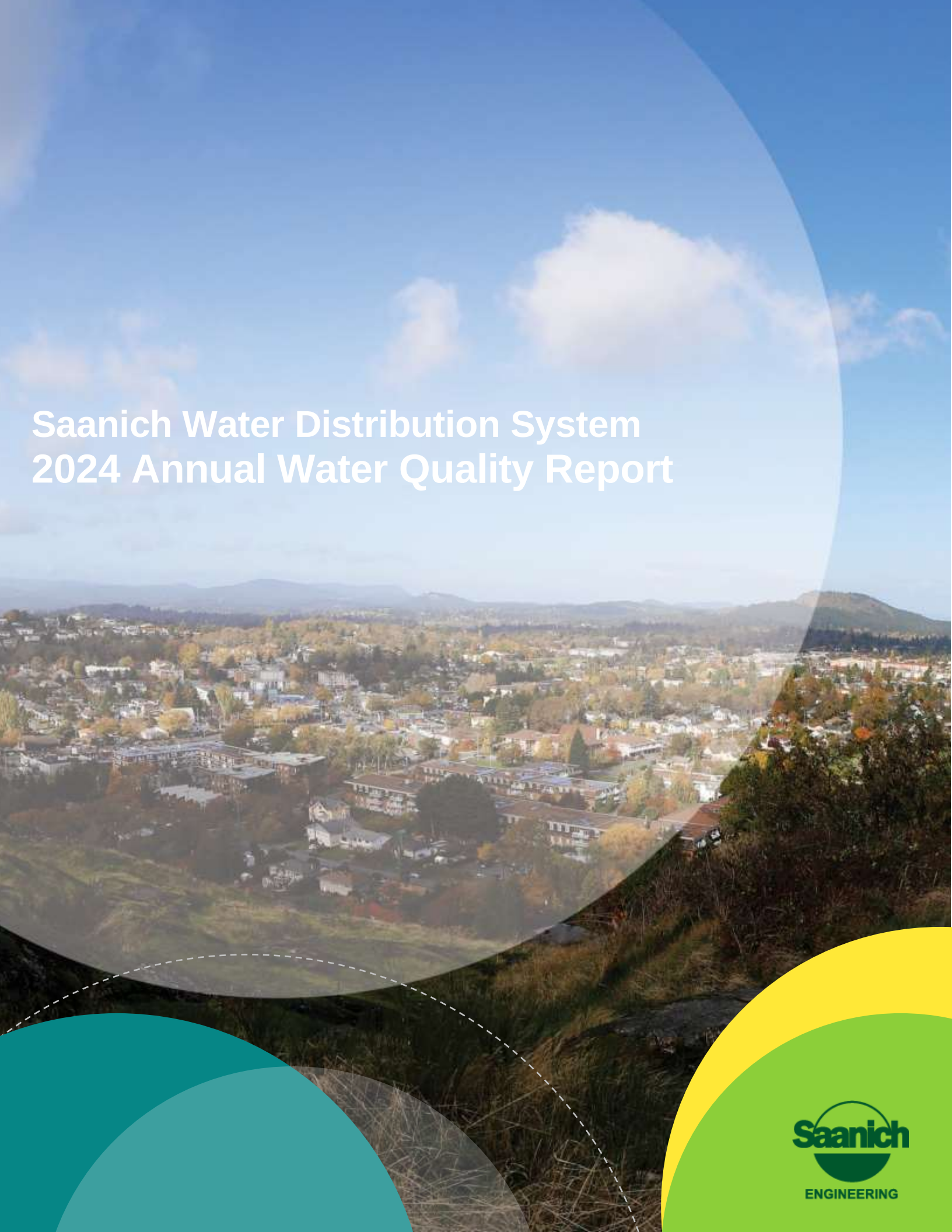
Saanich Water Distribution System
2024 Annual Water Quality Report



Saanich
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1.0 Introduction

This report is the 2024 annual overview of the results from water quality samples collected from the Saanich Water Distribution System (Map 3). The report summarizes data from District of Saanich owned and operated infrastructure with sample locations including reservoirs, pump stations, pressure regulating stations and locations from the distribution system. The parameters that are routinely monitored in the distribution systems for determining the microbiological quality of the drinking water are *E.* coli, total coliforms, turbidity, temperature, and chlorine residual. The water samples are collected by the Capital Regional District (CRD) water quality staff and analytical testing is performed at the CRD Water Quality Lab. Monthly and weekly summary reports on water quality data are posted on the CRD's website at: www.crd.bc.ca/about/data/drinking-water-quality-reports

2.0 Water System Description

The District of Saanich purchases bulk water from the Capital Regional District (CRD). The bulk water typically originates from the Sooke Lake Reservoir. The water travels from Sooke Lake Reservoir to the Goldstream Water Treatment Plant where disinfection occurs and then is distributed through several large transmission mains before reaching Saanich. Saanich is supplied by CRD Transmission Mains No. 1, 3, and 4 (shown in Appendix A) with 19 water connections from the CRD transmission system into the Saanich distribution system.

