METRO VANCOUVER REGIONAL DISTRICT
WATER COMMITTEE

MEETING

Wednesday, April 16, 2025
1:00 pm
28th Floor Committee Room, 4515 Central Boulevard, Burnaby, British Columbia
Webstream available at https://www.metrovancouver.org

A G E N D A

A. ADOPTION OF THE AGENDA

1. **April 16, 2025 Meeting Agenda**
That the Water Committee adopt the agenda for its meeting scheduled for April 16, 2025 as circulated.

B. ADOPTION OF THE MINUTES

1. **March 12, 2025 Meeting Minutes** *pg. 5*
That the Water Committee adopt the minutes of its meeting held March 12, 2025 as circulated.

C. DELEGATIONS

D. INVITED PRESENTATIONS

E. REPORTS FROM COMMITTEE OR CHIEF ADMINISTRATIVE OFFICER

1. Award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue *pg. 9*

Executive Summary
B&B Contracting (2012) Ltd.'s (B&B) tender was identified as the lowest cost compliant bid, and on that basis it is recommended that the GVWD Board award ITT 24-148 to B&B. B&B has a successful track record of working with the GVWD on similar projects.

The Annacis Main No. 5 – Phase 4A project includes the installation of approximately 1.3 km of 1800 mm diameter steel pipe and is required to meet the region's growing water demand.

ITT 24-148 was issued on November 22, 2024 to seven pre-qualified tenderers and the procurement was executed in accordance with the terms and conditions of Metro Vancouver's Procurement Policy. ITT 24-148 evaluation team have considered the tenders received and, on that basis, recommend that the GVWD award ITT 24-148 to B&B.

Recommendation
That the GVWD Board:

a) approve the award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue, in the amount of up to $30,656,600 (exclusive of taxes) to B&B Contracting (2012) Ltd. subject to final review by the Commissioner; and
b) authorize the General Manager, Procurement and Real Estate to execute the required documentation once the General Manager, Procurement and Real Estate is satisfied that the award should proceed.

2. GVWD Water Supply System 2024 Annual Update *pg. 13*

Executive Summary
The *GVWD Water Supply System 2024 Annual Update* (Report), Attachment 1, summarizes key initiatives undertaken by the Greater Vancouver Water District, operating under the name Metro Vancouver, to continue providing an uninterrupted supply of high-quality drinking water to the region. This report follows the Ministry of Health's (Ministry) guidance outlined in its *Guide for Communicating with Water Users.* It also promotes awareness of the drinking water program, one of the six elements of Health Canada's Multi-Barrier Approach to Safe Drinking Water.

It takes a tremendous amount of effort to ensure the continued and uninterrupted delivery of billions of litres of high-quality drinking water to over 3 million residents and businesses that call this region home. In 2024, Metro Vancouver ensured the reliable delivery of drinking water through infrastructure upgrades, risk mitigation, seasonal operating strategies, and conservation efforts. Key initiatives included water quality sampling, emergency preparedness, and major capital projects to enhance system resilience and support regional growth.

Recommendation
That the Water Committee receive for information the report dated March 18, 2025, titled "GVWD Water Supply System 2024 Annual Update".

3. GVWD 2024 Water Quality Annual Report *pg. 52*

Executive Summary
All of the water quality parameters monitored by Metro Vancouver for the regional drinking water supply met the B.C. provincial water quality regulations and the federal *Guidelines for Canadian Drinking Water Quality* (GCDWQ) with the exception of turbidity at the unfiltered Coquitlam source. The elevated turbidity was a consequence of a major atmospheric river event in October 2024 resulting in intensive rainfall. The multiple protection barriers helped to maintain high-quality drinking water for the region.

The Greater Vancouver Water District (GVWD) 2024 Water Quality Annual Report is required under the provincial *Drinking Water Protection Regulation* (DWPR), and Metro Vancouver's *Drinking Water Management Plan* (DWMP). The annual report summarizes the analysis of approximately 169,000 tests conducted on samples collected from the GVWD source reservoirs, water treatment plants, and transmission system, as well as microbiological water quality testing of member jurisdictions' systems supplied by the GVWD.

Recommendation
That the GVWD Board receive for information the report dated March 24, 2025, titled "GVWD 2024 Water Quality Annual Report".

4. Drinking Water Conservation Plan: 2025 Communications and Public Outreach *pg. 122*

Executive Summary
Metro Vancouver's annual water conservation communications educates residents on the value of drinking water and prompts behaviour change to reduce overall demand. Metro Vancouver began communicating about the Stage 1 water restrictions that come into effect on May 1, beginning the week of March 24. Promotional materials are distributed to member jurisdictions to support public education and enforcement programs. In addition to education, consistent enforcement of the water restrictions across the region is essential to ensure compliance. Enforcement of the restrictions, though local bylaws, is a responsibility of the member jurisdictions.

Within the context of an increasing population combined with unpredictable weather impacts related to climate change, the "It's All Drinking Water" campaign encourages mindful water use to ensure that drinking water is available all season long for where it's needed most: drinking, cooking, and cleaning.

Recommendation
That the Water Committee receive for information the report dated April 2, 2025, titled "Drinking Water Conservation Plan: 2025 Communications and Public Outreach."

5. Manager's Report *pg. 127*

Recommendation
That the Water Committee receive for information the report dated April 1, 2025, titled "Manager's Report".

F. INFORMATION ITEMS

G. OTHER BUSINESS

H. RESOLUTION TO CLOSE MEETING
Note: The Committee must state by resolution the basis under section 90 of the Community Charter on which the meeting is being closed. If a member wishes to add an item, the basis must be included below.

I. ADJOURNMENT
That the Water Committee adjourn its meeting of April 16, 2025.

Membership:
West, Brad (C) – Port Coquitlam
Sager, Mark (VC) – West Vancouver
Albrecht, Paul – Langley City
Bell, Don – North Vancouver City
Cassidy, Laura – scəw̓aθən məsteyəxʷ (Tsawwassen First Nation)
Guichon, Alicia – Delta
Hodge, Craig – Coquitlam
Keithley, Joe – Burnaby
Little, Mike – North Vancouver District
MacDonald, Nicole – Pitt Meadows
Meiszner, Peter – Vancouver
Rindt, Rob – Langley Township
Stutt, Rob – Surrey

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

METRO VANCOUVER REGIONAL DISTRICT
WATER COMMITTEE

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Water Committee held at 1:00 pm on Wednesday, March 12, 2025 in the 28th Floor Committee Room, 4515 Central Boulevard, Burnaby, British Columbia.

MEMBERS PRESENT:
Chair, Director Brad West, Port Coquitlam
Vice Chair, Director Mark Sager, West Vancouver
Councillor Paul Albrecht, Langley City
Councillor Don Bell, North Vancouver City
Councillor Alicia Guichon, Delta
Director Craig Hodge, Coquitlam
Councillor Joe Keithley, Burnaby
Mayor Mike Little, North Vancouver District (arrived at 1:04 pm)
Director Nicole MacDonald, Pitt Meadows
Director Peter Meiszner, Vancouver* (arrived at 1:03 pm)
Councillor Rob Rindt, Langley Township
Director Rob Stutt, Surrey

*denotes electronic meeting participation as authorized by the *Procedure Bylaw*

MEMBERS ABSENT:
Director Laura Cassidy, scəw̓aθən məsteyəxʷ (Tsawwassen First Nation)

STAFF PRESENT:
Marilyn Towill, General Manager, Water Services
Nikki Tilley, Legislative Services Supervisor, Board and Information Services
Peter Marshall, Field Hydrologist, Watersheds and Environment, Water Services

A. ADOPTION OF THE AGENDA

1. March 12, 2025 Meeting Agenda

It was MOVED and SECONDED
That the Water Committee adopt the agenda for its meeting scheduled for March 12, 2025 as circulated.

CARRIED

B. ADOPTION OF THE MINUTES

1. January 15, 2025 Meeting Minutes

<u>It was MOVED and SECONDED</u>
That the Water Committee adopt the minutes of its meeting held January 15, 2025 as circulated.

<u>CARRIED</u>

C. DELEGATIONS

No items presented.

D. INVITED PRESENTATIONS

No items presented.

E. REPORTS FROM COMMITTEE OR CHIEF ADMINISTRATIVE OFFICER

1. Water Supply Area Fisheries Initiatives Annual Update

Report dated February 28, 2025 from Jesse Montgomery, Division Manager, Watersheds and Environment, Water Services, providing the Water Committee with an annual update on fisheries initiatives and activities associated with the Capilano, Seymour, and Coquitlam River Watersheds.

<u>It was MOVED and SECONDED</u>
That the Water Committee receive for information the report dated February 28, 2025, titled “Water Supply Area Fisheries Initiatives Annual Update”.

<u>CARRIED</u>

2. Climate Impacts on the Water Supply Areas

Report dated February 27, 2025 from Peter Marshall, Field Hydrologist, Watersheds and Environment, Water Services, providing a summary of the Water Supply Areas Climate Report for 2024.

1:03 pm Director Meiszner arrived at the meeting.
1:04 pm Mayor Little arrived at the meeting.

Peter Marshall provided members with a presentation titled “Climate Impacts on the Water Supply Areas” that presented an overview of climate change projections for the 2050s, 2024 weather conditions, and climate change actions that Water Services is taking to prepare for impacts from climate change.

<u>It was MOVED and SECONDED</u>
That the Water Committee receive for information the report dated February 27, 2025, titled “Climate Impacts on the Water Supply Areas”.

<u>CARRIED</u>

3. Award of RFP No. 23-155 for Construction Services for Newton Pump Station No. 2

Executive Summary
Report dated February 18, 2025 from Joel Melanson, Division Manager, Engineering and Construction, Water Services, and George Kavouras, Director, Procurement and Real Estate Services, seeking approval from the GVWD to award of RFP No. 23-155 for Construction Services for Newton Pump Station No. 2 in the amount of up to $49,810,018.94 (exclusive of taxes) to Pomerleau, Inc.

It was MOVED and SECONDED
That the GVWD Board:
a) approve the award of RFP No. 23-155 for Construction Services for Newton Pump Station No. 2 in the amount of up to $49,810,018.94 (exclusive of taxes) to Pomerleau, Inc., subject to final review by the Commissioner; and
b) authorize the General Manager, Procurement and Real Estate to execute the required documentation once the General Manager, Procurement and Real Estate is satisfied that the award should proceed.

CARRIED

4. Manager's Report
Report dated March 4, 2025, from Marilyn Towill, General Manager, Water Services, providing the Water Committee with information on the 2025 snowpack considerations for water supply planning, Metro Vancouver's watershed wildfire readiness, and an overview of the non-potable water project.

It was MOVED and SECONDED
That the Water Committee receive for information the report dated February 28, 2025, titled "Manager's Report".

CARRIED

F. INFORMATION ITEMS
No items presented.

G. OTHER BUSINESS
No items presented.

H. RESOLUTION TO CLOSE MEETING

It was MOVED and SECONDED
That the Water Committee close its meeting scheduled for March 12, 2025 pursuant to section 226 (1) (a) of the *Local Government Act* and the *Community Charter* provisions as follows:

90 (1) A part of a council meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

(g) litigation or potential litigation affecting the municipality;

(m) a matter that, under another enactment, is such that the public may be excluded from the meeting; and

90 (2) A part of a council meeting must be closed to the public if the subject matter being considered relates to or is one or more of the following:

(b) the consideration of information received and held in confidence relating to negotiations between the regional district and a provincial government or the federal government or both and a third party.

CARRIED

I. ADJOURNMENT

It was MOVED and SECONDED
That the Water Committee adjourn its meeting of March 12, 2025.

CARRIED
(Time: 1:22 pm)

Nikki Tilley, Legislative Services Supervisor	Brad West, Chair

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Water Committee

From: Joel Melanson, Division Manager, Engineering & Construction, Water Services
George Kavouras, Director, Procurement, Procurement & Real Estate Services

Date: March 24, 2025 Meeting Date: April 16, 2025

Subject: **Award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue**

RECOMMENDATION

That the GVWD Board:

a) approve the award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue, in the amount of up to $30,656,600 (exclusive of taxes) to B&B Contracting (2012) Ltd. subject to final review by the Commissioner; and
b) authorize the General Manager, Procurement and Real Estate to execute the required documentation once the General Manager, Procurement and Real Estate is satisfied that the award should proceed.

EXECUTIVE SUMMARY

B&B Contracting (2012) Ltd.'s (B&B) tender was identified as the lowest cost compliant bid, and on that basis it is recommended that the GVWD Board award ITT 24-148 to B&B. B&B has a successful track record of working with the GVWD on similar projects.

The Annacis Main No. 5 – Phase 4A project includes the installation of approximately 1.3 km of 1800 mm diameter steel pipe and is required to meet the region's growing water demand.

ITT 24-148 was issued on November 22, 2024 to seven pre-qualified tenderers and the procurement was executed in accordance with the terms and conditions of Metro Vancouver's Procurement Policy. ITT 24-148 evaluation team have considered the tenders received and, on that basis, recommend that the GVWD award ITT 24-148 to B&B.

PURPOSE

Pursuant to the *GVWD Officers and Delegation Bylaw No. 247, 2014* (Bylaw) and *Board Policy No. FN-031*, procurement contracts which exceed a value of $10 million require the approval of the GVWD Board.

BACKGROUND

Metro Vancouver is sourcing the installation services for the southern section of a new, high-capacity, and seismically resilient water main that generally travels along River Road, Millar Road, 116 Street, and 96 Avenue, in the City of Surrey. This project consists of approximately 1.3 km of 1800 mm diameter steel water main and is driven by the need to supply the growing region's water demand.

The Annacis Main No. 5 South project consists of three phases and when complete it will connect the Annacis Water Supply Tunnel to the Kennedy Park Reservoir, as shown in Attachment 1. In order to mitigate impacts to the public, the first section of the Annacis Main No. 5 South was pre-built in 2022 to coordinate with City of Delta municipal upgrades planned in the area. The current phase will connect the Annacis Water Supply Tunnel to the pre-build section. The final phase of the project, which will connect to the Kennedy Newton Main and Reservoir, is nearing completion of detailed design with construction planned to commence in 2026.

PROCUREMENT SUMMARY

RFQ No. 23-367 was issued on November 2, 2023 to prequalify proponents to participate in ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A: River Road and Millar Road to 117B Street and 96 Avenue. 15 respondents responded to RFQ No. No. 23-367, of those 7 were shortlisted and invited to respond to ITT 24-148.

ITT 24-148 Submissions

Tenders	Pricing (excluding taxes)
B&B Contracting (2012) Ltd.	$30,656,600.00
Hall Constructors	$32,768,386.12
Matcon Civil Constructors Inc.	$38,394,130.00
Oscar Renda Contracting	$47,287,587.50

Metro Vancouver received 4 tenders. The compliant tenders were evaluated against each other based on the total tender prices submitted. The lowest tender was submitted by B&B. Procurement reviewed the tender submitted by B&B and it was compliant. Three of the prequalified proponents did not submit tenders primarily due to lack of capacity due to other prior commitments.

ALTERNATIVES

1. That the GVWD Board:
   a) approve award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue, in the amount of up to $30,656,600 (exclusive of taxes) to B&B Contracting (2012) Ltd., subject to final review by the Commissioner; and
   b) authorize the General Manager, Procurement and Real Estate to execute the required documentation once the General Manager, Procurement and Real Estate is satisfied that the award should proceed.

2. That the GVWD receive the report dated March 24, 2025, titled, "Award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue" for information.

FINANCIAL IMPLICATIONS

Finance has reviewed and confirmed that funding is available from the associated project budget.

The final phase of the project, Phase 4B is still under design. Upon completion of the detailed design the cost estimate will be updated and budget adjustments will be made as needed in order to complete the final phase.

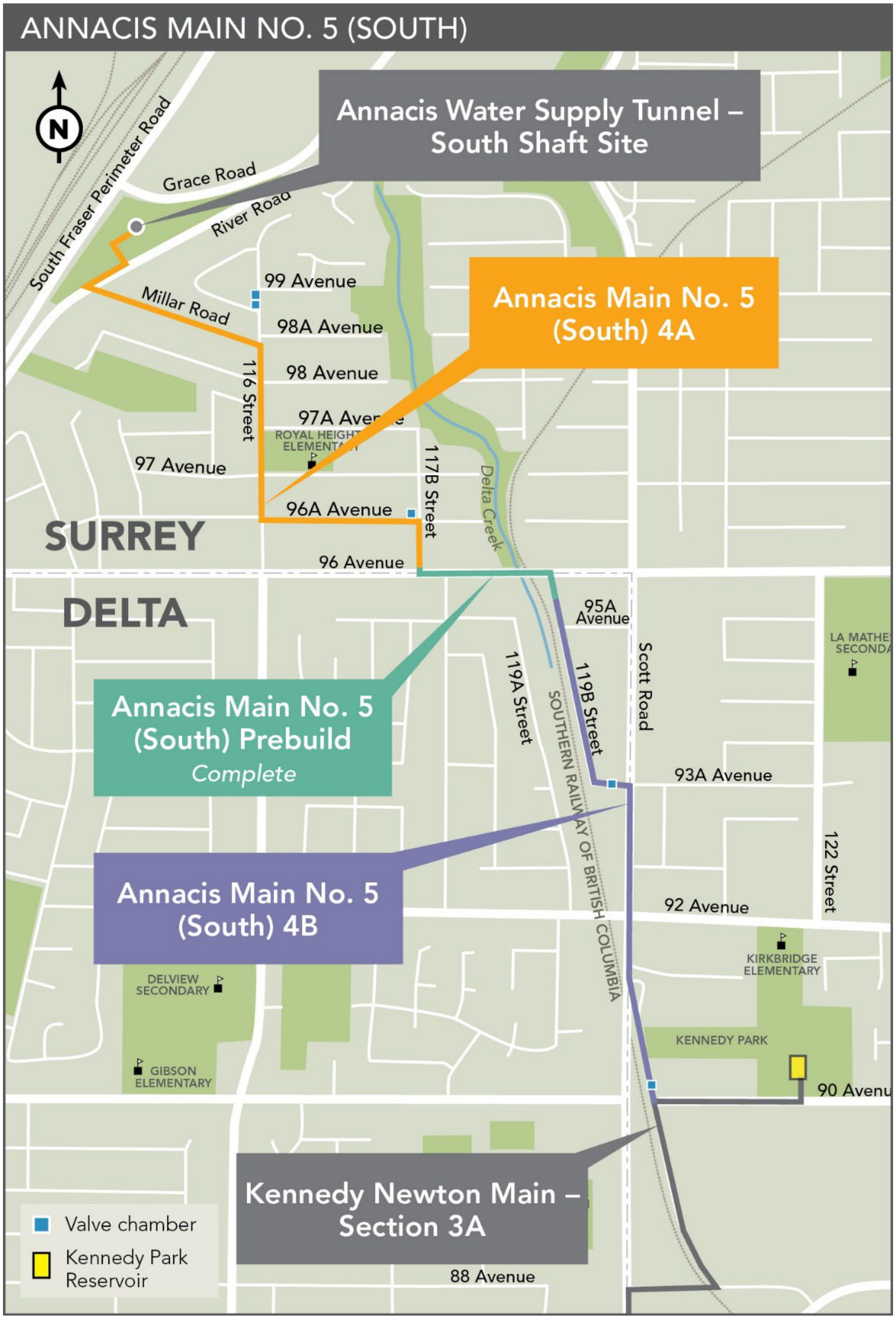
CONCLUSION

It is recommended that the GVWD Board approve the award of ITT 24-148 for Construction of Annacis Main No. 5 South – Contract 4A From River Road and Millar Road to 117B Street and 96th Avenue, in the amount of up to $30,656,600.00 (exclusive of taxes) to B&B Contracting (2012) Ltd. and authorize the General Manager, Procurement and Real Estate to execute the required documentation once the General Manager, Procurement and Real Estate is satisfied that the award should proceed.

