



# 2025 ANNUAL DRINKING WATER DISTRIBUTION REPORT

City of Victoria and Township of Esquimalt Water System



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## A. Executive Summary

The purpose of this report is to fulfill the requirements set out in the British Columbia Drinking Water Protection Act (DWPA)<sup>1</sup> by publishing the results of regular drinking water quality monitoring, and to provide a general overview of the City of Victoria and Township of Esquimalt Water System (The City water utility) for the 2025 calendar year, including key projects, infrastructure upgrades and ongoing operations and maintenance. In 2019, the City of Victoria (the City) started providing an Annual Report, as a new requirement of the Vancouver Island Health Water System Operating Permit Conditions for the City of Victoria and Township of Esquimalt Water System.

The Capital Regional District (CRD) supplies water for the Greater Victoria Drinking Water System from a protected watershed called the Greater Victoria Water Supply Area. The City of Victoria delivers safe drinking water and provides reliable fire protection to residents of the City of Victoria and Township of Esquimalt as part of its core services. The quality and reliability of water supply has a direct impact on public health and the City of Victoria takes this responsibility very seriously.

The City of Victoria owns, operates and maintains approximately 330 km of water distribution mains. Approximately 2.5 km of watermains are upgraded or rehabilitated annually by City forces or private contractors. Additionally, Underground Utilities Operations staff complete regular scheduled preventive maintenance programs on a variety of distribution assets including fire hydrants, control valves, pressure reducing valves and pump stations. Water service connections feeding residential and commercial properties are repaired or replaced as required. All staff that perform work on the drinking water distribution system possess valid Water Distribution Operator Certification through the Environmental Operator's Certification Program (EOCP) or work under the direction of staff who hold this certification.

Twice a year, in spring and fall, operations staff carry out a proactive watermain flushing program to maintain high water quality in the distribution system. During this time, approximately ¼ of the total system is flushed to remove accumulated sediment from the pipes and to eliminate stagnant water in larger diameter mains where flows are lowest. Since 2019, the City has been operating a new unidirectional flushing program which is now being reviewed and revised through an active Water Master Plan project.

Planned drinking water quality monitoring of the City of Victoria and Township of Esquimalt's Water System is completed by the CRD with annual reports available on the CRD's website: [Drinking Water Quality](#). Information pertaining to the Victoria and Esquimalt water systems is contained herein.

To protect public health, the City minimizes the risk of backflow occurrence in the system by ensuring that adequate pressure is maintained above 36 psi during peak demand conditions and above 20 psi during emergency conditions, including fires and watermain breaks.

Furthermore, the City continues to adhere to the Cross-Connection Control Program established by the CRD in 2008. All new bulk meters and park irrigation services have backflow preventers installed based on BC Building Code requirements. These devices are tested annually by certified backflow testers and reports are sent to CRD.

The Drinking Water Protection Act requires water utilities to have emergency response and contingency

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<sup>1</sup> [http://www.bclaws.ca/Recon/document/ID/freeside/00\\_01009\\_01](http://www.bclaws.ca/Recon/document/ID/freeside/00_01009_01)

plans and the City of Victoria has a Water Utility Emergency Response Plan that is undergoing significant revisions.

The City of Victoria remains committed to maintaining its drinking water distribution system to high standards and to ensuring the delivery of a safe and reliable supply to the City's residents, businesses and visitors.

## B. System Overview

The City's water is supplied by the Capital Regional District's (CRD) Water Services Department from the Goldstream Service Area with 98-100% from the Sooke Lake Reservoir. The reservoir is fed from an 11,000-ha watershed, which is located about 30 km northwest of the City and is protected from public access and industrial activities. The reservoir has been in use since 1915.

Raw water from the Sooke Reservoir runs underground through the Kapoor tunnel for 8.8 km where it then connects to the Goldstream Water Treatment Plant and passes through a multi-stage disinfection process that includes Ultraviolet disinfection, free-chlorine disinfection using liquid sodium hypochlorite and ammonia addition to the residual chlorine to provide a secondary disinfectant in the distribution system called chloramines.

The City of Victoria water utility owns and operates the distribution systems for both the City of Victoria and the Township of Esquimalt. The City purchased the Esquimalt water distribution system in 1925. Approximately 17% of the City water system is in Esquimalt.

The distribution system is composed of approximately 330 km of pipe and is considered fully metered with the exception of some of the older City park and boulevard irrigation connections. The system can be classified into two primary systems:

- regulated system (pressure is typically up to 80 psi), which serves the majority of domestic demands;
- unregulated system (operates at pressures greater than 80 psi) which provides fire protection to the downtown core and services a small number of residential customers that are generally at higher elevations.

The water system, illustrated in Figure 1, consists of the following:

- 8 pressure zones
- 331 kilometers of pipes (~85% in Victoria, ~15% in Esquimalt)
- 3,752 system valves (~85% in Victoria, ~15% in Esquimalt)
- 1,823 fire hydrants (~85% in Victoria, ~15% in Esquimalt)
- 8.5 kilometers of large diameter supply main
- 20,931 service connections (Victoria – 16,201 and Esquimalt – 4,730)
- ~605 fire services
- 11 PRV stations (Victoria – 8 and Esquimalt 3)
- 55 system blow-off valves (Victoria – 37, Esquimalt – 18)
- 1 pump station
- A storage tower and altitude valve – (not in current use)

The City currently funds its water capital and operating program as a utility established through bylaws. Funding comes from billing based on metered water consumption.