For more information on CRD Water Disinfection, please see the CRD Greater Victoria Drinking Water Quality Annual Report at: Drinking Water Quality | Capital Regional District

The Saanich Distribution System consists of 31 different pressure zones where source water comes directly from a Capital Regional District supply main or from another Saanich pressure zone. The distribution system includes 18 pumping stations, 49 pressure reducing stations, and 4 water reservoirs.

The Saanich Distribution System reservoirs are used to store and supply drinking water but also provide system balancing and fire and emergency storage.

Saanich Water Reservoirs listed from largest to smallest:

1. Rithet Reservoir: 15,750 m^3 (3,464,516 imperial gallons)
2. Mount Tolmie Reservoir: 4,063 m^3 (893,735 imperial gallons)
3. Wesley Reservoir: 2,632 m^3 (578,959 imperial gallons)
4. Hartland Reservoir: 797 m^3 (175,316 imperial gallons)

3.0 Water Quality Regulations

The District of Saanich Water Distribution System must comply with the British Columbia Drinking Water Protection Act (BCDWPA) and Drinking Water Protection Regulation (BCDWPR) as well as follow federal Guidelines for Canadian Drinking Water Quality (GCDW). The water quality standards for potable water systems are shown in Schedule A of the British Columbia Drinking Water Protection Regulation and in the Guidelines for Canadian Drinking Water Quality Summary Table. These standards are provided in Table 1:

Table 1 - Water Quality Standards for Potable Water – BCDWPR & GCDWQ

Parameter:	Standard:
Escherichia coli	No detectable *Escherichia coli* per 100 ml
Total coliform bacteria	
(a) 1 sample in 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 samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml
	No detectable total coliform from consecutive samples from the same site

Schedule B of the BCDWPR requires the number of water samples collected to correspond with population size as shown in Table 2:

Table 2 - Frequency of Monitoring Samples for Prescribed Water Supply Systems - BCDWPR

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

4.0 Vancouver Island Health Authority Water System Operating Permit

The Saanich Water Distribution System must comply with the Vancouver Island Health Authority (VIHA) and the Drinking Water Officer (DWO) terms and conditions for the permit to operate a water system.

The DWO conducts inspections and works with water system operators to ensure compliance with the BCDWPA and BCDWPR.

The Saanich Water Distribution System operates in compliance with the BCDWPA and the BCDWPR as well as the terms and conditions set by VIHA for the permit to operate a water system. These terms and conditions include:

1. Ensuring the minimum bacteriological sampling frequency is maintained as described in the BCDWPR and maintaining a drinking water quality sampling program.
2. Ensuring that all water system operators are adequately certified through the Environmental Operators Certification Program.
3. Annual review, updating and submittal of an Emergency Response Plan (to the DWO).
4. Publishing the Saanich Water Distribution System Annual Water Quality Report within the six months of the calendar year end.
5. Ongoing operation and maintenance of a Unidirectional Flushing program.

Saanich Drinking Water System operators and the VIHA DWO meet on an annual basis to confirm requirements for the permit to operate. During this time, the DWO will propose any additions to the terms and conditions of the operating permit.

5.0 Water Quality Monitoring

The population of Saanich is approximately 117,735 (based on 2021 Census data). Based on Schedule B of the BCDWPR, Saanich is required to collect 93 compliance samples per month. In 2024, a total of 1,180 samples were collected from 64 dedicated sampling stations within Saanich. The requirements for water samples from Schedule B of the BCDWPR and the actual samples taken from the Saanich Distribution System are summarized in Table 3.

Table 3 - District of Saanich Frequency of Sampling as per Schedule B of BCDWPR

Year	Population	Number of Sample sites		Required Number of Samples per Month[1]	Actual	
					Average Number of Samples Per Month Collected	Number of Samples Per Year Collected
2024	117,735	64		93[1]	98.3	1,180

1 Minimum number of samples per month required by Schedule B of BCDWPR and Island Health Drinking Water Officer

In 2024, water quality samples were collected by CRD staff for compliance samples each month. The monthly requirements for compliance water quality sampling for the Saanich Water Distribution System based on population and the BCDWPR is 93 samples. Water quality compliance sampling exceeded the minimum requirements all twelve months of the year with the number of samples ranging from 95 to 105 per month with an average of 98.3 each month, see Table 4.