ATTACHMENT

1. Annacis Main No. 5 (South) Map.

74090905


ANNACIS MAIN NO. 5 (SOUTH)
N
Annacis Water Supply Tunnel – South Shaft Site
South Fraser Perimeter Road
Grace Road
River Road
Millar Road
99 Avenue
98A Avenue
98 Avenue
97A Avenue
ROYAL HEIGHTS ELEMENTARY
97 Avenue
96A Avenue
96 Avenue
116 Street
117B Street
Delta Creek
Annacis Main No. 5 (South) 4A
SURREY
DELTA
95A Avenue
119A Street
119B Street
Scott Road
SOUTHERN RAILWAY OF BRITISH COLUMBIA
LA MATHESON SECONDARY
Annacis Main No. 5 (South) Prebuild
Complete
93A Avenue
Annacis Main No. 5 (South) 4B
92 Avenue
122 Street
KIRKBRIDGE ELEMENTARY
DELVIEW SECONDARY
KENNEDY PARK
GIBSON ELEMENTARY
90 Avenue
Kennedy Newton Main – Section 3A
88 Avenue
Valve chamber
Kennedy Park Reservoir

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Water Committee

From: Linda Parkinson, Director, Policy, Planning and Analysis, Water Services

Date: March 18, 2025 Meeting Date: April 16, 2025

Subject: **GVWD Water Supply System 2024 Annual Update**

RECOMMENDATION
That the Water Committee receive for information the report dated March 18, 2025, titled "GVWD Water Supply System 2024 Annual Update".

EXECUTIVE SUMMARY
The *GVWD Water Supply System 2024 Annual Update* (Report), Attachment 1, summarizes key initiatives undertaken by the Greater Vancouver Water District, operating under the name Metro Vancouver, to continue providing an uninterrupted supply of high-quality drinking water to the region. This report follows the Ministry of Health's (Ministry) guidance outlined in its *Guide for Communicating with Water Users.* It also promotes awareness of the drinking water program, one of the six elements of Health Canada's Multi-Barrier Approach to Safe Drinking Water.

It takes a tremendous amount of effort to ensure the continued and uninterrupted delivery of billions of litres of high-quality drinking water to over 3 million residents and businesses that call this region home. In 2024, Metro Vancouver ensured the reliable delivery of drinking water through infrastructure upgrades, risk mitigation, seasonal operating strategies, and conservation efforts. Key initiatives included water quality sampling, emergency preparedness, and major capital projects to enhance system resilience and support regional growth.

PURPOSE
To provide the Water Committee with the GVWD Water Supply System 2024 Annual Update that ensures Metro Vancouver remains aligned with provincial legislation.

BACKGROUND
The Ministry has developed the *Guide for Communicating with Water Users* to create a standardized approach to stay aligned with the legislated communication requirements. By completing the Report, Metro Vancouver aligns with the Ministry's direction and provides transparent and proactive communication with water users. It also promotes public awareness and involvement in the drinking water program, one of the six elements of Health Canada's *Multi-Barrier Approach to Safe Drinking Water.*

GVWD Water Supply 2024 Annual Update Report Summary
Metro Vancouver's drinking water comes from rainfall and snowmelt in three protected water supply areas. The water supply areas provide a source of drinking water for over 3 million residents in the region. Rain and melting snow flow into three main reservoirs; Capilano, Seymour, and Coquitlam. The water is then treated at either Seymour Capilano Filtration Plant or Coquitlam

Water Treatment Plant and distributed, wholesale, to member jurisdictions within the region via over 520 kilometres of transmission mains, 19 pump stations, 27 in-system storage reservoirs, and eight re-chlorination stations. Member jurisdictions then distribute the water to residents and businesses via their local water distribution systems. The water is tested throughout the Metro Vancouver transmission system to ensure that high-quality drinking water is distributed to member jurisdictions. Metro Vancouver maintains, upgrades, and builds infrastructure to ensure the ability to continue providing high-quality drinking water to meet the current and future needs of the growing region.

Key initiatives undertaken by Metro Vancouver in 2024 included the following:

- Water Quality Sampling and Testing:
  - Conducting 169,127 tests of drinking water through the *Water Quality Monitoring and Reporting Plan* for Metro Vancouver and member jurisdictions; the results of which can be found in the *GVWD 2024 Water Quality Annual Report*.
- Water System Risk Mitigation:
  - Auditing the *Quality Management System for Drinking Water Operational Plan* and conducting long-term water supply infrastructure planning to mitigate risks to the drinking water system.
- Water Conservation:
  - Tracking, monitoring, and analyzing drinking water demand for each of our members. The highest peak day consumption in the summer of 2024 was 1.54 billion litres (BL), which was recorded on Saturday, July 20, 2024.
  - Promoting water conservation through the Water Conservation campaign and the Water Wagon program.
  - Rolling out communication and education related to *the Drinking Water Conservation Plan (DWCP),* which sets water use restrictions.
  - Management of the Summer Support Program to assist member jurisdictions in the monitoring and enforcement of the DWCP.
- Financial Planning:
  - Total water sales of $367 million with seasonal bulk water rates intended to incentivize members to control demand in the high demand season (May to September).
  - Implementing a new Development Cost Charge (DCC) framework to fund water infrastructure for future growth-driven developments, ensuring long-term regional affordability and alignment with the 2022-2026 Board Strategic Plan.
- Water System Management:
  - Conducting annual maintenance projects, including the cleaning of seven in-system reservoirs, completing 72 condition assessments, performing 4,084 preventative maintenance work orders, and conducting thousands of asset inspections, rehabilitation, and replacement activities to ensure the existing infrastructure continues to perform as required to meet service objectives.
  - Completing the construction of the deep vertical shaft on the south side of the Fraser River and commencing the north shaft construction for the Annacis Water Supply Tunnel.

- Completing the installation of steel water mains inside the Second Narrows Water Supply Tunnel under Burrard Inlet, between North Vancouver and Burnaby, to increase the reliability of supply in the event of a major earthquake as well as to provide additional long-term supply capacity.
- Completing the seismic upgrade of the Pebble Hill Reservoir Units 1 and 2 to withstand and remain in operation following a major earthquake. Commencing construction of the Capilano Raw Pump Station Water Backup Power system to maintain water delivery to the Seymour Capilano Filtration Plant in the event of a power outage.

- Emergency Response:
  - Undertaking training, tabletop exercises, and functional emergency exercises to test and prepare for emergencies.
  - Repaired 31 transmission system leaks in 2024.

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
There are no financial implications associated with this report. The cost for all programs and projects are recovered through water sales.

CONCLUSION
By completing the Report, Metro Vancouver remains aligned with the Ministry of Health's direction and initiatives concerning public communication. The report provides transparent and proactive communication with water users. It also promotes public involvement and awareness of the drinking water program, one of the six elements of Health Canada's *Multi-Barrier Approach to Safe Drinking Water.*

ATTACHMENT
1. Greater Vancouver Water District Water Supply System 2024 Annual Update dated March 6, 2025. https://orbit.gvrd.bc.ca/orbit/llisapi.dll/app/nodes/74848745.

71733643

Greater Vancouver Water District

Water Supply System 2024 Annual Update

March 2025

Indigenous Territorial Acknowledgement

Metro Vancouver acknowledges that the region's residents live, work, and learn on the shared territories of many Indigenous peoples, including 10 local First Nations: q̓icə̓y̓ (Katzie), q̓ʷɑ:n̓ƛ̓ən̓ (Kwantlen), kʷikʷəƛ̓əm (Kwikwetlem), máthxwi (Matsqui), xʷməθkʷəy̓əm (Musqueam), qiqéyt (Qayqayt), Semiahmoo, Sḵwx̱wú7mesh Úxwumixw (Squamish), scəw̓aθən məsteyəxʷ (Tsawwassen), and səlilwətaɬ (Tsleil-Waututh).

Metro Vancouver respects the diverse and distinct histories, languages, and cultures of First Nations, Métis, and Inuit, which collectively enrich our lives and the region.

About Metro Vancouver

Metro Vancouver is a diverse organization that plans for and delivers regional utility services, including water, sewers and wastewater treatment, and solid waste management. It also regulates air quality, plans for urban growth, manages a regional parks system, provides affordable housing, and serves as a regional federation. The organization is a federation of 21 municipalities, one electoral area, and one treaty First Nation located in the region of the same name. The organization is governed by a Board of Directors of elected officials from each member jurisdiction.

4515 Central Boulevard, Burnaby, BC, V5H 0C6
metrovancouver.org
March 2025

Cover: Jericho Reservoir

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EXECUTIVE SUMMARY

The *Greater Vancouver Water District Water Supply System 2024 Annual Update* report summarizes key initiatives undertaken in 2024 by the Greater Vancouver Water District, operating under the name Metro Vancouver. In 2024, Metro Vancouver undertook water system risk mitigation, water conservation, water quality sampling and testing, and maintenance activities to continue to meet service objectives. Capital projects were undertaken to maintain and upgrade the existing infrastructure, increase resiliency, and accommodate regional growth.

This report was prepared following the Ministry of Health's (the Ministry) *Guide for Communicating with Water Users*.

Background

The purpose of the report is to remain aligned with the communication requirements stipulated in the BC provincial *Drinking Water Protection Act* and *Drinking Water Protection Regulation*. As a water supplier regulated under this legislation, Metro Vancouver communicates with water users through this report on topics defined within the Ministry developed Guide for Communicating with Water Users. This report provides transparent and proactive communication with water users. It also promotes public awareness and involvement in the drinking water program, one of the six elements of Health Canada's **Multi-Barrier Approach to Safe Drinking Water**.

Summary

Metro Vancouver's drinking water comes from rainfall and snowmelt in three protected water supply areas. The water supply areas provide a source of drinking water to over 3 million residents in the region. Rain and melting snow flow into three main reservoirs: Capilano, Seymour, and Coquitlam. The water is then treated at either the Seymour Capilano Filtration Plant or the Coquitlam Water Treatment Plant and distributed, wholesale, to member jurisdictions within the region via over 520 kilometres of transmission mains, 19 pump stations, 27 in-system storage reservoirs, and eight rechlorination stations. Member jurisdictions then distribute the water to residents and businesses via their local distribution system. This water is tested throughout the transmission system to guarantee that high-quality drinking water is distributed to member jurisdictions. Metro Vancouver maintains, upgrades, and builds infrastructure to ensure its ability to continue providing high-quality drinking water to meet the current and future needs of a growing region.

Key initiatives undertaken by Metro Vancouver in 2024 included the following:

Water Quality Sampling and Testing:

- Conducting 169,127 tests of drinking water through the *Water Quality Monitoring and Reporting Plan for Metro Vancouver and Member Jurisdictions*; the results of which can be found in the *Greater Vancouver Water District 2024 Water Quality Annual Report*.

Water System Risk Mitigation:

- Auditing the *Quality Management System for Drinking Water Operational Plan* and conducting long-term water supply infrastructure planning to mitigate risks to the drinking water system.

Water Conservation:

- Tracking, monitoring, and analyzing drinking water demand for each of our members. The highest peak day consumption in the summer of 2024 was 1.54 billion litres (BL), which was recorded on Saturday, July 20, 2024.
- Promoting water conservation through the Water Conservation campaign and the Water Wagon program.
- Rolling out communication and education related to the *Drinking Water Conservation Plan (DWCP)*, which sets water use restrictions.
- Running of the Summer Support Program to assist member jurisdictions in the monitoring and enforcement of the DWCP.

Financial Planning:

- Total water sales of $367 million with seasonal bulk water rates intended to incentivize members to control demand during the high demand season.
- Implementing a new DCC framework to fund water infrastructure for future developments, ensuring long-term regional affordability and alignment with the 2022 - 2026 Board Strategic Plan.

Water System Management:

- Conducting annual maintenance projects, including the cleaning of seven in-system reservoirs, completing 72 condition assessments, performing 4,084 preventative maintenance work orders, and conducting thousands of asset inspections, rehabilitation, and replacement activities to ensure the existing infrastructure continues to perform as required to meet service objectives.
- Completing the construction of the deep vertical shaft on the south side of the Fraser River and commencing the north shaft construction for the Annacis Water Supply Tunnel.
- Completing the installation of steel water mains inside the Second Narrows Water Supply Tunnel under Burrard Inlet, between North Vancouver and Burnaby, to increase the reliability of supply in the event of a major earthquake as well as to provide additional long-term supply capacity.
- Completing the seismic upgrade of the Pebble Hill Reservoir Units 1 and 2 to withstand and remain in operation following a major earthquake. Commencing construction of the Capilano Raw Water Pump Station Backup Power system to maintain water delivery to the Seymour Capilano Filtration Plant in the event of a power outage.

Emergency Response:

- Undertaking training, tabletop exercises, and functional emergency exercises to test and prepare for emergencies.
- Metro Vancouver was involved with repairing 31 transmission system leaks in 2024.

ACRONYMS

BC	British Columbia
BL	Billion Litres
CWTP	Coquitlam Water Treatment Plant
DCC	Development Cost Charge
DWCP	Drinking Water Conservation Plan
ERP	Emergency Response Plan
GVWD	Greater Vancouver Water District
ha	Hectares
km	Kilometres
m	Metres
ML	Million Litres
MLD	Million Litres per Day
QMSDW	Quality Management System for Drinking Water
SCFP	Seymour Capilano Filtration Plant
SSP	Summer Support Program
UOCG	Utility Operational Coordination Guide
UV	Ultraviolet
WSEMP	Water Services Emergency Management Plan

1. INTRODUCTION

1.1 Purpose

As a water supplier regulated under BC's *Drinking Water Protection Act* and *Drinking Water Protection Regulation*, Metro Vancouver is required to communicate with water users on various topics defined in the legislation. This report was prepared following guidance from the Ministry of Health's *Guide for Communicating with Water Users*.

The purpose of this report is to proactively communicate with member jurisdictions and the public by providing an annual update on the drinking water supply system. Through this report, Metro Vancouver seeks to promote public awareness of the drinking water program, which has been identified as one of the components of the *Multi-Barrier Approach to Safe Drinking Water* by Health Canada.

1.2 Greater Vancouver Water District

The *Greater Vancouver Water District* (GVWD), operating as Metro Vancouver, was created and constituted under the provincial statute, the *Greater Vancouver Water District Act*, to supply drinking water to member jurisdictions within the region. The GVWD is governed by an administration board (the Board) consisting of representatives from the member jurisdictions of the GVWD. The Board appoints a Commissioner (the GVWD Commissioner) who provides management and oversight of the activities of the GVWD.

The GVWD membership consists of 18 municipalities, one Electoral Area, and one Treaty First Nation. The GVWD, working together with its members, plans for and delivers regional-scale drinking water services to over 3 million people. Table 1 shows the list of member jurisdictions that are supplied water from the GVWD.

TABLE 1: GREATER VANCOUVER WATER DISTRICT MEMBER JURISDICTIONS

Greater Vancouver Water District Member Jurisdictions
Village of Anmore
Village of Belcarra
City of Burnaby
City of Coquitlam
City of Delta
Electoral Area A
City of Langley
Township of Langley
City of Maple Ridge
City of New Westminster
City of North Vancouver
District of North Vancouver
City of Pitt Meadows
City of Port Coquitlam
City of Port Moody
City of Richmond
City of Surrey
scəw̓aθən məsteyəxʷ (Tsawwassen First Nation)
City of Vancouver
District of West Vancouver

Metro Vancouver is responsible for the following:

- Protecting the water supply areas
- Storing, treating, and ensuring the quality of the water
- Supplying water to member jurisdictions
- Upgrading, maintaining, and expanding the system
- Promoting water conservation
- Planning for the future to meet the drinking water needs of the growing population
- Ensuring the region's resilience in the face of unpredictable annual impacts of climate change

Metro Vancouver and its members work together to supply high-quality drinking water to the region's businesses and over 3 million residents.

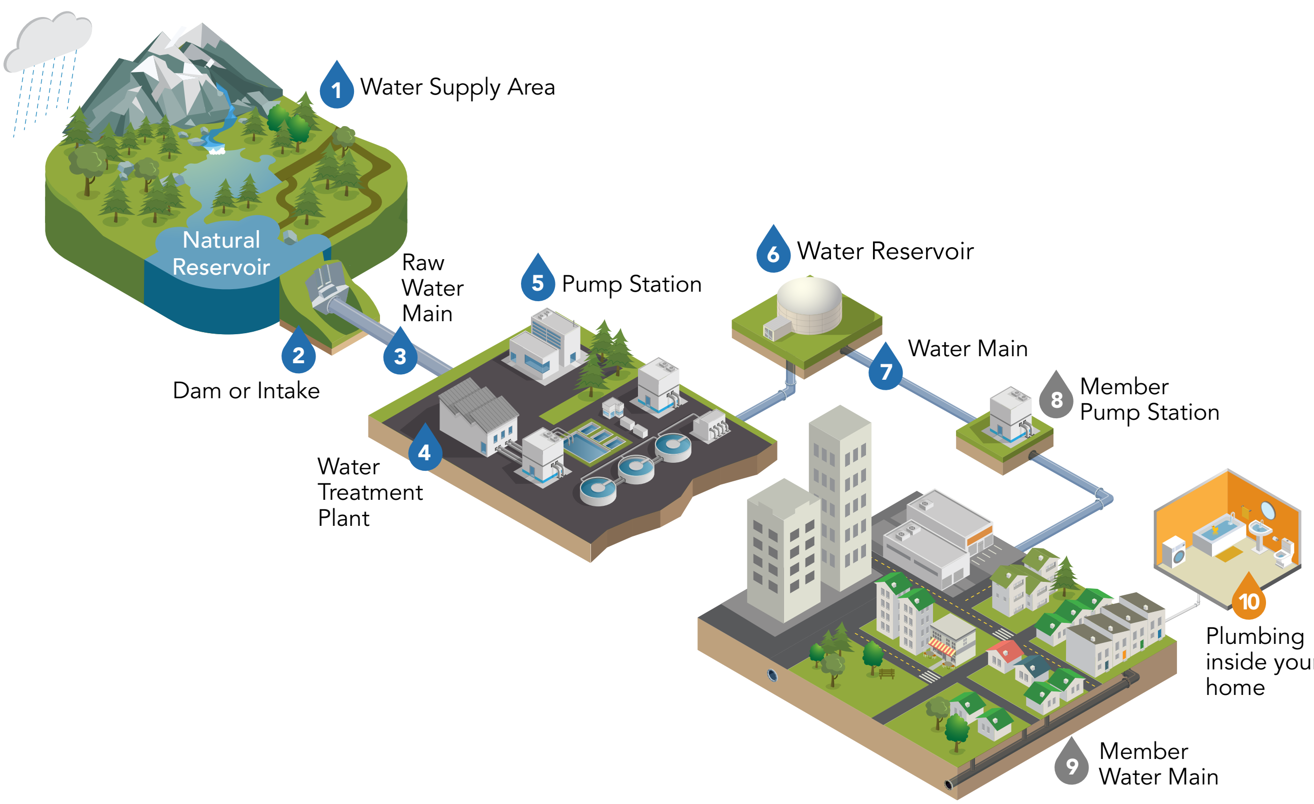

Figure 1: Metro Vancouver Drinking Water System Overview

2. DRINKING WATER SYSTEM OVERVIEW

Metro Vancouver's drinking water comes from rainfall and snowmelt stored in three protected reservoirs: Capilano, Seymour, and Coquitlam. Three alpine lakes, Loch Lomond, Burwell Lake, and Palisade Lake, provide additional water storage. To control water storage in the reservoirs, Metro Vancouver operates and maintains the Cleveland, Seymour Falls, and alpine lake dams, while the Coquitlam Dam is owned and operated by BC Hydro. Water is collected, stored, treated, and distributed to member jurisdictions through a network of dams, treatment plants, transmission mains, pump stations, and in-system storage reservoirs located throughout the region. The entire water system, including the water supply areas, encompasses a total land area of 2,860 square kilometres. Figure 2 provides an overview of the Metro Vancouver water supply system.