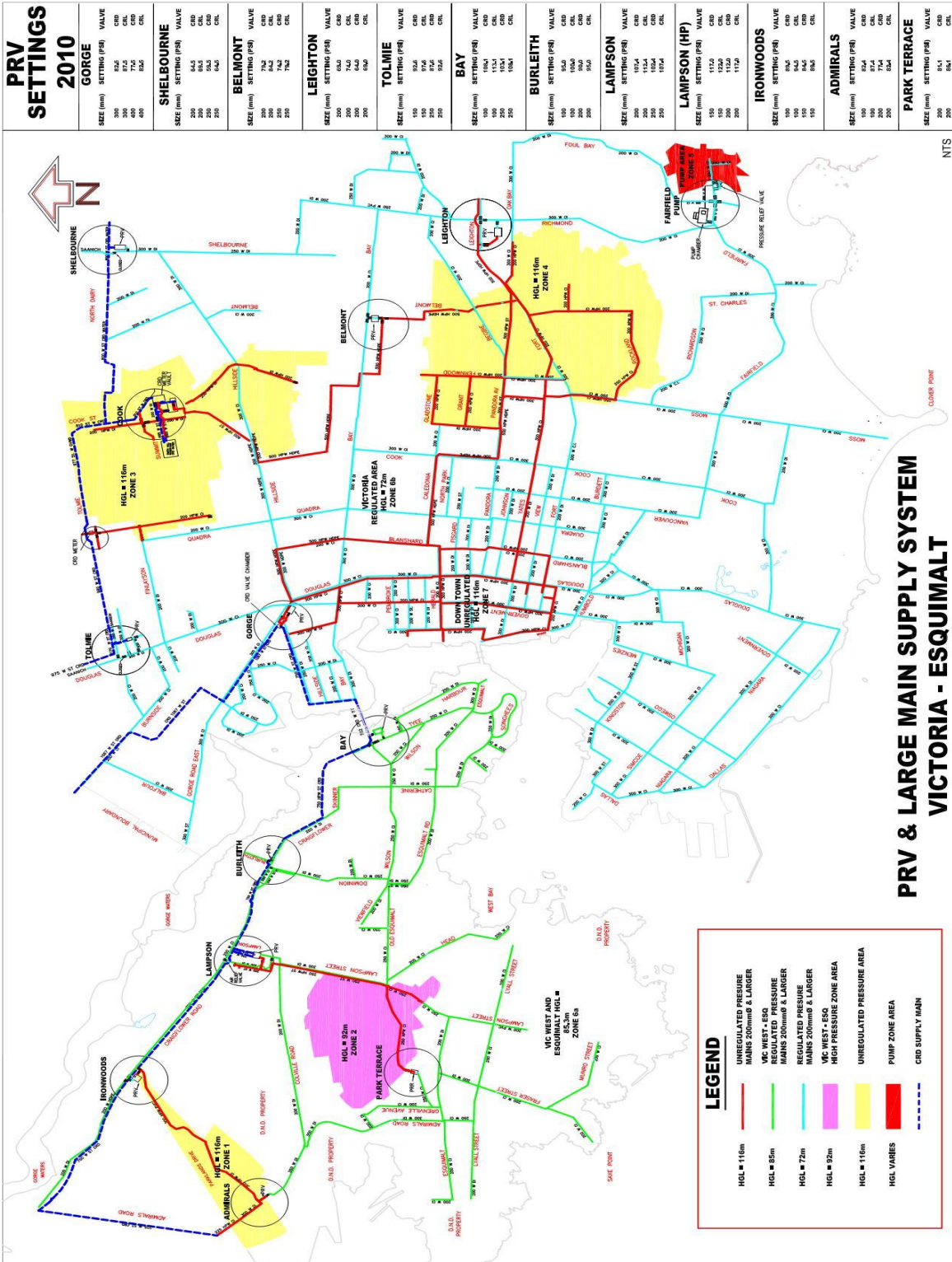


Figure 1: Drinking water distribution system for Victoria and Esquimalt

The City of Victoria's infrastructure is amongst the oldest in Canada and has been constructed from many different pipe materials. Steel was used in the early years, and on mains larger than 300mm diameter. Cast iron (pit cast) was used until the time of the Second World War, at which point spun cast pipe was introduced. For the two decades spanning 1960 and 1970, asbestos cement pipe was used moderately. There is very little asbestos cement pipe still in use today and only ~700m of asbestos concrete pipe left in the City's water system. Since the early 1980s, the City has installed mostly ductile iron pipe, along with some polyvinyl chloride (PVC) and PVCO (molecularly oriented). Recent trenchless projects have also included lining large diameter steel mains with high density polyethylene pipe and lining smaller diameter pipes with a spray-in-place polyuria-based product. These different pipe materials have varying service lives, ranging from 50 to 100 years. In many cases, the infrastructure is nearing or has exceeded the end of its lifecycle and is in need of rehabilitation or replacement.