Table 4 - Saanich Distribution System Bacteriological Water Quality 2024

Month	Bacterial Water Samples Collected	Total Coliforms				E.coli Samples > 0 CFU/100ml
		Samples TC > 0 CFU/100ml	TC > 0 Percent	Resamples TC > 0 CFU/100ml	Samples TC > 10 CFU/100ml	
January	98	0	0.0	0	0	0
February	96	0	0.0	0	0	0
March	96	0	0.0	0	0	0
April	97	0	0.0	0	0	0
May	105	0	0.0	0	0	0
June	95	0	0.0	0	0	0
July	97	0	0.0	0	0	0
August	99	0	0.0	0	0	0
September	96	0	0.0	0	0	0
October	105	0	0.0	0	0	0
November	98	0	0.0	0	0	0
December	98	0	0.0	0	0	0
Total	1,180	0	0.0	0	0	0

6.0 Bacteriological and Physical Water Quality Results

Microbiological pathogens are considered to be the most significant threat to public drinking water affecting the public's health. The effects of microbiological pathogens are acute. If they are ingested, pathogens can give people gastro-intestinal illness within a matter of hours or days. In some cases, ingesting microbiological pathogens can result in permanent damage to internal organs or lead to chronic health issues. In the most severe instances, ingesting pathogens can be fatal.

6.1 Escherichia coli (E. coli)

E. coli is used as an indicator of the microbiological safety of drinking water. *E. coli* is a member of the coliform group of bacteria that is naturally found in the intestines of humans and warm-blooded animals. No detectable presence in a 100mL water sample is the maximum acceptable concentration (MAC) for potable water. Monitoring for *E.* coli provides information on the microbial condition of the distribution system. The presence of *E. coli* indicates recent fecal contamination and the potential presence of microorganisms capable of gastrointestinal illnesses. The absence of *E. coli* in drinking water generally indicates that the water system is free of gastrointestinal illness causing bacteria.

If *E. coli* is detected in a water sample, the BCDWPA stipulates that the lab conducting the analysis (CRD) must notify the water supplier (Saanich), the Drinking Water Officer, and the Medical Health Officer. In turn Saanich must also immediately notify the Drinking Water Officer and the Medical Health Officer. Together, an assessment will be made of the possible health risk to the public and the most effective means to protecting the public. The assessment will consider past water samples, the temperature, turbidity, chlorine residual of the water sample as well as any operational changes or disturbances creating low pressures and other relevant information. The water will be resampled immediately. If the risk assessment deems the water system is operating as expected, a decision may be made to wait for results from the second water sample to determine if further action is required.

In 2024, there were 1,180 water samples taken with all samples testing negative for *E.coli* (Table 4).

6.2 Total Coliforms

Coliform bacteria are used as operational indicators in water distribution systems. Their presence indicates water quality has degraded, possibly by bacterial regrowth or system contamination. Alternatively, coliform bacteria positive samples followed immediately with a negative sample for coliform bacteria may indicate contamination during sample collection.

Monitoring for total coliforms allows for the detection of changing conditions, intrusion of contaminants, or areas of reduced water quality, which can then be investigated and followed with corrective actions if required.

In 2024, there were 1,180 water samples taken with no samples testing positive for total coliforms.

Saanich Water Distribution system complied with the BCDWPR with all months exceeding 90% of samples with no coliform present. The annual average total coliform percentage positive was well below the 10% allowable limit at 0.0% (Table 4).

6.3 Chlorine Residual

Chlorine is used to treat the raw water from Sooke Lake to produce potable, disinfected water. The Chlorine residual in the drinking water post treatment is there to safeguard against microbial regrowth or contamination in the drinking water system. Monitoring the chlorine residual in the drinking water system gives valuable information on the condition of the water currently in the system. A stable chlorine residual indicates that there is no microbial regrowth in the system. Alternately, if the chlorine residual were to suddenly decrease or disappear altogether would indicate that something has changed in the system and further investigation is needed to determine the cause to ensure that there has not been a contamination event.

The annual median chlorine residual in the Saanich Water Distribution System was 1.59 mg/L (Table 5). The lowest monthly median was in October (1.42 mg/L) and the maximum monthly median was in March (1.70 mg/L) (Figure 1). The recommended acceptable range concentration for chlorine in drinking water is 0.2 mg/L - 3.0 mg/L.