Figure 2: Metro Vancouver Drinking Water System Map

2.1 Source Water

Metro Vancouver's water supply areas and the Lower Seymour Conservation Reserve total approximately 60,000 hectares (ha) of protected lands north of the metropolitan area. The three water supply areas are, in order from west to east, Capilano (19,535 ha), Seymour (12,375 ha), and Coquitlam (20,461 ha). Access to the water supply areas is controlled and limited through the *Watershed Access Policy*. Protecting the water supply areas by restricting access is a fundamental component of the *Multi-Barrier Approach to Safe Drinking Water*, as outlined by Health Canada.

The Capilano water supply area is the most western of Metro Vancouver's water supply areas. The Cleveland Dam and Capilano Reservoir created behind it are located on the Capilano River. The Cleveland Dam is a concrete dam built in 1954. The Capilano water supply area has one additional storage reservoir, Palisade Lake, with an annually usable storage capacity of 10 BL.

The Seymour Falls Dam and the Seymour Reservoir created behind it are located on the Seymour River and is at the highest elevation of the three water system supply sources. The Seymour Falls Dam was built in 1961 to replace the original dam that was built in 1927. Also within the Seymour water supply area are two dammed alpine lakes, Burwell Lake and Loch Lomond, which have storage capacities of 12 BL and 7 BL, respectively. Water from the alpine lakes is typically used only during high-demand periods in the summer.

Metro Vancouver's most eastern water supply is the Coquitlam Reservoir. The water in Coquitlam Reservoir is governed by the Province of BC and is allocated through licenses to BC Hydro for power generation and Metro Vancouver for drinking water. BC Hydro owns and operates the Coquitlam Dam and is also responsible for releasing environmental flows into the Coquitlam River for fish and wildlife. Metro Vancouver has agreements with BC Hydro to access additional drinking water supply from the reservoir by buying a portion of the water currently allocated to power generation. The province licenses Metro Vancouver to use 451 billion litres (BL) of water per year. Every year, additional water is purchased from BC Hydro by Metro Vancouver for drinking water. In 2024, Metro Vancouver purchased an additional 60.2 BL.

2.2 Water Treatment Facilities

Metro Vancouver's source water is required by the Ministry to be treated to meet the *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia*. In addition, Metro Vancouver's treated water meets the requirements for physical and chemical parameters listed in the federal *Guidelines for Canadian Drinking Water Quality*. Metro Vancouver's water is treated at either the Seymour Capilano Filtration Plant (SCFP) or the Coquitlam Water Treatment Plant (CWTP).

2.21 Seymour Capilano Filtration Plant

The SCFP facility receives good-quality raw water from the Seymour and Capilano Reservoirs. Twin tunnels transport both raw and treated water over 7 km between the Capilano Reservoir and SCFP. This provides the ability to blend or separately treat each source if raw water quality conditions require it. Raw water is pumped from Capilano Reservoir for treatment at SCFP. Since the SCFP is at a higher elevation than the Capilano Reservoir, excess pressure is available from the returning treated water, for which an energy recovery system is utilized. The recovered energy partially offsets the power requirements for the Capilano Raw Water Pump Station.

The treatment processes at the facility include direct filtration, including granular media (fine sand and anthracite), after coagulation, and flocculation processes. The ultraviolet (UV) is used for primary disinfection, and sodium hypochlorite is used for secondary disinfection. An added benefit of filtration is that less chlorine is required to maintain a residual in the transmission and distribution systems. The final step is treatment with lime and carbonic acid for corrosion control. Dewatered residuals as the final dry material of the backwash water treatment are transported to a concrete plant for reuse in concrete production or to a landfill when the concrete plant is temporarily shut down for maintenance. Figure 3 describes the individual treatment processes. In 2024, SCFP treated an average of 695 million litres per day (MLD) and a maximum of 994 MLD; the plant is designed to treat up to 1,800 MLD. For more information see [Seymour Capilano Filtration Plant Brochure (metrovancouver.org)].

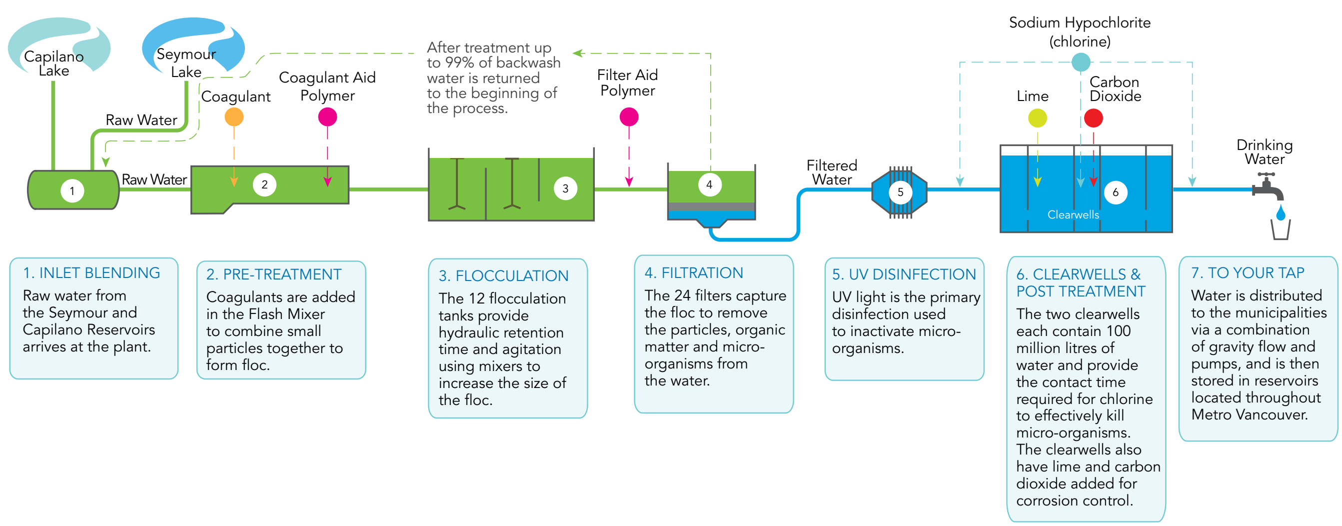

Figure 3: Seymour Capilano Filtration Plant Process Overview

2.22 Coquitlam Water Treatment Plant

The CWTP is located within the City of Coquitlam's northern boundary and treats water from the Coquitlam Reservoir. In 2024, CWTP treated an average of 392 MLD and a maximum of 834 MLD; the plant is designed to treat a maximum of 1,200 MLD.

The Coquitlam Water Supply Area is of different geology than the Seymour and Capilano Water Supply Areas. The water is typically less turbid even during heavy rain events, and as such, this system relies on different forms of treatment than SCFP. At CWTP, ozone is used as a pretreatment to help break down organics and reduce the production of disinfection by-products (DBPs). DBPs are chemicals that can be formed when chlorine is used for disinfecting drinking water. The primary treatment is UV disinfection followed by sodium hypochlorite (chlorination) for disinfection. The pH and alkalinity are adjusted using a combination of soda ash (sodium carbonate) and carbon dioxide before it enters the transmission system. Figure 4 shows the process flow diagram for CWTP. For more information see coquitlam-ultraviolet-fact-sheet-update.pdf (metrovancouver.org)

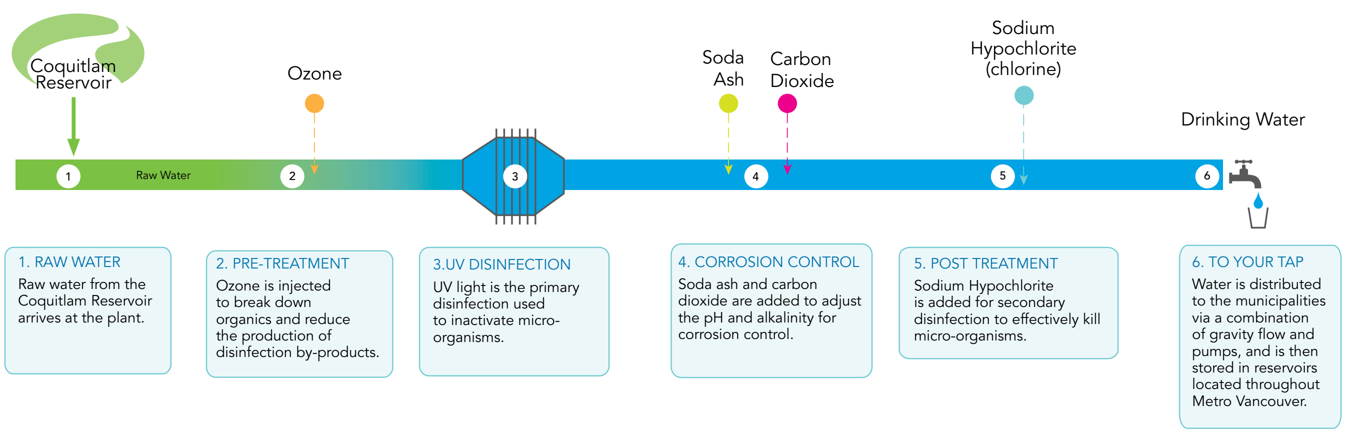

Figure 4: Coquitlam Water Treatment Plant Process Overview

2.3 Transmission System

Metro Vancouver supplies approximately 1 BL of drinking water each day, rising to over 1.5 BL in the summer, to member jurisdictions through a network of 19 pump stations, 27 in-system storage reservoirs, eight secondary disinfection facilities, and over 520 km of transmission water mains ranging from 0.35 to 3 m in diameter. Thousands of kilometres of additional local distribution mains deliver water directly to residents and businesses.

Water transmission from the Capilano and Seymour sources cross under Burrard Inlet via the First Narrows and Second Narrows marine crossings. The Coquitlam supply is conveyed south without immediately crossing major waterways. From these points, the conveyance of water is predominantly in a north-to-south direction, with interconnecting east-west transmission mains and pump stations.

When water demands are relatively low, the geography of the region provides, in large part, conveyance supported by gravity due to the higher elevation of the water treatment plants for much of the region. However, when water demand is high during the summer months or if portions of the system are out of service for construction or maintenance work, pumping is required at many locations as gravity flow capacity alone is insufficient.

3. WATER QUALITY SAMPLING PROGRAM

Metro Vancouver conducts daily tests on the drinking water. In 2024, Metro Vancouver conducted 169,127 tests on the water; the results of which are published in [***Water Quality Annual Reports***] available on the Metro Vancouver website. The *Greater Vancouver Water District 2024 Water Quality Annual Report* will be available in late April 2024. The Water Quality Annual Report summarizes the water quality analysis results for source, treated, and distributed water.

The *Water Quality Monitoring and Reporting Plan for Metro Vancouver (GVWD)* and Member Jurisdictions is currently being updated from its 2018 edition and will be completed in early 2025.

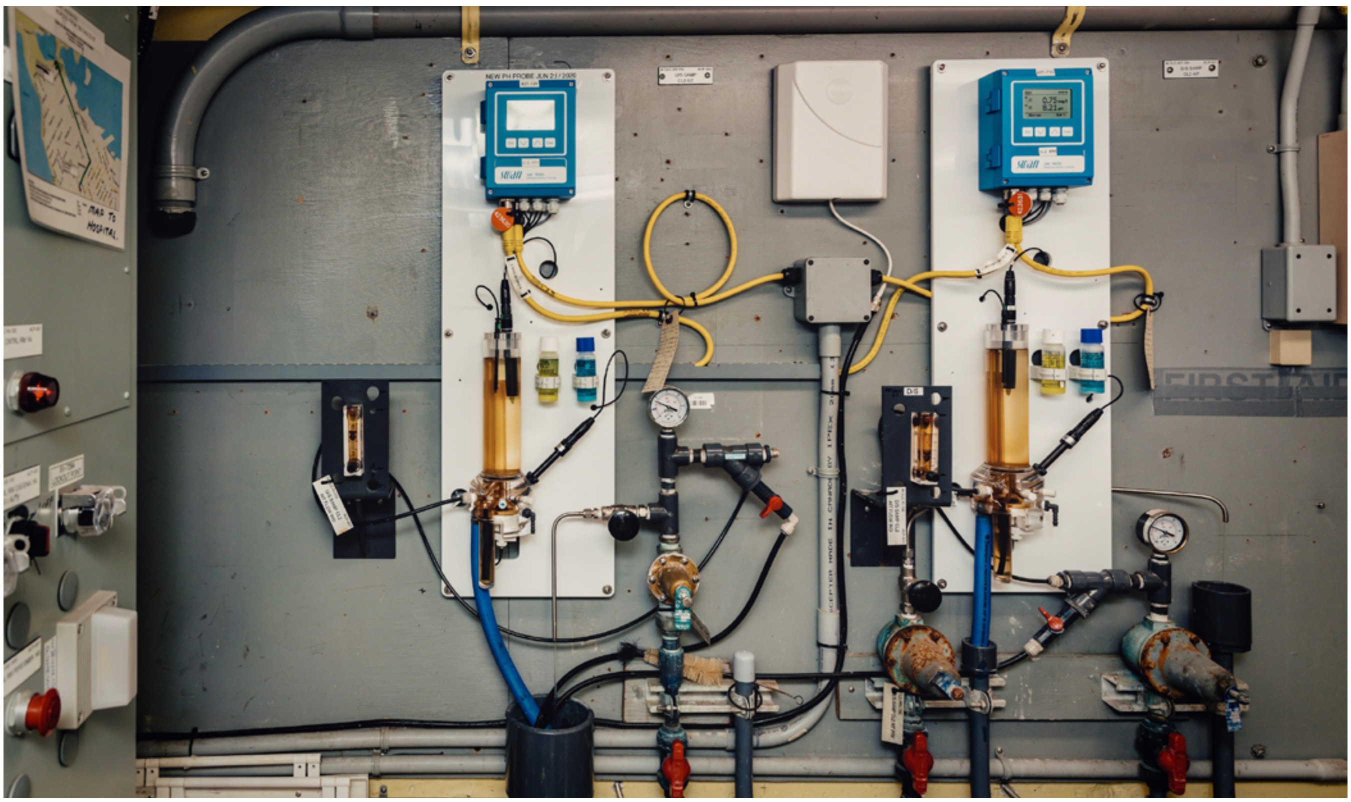

Figure 5: Water sampling to test for water quality in Metro Vancouver at Chilco and Alberni Secondary Disinfection Station

4. EVOLVING GUIDELINES

The *Guidelines for Canadian Drinking Water Quality* are developed by the Federal-Provincial-Territorial Committee on Drinking Water and published by Health Canada. BC's Ministry of Health is responsible for adopting these guidelines as water quality objectives, as well as publishing their own BC-specific guidance in the Drinking Water Officers' Guide. As new guidelines are developed and implemented, Metro Vancouver proactively reviews the water supply system and ensures that the system is capable of meeting the latest guidelines or identifies and plans for treatment systems or other upgrades as required.

5. WATER SYSTEM RISKS AND MITIGATION

Metro Vancouver follows the *Quality Management System for Drinking Water* (QMSDW) *Operational Plan*, which includes risk assessment outcomes and implementation of critical control measures. Risk assessment is a fundamental part of the QMSDW **Operational Plan** process. It forms the foundation for building a set of specific prioritized actions to safeguard drinking water and aid in strategic decision making, planning, and resource allocation. The analysis includes identifying, assessing, controlling, and mitigating the risks of the hazardous events that may occur in Metro Vancouver's drinking water system. The QMSDW has an annual audit requirement, and the 2024 audit was completed.

5.1 Water Supply Area Risks and Mitigation

Metro Vancouver's water supply areas have restricted access to minimize human-caused pollution, environmental damage, and wildfires. A changing climate continues to pose significant risk to water quality and quantity in the water supply areas. Climate models predict more frequent and intense precipitation events through the winter and spring and hotter, drier summers and falls. This shift in weather patterns may increase landslide and wildfire activity, which could result in turbidity events capable of overwhelming current treatment systems.

A reduction in snowpack accumulation is also anticipated with the warming climate which will reduce the inflow to the reservoirs due to snowmelt during spring and summer and potentially increase wildfire risk at higher elevations. Increased turbidity and changes in precipitation patterns that may impact source supply volumes have been considered in long-term water supply infrastructure planning through filtration pretreatment, changes in intake location, and treatment designs. Additional mitigation measures are underway including enhanced snowpack monitoring and wildfire risk planning.

5.2 Treatment System Risks and Mitigation

The source water quality at Coquitlam Reservoir and treated water quality at CWTP meet the current federal and provincial objectives for filtration exemption, and on this basis, CWTP was designed to include ozone, UV, and chlorine disinfection. Although the source water quality in Coquitlam Reservoir is good, turbidity events do occur at the existing intake location, and more frequent events are expected to occur in the future due to climate change. Therefore, filtration of water from the Coquitlam Reservoir may be required in the future to comply with regulatory requirements as well as to increase the resiliency of the CWTP to the anticipated impacts of climate change that would affect water quality.

Turbidity is just one water quality parameter among other parameters that would require filtration of the Coquitlam source water in the future. Filtration removes turbidity including (a portion of) naturally occurring organics. Organics reduction has several benefits, including reducing the amount of chlorination required to maintain adequate residual levels in the transmission and distribution systems. Reduced chlorination and organics also lowers the levels of disinfection by-products, which are health-regulated parameters under the federal *Guidelines for Canadian Drinking Water Quality*. Filtration provides resiliency and risk mitigation against changing future regulations and emerging contaminants. The past decision to filter the Capilano and Seymour sources was based on similar considerations. Metro Vancouver is in the early works of designing a new water supply intake, water supply tunnel, and filtration plant for the Coquitlam source water.

5.3 Transmission System Risks and Mitigation

Some of the risks that Metro Vancouver faces in the transmission system include potential seismic events, power outages, aging infrastructure, and strain on the system during peak day demand.

SEISMIC

Metro Vancouver has completed a series of seismic upgrades over the past 30 years and has over $1.2 billion worth of planned resiliency projects in the next 10 years, including seismic upgrades to pump stations and reservoirs, marine crossing replacements, and water main renewals.