A core objective for Victoria's water utility is to maximize the life of existing assets, while cost-effectively accommodating new customers and businesses. To provide adequate levels of service for water distribution system infrastructure, the City developed a Water System Master Plan as a guiding document. This Master Plan is updated approximately every 5 years and is currently undergoing an update.

## **C. System Upgrades**

Each year, the City renews watermains that have inadequate capacity, affect water quality or have exceeded their service life. Funding comes from The City Water Utility's Capital budgets as well as grant funding.

In 2018, the City of Victoria submitted to the Government of Canada a proposal for the funding of the Climate and Seismic Resilient Underground Infrastructure Project. In 2019, City of Victoria was awarded over 15 million dollars as a part of the Government of Canada \$2 billion Disaster Mitigation and Adaption Fund (DMAF). The objective of the Climate and Seismic Resilient Underground Infrastructure project is to improve resiliency of the city's underground infrastructure to natural hazards such as earthquakes, tsunamis and liquefaction as well as climate change impacts including sea level rise, extreme storms and prolonged droughts. The City is addressing these by using the DMAF funding to accelerate underground adaptation and mitigation projects, including water distribution, over and above the city's existing annual capital program, operations and maintenance projects.

In 2025, the City renewed 1900 m of watermains as part of the DMAF program as well as regular capital renewals. Future upgrades will be informed through the City's updated Water Master Plan as well as reviews of annual operations and maintenance data.

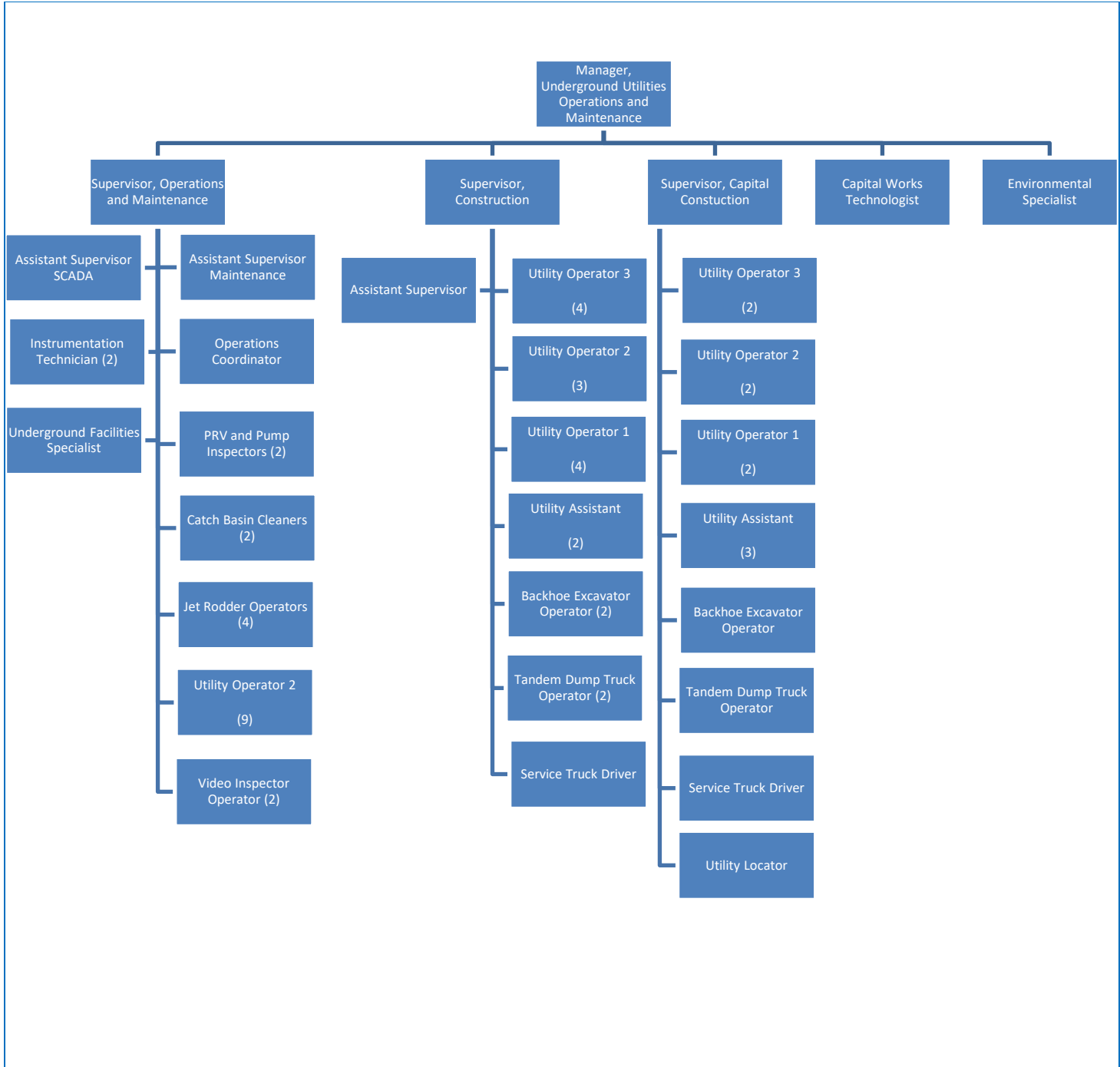
Plans are underway to implement a water meter replacement program, which will see the replacement of all existing water meters with new, "smart" water meters. This program will reduce costs and increase efficiency by enabling remote reading of water meters rather than the current process of manually reading meters. As part of this program, meters will also be right-sized where required to ensure the correct meter size is installed based on water volume and infrastructure sizing.