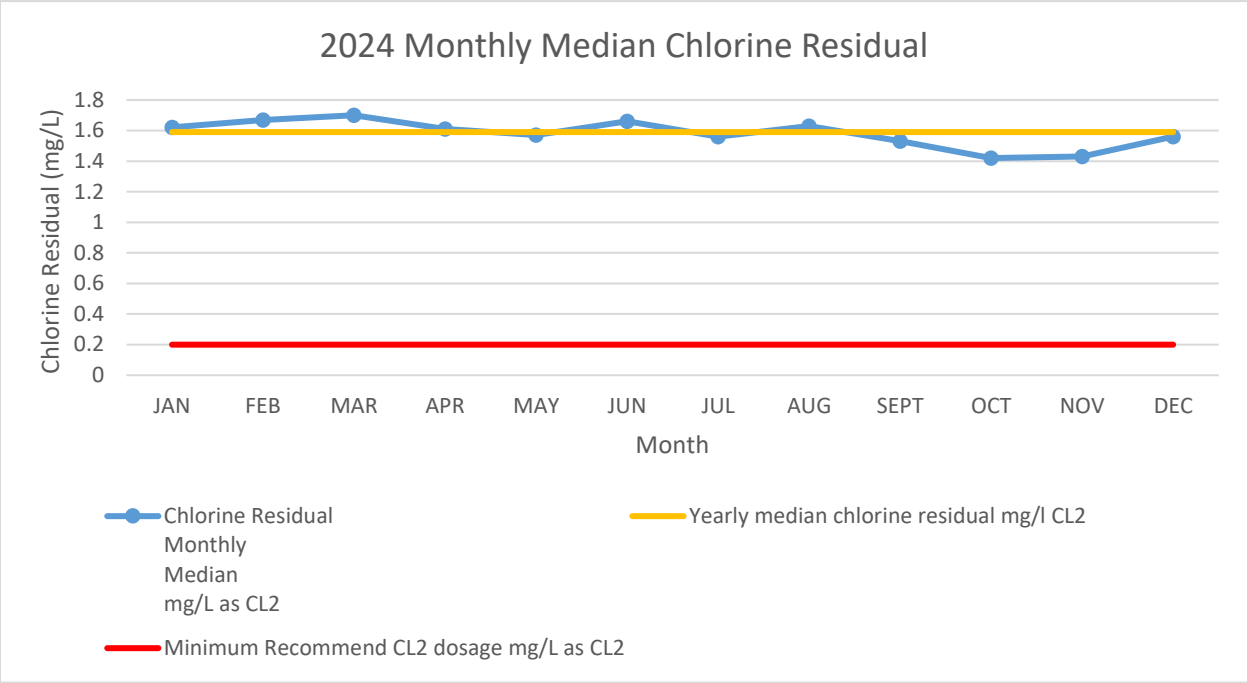


Figure 1 - 2024 Monthly Median Chlorine Residual

6.4 Water Temperature

The CRD's Sooke Lake Reservoir is a surface raw water source subject to a wide seasonal variation in temperatures which affects the water temperature within the Saanich Distribution System. Guidelines for Canadian Drinking Water Quality classify temperature as being an aesthetic objective. Preferably, the drinking water temperature would be ≤ 15°C. Aesthetic objective limits apply to certain characteristics of the drinking water that can lower user acceptance due to the perceived palatability of the water. Temperatures above 15°C in the water system can lead to unpleasant tastes and odours. From a consumer perspective, cool water tastes better than warm water.

The annual median water temperature in the Saanich Water Distribution System was 12.4 °C. Monthly medians ranged from 7.5 °C in January to 19.5 °C in September (Figure 2). Drinking water temperatures in the Saanich Distribution System were below the Aesthetic Objective limit for most of the year except during the four summer months from June to September.