Metro Vancouver is developing resiliency and emergency response plans for the water supply system that will address how basic service can be provided to the region after a major seismic event that results in significant damage. Further studies will be required to determine potential resiliency measures for infrastructure deemed most at risk from damage or failure after a seismic event. Resiliency measures will be prioritized and incorporated in future capital projects.

POWER OUTAGES

Power outages can cause operational issues in the transmission system, particularly at pump stations. Backup power is in place at most critical sites to ensure a robust water supply system. Additional backup power is being implemented to ensure continued operation of key water supply facilities during planned and unplanned power outages.

AGING INFRASTRUCTURE

Aging infrastructure poses a risk to the transmission system with leakage and disrupted services. Metro Vancouver has an *Asset Management for Water Services Policy* that requires condition assessments of assets to be carried out, which may lead to repair and replacement projects. See Section 9.0 for more information on the Asset Management Program for the regional water utility.

PEAK DAY DEMAND

Peak day is defined as that day of the year when the highest volume of water is drawn from the region's three water supply sources. The transmission system is at risk of being strained during this time. Peak day water use is responsive to summer weather conditions. The annual outdoor watering restrictions, in combination with strong education and enforcement programs, encourage increased drinking water conservation and helps minimize peak day demand.

6. WATER USE AND CONSERVATION

6.1 Water Availability and Use Trends

Metro Vancouver's reservoirs get filled every winter and spring by precipitation and snowmelt, and that water needs to last through the summer and into the fall. In 2024, Metro Vancouver's snowpack was below historical average during the winter months. However, the region experienced more typical weather conditions through the summer. The water supply areas received near-normal precipitation for the period of May 1 to October 15 with a series of well-timed storms each month that benefited the water supply areas by relieving local drought conditions and reducing wildfire danger. The source reservoirs were proactively managed through the spring and early summer to capture the incoming streamflow to ensure the Capilano and Seymour Reservoirs reached their full pool water levels which happened on May 4 and June 14 respectively.

As shown in Figure 6, the peak day consumption in the summer of 2024 was 1.54 BL/d, recorded on Saturday, July 20. The 2023 peak day consumption was 1.56 BL/d, which occurred on Wednesday, July 5.

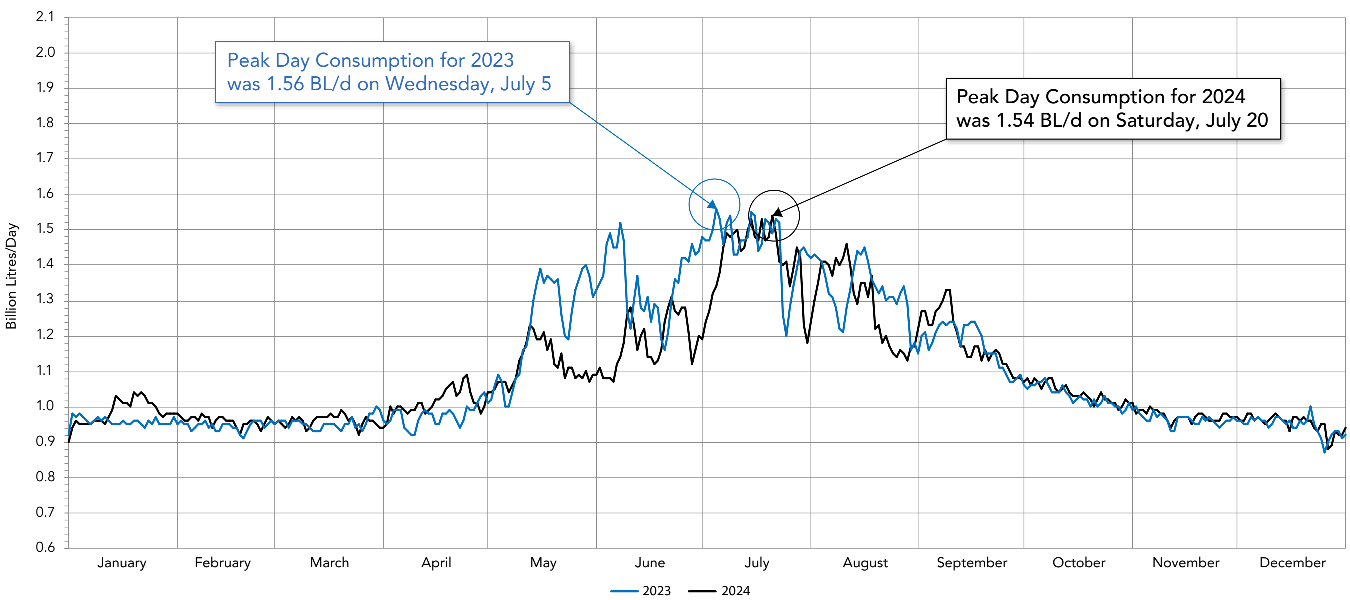

Figure 6: 2023 and 2024 Daily Water Consumption

The average 2024 summer daily demands were lower than at the same time in 2023. Overall, in terms of volume, the region used about 5 per cent less water during the entire high demand season of 2024 (205.0 BL) than that of 2023 (216.0 BL). The reduction in water use in 2024 could be attributed to having a wetter summer season, receiving over 105 per cent of normal precipitation from May 1 to October 15, while in 2023 the region received only 50 per cent of the normal precipitation.

Between 1999 and 2024, Metro Vancouver's service population has grown by 967,000 people at an annual growth rate of approximately 1.65 per cent. Despite the population growth, average daily water demand has remained relatively constant over the past 25 years, as shown in Figure 7. Thus, per capita water use has been declining over the past 25 years, as shown in Figure 8, which is often attributed to more efficient plumbing fixtures, densification, increasing public awareness about water conservation, and increasingly stringent watering restrictions.

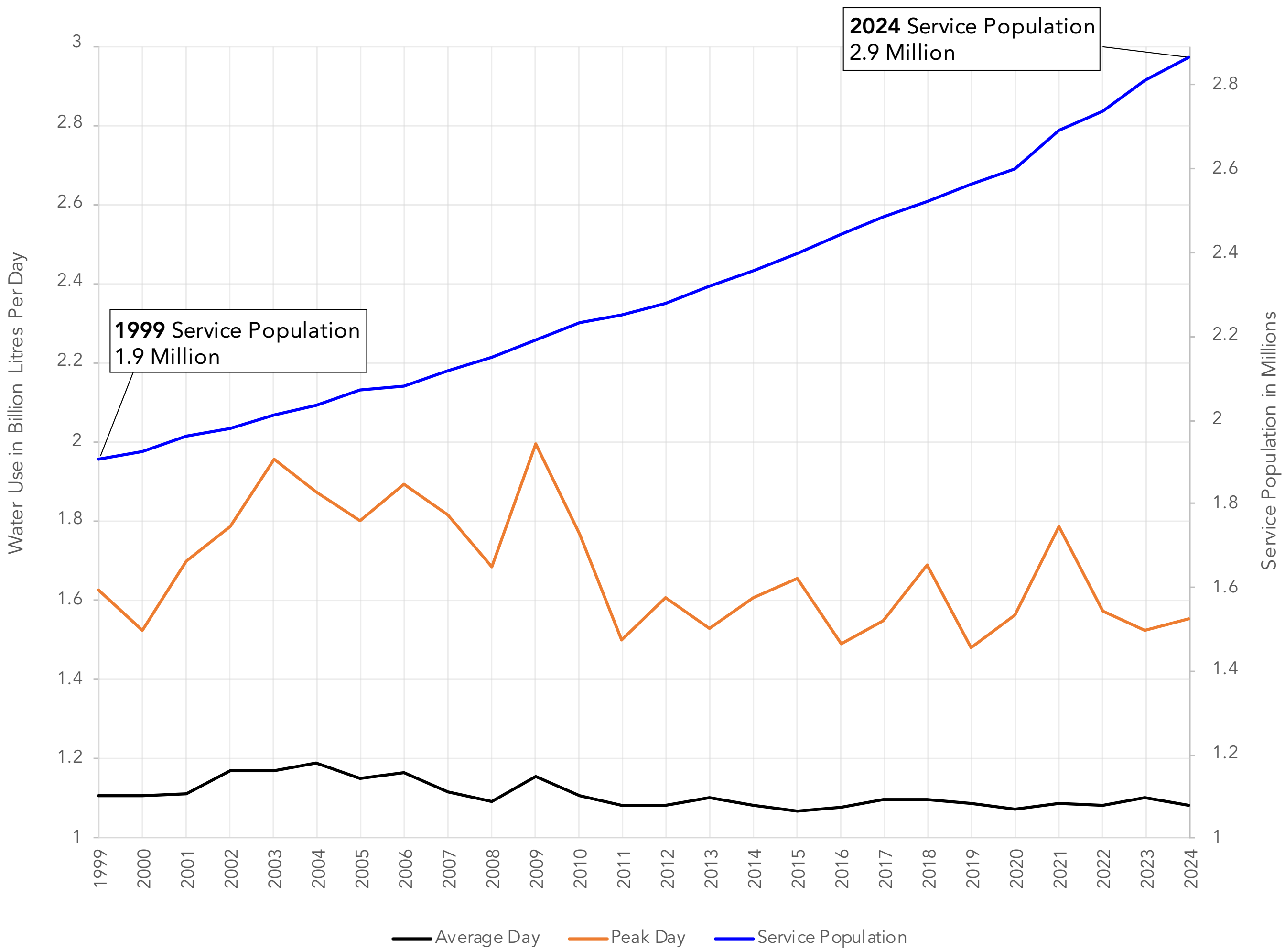

Figure 7: Regional Population and Water Use from 1999 to 2024

To ensure the region's collective needs for drinking water are met affordably and sustainably now and, in the future, the Drinking Water Conservation Plan (DWCP) was developed by Metro Vancouver with member jurisdictions. The DWCP is a regional policy developed to manage the use of drinking water during periods of high demand, mostly during late spring to early fall, and during periods of water shortages and emergencies. Figure 8 shows the regional per capita water use graphs from 1999 to 2024, together with the major milestones of the DWCP during this period.

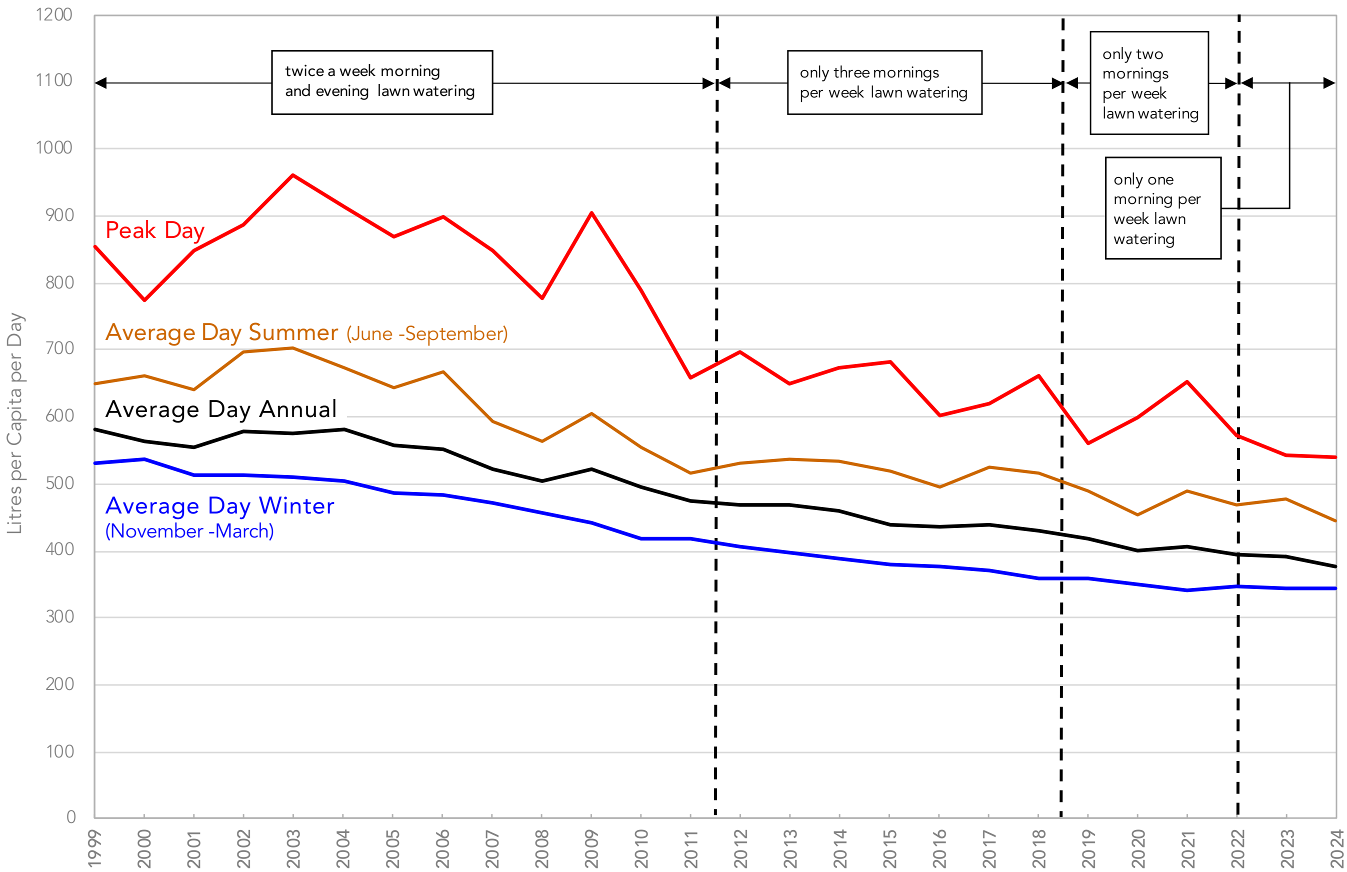

Figure 8: Regional Per Capita Water Use from 1999 to 2024

6.2 Water Conservation Measures

Metro Vancouver promotes water conservation through the following key initiatives:

WATER COMMUNICATIONS AND PUBLIC OUTREACH

Metro Vancouver undertakes several communication initiatives annually to promote the efficient use of drinking water resources throughout the region.

In 2024, Metro Vancouver educated residents on the value of drinking water and supported drinking water conservation through four communications initiatives: the watering restrictions promotion, the Water Conservation campaign, the Water Wagon program, and the 100th Anniversary of the Greater Vancouver Water District celebration. Figure 9 shows examples from the 2024 watering restrictions promotion.

Figure 9: Example of 2024 Lawn watering restrictions communication material (a) Post card front and back, (b) Rack card front and back (c) Social media story image

The creative direction for the watering restrictions promotion and the water conservation campaign was updated in response to focus group findings and to make a stronger connectionbetween the two programs. The key message and tagline were "Water one hour a week for a healthy lawn" and "It's all drinking water." Water conservation tips were woven throughout the creative. Figure 10 shows 2024 water conservation campaign materials.

Figure 10: Example of 2024 water conservation campaign materials

The promotional strategies for these initiatives in 2024 included region-wide reach through television, radio, multicultural print, direct mail, online, outdoor digital billboards, and social media. These broadcast and digital promotions delivered a combined total of 68.5 million impressions. Earned media resulted in a total potential combined reach and impressions of $324 million with an ad value equivalent of $10.3 million. The Water Wagon program resulted in 8,227 water bottle refills and fountain uses and 2,931 engagements with residents about drinking water conservation and quality.

In 2024, the 100th anniversary of the Greater Vancouver Water District was celebrated using communications that aimed to increase awareness of Metro Vancouver's role in delivering high-quality drinking water. Launching with a media release on January 11, the anniversary was highlighted on the website, social media (Facebook, Instagram, Twitter/X, YouTube), the PNE Fair showcase, Water Wagon, and at Metro Vancouver construction projects. An outdoor celebration event was held on July 20 in the Lower Seymour Conservation Reserve.

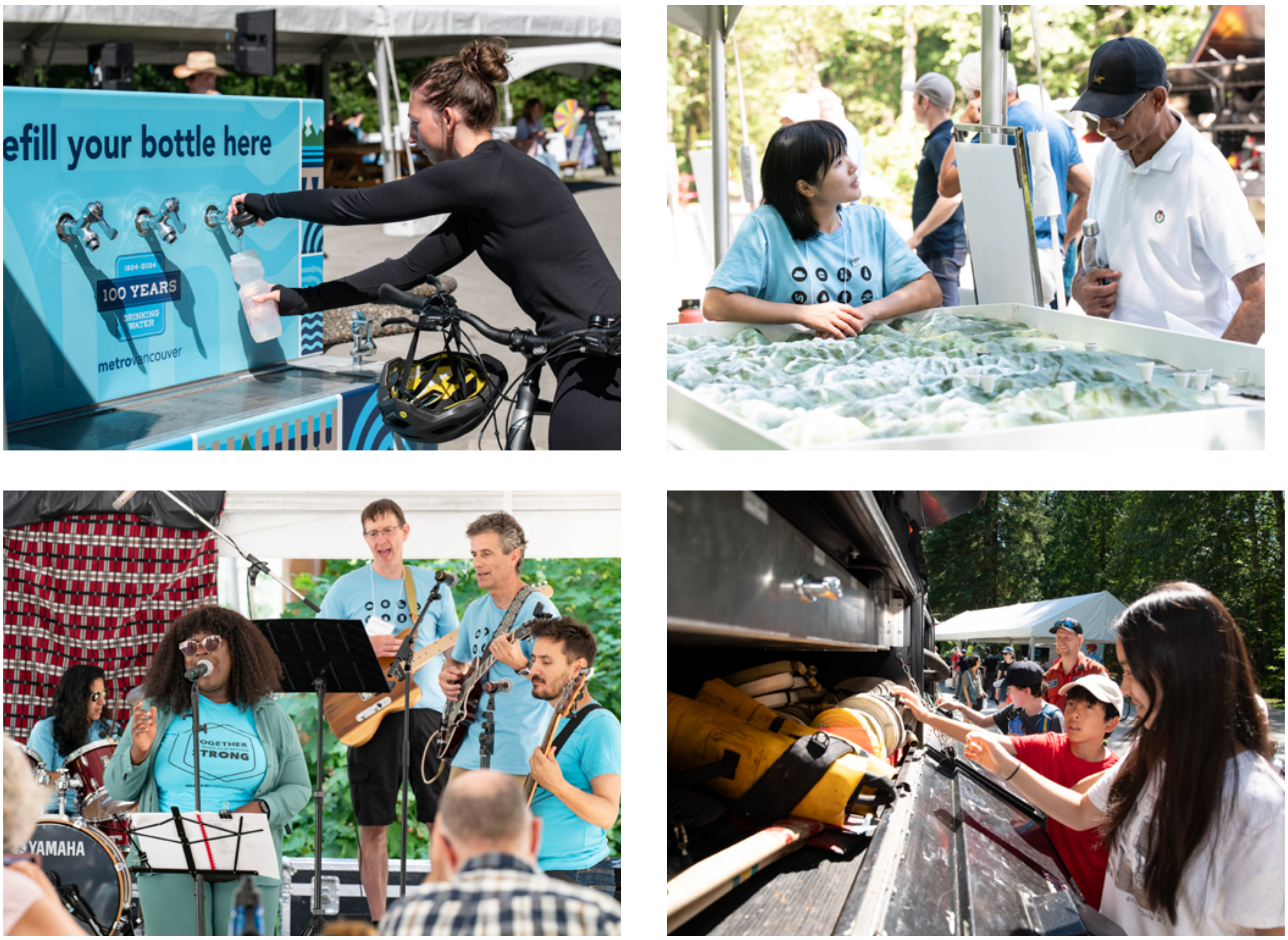

Figure 11: Images from the Water 100th Anniversary Celebration event

SUMMER SUPPORT PROGRAM

Metro Vancouver also delivered DWCP Summer Support Program (SSP) to assist member jurisdictions with promoting and monitoring the regional watering restrictions outlined in the DWCP from July to August 2024. Data indicates that non-compliant watering is more prevalent in the early morning and increased non-compliant lawn watering happens during the hotter and drier periods, as expected. Enforcement of watering restrictions bylaws is, and remains, a member jurisdiction's responsibility with the SPP noted as being beneficial and supportive of local education and enforcement efforts. This was the last year the program was offered to member jurisdictions.