**Photograph 1: Watermain repairs**

## D. System Operations and Maintenance

The City of Victoria has a team of 63 personnel that collectively support the daily operation and maintenance of the drinking water distribution system, stormwater system and wastewater collection system. The Underground Utilities Operations organizational structure is shown in Figure 2.



**Figure 2: Underground Utilities Operations Organization Structure**

The City’s Water Utility is classified as a Class II Water Distribution Facility with the EOCP. Numbers and EOCP Certification Levels of all staff who support the drinking water system are shown in Table 1.

**Table 1: Underground Utilities Operations EOCP Certification Levels**

<b>EOCP Drinking Water Distribution Certification</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>
<b>Number of Staff</b>	<b>14</b>	<b>20</b>	<b>3</b>	<b>1</b>

Operation and maintenance of the drinking water system includes the watermains, hydrants, isolation valves, water meters, water services, pressure reducing stations and pump station and includes the following summary of duties.

1. Installation, repair, and replacement of water services throughout the system.
2. Maintenance and leak repair, including emergency repairs.
3. Installation and pressure testing of new watermains, including tie-ins to the existing system.
4. Pressure testing and disinfection of new installations.
5. Monitoring private contractor installations and connections to the live system.
6. Chlorine residual testing, scheduled and on-demand watermains flushing, and on-demand sampling
7. Fire hydrants - Pressure testing, painting, physical inspection and preventative maintenance (annually); data reported to fire department
8. Valve exercising - Operate all system valves to confirm accessibility and operation.
9. Inspection and maintenance of pressure reducing stations
10. Monitoring of and adjustments to the mechanical and electrical controls of the water pump station and pressure reducing stations
11. Replacement and repair of water meters

### **Hydrant Maintenance**

As of 2025, the City of Victoria maintains 1,823 active fire hydrants within the water distribution system. A comprehensive fire hydrant maintenance program is in place to support fire protection and ensure system reliability. Hydrant maintenance is carried out year-round by dedicated utility crews and includes routine servicing and lubrication, operational inspections, and full teardown repairs when required.

Hydrant painting is completed separately by the City’s painting program, with hydrants colour-coded by available flow (gallons per minute) in accordance with fire department requirements.

New hydrant installations, as well as the decommissioning of hydrants that have reached the end of their service life, are completed by City construction crews.

During 2025, crews serviced 1,480 hydrants, representing approximately 81% of the total hydrant inventory, ensuring continued access to reliable fire protection infrastructure across the city.

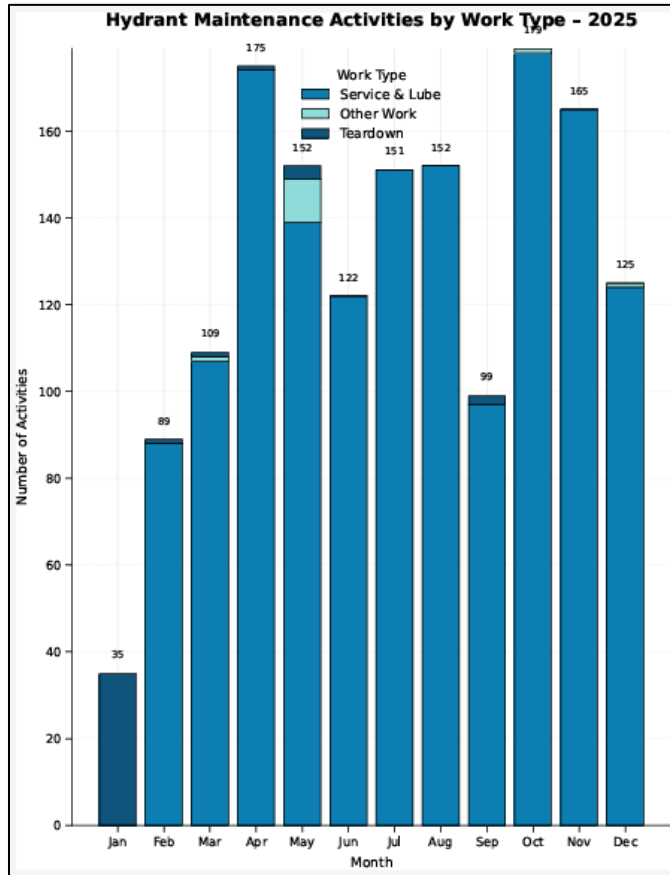
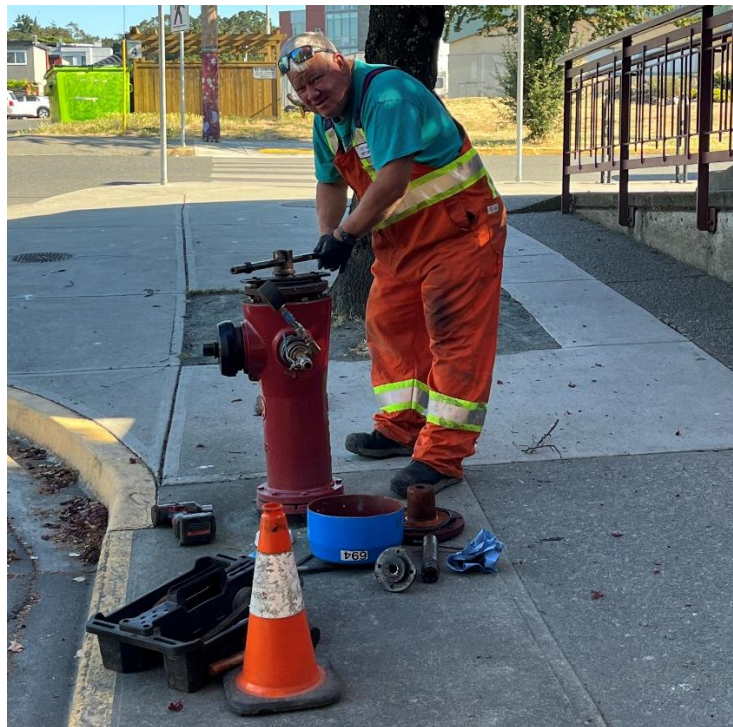