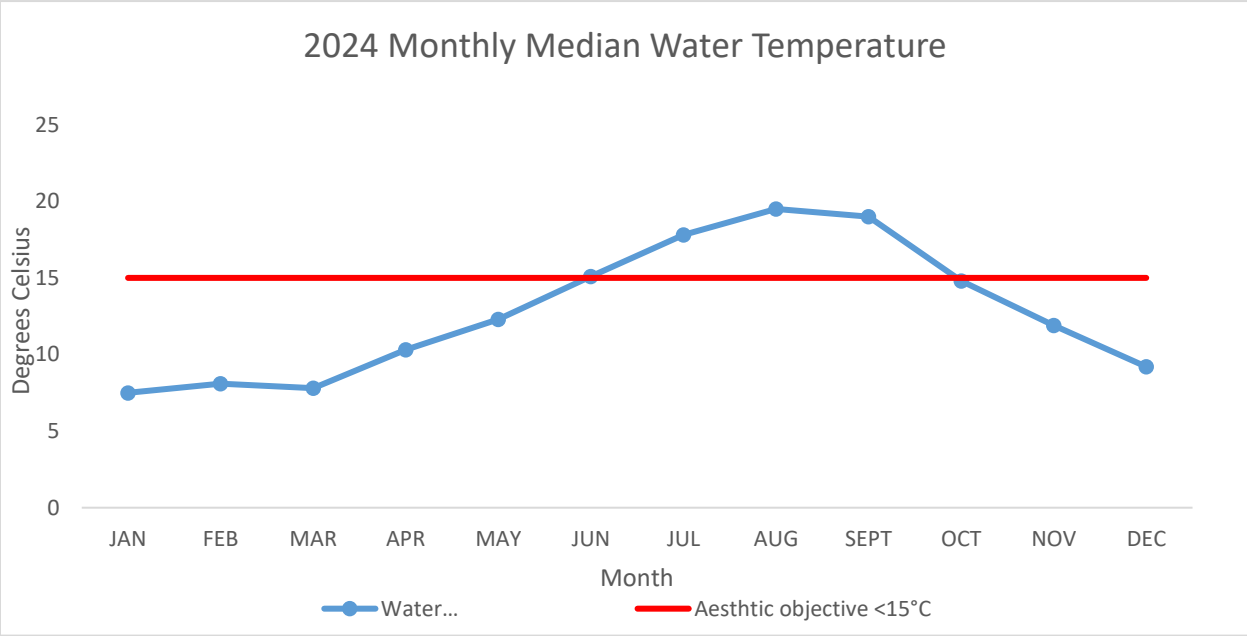


Figure 2 - 2024 Monthly Median Water Temperature (degrees Celsius)

6.5 Turbidity

Turbidity refers to the suspension of small particles of sediment or organic matter within the water column resulting in a cloudy appearance. Turbidity is measured by the amount of light scattered by the particles within the water sample. Turbidity is measured in nephelometric turbidity units (NTU). Guidelines for Canadian Drinking Water Quality recommends that water entering a water distribution system have turbidity of 1.0 NTU or less.

In 2024, there were 47 turbidity samples taken at various locations within the distribution system with two (2) samples exceeding the guidelines. When localized turbidity events occur, they are likely caused by watermain flushing activities, fire hydrant use, and/or velocity/flow changes due to construction or maintenance activities. The resulting discolouration or cloudiness can be an aesthetic concern to customers. Turbidity is generally temporary and flushing of cold-water taps generally restores water clarity.

Table 5 – 2024: Turbidity, Chlorine Residual, and Water Temperature

Month	Turbidity		Chlorine Residual Monthly Median mg/l as Cl_2	Water Temperature Monthly Median Degrees C
	Samples Collected	Adverse > 1 NTU		
January	4	1	1.62	7.5
February	5	0	1.67	8.1
March	4	0	1.70	7.8
April	4	0	1.61	10.3
May	4	0	1.57	12.6
June	3	0	1.66	15.1[1]
July	4	0	1.56	17.8[1]
August	4	0	1.63	19.5[1]
September	4	0	1.53	19.0[1]
October	6	1	1.42	14.8
November	2	0	1.43	11.9
December	3	0	1.56	9.2
Total or Median	47	0	1.59	12.4

[1] *Exceeded Canadian Drinking Water Quality guidelines of ≤ 15°C for Aesthetic conditions*

7.0 Lead in Drinking Water

In March of 2019, Health Canada revised the guideline for lead in drinking water. The maximum acceptable concentration (MAC) was lowered from 0.01 mg/L to 0.005 mg/L, based on a sample taken at the tap. More information on the background for this guideline revision and potential public health implication can be found in the reference links provided in Appendix B.

Lead is commonly found in the environment, both naturally and because of human activities. Lead is not known to be naturally occurring in the source water for Greater Victoria but can be found in drinking water where it has leached out of distribution and plumbing system components, particularly in aggressive (corrosive) water. Low pH is the most common cause of corrosive water. The extent of leaching depends on the type and age of plumbing materials, corrosiveness of the water, and the length of time that the water is stagnant in the plumbing fixtures.

Lead service lines (the pipe connecting the municipal watermain to the private water system at property line) were not commonly used in the Saanich Distribution system as they were in other parts of Canada. Currently, there are no known lead service connection lines in use. If a lead service line is found in use, Saanich policy is to immediately replace the water service connection. In the past ten years, only a small number of lead service

connection lines have been found active in the distribution system and were subsequently replaced.