7. SOURCE WATER PROTECTION

Metro Vancouver's approach to source water protection is to protect the water supply areas for drinking water and to restrict public access.

Access to the water supply areas is managed and enforced by Metro Vancouver staff. Regular patrols are conducted to intercept trespassers and inspect approved work activities to assure compliance with the requirements of the *GVWD Watershed Regulations*.

Figure 12: Metro Vancouver's wildfire crew

In addition, Metro Vancouver has its own dedicated wildfire crews, maintains a resource sharing agreement with the BC Wildfire Service, and partners with municipal fire departments to plan for and respond to wildfires in the water supply areas and adjacent lands.

Figure 13: Metro Vancouver's Watershed Security

8. EMERGENCY RESPONSE AND CONTINGENCY PLAN SUMMARY

8.1 Water Services Emergency Management Plan Summary

The *Water Services Emergency Management Plan* (WSEMP) covers all aspects of the Water Services Emergency Management structure. The WSEMP comprises a suite of documents: an overarching *Emergency Management Plan* and ten emergency response plans (ERPs) that cover the different components of the water supply system. These plans are updated on an annual basis with the last updated plan issued in 2024.

Together with the *Corporate Emergency Management Plan*, Emergency Management Standard, business continuity plans, and ERPs, all activities related to emergencies that may affect water supply are addressed. The WSEMP is intended to meet all requirements of the *Emergency and Disaster Management Act and the Drinking Water Protection Act and Regulation for an Emergency Response and Contingency Plan*. Similarly, this summary of the WSEMP is intended to meet the *Drinking Water Protection Regulation* Section 13 (4), which requires water suppliers to make public a summary to the water users.

Water system operations and emergency management are shared responsibilities between Metro Vancouver and its member jurisdictions. The overall purpose of the WSEMP is to provide general guidance to Metro Vancouver in preparing for, responding to, and recovering from an emergency. Emergencies may include but are not limited to earthquakes, floods, wildland and interface fire, and severe weather. The WSEMP defines Water Services' roles and responsibilities during incidents, emergencies, and disasters.

A Utility Operational Coordination Guide (UOCG) guides the operational-level interactions between Metro Vancouver and local government partners when responding to an emergency. Overall guidance during a major emergency is provided by the regional and local government Emergency Operations Centres.

In the case of significant damage to the Metro Vancouver portion of the water supply system, Water Services will make drinking water available to the affected member at the closest practical supply point in the undamaged part of the system to enable the member jurisdictions to distribute by temporary line, water truck or other means as identified by their emergency plan.

Ultimately, Metro Vancouver will endeavour to maintain the continuity of drinking water delivery to member jurisdictions. In an emergency, Metro Vancouver's priorities for water supply are:

1. Deliver drinking water whenever possible to members for consumption and/or firefighting.
2. Protect the integrity of water in its system for public health.

In meeting these priorities, Metro Vancouver subscribes to the following response objectives, in this order of priority:

1. Ensure the safety and health of all responders and Metro Vancouver staff
2. Save lives
3. Reduce suffering
4. Protect the public
5. Protect critical infrastructure
6. Protect property
7. Protect the environment
8. Reduce social and economic losses

8.2 Emergency Repairs

Metro Vancouver was involved with 31 leak repairs in 2024. See Table 2 for a summary of leaks.

TABLE 2: SUMMARY OF WATER MAIN LEAKS

Name	Location	Date of Leak	Flowrate of Discharge	Impact on Residents
UEL Main No.2	Vancouver	9-Jan-24	5	No
SCFP Drain Line	North Vancouver (District)	17-Jan-24	120	No
Seymour Capilano Treated Water Tunnel	North Vancouver (District)	23-Jan-24	900	No
Douglas Road Main	Burnaby	31-Jan-24	N/A[1]	No
UEL Main No.1	Vancouver	1-Feb-24	5	No
Prospect Avenue Pipeline	North Vancouver (District)	7-Feb-24	10 - 240	No
Capilano Main No. 7	North Vancouver (District)	9-Feb-24	0.5 - 1	No
Grandview Main	Surrey	12-Feb-24	1	No
North Road Main	Burnaby	17-Feb-24	100	No
Haney Main No. 3	Pitt Meadows	22-Mar-24	100	No
Central Park Main No. 2	Burnaby	5-Apr-24	200-500	No
Tilbury Main (River Rd)	Richmond	4-May-24	180	Yes, leaked to private property.
Tilbury Main (Bridgeport Rd)	Richmond	18-May-24	180	No
Tilbury Main (Cambie Rd)	Richmond	8-Jun-24	500	No
Seymour Main No. 3	North Vancouver (District)	18-Jun-24	15	No
Annacis Main No. 2	Surrey	25-Jun-24	12 - 20	No
Sapperton Main No. 1	Coquitlam	10-Jul-24	30	No

Name	Location	Date of Leak	Flowrate of Discharge	Impact on Residents
North Burnaby Main	Burnaby	24-Jul-24	150	No
Capilano Main No. 4	Vancouver	5-Aug-24	300	No
North Burnaby Main (Burnwood Dr)	Burnaby	8-Aug-24	100	No
Mathers Avenue Main	West Vancouver	20-Aug-24	50 - 100	No
North Burnaby Main (Howard Ave)	Burnaby	31-Aug-24	180	No
Annacis Main No. 2 (86 Ave)	Delta	7-Sep-24	150	No
Capilano Main No. 4 (Capilano Rd)	North Vancouver (District)	8-Sep-24	2 - 1200	No
Douglas Road Main	Burnaby	23-Oct-24	3	No
Surrey Hickleton Main	Surrey	25-Oct-24	100	No
Mathers Avenue Main (1086 Mathers)	West Vancouver (District)	4-Nov-24	2 - 5	No
North Burnaby Main (Glynde Ave)	Burnaby	7-Nov-24	5	No
Annacis Main No. 4 (Boundary Rd.)	Richmond	28-Nov-24	100	No
CWTP Service Water (connected to Coquitlam Main No. 3)	Coquitlam	9-Dec-24	N/A[1]	No
Haney Main No. 3	Pitt Meadows	11-Dec-24	50	No

1 Flow rate could not be estimated.

9. WATER SYSTEM MANAGEMENT

9.1 Asset Management Program

Metro Vancouver's asset management program ensures that assets are managed in a manner that minimizes asset failure risks and optimizes the lifecycle value of assets to meet asset performance targets. In 2019, the Board approved the ***Asset Management for Water Services Policy***. This policy establishes asset management principles and a framework to balance asset performance, risk, and cost to deliver Metro Vancouver water services. As part of the Asset Management Program, in 2022, Metro Vancouver produced and presented the ***State of the Assets Report – Water Services*** to the Board.

9.2 Operations and Maintenance Program

Repairs and upgrades required for the drinking water system are identified through the Operation and Maintenance Program. These repairs and improvements are undertaken as ongoing maintenance projects or as replacement/upgrade projects. Annual maintenance is an essential component of the asset management program and identifies the need for replacement or refurbishment of existing infrastructure to ensure that it continues to perform as required to meet service objectives.

Metro Vancouver undertakes system maintenance daily through scheduled work orders performed by certified trades staff to ensure that existing equipment and facilities are kept in a good state of repair and to identify when additional maintenance or replacement is needed.

Notable maintenance projects that took place in 2024 included the following:

Condition assessments

These follow the *Asset Management for Water Services Policy*, improve understanding of the water system's overall condition, and can lead to asset repair and replacement projects. In 2024, Metro Vancouver completed condition assessments of 125 chambers, four sections of water mains, three pump stations, and four reservoirs.

Reservoir cleaning

Metro Vancouver's in-system water storage reservoirs are periodically isolated and drained for interior cleaning, inspection, and repair or upgrade. In 2024, seven reservoirs were isolated, drained, and cleaned using high-pressure water spray. Each reservoir was disinfected as per *AWWA C652-19 Disinfection of Water Storage Facilities* and tested prior to being returned to service.

Figure 14: a. Inside Clayton Reservoir – prior to cleaning April 2023 b. Inside Clayton Reservoir – post cleaning February 2024

Valve exercising program

Metro Vancouver's water transmission system contains over 7,000 valves. Valves are used to regulate and isolate the water flow through the water transmission system. Commencing in 2022, a pilot program was launched to formalize exercising critical valves and to collect comprehensive data for the valves and chambers. The program assesses the condition of these assets and conducts proactive maintenance as a strategy to reduce reactive and emergency mobilizations to repair or replace failed valves. Two pilot phases were completed in 2023 and 2024, focusing on exercising critical water mains in alignment with line maintenance projects. During the pilots for the selected water mains, field data were collected and verified. Utilized resources included Enterprise Asset Management, GIS, and engineering drawings. The next phase will focus on integrating the valve exercising program with the line maintenance priorities, with the ultimate goal of establishing the program and ensuring all critical valves in the system are exercised over a three-year cycle.

Valve replacement program

Metro Vancouver is continually reviewing the water transmission system to ensure valves are in good working order through condition assessments and isolation tests and has identified that there is a need for a more formalized approach to valve maintenance, including valve replacement. Metro Vancouver staff began developing a formal valve replacement program in 2022 and created a risk ranking matrix for critical valves in 2023. In 2024, Metro Vancouver has initiated, the replacement of four critical valves. The goal is to replace high-risk valves annually through the Minor Capital Program.

Submerged water main crossings

Metro Vancouver continues to inspect and protect submerged water main crossings that are subject to hydraulic scour. Staff conduct annual monitoring of all major submerged water main crossings to assess if maintenance of existing scour protection or additional scour protection is required. In 2024, Metro Vancouver initiated feasibility studies to conduct Close Interval Potential Survey and Direct Current Voltage Gradient surveys on three water mains at water crossings to assess pipeline integrity. The pipelines include the Capilano Main No. 7 at the crossing with Mosquito Creek, Port Moody Main No. 1 at the crossing with Pinnacle Pond, and the First Narrows Pressure Tunnel at the First Narrows crossing.

Aerial water main crossings

Metro Vancouver continues to inspect and maintain aerial water main crossings that are suspended over water bodies. Staff completed condition assessments for two water mains in 2024 which include the East Burnaby Main at the crossing over Stoney Creek and North Road Main at the crossing over the BNSF Railway. Identified repairs are currently underway, preventing costly failures from occurring.

Mechanical, instrumentation, and electrical maintenance

In 2024, the maintenance team performed 4,084 preventative maintenance work orders. Examples of maintenance work include seven pump rebuilds at various water pump stations.

9.3 Capital Program

The 2024 – 2028 Water Services capital budget included $ 424.9 million for capital projects in 2024 and a total of $3.0 billion over five years. In 2024, there were 143 projects on the five-year capital plan. These projects are driven by system expansion requirements to meet the needs of a growing population, upgrades to improve system resiliency, and maintenance of aging infrastructure. Capital investments addressing population growth are the largest component of the budget, representing slightly more than 50 per cent of spending between 2024 – 2028.

In 2024, many major projects reached significant milestones, including the following key projects:

Capilano Raw Water Pump Station Backup Power Project

A new backup power system is being constructed for the Capilano Raw Water Pump Station to maintain water delivery to the Seymour Capilano Filtration Plant in the event of a power outage. The backup power system includes an underground fuel vault and a new powerhouse. Construction is currently underway and is expected to be complete in 2025.

Seymour Capilano Filtration Plant Dry Polymer Upgrade

The purpose of this project is to improve the Filter Aid Polymer and Wash Water Recovery processes at the plant and consists of replacing the existing oil-emulsion based polymer systems with dry polymer make-up systems. The dry polymer system is simpler, more robust, and is easier to transport and recycle. The dry polymer system is successfully commissioned in the summer of 2024.

Stanley Park Water Supply Tunnel

This 1.4 km long steel water main, in a tunnel, will replace the existing Capilano Main No. 4 through Stanley Park which is at the end of its service life. The new water main will meet growing water demand and provide increased system resiliency. Procurement for the construction contractor is complete. Construction started in late 2024 and is expected to be substantially complete by 2029. For more information, see Stanley Park Water Supply Tunnel | Metro Vancouver

Second Narrows Water Supply Tunnel

This project comprises a 1.1 km long, 6.5 m diameter water supply tunnel under the Burrard Inlet, between North Vancouver and Burnaby, to increase the reliability of supply in the event of a major earthquake as well as to provide additional long-term supply capacity. Construction of this new tunnel infrastructure commenced in 2019 and is scheduled to be completed early 2025. The three new water mains will be tied into the drinking water system over the next few winters and are expected to be in service by 2028.

Figure 16: Second Narrows Water Supply Tunnel – valve chamber construction and south shaft

Annacis Water Supply Tunnel

A 2.3 km long, 4.5-metre diameter water supply tunnel is required under the Fraser River between the City of New Westminster and the City of Surrey to meet growing water demand south of the Fraser River. Construction commenced in early 2022 and the new tunnel is scheduled to be completed and in service by 2028. For more information, see Annacis Water Supply Tunnel | Metro Vancouver

Coquitlam Lake Water Supply Project (CLWSP)

A new water supply intake, tunnel, and treatment plant is proposed to increase the capacity to treat and deliver drinking water from the Coquitam source to meet the demand of the growing region. The project is currently in the permitting and regulatory phase, focusing on engagement with First Nations, the City of Coquitlam, regulators, and stakeholders. A program management firm has been retained. Planning of the treatment pilot testing facilities is underway and are anticipated to be installed by the second quarter of 2025. For more information, see Coquitlam Lake Water Supply Project | Metro Vancouver

Figure 15: Annacis Water Supply Tunnel - Tunnel boring machine

Coquitlam Water Main No. 4

This 12 km long steel water main will increase the transmission capacity from the Coquitlam source to the Cape Horn Pump Station and Reservoir in the City of Coquitlam. This project is required to optimize the capacity of the existing Coquitlam supply system and also provide additional capacity for the future Coquitlam Lake Water Supply Project. Construction of the first section, Robson to Guildford, is underway with 500 m of 3.2 m diameter steel pipe installed and is scheduled to be completed in 2026. The remaining three sections are in detailed design. For more information, see Coquitlam Water Main | Metro Vancouver

Newton Pump Station No. 2

This project, located at 6287 128 Street in the City of Surrey, consists of replacing the existing Newton Pump Station and includes full backup power redundancy, connections to existing and future infrastructure, and installation of new outlets to the existing Newton Reservoir. In 2024, the construction of the new reservoir outlets was completed. Design of the new pump station and backup power was also completed and the procurement for construction was issued to the prequalified contractors. Construction is planned to commence in mid-2025 with completion anticipated in 2028. For more information, see Newton Pump Station No. 2 | Metro Vancouver

Figure 17 : Rendering of Newton Pump Station No. 2 – View from 128 Street

Kennedy Newton Water Main

This 1.8 m diameter, 8 km long water main will connect the Newton Reservoir to the Kennedy Reservoir in the City of Surrey and is being built to meet growing water demand south of the Fraser River. The work includes the construction of line valve chambers, cross-over chambers, air release valves, and blow down valves. Construction of the first two of three phases is complete. The final phase of the project commenced in 2022 and is expected to be complete in 2026. For more information, see Kennedy Newton Water Main | Metro Vancouver

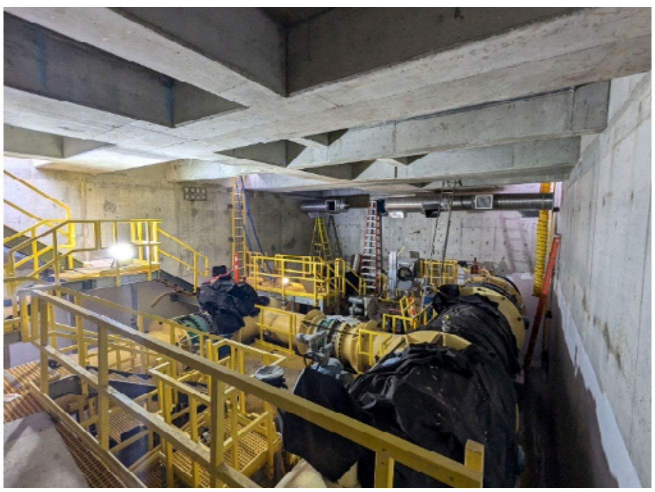

Figure 18: Kennedy Newton Water Main – Installation of Piping and Valves within the Large Underground Valve Chamber

Figure 19: Kennedy Newton Water Main – Installation of 1.8m Diameter Water Main

Pebble Hill Seismic Upgrade

Located in the City of Delta's Pebble Hill Park, this project involves the seismic upgrade of Pebble Hill Reservoir Unit 1 and Unit 2 to withstand and remain in operation following a major earthquake. Construction of the upgrade works was completed in 2024. Final restoration takes place in spring 2025. For more information, see Pebble Hill Reservoir Seismic Upgrade | Metro Vancouver

Cambie-Richmond Water Supply Tunnel (Preliminary Design)

This is a 1.1 km long, 4.5 m diameter crossing under the Fraser River from Vancouver to Richmond. The project consists of a tunnel and deep vertical shafts located on each side of the river to facilitate the installation of a 2.1 m diameter welded steel water main. Each shaft site will also include the construction of underground valve chambers to facilitate water control functions. The conceptual design phase of the project was completed in 2022. The preliminary design phase began in September 2024. Construction is set to start in 2029 and is expected to take about five years to complete. For more information, see Cambie-Richmond Water Supply Tunnel| Metro Vancouver

9.4 Financial Review

Metro Vancouver had 2024 total water sales revenues of approximately $367 million, with higher summer wholesale rates of $1.2537/m^3 for June through September and a wholesale rate of $0.7119/m^3 applying for the rest of the year (equating to an average water rate of $0.9333/m^3). The differential rates are intended to incentivize conservation efforts by member jurisdictions. Each member jurisdiction determines the specific way they collect fees to cover the cost of water purchased from Metro Vancouver.

Metro Vancouver has implemented a new development cost charge (DCC) for regional water infrastructure. Under this framework, Metro Vancouver collects DCCs from new residential and non-residential developments across the region to fund the water infrastructure required to support future occupants of these buildings. This initiative is guided by the 2025 - 2029 Metro Vancouver Financial Plan. The concept of funding regional water infrastructure through development cost charges is a critical component of maintaining regional affordability in the long-term financial plan.

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To:	Water Committee
From:	Inder Singh, Director, Interagency Projects and Quality Control, Water Services
Date:	March 24, 2025 — Meeting Date: April 16, 2025
Subject:	**GVWD 2024 Water Quality Annual Report**

RECOMMENDATION

That the GVWD Board receive for information the report dated March 24, 2025, titled "GVWD 2024 Water Quality Annual Report".