Figure 3: 2025 hydrant maintenance activities by month



Photograph 2: Hydrant Maintenance

## Valve Maintenance

The City of Victoria operates an ongoing valve maintenance and exercising program to ensure the reliability and operability of the water distribution system. As of 2025, the City maintains 3,752 active water valves throughout the system.

In 2025, the City's valve exercising truck serviced 1,163 valves, representing approximately 30% of the total valve inventory. Valve exercising activities provide critical operational information to utility staff, including valve functionality, the number of turns required for operation, and torque measurements needed to fully open and close each valve. This information helps identify valves that may require repair or replacement and supports effective isolation of the water system during maintenance or emergency response.

Valves identified as leaking, damaged, or non-operational are repaired or replaced as part of the valve maintenance program, as well as during scheduled capital water main replacement projects. This proactive approach supports system reliability, minimizes service disruptions, and ensures continued protection of public health and safety.



**Photograph 3: Valve Exercising**

## Water Meters

The City of Victoria operates a meter maintenance and customer service program to support accurate water measurement, system integrity, and customer water quality concerns. The program is supported by a dedicated meter shop operator who responds to service requests related to water meters, leaks, water pressure, and water quality issues.

As of 2025, the City of Victoria maintains over 19,000 active water meters within the distribution system and in 2025, the meter shop responded to 1,417 calls for service, addressing customer concerns and ensuring meters and associated services continued to operate reliably.

This ongoing program supports accurate billing, timely response to system issues, and early identification of conditions that may impact water quality or system performance.

## Unidirectional Flushing Program

The City of Victoria and the Township of Esquimalt's water distribution system consists of approximately 330 kilometres of water main with approximately 85% within the City of Victoria and 15% within the Township of Esquimalt. An additional 8.5 kilometres of large-diameter supply mains serve both communities.

The Unidirectional Flushing (UDF) program is conducted seasonally during the spring and fall, when system water demands are typically lower. This controlled flushing process is designed to remove accumulated sediment from water mains and support water quality throughout the distribution system. The UDF program follows a planned, system-wide cycle and requires approximately two years to complete flushing activities across both the City of Victoria and the Township of Esquimalt. This ongoing program supports the delivery of high-quality drinking water and helps maintain the overall performance and reliability of the distribution infrastructure.

Flush and pressure zones are shown in Figure 3.

Dead-end mains and parts of the system with lower water circulation are also flushed and on a more frequent schedule. Blow-off valves were installed on all remaining dead-end mains to assist with this flushing process to remove stagnant water from the system and preserving the critical disinfectant residual in the system.