The Canadian Standards Association standard for plumbing supply fittings changed in 2012 to revise the requirement for “lead free” plumbing components from 8% Lead to 0.25% lead by weight. This means that houses built as late as 2012 could have fixtures with 8% lead in their components, potentially enough to cause stagnant (first flush or first draw) water samples to exceed the MAC. If homeowners are concerned or uncertain about whether their private residence has lead plumbing components, best practice is to flush the tap or fixture until the water runs cold after water has not been used for several hours or overnight. This will flush out the water in the lines and replace with fresh water from the water distribution main on the street.

In response to this change in DWQ parameters, in 2019 (through to 2021) the District of Saanich partnered with the CRD, along with the City of Victoria, and the District of Oak Bay to commence the “Greater Victoria pH & Corrosion Study”. The study, under the lead of the CRD, assessed corrosiveness of the water in all parts of the water systems to identify areas with higher corrosion potential. The study examined factors such as corrosiveness index, the age of buildings, with the assumption that older homes in the region will likely have a higher likelihood of lead-containing plumbing fixtures.

The data obtained from both the public (water system) and private (residential taps) sampling has indicated that the water in the Greater Victoria Drinking Water System can be classified as passive to mildly corrosive. This indicates that there will always be a level of potential for lead to be leached into the drinking water, the risk of leaching metals into the drinking water is generally low.

Based on the Greater Victoria pH and Corrosion Study results, lead levels in drinking water in the Greater Victoria Drinking Water System does not pose a community health concern.

For more information on CRD Water Quality, please see CRD website FAQ at Drinking Water Quality | Capital Regional District

8.0 System Maintenance

Saanich undertakes daily, monthly, and annual maintenance functions to ensure that the drinking water system and its components are in good working order for sustainable service delivery. These ongoing maintenance functions are part of the preventative maintenance plans with a systematic approach to proactively maintain and service the operational components of the water system to prevent breakdowns, reduce downtime, and extend their operational lifespan. System maintenance includes uni-directional flushing, rebuilding and replacing fire hydrants, operating and repairing valves, repairing leaks and providing customer service to the 30,000 individual connection points to our distribution system.

8.1 Unidirectional Flushing Program

The District's uni-directional flushing (UDF) program removes sediment and biofilm from the watermains to maintain water quality. Unidirectional flushing involves isolating segments of the water system by closing valves to flush sequentially from source to periphery of system.

Removing sediment and biofilm is important as sediment in watermains gives bacteria a place to live and hide from the chlorine residual in the water. Sediment reduces the flow capacity of the pipe network and sediment, and biofilm may get disturbed if normal flow patterns change during fire hydrant use or construction work. Flushing out the sediment on an annual basis helps maintain proper flow and sustain water quality.

The District's distribution system consists of over 540 km of pipe. The UDF program objective is to complete the full program every two years. The two largest water pressure zones in the system are flushed every other year with the remaining 29 pressure zones typically flushed yearly. Spring flushing runs from February to June. Fall flushing typically runs from mid-September to the end of December and often into January. In 2024, 304.2 km of watermains were flushed.

Table 6 - Kilometers of Watermain Flushed by Year

Year	Total Kilometers Flushed
2024	304.2
2023	324.1
2022	241.8
2021	425.9
2020	409.4
2019	286.3
2018	244.2
2017	295.0

Map 1 - 2024 Spring Flushing Areas

Map 2 - 2024 Fall Flushing Areas

8.2 Monthly Flush Program

In addition to the UDF program, the District operates an ongoing Monthly Flush Program to flush out water from dead end sections of watermain to maintain water quality. Dead end sections of watermain tend to have higher water age (length of time from treatment to consumption) than other parts of the system. Typically, the higher water age on these dead-end watermains is because the localized customer demand is not enough to effectively exchange the water in the pipe adequately. These dead-end sections are also more prone to sedimentation.

The locations that are currently part of the Monthly Flush Program have been determined by customer complaints, field data and observations from Operational staff throughout the years.

8.3 Autoflush Locations

When site conditions are favorable, the District installs autoflushes at the end of dead-end sections of watermain. These autoflushes are the equivalent of an irrigation valve on a set programmed timer. This allows these sites to run weekly, bi-weekly, or as needed to pro-actively maintain water quality in the dead-end watermains within the distribution system.

The autoflushes are designed and installed to avoid freezing so they can operate year-round. They have a built-in drain system with a de-chlorination system to ensure water discharged into the environment is de-chlorinated appropriately to protect the health of receiving bodies of water.

Autoflushes are primarily buried below ground with only a small portion above ground in a small protective box to minimize the impact to the neighbourhood boulevard.