EXECUTIVE SUMMARY

All of the water quality parameters monitored by Metro Vancouver for the regional drinking water supply met the B.C. provincial water quality regulations and the federal *Guidelines for Canadian Drinking Water Quality* (GCDWQ) with the exception of turbidity at the unfiltered Coquitlam source. The elevated turbidity was a consequence of a major atmospheric river event in October 2024 resulting in intensive rainfall. The multiple protection barriers helped to maintain high-quality drinking water for the region.

The Greater Vancouver Water District (GVWD) 2024 Water Quality Annual Report is required under the provincial *Drinking Water Protection Regulation* (DWPR), and Metro Vancouver's *Drinking Water Management Plan* (DWMP). The annual report summarizes the analysis of approximately 169,000 tests conducted on samples collected from the GVWD source reservoirs, water treatment plants, and transmission system, as well as microbiological water quality testing of member jurisdictions' systems supplied by the GVWD.

PURPOSE

To provide the GVWD Board with a summary of the GVWD 2024 Water Quality Annual Report.

BACKGROUND

Each year Metro Vancouver is required under the provincial DWPR to produce an annual report on drinking water quality. The annual report is also a requirement of Metro Vancouver's DWMP. The annual report provides the key results and findings associated with Metro Vancouver's program of ongoing monitoring and assessment of drinking water quality in the region. Over 169,000 tests were conducted in 2024 to provide an assessment of drinking water quality relative to the existing drinking water standards and guidelines and highlights any unusual occurrences. Monitoring results for water systems supplied with GVWD water are also discussed in the annual report, where relevant.

In accordance with the DWPR, the annual report will be sent to the Chief Medical Health Officers of the Vancouver Coastal and Fraser Health Authorities. Additionally, the annual report will be made accessible to the public through public libraries in the region, including Metro Vancouver's Library and Information Centre, and will be posted on Metro Vancouver's website.

This report is being brought forward at this time to enable Metro Vancouver and its member jurisdictions to meet the provincial reporting timeline stipulated in the DWPR.

WATER QUALITY/TREATMENT HIGHLIGHTS

A summary of the main items relevant to drinking water quality during 2024 is as follows:

1. Source Water Quality

- The Capilano supply was in service for the entire year. October's atmospheric river event resulted in the source water average daily turbidity peaking at 20 NTU.
- The Seymour supply was in service for the entire year and this source's highest average daily turbidity reading was 2.5 NTU.
- The Coquitlam supply was in service for the entire year. October's atmospheric river event resulted in the source water average daily turbidity peaking at 10.6 NTU.
- The Coquitlam supply was greater than 1.0 NTU for 32 days in the year, and exceeded 5.0 NTU for 3 days in October. The provincial *Drinking Water Treatment Objectives* require unfiltered source water turbidity levels should be below 1.0 NTU, but not to exceed 5.0 NTU for more than two days in a 12-month period.
- The microbiological quality of the three source waters was excellent. The levels of bacteria and protozoa detected were low, and indicative of high quality source water.
- Coquitlam source water quality met the bacteriological requirements for an unfiltered source supply as specified in the GCDWQ.
- Results of the source water analyses for herbicides, pesticides, volatile organic compounds and radionuclides were all found to be below the recommended limits as listed in the GCDWQ.

2. Water Treatment

- The Seymour Capilano Filtration Plant (SCFP) performance, as measured by the quality of the delivered water, was excellent. The daily average turbidity of water leaving the Clearwell to enter the GVWD transmission system was an average of 0.19 NTU.
- Turbidity levels for Individual Filter Effluent met the turbidity requirements of the GCDWQ, with the exception of a 40 second period in October, when one filter was greater than 1.0 NTU.
- Filtration consistently removed iron, colour, and naturally occurring organics from the Capilano and Seymour source water.
- There were no outages of disinfection treatment at the SCFP, or Coquitlam Water Treatment Plant (CWTP).
- In May, there was a one-hour outage of corrosion control at the CWTP, which resulted in a temporary low pH of 6.8 leaving the plant, as compared to the annual average pH of 8.3.
- The secondary disinfection stations boosted the residual chlorine when required.

3. Transmission and Distribution System Water Quality

- Bacteriological water quality was excellent in the GVWD transmission water mains and in-system storage reservoirs. The number of *E. coli* detected in samples from both GVWD and water systems supplied with GVWD water is typically very low. More than 29,800 samples were collected and analyzed for GVWD and GVWD supplied systems, of which only two member jurisdiction samples were positive for *E. coli*. Repeat samples were taken, and no additional *E. coli* were found.
- The average levels of the Total Trihalomethane chlorine disinfection by-products (DBPs) measured in the delivered water in the GVWD and member jurisdiction systems were 24 µg/L (0.024 mg/L) and 34 µg/L (0.034 mg/L), respectively. The average levels for the Total Haloacetic Acid chlorine DBPs measured in the delivered water in both the GVWD and member jurisdiction systems were 21 µg/L (0.021 mg/L) and 25 µg/L (0.025 mg/L), respectively. All DBP levels were below limits established in the GCDWQ.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Water quality analyses included in the annual report are incorporated within the annual operating budget of the Interagency Projects and Quality Control Division of Water Services.

CONCLUSION

As outlined by the GVWD 2024 Water Quality Annual Report, Metro Vancouver's water quality monitoring continues to fulfill its role in confirming that the multiple protection barriers are maintaining high-quality drinking water for the region. This includes the continued protection of our water supply areas, effective and efficient water treatment processes, and uninterrupted operation of the water supply system by trained and certified operators. This monitoring is essential in assessing performance of treatment technologies to ensure compliance with current standards, and identify potential treatment upgrade requirements for the future.

The drinking water provided by the GVWD to its member jurisdictions met or exceeded all applicable water quality regulations, operating permits, and guidelines in 2024, with the exception of turbidity at the unfiltered Coquitlam source.

ATTACHMENT

1. "Greater Vancouver Water District 2024 Water Quality Annual Report, Volume 1", dated March 2025.

71729888

Greater Vancouver Water District
2024 Water Quality Annual Report
Volume 1 of 2

March 2025

72666422

Metro Vancouver acknowledges that the region's residents live, work, and learn on the shared territories of many Indigenous Peoples, including 10 local First Nations: q̓ic̓əy̓ (Katzie), q̓ʷɑ:n̓ƛ̓ən̓ (Kwantlen), kʷikʷəƛ̓əm (Kwikwetlem), máthxwi (Matsqui), xʷməθkʷəy̓əm (Musqueam), qiqéyt (Qayqayt), Semiahmoo, Sḵwx̱wú7mesh Úxwumixw (Squamish), scəw̓aθən məsteyəxʷ (Tsawwassen), and səlilwətaɬ (Tsleil-Waututh).

Metro Vancouver respects the diverse and distinct histories, languages, and cultures of First Nations, Métis, and Inuit, which collectively enrich our lives and the region.

Volume 1 of 2 – A report produced annually summarizing the analysis of samples collected from the GVWD source reservoirs, water treatment plants and transmission system, as well as microbiological water quality of member jurisdictions' systems supplied by the Greater Vancouver Water District.

Volume 2 of 2 – A volume of analytical results from untreated and treated source water as well as representative locations throughout the GVWD Transmission system. Published under separate cover: Orbit 74220419.

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Acronyms/Abbreviations

ACU	Apparent Colour Unit
ALARA	As Low As Reasonably Achievable
AO	Aesthetic Objective (characteristics such as taste, colour, appearance, temperature that are not health related)
BTEX	Benzene, Ethylbenzene, Toluene, Xylene
CALA	Canadian Association for Laboratory Accreditation
CO_2	Carbon Dioxide
CWTP	Coquitlam Water Treatment Plant
DBP	Disinfection By-product
DWMP	*Drinking Water Management Plan*
DWPR	*Drinking Water Protection Regulation*
DWTO	*Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia*
E. coli	*Escherichia coli*
GCDWQ	*Guidelines for Canadian Drinking Water Quality*
GVWD	Greater Vancouver Water District
HPC	Heterotrophic Plate Count
IFE	Individual Filter Effluent
MAC	Maximum Acceptable Concentration
µg/L	Microgram per litre (0.000001 g/L)
mg/L	Milligram per litre (0.001 g/L)
mL	Milliliter
ng/L	Nanogram per litre (0.000000001 g/L)
N/A	Not Applicable
NTU	Nephelometric Turbidity Unit
PAH	Polycyclic Aromatic Hydrocarbon
PHAC	Public Health Agency of Canada
PFAS	Per- and polyfluoroalkyl Substances
PFOA	Perfluorooactanoic Acid
PFOS	Perfluorooctane Sulfonate
pH	Measure of acidity or basicity of water; pH 7 is neutral
SCFP	Seymour Capilano Filtration Plant
THAA	Total Haloacetic Acid
TSI	Trophic State Index
TTHM	Total Trihalomethane
UV_{254}	Ultraviolet Absorbance at 254 nm
VOC	Volatile Organic Compounds
WQMRP	*Water Quality Monitoring and Reporting Plan for Metro Vancouver (GVWD) and Member Jurisdictions*

Executive Summary

The Greater Vancouver Water District (GVWD) 2024 Water Quality Annual Report is required under the provincial *Drinking Water Protection Regulation* (DWPR), and Metro Vancouver's *Drinking Water Management Plan* (DWMP). The annual report summarizes the analysis of approximately 169,000 tests conducted on samples collected from the GVWD source reservoirs, water treatment plants and transmission system, as well as microbiological water quality testing of member jurisdictions' systems supplied by the GVWD.

The annual report outlines how Metro Vancouver's water quality monitoring program continues to fulfill its role in confirming that the multiple protection barriers are maintaining high-quality drinking water for the region. This includes the continued protection of our water supply areas, effective and efficient water treatment processes, and uninterrupted operation of the water supply system by trained and certified operators.

In 2024, all water quality parameters analyzed met or exceeded provincial water quality regulations and the federal *Guidelines for Canadian Drinking Water Quality* (GCDWQ) with the exception of 3 days when Coquitlam source was in non compliance. Results of the analyses of the source water for herbicides, pesticides, volatile organic compounds and radionuclides were all found to be below the recommended limits for these substances as listed in the GCDWQ.

As in past years, heavy rains were the cause of turbidity within the source supply reservoirs. In October, an intense atmospheric river event engulfed the Metro Vancouver region, resulting in the Capilano and Coquitlam source lakes experiencing elevated turbidity. The Capilano source water turbidity rose to 20 Nephelometric Turbidity Unit (NTU), its highest daily average level for the year. The Seymour source's highest daily average turbidity of 2.5 NTU occurred in January. The Seymour Capilano Filtration Plant (SCFP) effectively removed the excess sedimentation originating from these two sources. The unfiltered Coquitlam source water was greater than 1.0 NTU for 32 days in the year, and exceeded 5.0 NTU for 3 days in October, peaking at a daily average of 10.6 NTU.

The SCFP performance, as measured by the quality of the delivered water, was excellent in 2024. The daily average turbidity of water leaving the Clearwell to enter the GVWD transmission system was an average of 0.19 NTU. Filtration consistently removed iron, colour, and organics from the Capilano and Seymour source waters, and all disinfection requirements were met.

The Coquitlam Water Treatment Plant (CWTP), using ozone, ultraviolet, and chlorination systems, met all disinfection requirements. Bacteriological water quality was excellent in the GVWD transmission mains and in-system storage reservoirs. The number of *E. coli* detected in samples from both GVWD and water systems supplied with GVWD water is typically very low. More than 29,800 samples were collected and analyzed for GVWD and GVWD supplied systems in 2024, of which two samples from a GVWD supplied system were positive for *E. coli*. Repeat samples for the same location were taken, and no additional *E. coli* were found.

1.0 Source Water Quality

The first barrier to protect the quality of the drinking water supply is protection of the source water supply areas. Source water monitoring provides ongoing confirmation that the barrier is effective, identifies seasonal changes, and provides the monitoring information necessary to adjust the level of water treatment. Regular monitoring of the water sources is a requirement of the *Water Quality Monitoring and Reporting Plan for Metro Vancouver (GVWD) and Member Jurisdictions (WQMRP)*. Refer to Appendix A for a summary of the water sampling frequency for various parameters. Volume 2 (published under a separate cover), contains detailed analytical test results from source waters.

1.1. Bacteriological Quality of the Source Water

The bacteriological quality of the source water is an important indicator of the degree of any potential contamination, and the treatment required to ensure a high-quality water supply. *The Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia* (DWTO) Section 4.3 states *"The number of E. coli in raw water does not exceed 20/100 mL (or if E. coli data are not available less than 100/100 mL of total coliform) in at least 90% of the weekly samples from the previous six months. Treatment target for all water systems is to contain no detectable E. coli or fecal coliform per 100 mL."*

Table 1 summarizes *E. coli* data for all three GVWD water supply sources. The levels of *E. coli* for all three sources were below the 10% limit in the provincial DWTO.

Table 1: Percent of Samples in Six Continual Months with *E. coli*/100 mL Exceeding 20

Month	Capilano	Seymour	Coquitlam
Jan	3.8	3.8	0.5
Feb	3.9	3.9	0.6
Mar	1.1	1.6	0.5
Apr	0.9	1.4	0.5
May	0.0	0.0	0.0
Jun	0.0	0.0	0.0
Jul	0.0	0.0	0.0
Aug	0.0	0.0	0.0
Sep	0.0	0.5	0.0
Oct	0.5	6.5	0.5
Nov	0.5	7.1	0.7
Dec	0.5	7.1	0.5

Figure 1 shows the results of the analysis of the source water from 2021 to 2024 at all three intakes compared to the limits for source water bacterial levels in the DWTO. As in previous years, all three sources met the limit of not more than 10% exceeding 20 *E. coli*/100 mL. Also, as is typical, samples collected at the intakes in the fall and winter had the highest *E. coli* levels. Typically, *E. coli* can be traced back to high flow levels at the main tributaries of the supply lakes, and a first flush phenomenon after a period of dry weather.

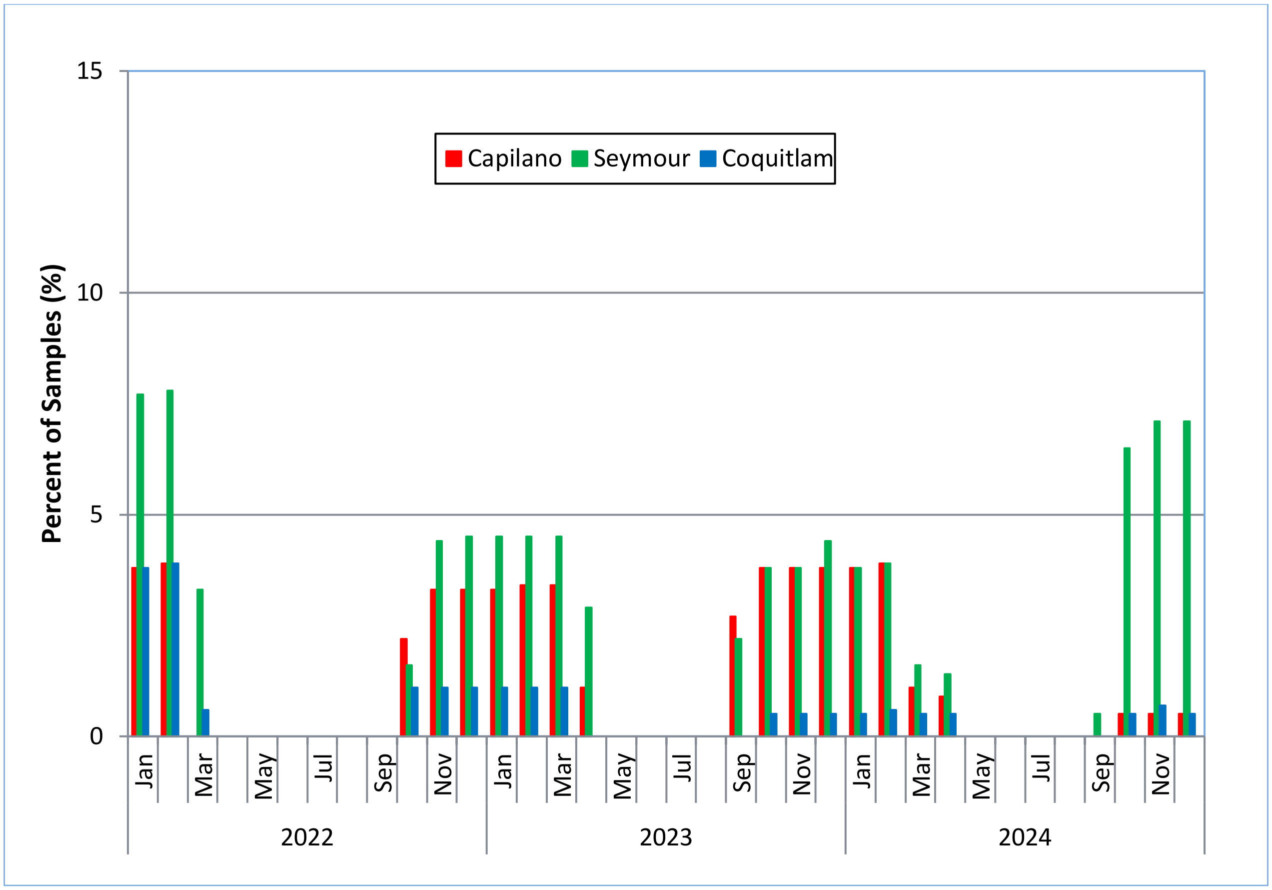


Figure 1: Percent of Samples Exceeding 20 *E. coli*/100 mL at all Three Sources (2021 to 2024)

1.2. Source Water Monitoring for *Giardia* and *Cryptosporidium*

Unfiltered surface water supplies have the potential of containing the protozoan pathogens *Giardia* and *Cryptosporidium*. Outbreaks of *Giardiasis* occurred in a number of locations in BC and Washington State in the late 1980s, and Metro Vancouver has been monitoring source water for *Giardia* since 1987. Since 1992, Metro Vancouver has participated in a program with the Environmental Microbiology Laboratory of the BC Centre of Disease Control Public Health Laboratory to gather more information about the number and nature of cysts found in the GVWD water supplies. The program has involved collecting samples from the Capilano, Seymour and Coquitlam sources upstream of disinfection.

Complete results of the 2024 testing program are contained in the Metro Vancouver Detection of Waterborne *Cryptosporidium* and *Giardia* Annual Report January - December, 2024, prepared by the Environmental Microbiology Laboratory of the BC Centre for Disease Control Public Health Laboratory, attached as Appendix D.

One of twelve (8%) samples collected at Capilano, three of the twelve (25%) at Seymour, and zero of twelve (0%) at Coquitlam were positive for *Giardia* in 2024. Table 2 summarizes *Giardia* data for the past ten years (Seymour sample collection began in 2022).

Table 2: Percent of Source Water Samples Positive for *Giardia*

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Capilano	18	50	58	33	33	33	25	17	50	8
Seymour								0	8	25
Coquitlam	0	17	67	8	25	25	25	8	8	0

Zero of twelve (0%) samples collected at Capilano, zero of twelve (0%) at Seymour, and zero of twelve at Coquitlam (0%) were positive for *Cryptosporidium* in 2024. Table 3 summarizes *Cryptosporidium* data for the past 10 years (Seymour sample collection began in 2022).