**Photograph 4: Watermain Flushing**

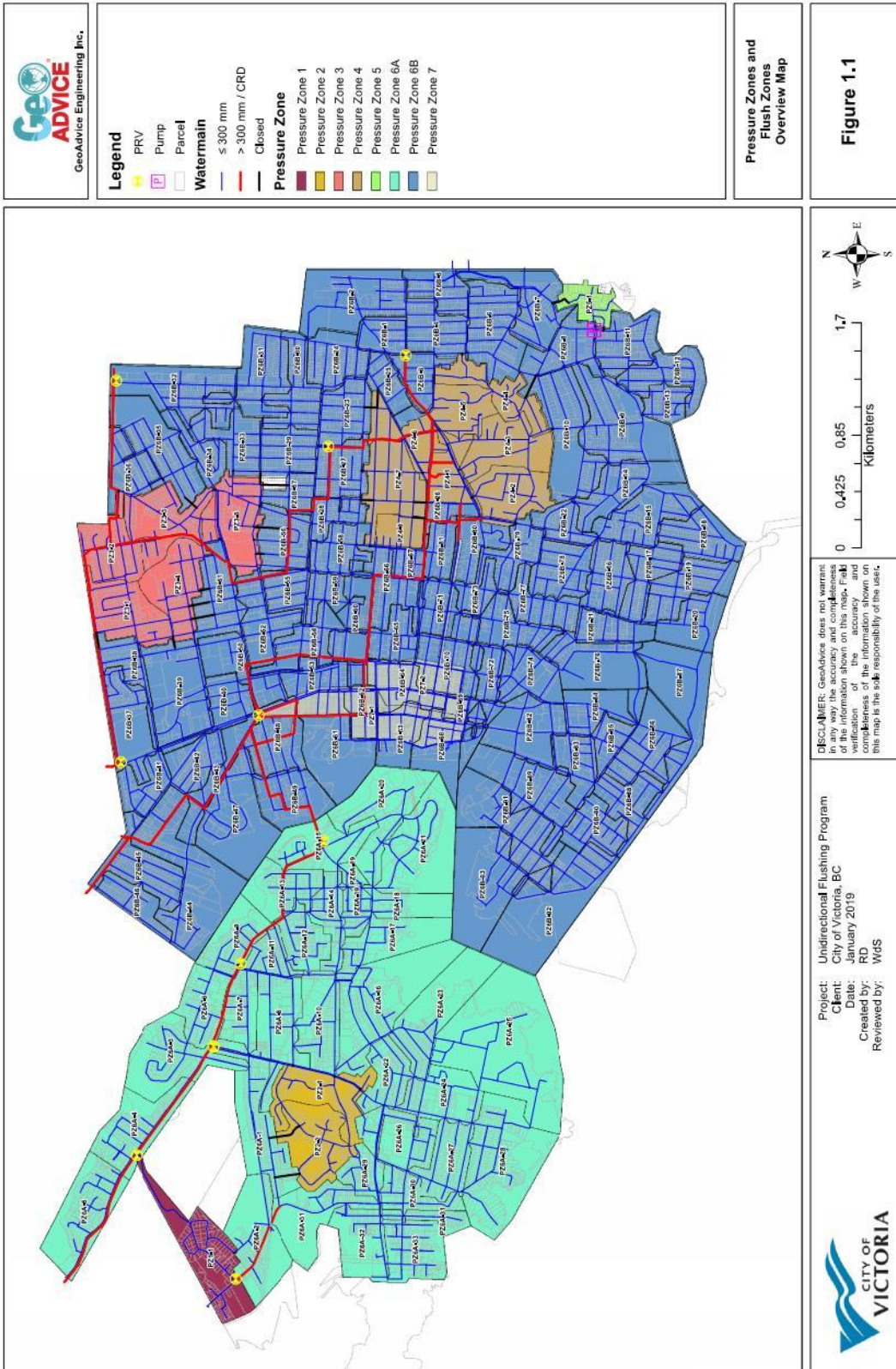


Figure 3: Unidirectional Flushing Zones

## E. Water System Repairs and Response

The average age of the City's Water Utility infrastructure is approximately 64 years with some pipes in the system older than 100 years. Due to this aging infrastructure, repairs of breaks and leaks are an inevitable scope of work that is carried out by City Operations & Maintenance staff. These staff spend approximately 56% of their time on emergency or reactive work and 44% on planned preventative maintenance work, which also reflects the age of the City's infrastructure.

Protection of public health and customer service are top priorities, and the City maintains a target response time of 30 minutes to respond to and investigate water issues during regular hours and 1 hour to respond to and investigate water issues that occur after hours. Depending on the nature of the issue, repairs are either completed immediately by diverting staff from other work or calling crews in after hours or scheduling the repair as soon as a crew becomes available for the work. In 2025, City crews repaired a total of 37 watermain breaks and 43 service leaks.

Underground Utilities staff also respond to and resolve customer complaints that are typically related to water pressure or water quality. Table 2 below provides the breakdown of customer calls received in 2025 for these two categories.

**Table 2: Number and Breakdown of Water Quality and Pressure Calls for 2025**

Call Type	Total
Discoloured water	21
Taste / odour	3
Other <sup>1</sup>	1
Low pressure	17
High pressure	2
<b>TOTAL</b>	<b>44</b>

<sup>1</sup>Inquiry about if water service was lead (service was copper)



**Photograph 4: Watermain repair**

## F. Water Quality Monitoring

In 2025, 17 sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Victoria/Esquimalt Distribution System. Victoria/Esquimalt sampling stations are part of the daily distribution sampling runs by CRD staff.

**Sample Collection.** In 2025, 1,219 bacteriological and 213 water chemistry samples were collected from the Victoria/Esquimalt Distribution System (Table 3). Based on current population data for Victoria and Esquimalt, 93 samples are required for bacteria testing each month. Table 3 shows the number of monthly samples collected and analyzed for compliance.