Figure 3 - Example of an Autoflush location

8.4 Valve Maintenance

Water distribution valves are installed in the system to isolate areas for maintenance, emergency repairs, or installing new components into the water system. Saanich undertakes an extensive program of inspection, exercising (opening and closing), and maintenance and repair of valves annually to ensure that valves operate when needed. .

There are almost 10,000 valves in the Saanich Water Distribution System. Due to the number of valves in the system it takes four to five years to complete the full valve maintenance program. The District Valve Crew serviced 2757 valves in 2024.

8.5 Hydrant Maintenance

The Saanich Water Distribution System has 2,369 fire hydrants. As part of the hydrant maintenance program all hydrants are fully serviced on a 7–8-year cycle. This includes everything from paint to pressure measurement to flushing the hydrant to complete rebuilds. Midway through 2024 we moved to a service model that follows the AWWA M17 standard. To meet this standard, we increased our staffing to achieve our goal of inspecting every hydrant in the District on an annual basis. In 2023, the Hydrant Service Crews serviced 349 Hydrants, while in 2024 our new model saw staff service 1144 Hydrants.

8.6 Water Meters and Customer Service

There are over 30,000 water meters connected into the District of Saanich Water Distribution System. There are currently 3 dedicated Service trucks responsible for replacement of failed water meters, meter testing, leak assessment and customer service requests. These staff responded to 2791 Calls for Service in 2024.

8.7 Drought Response

The impacts of climate change and severe droughts in British Columbia and Vancouver Island in recent years has led to creation of drought response plans for water suppliers in the British Columbia.

Saanich is a water distributor and not a supplier of potable water, as such any drought response plan would be an inter-dependant venture with the Capital Regional District (CRD) regional water supply and response would be on a regional level with all the areas supplied by the Greater Victoria Drinking Water Supply.

Saanich operates within the CRD water conservation bylaw following watering restrictions. During a drought scenario, Saanich would be communicating the applicable watering restriction or guidelines to Saanich residents as dictated by CRD. During this time, Saanich would be monitoring the distribution network for flow changes via the SCADA system, including reservoir levels for system balancing to ensure adequate water storage for emergency use and firefighting requirements.

CRD is the regional water supplier for Greater Victoria and as such all water purveyors in the region would be reliant upon the CRD's contingency plans for supply during a drought scenario.

8.8 System Upgrades

Each year, the District replaces aging or undersized watermains that impact system performance, water quality, or have exceeded their expected lifespan. In 2024, the District renewed 1.30 km of the water distribution system. The following are some of the notable projects completed in 2024:

Quadra St. Phase 2 (Cook St.to Holmes St.) – 350m of 150mm diameter cast iron water main installed in 1916 was replaced with 200mm diameter ductile iron main to address fire flow deficiencies and to replace aging infrastructure. Work included new water services and fire hydrants.

Tattersall Dr. (Quadra St. to Salsbury Way) – 450m of 150mm diameter cast iron water main installed in 1916 was replaced with 200mm diameter ductile iron main in conjunction with a sanitary sewer replacement along the same corridor.

Knight St. (Richmond Rd. to Shelbourne St.) – 480m of 150mm diameter asbestos cement (AC) water main installed in 1976 was replaced with 250mm diameter PVC main to address fire flow deficiencies. Work included the installation of 3 new fire hydrants.

9.0 Summary

1. The water quality data collected in 2024 demonstrates that the drinking water in the Saanich Distribution System is of good quality for consumption. Temperatures in the Saanich Distribution System stayed below the Aesthetic Objective of 15°C for most of the year except during the summer months due to source water conditions.