Table 3: Percent of Source Water Samples Positive for *Cryptosporidium*

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Capilano	9	25	17	8	0	0	0	0	0	0
Seymour								0	8	0
Coquitlam	0	0	0	0	0	0	0	0	0	0

Year to year fluctuations are demonstrated for *Giardia* and *Cryptosporidium,* and there has typically been considerable variation in the results.

At the SCFP, monitoring for *Giardia* and *Cryptosporidium* has focused on the recycled water returning to the head of the plant, and this monitoring has confirmed that the procedures in place effectively control the levels of *Giardia* and *Cryptosporidium* in the recycled wash water from the filters. Zero of twelve (0%) samples collected were positive for *Giardia*, and zero of twelve (0%) were positive for *Cryptosporidium* in 2024. Table 4 shows the percentage of samples positive for *Giardia* and *Cryptosporidium* for the past 10 years.

Table 4: Percent of SCFP Recycled Water Samples Positive for *Giardia* and *Cryptosporidium*

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Giardia	8	17	8	0	0	0	0	0	0	0
Cryptosporidium	0	0	0	0	0	0	0	0	0	0

1.3. Turbidity

As shown in Figure 2, GVWD water sources have been susceptible to turbidity events due to high runoff from storms, which can cause slides and stream scouring in the Water Supply Areas, or from suspension of sediment from the edges of the lakes during periods of low water levels. The DWTO allows a utility to be exempt from filtration if a minimum of two disinfectants providing 4-log reduction of viruses and 3-log reduction of *Cryptosporidium* and *Giardia* are used; the number of *E. coli* in raw water does not exceed 20/100 mL in at least 90% of the weekly samples from the previous six months; average daily turbidity level before disinfection is around 1 NTU, but does not exceed 5 NTU for more than two days in a 12-month period; and a watershed control program is maintained. Specifically, Section 4.4 of the DWTO (Version 1.2, November 2012) contains the following provision for filtration exemption:

"For nonfiltered surface water to be acceptable as a drinking water source supply, average daily turbidity levels should be established through sampling at equal intervals (at least every four hours) immediately before the disinfectant is applied. Turbidity levels of around 1.0 NTU but not exceeding 5.0 NTU for more than two days in a 12-month period should be demonstrated in the absence of filtration. In addition, source water turbidity also should not show evidence of harbouring microbiological contaminants in excess of the exemption criteria."

Capilano and Seymour water is filtered, therefore the above source water criteria does not apply to the delivered water from these sources. On October 20, 2024, due to the significant amount of rainfall associated with an atmospheric river event, turbidity increased in the Coquitlam Lake source water and downstream water mains. Fraser Health was notified, resulting in a request for additional downstream sampling be conducted to monitor for possible microbiological effects, and the release of a public advisory stating possible aesthetic affects. None of the samples taken had total coliforms or *E.coli* detected and flows from the CWTP were significantly reduced. The daily average turbidity was above 5.0 NTU for 3 days and the highest daily average turbidity was 10.6 NTU, measured on October 20, 2024.

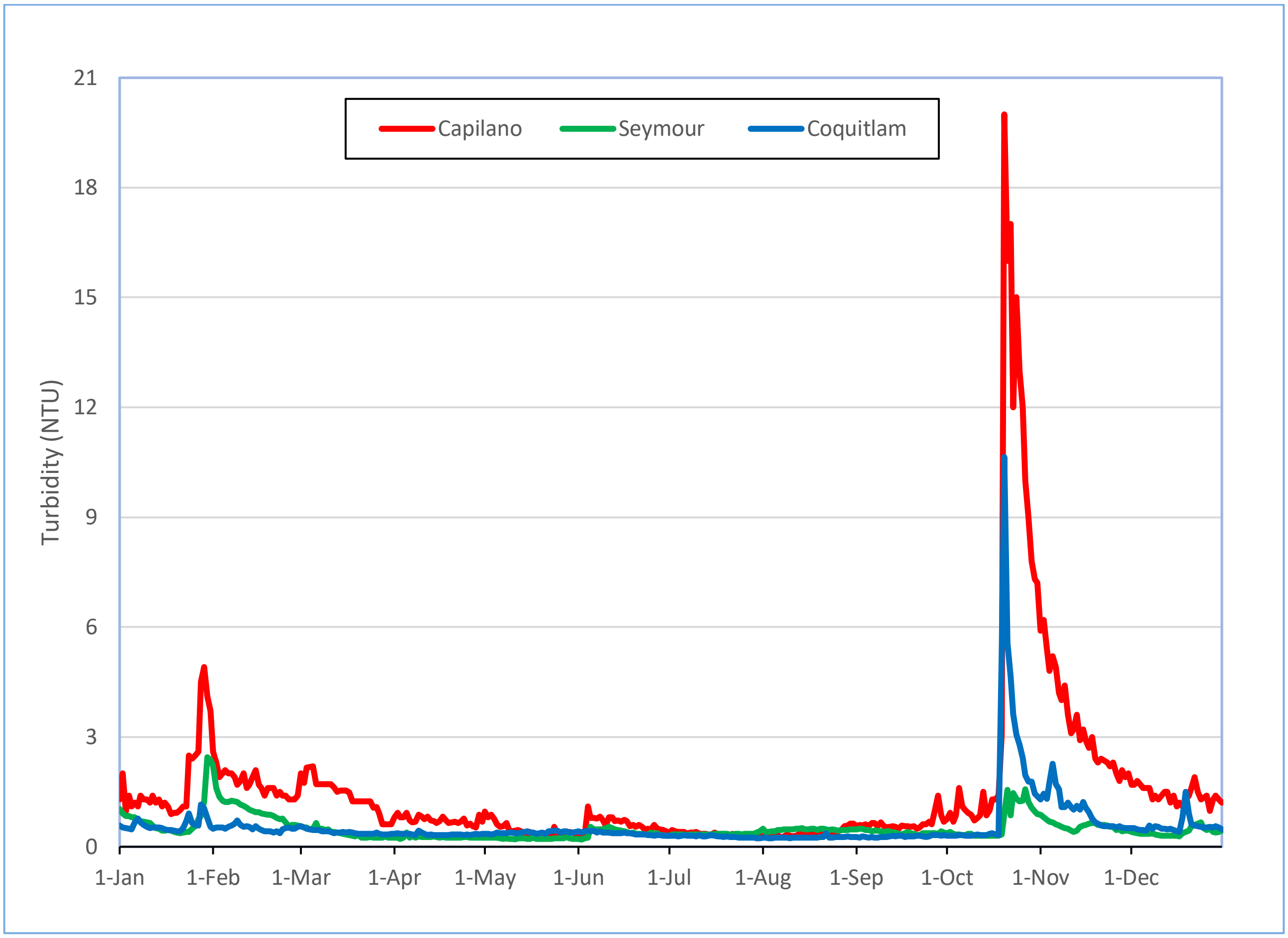


Figure 2: Average Daily Turbidity of Source Water (From In-line Readings)

1.4. Chemistry

1.4.1. Chemical and Physical Analysis of the Source Water

The chemical and physical characteristics of the GVWD source water are summarized in Appendix B of this report; detailed analytical results are provided in Volume 2. The results from the chemical and physical analyses of the source water in 2024 were similar to those for previous years. The analysis was carried out by accredited laboratories using methods based on the current version of *Standard Methods for the Examination of Water and Wastewater*.

1.4.2. Analysis of Water for Organic Components and Radionuclides

Analyses of the source water for a variety of organic and other compounds, including all of the compounds with a specified Maximum Acceptable Concentration (MAC) in the GCDWQ, is carried out on an annual basis in accordance with the WQMRP. The results are contained in Appendix C of this report and in Volume 2. No parameters were detected above the applicable GCDWQ health-based limits.

1.4.3. Per- and Polyfluorinated Substances

Per- and Polyfluorinated Substances are a group of compounds collectively known as PFAS. Based on recent scientific information, Health Canada determined that these contaminants needed to be addressed sooner than the formal GCDWQ guideline development process allows, and in August 2024, Health Canada released an objective of 30 ng/L for the sum of 25 individual PFAS compounds. Prior to August 2024, the GCDWQ only identified Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA). The results of PFOS and PFOA testing conducted prior to August on source waters are detailed in Table 5. After this objective was released, Metro Vancouver expanded the parameters analyzed to meet this new objective. The sum of the 25 identified parameters are shown in Table 6. All 25 PFAS parameters can be found in Appendix C.

Common sources of these synthetic chemicals are from consumer products and fire-fighting foam, used for their water and oil repellant properties. No parameters were detected above the applicable health-based limits in 2024.

Table 5: Monitoring of Source Waters for PFOS and PFOA

Parameter	Capilano (ng/L)	Seymour (ng/L)	Coquitlam (ng/L)	MAC (ng/L)
	10-Jun	10-Jun	10-Jun	
PFOS	<0.36	<0.36	<0.36	600
PFOA	<0.20	<0.20	<0.20	200

Table 6: Monitoring of Source Waters for PFAS

Parameter	Capilano (ng/L)	Seymour (ng/L)	Coquitlam (ng/L)	Objective Value (ng/L)
	21-Nov	21-Nov	21-Nov	
PFAS (sum of 25 parameters)	<4.0	<4.0	<4.0	30

1.4.4. Limnology

The annual reservoir limnology monitoring, started in 2014, collects limnology data (physical, chemical and biological parameters) for the Capilano, Seymour and Coquitlam supply reservoirs. This monitoring information significantly contributes to the proactive management of the supply reservoirs, as water quality could be impacted by environmental variability and climate change. This program assists in ensuring that variation and trends in reservoir water quality are scientifically tracked over time.

Water sampling of the source reservoirs and inflow streams and tributaries is conducted between April and November. Biological productivity that can influence water quality is highest during this time of year, making it an important time for taking samples and measurements. Monthly sampling of the source water is conducted and sample analysis undertaken by accredited labs. More frequent water quality data is measured by arrays of scientific instruments located in each reservoir.

Analysis of 2024 data, as in previous years, confirms that the three source reservoirs fall well within the oligotrophic classification based on the parameters shown in Table 7, which means they have low nutrient levels, low levels of biological production, and are considered very high-quality source waters. These parameters are at the lower end of data ranges for oligotrophic waterbodies identified in the literature, and the three reservoirs can be deemed 'ultra-oligotrophic'.

Table 7: Comparison of Water Quality in GVWD Water Supply Sources to Standard Water Quality Classifications

Parameter	Average Value			
	Mean Value - Oligotrophic Status[1,2]	Capilano Reservoir 2014-2024 (2024 only)	Seymour Reservoir 2014-2024 (2024 only)	Coquitlam Reservoir 2014-2024 (2024 only)
Total Phosphorus (µg/L)	8.0	3.0 (2.5)	3.1 (3.2)	3.1 (2.6)
Total Nitrogen (µg/L)	661	119 (95)	120 (111)	126 (123)
Phytoplankton Biomass (µg/L of chlorophyll-a)	1.7	0.49 (0.56)	0.55 (0.50)	0.60 (0.69)
Status of Reservoirs		Ultra-oligotrophic	Ultra-oligotrophic	Ultra-oligotrophic

[1]General trophic classification based on study of more than 200 lakes and reservoirs.
[2]Wetzel, R.G. 2001 Lake and River Ecosystems. 3rd edition. Academic Press. New York.

The Trophic State Index (TSI) is used to infer change over time in water quality based on the amount of algal biomass in the water column of each source reservoir. Figure 3 shows TSI values over the last 10 years for each of the three primary source reservoirs, which will continue to be tracked and referenced to assist in monitoring changing weather, climate and nutrient conditions.

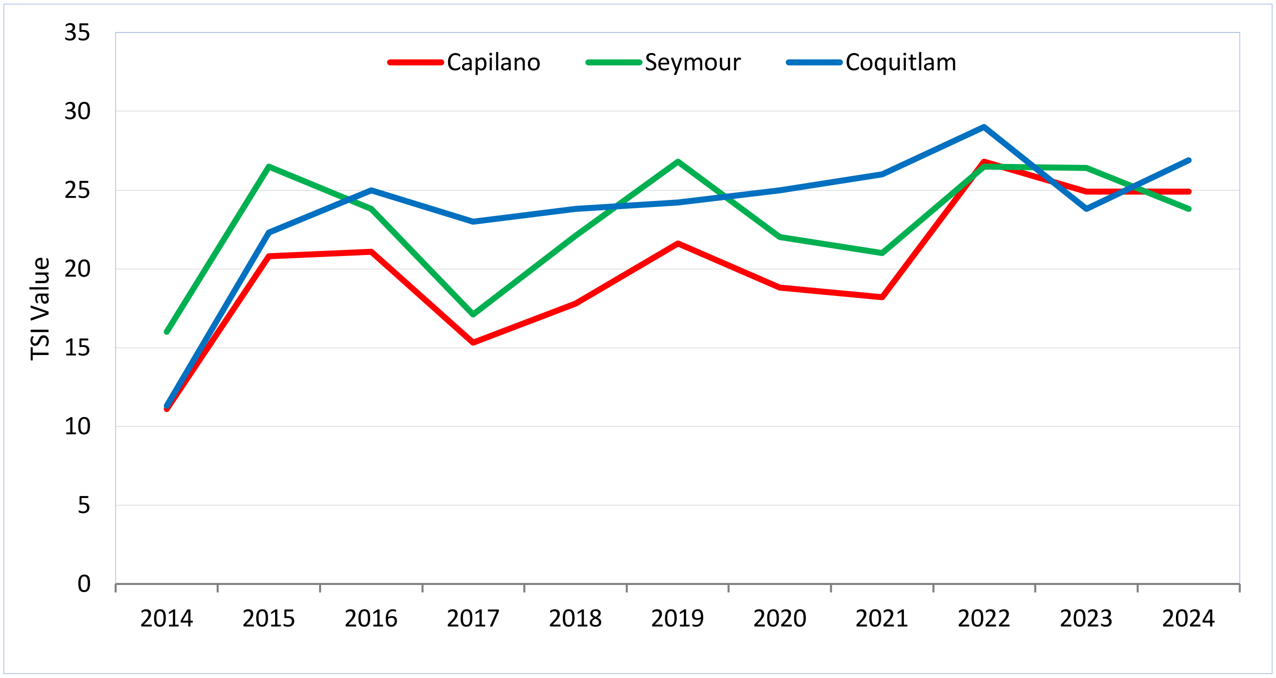


Figure 3: Trophic State Index of Source Waters

The ultra-oligotrophic classification and low TSI values are highly desirable for source drinking water supply and shows that the GVWD Water Supply Areas continue to supply high quality source water.

There is worldwide interest in blue-green algae (also known as cyanobacteria) in drinking water reservoirs. These algae can produce toxins that are collectively known as microcystins. A common cyanobacterium in GVWD reservoirs is called *Merismopedia* spp., which is thought to produce these microcystins. Despite the presence of cyanobacteria, the concentration of microcystins in GVWD source reservoirs remains consistently below the detection limit of 0.2 µg/L. This desirable condition is due to the ultra-oligotrophic status of the supply reservoirs. Metro Vancouver continues to monitor cyanobacteria, including *Merismopedia* spp., as well as processes in the source reservoirs that control the growth of cyanobacteria and other algae. These data are routinely used to help predict changes to water quality over time related to climatic and environmental change, and aid in making proactive decisions about ongoing source reservoir management strategies.

2.0 Quality Control Assessment of Water Treatment

Following source water protection, primary treatment of the source water is the second barrier used to assure the high-quality of the water supply.

Metro Vancouver filters water from the Capilano and Seymour source reservoirs at the SCFP, which is located in GVWD's Lower Seymour Conservation Reserve. Twin tunnels connect the two supply sources. The untreated Capilano source water is pumped through the Raw Water Tunnel and is blended with the Seymour source water (under regular operations) at the inlet to the SCFP. Both treated sources enter the Clearwell at the SCFP for further treatment before the blended water enters the transmission system, typically supplying about two thirds of the region's drinking water. Blended treated water returns to the Capilano service area through the Treated Water Tunnel, providing high-quality drinking water to the Capilano area, while the remainder is transmitted through the Seymour system.

The CWTP is located north of the City of Coquitlam, and typically supplies about one third of the region's drinking water. Due to the historically low turbidity levels, the Coquitlam source water is not filtered.

Metro Vancouver operates the water supply system under the *GVWD Permit to Operate* issued jointly by Vancouver Coastal Health and Fraser Health. The permit stipulates that Metro Vancouver must meet the requirements to achieve at least a 4-log (99.99%) reduction and/or inactivation of viruses, and at least a 3-log (99.9%) reduction and/or inactivation of *Giardia* cysts and *Cryptosporidium* oocysts. Operationally, Metro Vancouver meets the permit requirements, managing the microbial risks using a combination of direct filtration, ultraviolet (UV) light and chlorine at the SCFP, and ozone, UV light and chlorine at the CWTP.

2.1. Seymour Capilano Filtration Plant

The SCFP is a chemically assisted direct filtration plant, which uses polyaluminum chloride as a coagulant with polymers to improve particle removal. These substances help aggregate particles to form visible floc. The flocculated particles are removed by passing this water through a filter medium of anthracite and sand. The result is the production of filtered water, which is then exposed to UV light as the water exits each filter. The final processes are the addition of sodium hypochlorite (chlorine) and calcium hydroxide (hydrated lime) before the water enters the Clearwell. The Clearwell, divided into the West and East Cells, is a large water storage reservoir that stores and allows controlled passage and mixing of water with the injected chlorine and hydrated lime. The Clearwell provides sufficient retention (or contact time) with chlorine to provide any further disinfection required after filtration and UV light treatment. The treatment process of the SCFP is shown in Figure 4.