**Bacteriological Results.** One sample collected on October 10 tested positive for elevated concentrations of total coliform bacteria (10 CFU/100 mL) and *E. coli* bacteria (2 CFU/100 mL) (Table 3). All resamples collected on October 11 from the same location, as well as from up- and downstream sites, were free of indicator bacteria.

Because the October 10 sample contained exactly 10 CFU/100 mL of total coliforms, it did not exceed the regulatory maximum limit. The system also met the requirement that no more than 10% of samples be total coliform positive in any month, and the annual percentage of positives remained well below the limit at 0.1% (Table 3).

The October 10 sample that tested positive for *E. coli* was collected at the sampling station located at Langford Street / Fullerton Avenue in Esquimalt. CRD and City staff initiated emergency response procedures, flushed the area, and collected resamples including from up- and downstream locations. All resamples were free of *E. coli*. The bacteria were likely introduced during sampling or subsequent sample handling.

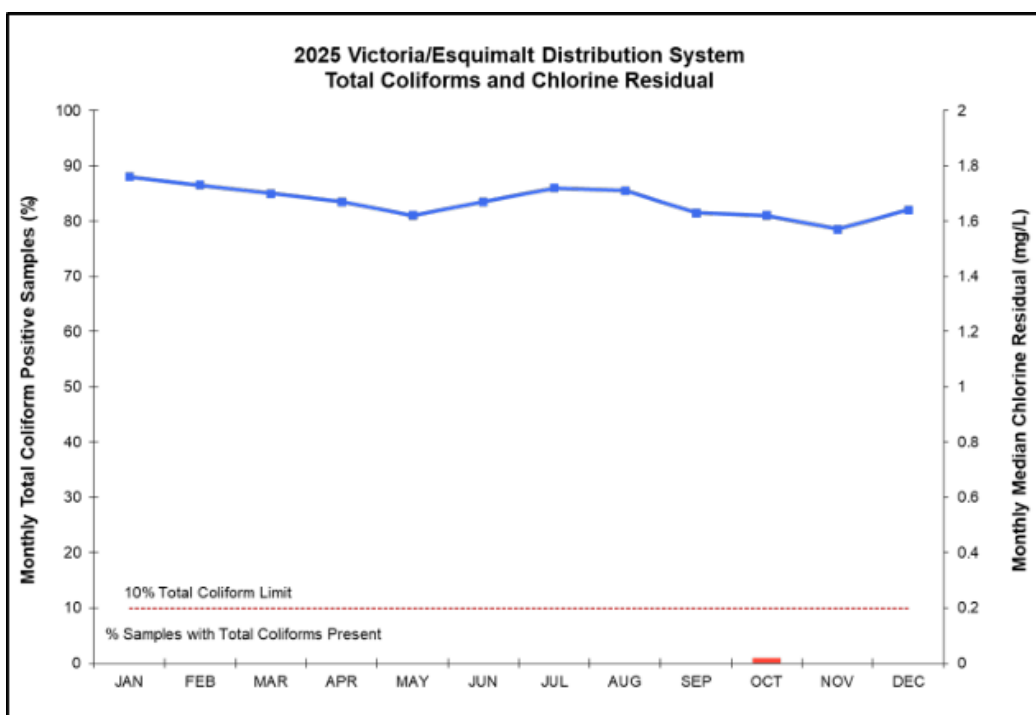
**Table 3: 2025 Summary of Water Quality Sampling for Victoria/Esquimalt Water System**

Month	Samples Collected	Total Coliforms (CFU/100mL)				<i>E. coli</i> (CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC > 0	Resamples TC > 0	Samples TC > 10	Samples > 0	Samples Collected	Samples > 1 NTU	Median mg/L as CL <sub>2</sub>	Median °C
JAN	105	0	0	0	0	0	9	1	1.76	7.7
FEB	96	0	0	0	0	0	7	0	1.73	6.3
MAR	99	0	0	0	0	0	7	0	1.7	8.2
APR	113	0	0	0	0	0	7	0	1.67	11.2
MAY	98	0	0	0	0	0	7	0	1.62	13.8
JUN	96	0	0	0	0	0	8	0	1.67	16.9
JUL	116	0	0	0	0	0	8	0	1.72	19.2
AUG	98	0	0	0	0	0	6	0	1.71	21
SEP	106	0	0	0	0	0	7	0	1.63	20.2
OCT	101	1	1	0	0	1	4	0	1.62	15.9
NOV	95	0	0	0	0	0	5	0	1.57	11.9
DEC	96	0	0	0	0	0	5	0	1.64	10.1
<b>Total:</b>	1219	1	0.1	0	0	1	80	1	1.67	13

**Notes:**

TC = Total Coliforms, *E. coli* = *Escherichia coli*, Cl<sub>2</sub> = chlorine, NTU = Nephelometric turbidity unit  
 > = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

**Chlorine Residual.** The annual median chlorine residual in the Victoria/Esquimalt Distribution System was 1.67 mg/L. The lowest monthly median was in November (1.57 mg/L) and the maximum monthly median was in January (1.76 mg/L). In general, chlorine residuals were adequate and were slightly higher and more consistent than in previous years (refer to Figure 4).