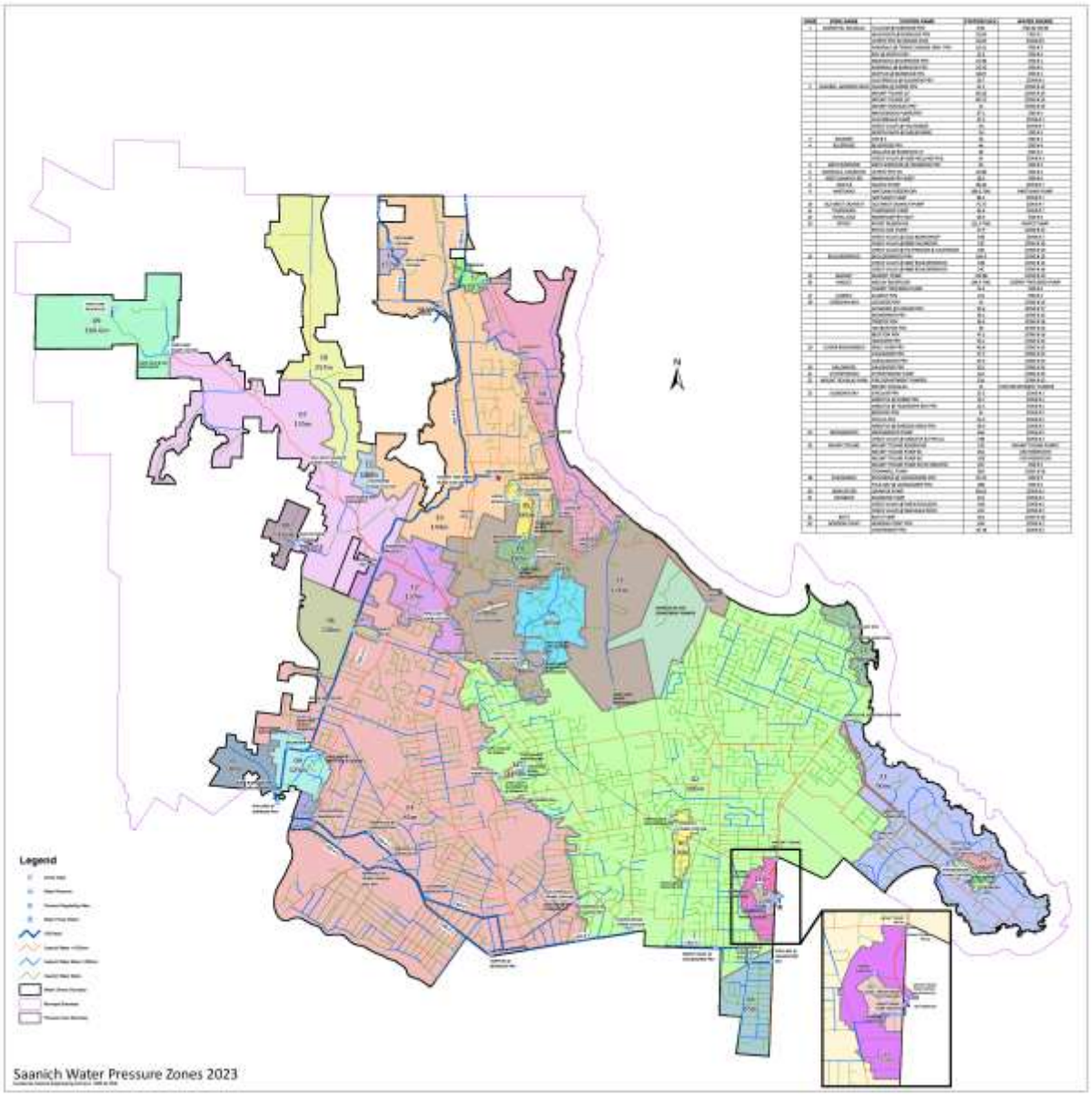
2. The monthly average for water samples taken in 2024 was 98.3 samples exceeding the required number of samples each month of 93 based on the British Columbia Drinking Water Protection Act and Regulation.

3. All 1,180 *E. coli* samples in 2024 were negative for *E. coli.*

4. The Saanich Distribution System had less than the 10% Total Coliform standard for all months with a monthly average at 0.0%, based on 1180 samples.

5. The Saanich Distribution System met the terms and conditions set forth by the Vancouver Island Health Authority and the local Drinking water Officer for the Permit to Operate a Water System for the 2024 calendar year.

Appendix A - Map 3 Saanich Water Pressure Zones & Watermains



Appendix B - References

Canadian Drinking Water Guidelines:
https://www.canada.ca/en/health-canada/services/environmental-workplace-health/water-quality/drinking-water/canadian-drinking-water-guidelines.html

Guidelines for Canadian Drinking Water Quality Summary Table 2019:
https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf

From Source to Tap: Guidance on the multi-barrier approach to Safe drinking Water:
tap-source-robinet-eng.pdf (canada.ca)

Guidance on the Use of the Microbiological Drinking Water Guidelines:
https://publications.gc.ca/collections/collection_2014/sc-hc/H144-12-2013-eng.pdf

British Columbia Drinking Water Protection Act:
http://www.bclaws.ca/civix/document/id/complete/statreg/01009_01

British Columbia Drinking Water Protection Regulation:
http://www.bclaws.ca/civix/document/id/complete/statreg/200_2003

Guidelines for Canadian Drinking Water Quality – Lead Guideline Technical Document:
https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-lead/guidance-document/guidance-document.pdf

Vancouver Island Health Authority: Lead in Water webpage
Lead in water | Island Health

Vancouver Island Health Authority: Drinking Water webpage
Drinking Water | Island Health