**Figure 4: 2025 Monthly Total Coliform and Medium Chlorine Residual Levels in the Victoria and Esquimalt Water System**

**Water Temperature.** The annual median water temperature in the Victoria/Esquimalt Distribution System was 13.0°C, with monthly medians ranging between 6.3°C (February) and 20.2°C (September) (Table 3).

**Disinfection Byproducts.** No data for 2025.

**Physical/Chemical Parameters.** The drinking water in the Victoria/Esquimalt Distribution System had the following physical and chemical characteristics in 2025:

- Median pH: 7.8
- Median Alkalinity: 18.20 mg/L
- Median Turbidity: 0.25 NTU
- Median Conductivity (25°C): 57.510 µS/cm
- Median Colour: 5.0 TCU

Only one routine grab sample from this distribution system showed elevated turbidity (>1 NTU) in 2025 (Table 3). Because this occurred in January, it was likely associated with the municipal water main flushing program. Overall, the results indicate good drinking water quality.

**Metals.** No data in 2025.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

**Compliance Status.** The Victoria/Esquimalt Distribution System was in compliance with the BC Drinking Water Protection Act and Drinking Water Protection Regulation in 2025, except for October, when one sample tested positive for E. coli bacteria.

## **G. Water System Security:**

A combination of physical security and monitoring measures continues to be utilized to protect the water distribution system. City PRV and water pump station kiosks are secured with locked access doors and hatches, which are integrated with the City's SCADA intrusion monitoring system. These systems are designed to detect unauthorized access and provide real-time alerts.

In 2025, enhancements were made through the implementation of 24/7 standby monitoring coverage. When a security breach is detected at any site, an alarm is generated in SCADA and an automatic callout is issued to standby personnel to ensure a timely response.

There were no reported incidents of tampering or vandalism within the City's water system in 2025.

## **H. Backflow Prevention and Cross Connection Control:**

In 2008, CRD implemented a regional Cross Connection Control Program, including Cross Connection Control Bylaw 3516, to safeguard drinking water system from contaminated water flowing backwards into the public water supply and distribution system.

The City of Victoria requires installation of backflow preventers for all new construction through the plumbing permit process.

Annual testing of all backflow preventers is performed by the CRD.

## **I. Risk Management and Emergency Response:**

Pursuant to the Drinking Water Protection Act, drinking water suppliers in British Columbia are required to protect public health and to maintain written emergency response and contingency plans for events that may affect water quality, water quantity, or normal system operations. Accordingly, risk management and emergency preparedness form integral components of the operation of a municipal drinking water system and support a proactive approach to hazard identification, vulnerability reduction, and service continuity during abnormal or emergency conditions.

The City has a risk register for the water system that identifies potential risks to water delivery or water quality as well as recommended actions and treatments to reduce risks where they exceed risk tolerance levels.

In 2025, the City of Victoria completed the Source and System Assessment for the water system as prescribed by Vancouver Island Health and has been actively working on the associated corrective action plan.

Drinking water distribution systems in British Columbia may be subject to a range of hazards, including watermain breaks, power outages, equipment failures, contamination events, extreme weather, wildfire, drought, flooding, earthquakes, and other natural or human-caused incidents. Such events may interrupt the delivery of safe drinking water, reduce fire protection capacity, and affect other critical community services. Effective emergency preparedness mitigates these risks through the establishment of defined response procedures, communication protocols, staff responsibilities, and recovery measures to support the timely and safe restoration of service.

The Engineering & Public Works Department, in coordination with the Fire Department's Emergency Management Division, is responsible for emergency response events associated with the water distribution system.

The Water Utility Emergency Response Plan contains the City's procedures for field response, communications, regulatory notification, and service restoration during water system emergencies. The plan also provides for coordination with Island Health with respect to drinking water officer notification, public health direction, and advisory requirements, and with the Capital Regional District (CRD), as required.

Several updates were made to the Water Utility Emergency Response Plan in 2025 including the following:

- Creation of Site-Specific Emergency Response Plans for each Pressure Reducing Valve (PRV) station in the system as well as for the Fairfield Water Pump Station. These plans contain information on site specific infrastructure, operational set-points, alarm types, alarm priority levels, target response times, response procedures and emergency contacts.
- Significant revisions to the Water Quality Emergency Procedures focusing on types of incidents, customer response, escalation, notification and restoration of service.
- Provisions for alternate water supplies in the event of a major water disruption or drought.

Updates to the Water Master Plan will also result in information to strengthen the City's emergency response plans for seismic events and tsunamis.

## **J. Conclusion**

In 2025, the City of Victoria continued to operate and maintain the City of Victoria and Township of Esquimalt Water System in a manner that supports the delivery of safe, reliable drinking water and fire protection services. Regular infrastructure renewal, preventative maintenance, customer response, water quality monitoring, system security, backflow prevention, and emergency planning all contributed to the overall performance and resiliency of the distribution system.

Overall, 2025 monitoring results indicate that the system continued to provide good drinking water quality and remained compliant with applicable drinking water requirements, with appropriate follow-up completed where required. The City remains committed to protecting public health, maintaining critical infrastructure, and using ongoing planning efforts, including the Water Master Plan update and Emergency Response Plan improvements, to guide future investments and strengthen long-term service reliability.