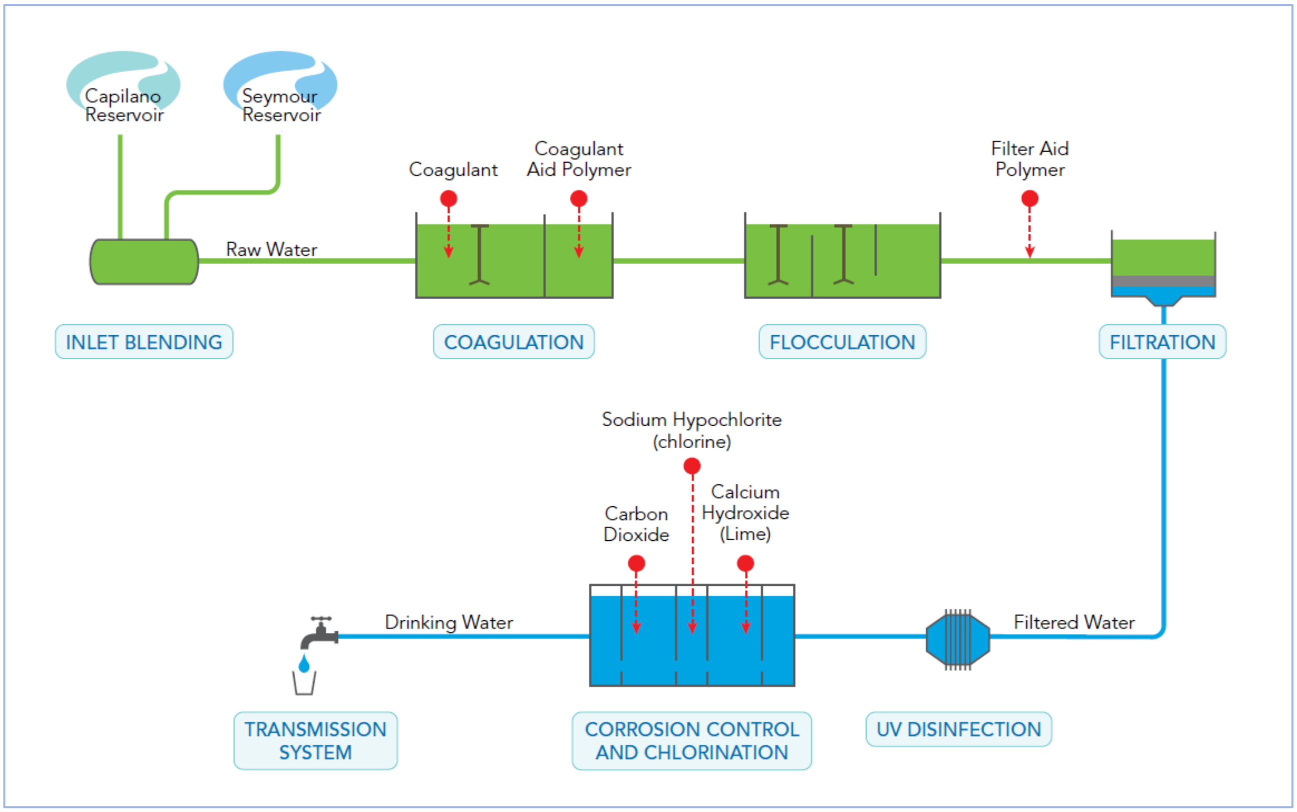


Figure 4: SCFP Treatment Process

As part of corrosion control, carbon dioxide (CO_2) in solution is added to trim pH once the desired alkalinity is reached using hydrated lime. After the Clearwell, the finished water enters the transmission system at the Seymour Treated Water Valve Chamber. The quality of the water produced has been excellent leaving the SCFP.

2.1.1. Filtration

Filtration of the Capilano and Seymour water sources improves the characteristics of the delivered water. One improvement is the removal of the brown hue that is characteristic of Capilano and Seymour source waters. This is achieved with the removal of naturally occurring compounds, resulting in a visible decrease in colour and increase in clarity. In addition, suspended particles in water that cause light to scatter (turbidity) are also removed. The end product is water that is very clear, and may have a slight bluish tinge. Figure 5 compares the apparent colour of SCFP filtered water with Capilano and Seymour source waters for 2024. The Seymour source had an Apparent Colour Unit (ACU) of 30 ACU in February, an elevated ACU reading of 29 in April, and the Capilano source had an ACU reading of 30 ACU in October. The SCFP removed the organic material through filtration, resulting in the final colour of zero ACU in all incidences. Throughout 2024, the colour of the filtered water delivered to the public was never greater than 3 ACU.

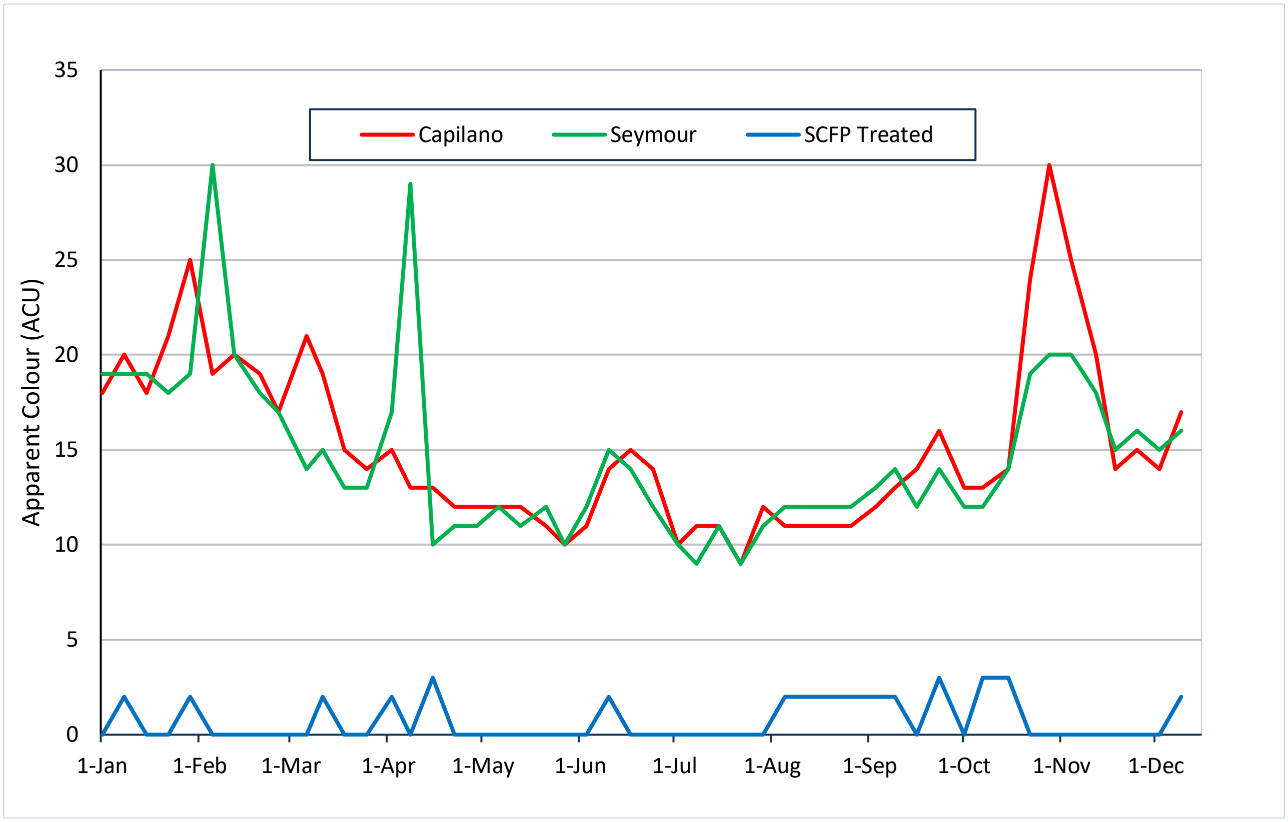


Figure 5: Apparent Colour Levels Before and After Filtration

Figure 6 compares turbidity of the two source waters that feed the SCFP to the turbidity level of the finished water. The Seymour source experienced an average daily turbidity greater than 1.0 NTU during 44 days. The Capilano source exceeded 1.0 NTU during 155 days. Since both sources are filtered at the SCFP, the maximum turbidity of the treated water was 0.48 NTU, measured on January 12, 2024 and the annual average was 0.19 NTU.

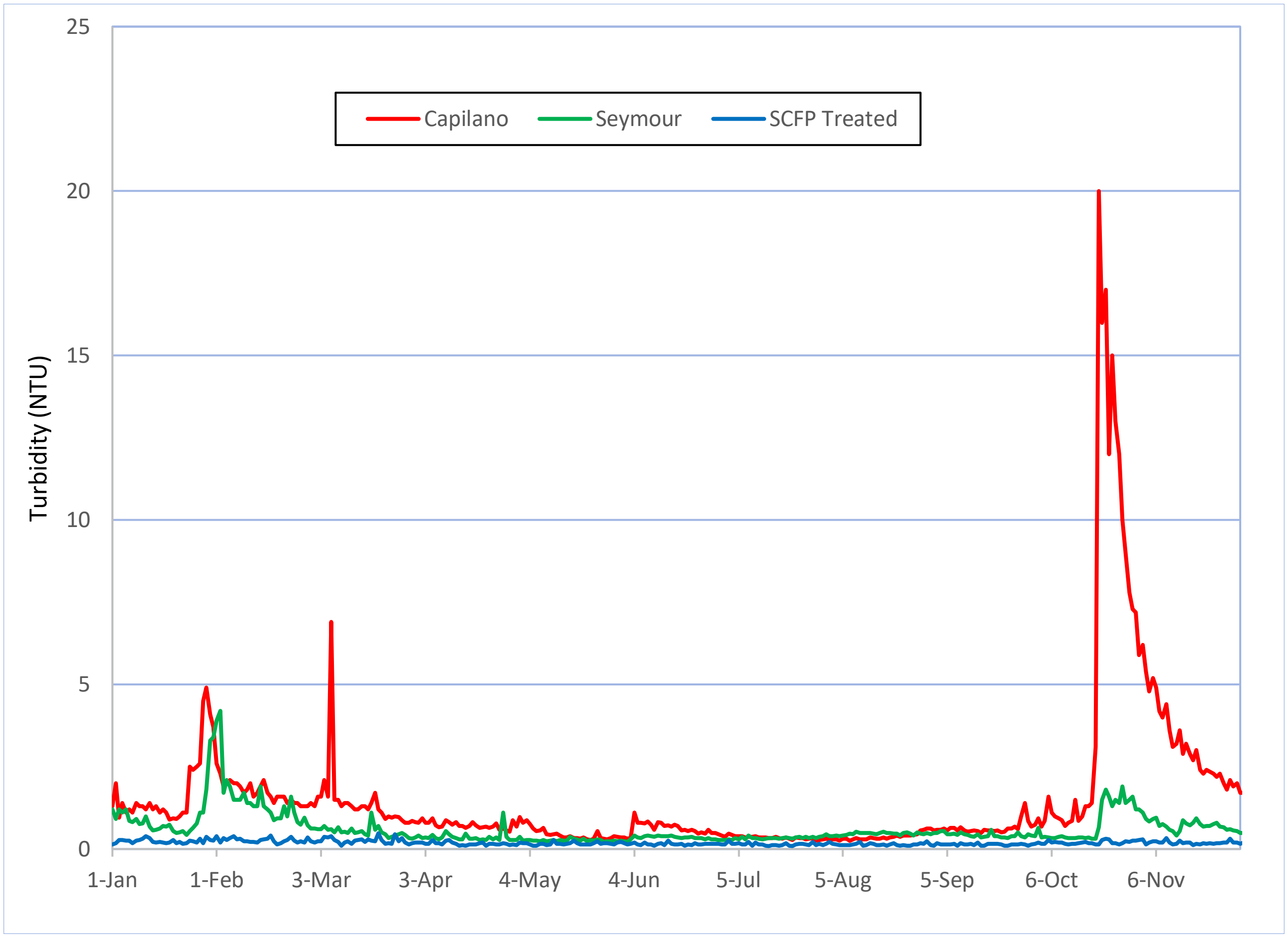


Figure 6: Daily Turbidity Levels Before and After Filtration

Removal of turbidity in the source water improves the aesthetic qualities of the water, but it also has the benefit of removing certain types of pathogenic microorganisms that may be present. At a minimum, properly run direct filtration plants such as the SCFP will remove up to 2.5 log (two log is a 99% reduction) of *Giardia* and *Cryptosporidium,* plus 1 log of viruses. To ensure this removal, it is critical that the performance of each filter determined by the turbidity of its effluent is monitored on a continuous basis.

The GCDWQ states: *"For conventional and direct filtration, less than or equal to 0.3 nephelometric turbidity units (NTU) in at least 95% of measurements either per filter cycle or per month and never to exceed 1.0 NTU."*

According to the GCDWQ, ideally, the turbidity from each filter would never exceed 0.1 NTU; however, there are rare occurrences of turbidity readings that exceed this ideal level. The turbidity performance of all 24 filters is measured by examining the percent of time that the turbidity of each Individual Filter Effluent (IFE) met the turbidity guidelines of not greater than 1.0 NTU, and at least 95% of the time less than 0.3 NTU. The results are summarized in Table 8. In 2024, there was one incident where the IFE was greater than 1.0 NTU, which occurred on a single filter and lasted for a duration of 40 seconds. The few incidences of filter turbidity readings that were greater than 0.3 NTU were all well within the 95% limit.

Table 8: Monthly Filter Effluent Turbidity Summary

Month	Occurrence of IFE Turbidity greater than 1.0 NTU (None Allowed)	Percent of Time IFE Turbidity was less than 0.3 NTU (Minimum 95% Required)
January	0	99.940
February	0	99.995
March	0	100
April	0	99.995
May	0	99.997
June	0	100
July	0	100
August	0	100
September	0	100
October	1	99.953
November	0	100
December	0	100

Under normal operating conditions, the average maximum turbidity of the water, post filtration, and before disinfection and corrosion control at SCFP was 0.05 NTU.

All water that flows through the filters immediately passes through the UV units. The intensity of the UV lamps automatically increases when there is an increase in turbidity or colour of the water exiting each filter. After UV treatment, the water is chlorinated as it enters the Clearwell.

2.1.2. Ultraviolet Treatment

Water passing through each filter is subsequently treated with UV light. UV treatment is effective in altering the DNA structure of *Giardia* and *Cryptosporidium* thus rendering cysts and oocysts, respectively, of these parasites, non-infectious. Other disinfectants, especially chlorine, are ineffective against *Cryptosporidium* oocysts at reasonable dosages. In the unlikely event of a breakthrough of *Cryptosporidium* oocysts, especially at the end of a filter run, UV light is present to render any parasites that may be present as non-infectious. Cysts and oocysts are not able to proliferate inside the intestines of human hosts to cause illness after a sufficient dose of UV light. The target dosage for UV light is to achieve 2-Log (99%) *Giardia* and *Cryptosporidium* inactivation.

Under normal operating conditions, two rows of lamps operating at 75% power provide sufficient UV light to meet the dosage requirement for 2-log reduction of *Giardia* and *Cryptosporidium.* Table 9 summarizes the performance of the SCFP UV system in 2024.

Table 9: Percent of Volume Meeting Ultraviolet Dosage Requirements at SCFP

Month	Percent of Monthly Volume ≥ 2-log of *Giardia* and *Cryptosporidium* Inactivation (95 of monthly volume required)
January	99.925
February	99.952
March	99.953
April	99.912
May	99.962
June	99.962
July	99.949
August	99.918
September	99.923
October	99.916
November	99.943
December	99.948

2.1.3. Chlorination

Chlorination is used for disinfection at the SCFP, as well as at downstream secondary disinfection stations to minimize bacterial regrowth in the GVWD transmission and GVWD supplied distribution systems. Chlorination provides 4-log virus inactivation with liquid sodium hypochlorite. The chlorination system was operational 100% of the time in 2024.

2.2. Coquitlam Water Treatment Plant

The Coquitlam Water Treatment Plant (CWTP) treats the Coquitlam source water using multiple disinfection barriers, specifically, ozone, UV and chlorine, and provides corrosion control as shown in figure 7 below. The Coquitlam source water is not filtered. Ozone contact is achieved in a stainless steel contactor pipeline that connects the Ozonation facility with the Corrosion Control and Chlorination facility. The primary function of ozone is to improve the transmissivity of the water (clarity) for subsequent UV light treatment and oxidize organic precursors responsible for the formation of disinfection by-products (DBPs) following chlorination.

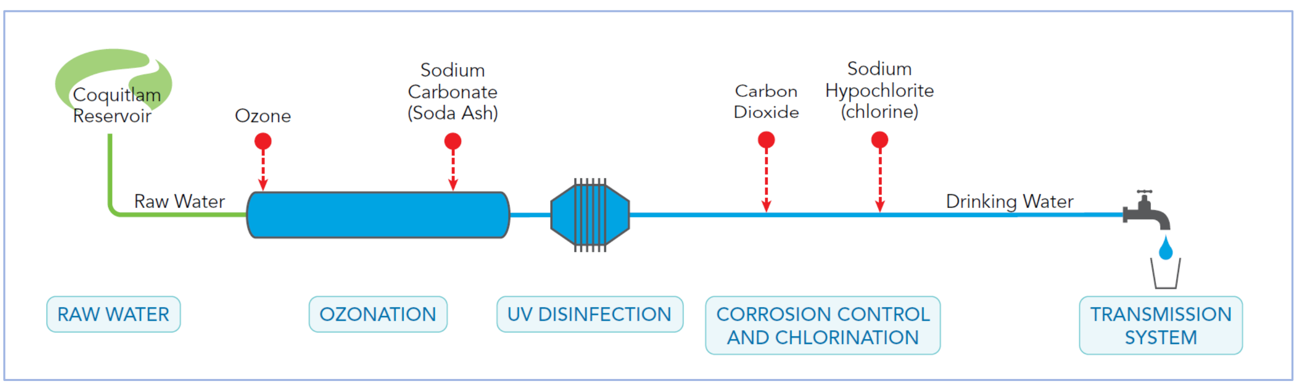


Figure 7: CWTP Treatment Process

Ozone also provides disinfection capacity for *Giardia* and viruses. UV light is the primary process for inactivation of *Giardia* and *Cryptosporidium* and chlorine for viruses. Corrosion control is achieved using sodium carbonate and CO_2; the latter is added to trim the pH once the desired alkalinity is reached. After chlorination, the finished water enters the transmission system.

2.2.1. Ozonation

Ozone is intended as a pre-treatment, however, also provides backup for inactivation of *Giardia*, should the UV treatment system be offline. Ozonation also provides additional virus inactivation to chlorination. The ozonation system was operational for 99.3% of the time in 2024. The ozone outages were due to a combination of planned and unplanned events that included electrical/instrument maintenance, ozone dosing tests, and ozone generator faults, testing or power loss.

2.2.2. Ultraviolet Treatment

UV light treatment provides for primary disinfection and achieves 3-log inactivation of the chlorine-resistant micro-organisms, *Giardia* and *Cryptosporidium*. The water is directed into 8 UV units. BC *Guidelines for Ultraviolet Disinfection of Drinking Water* requires that the ultraviolet disinfection process results in target *Giardia* and *Cryptosporidium* inactivation in at least 95% of the treated water volume on a monthly basis, which is summarized in Table 9. There was no loss of UV in 2024. The small percentage of water that did not meet the criteria was the result of unplanned events, as well as planned power outages required to test the emergency back-up power system.

Table 10: Percent of Volume Meeting Ultraviolet Dosage Requirements at CWTP

Month	Percent of Monthly Volume ≥ 3-log *Giardia* and *Cryptosporidium* Inactivation (Minimum 95% Required)
January	99.891
February	99.910
March	99.854
April	99.898
May	99.878
June	99.835
July	99.895
August	99.826
September	99.859
October	99.917
November	99.908
December	99.844

2.2.3. Chlorination

Chlorination is used for disinfection at the CWTP, as well as at secondary disinfection stations to minimize bacterial regrowth in the GVWD transmission and GVWD supplied distribution systems. Chlorination provides 4-log virus inactivation using a liquid sodium hypochlorite solution. The chlorination system operated 100% of the time in 2024.

2.3. Secondary Disinfection

There are eight secondary disinfection stations operated by Metro Vancouver. The purpose of these stations is to increase the chlorine residual in the GVWD transmission and GVWD supplied distribution systems to meet a target residual based on a number of factors, including source water turbidity, the amount of bacterial regrowth detected in GVWD supplied distribution system samples, and the chlorine demand in the water. The rate of chlorine decay is lower in the areas receiving filtered water from the SCFP and consequently, lower chlorine dosage levels are required to maintain desired chlorine residual levels. The target chlorine residual leaving the SCFP is 0.80 mg/L. The target chlorine residual leaving the CWTP ranges from 1.30 to 1.50 mg/L. These chlorine residuals leaving the treatment plants have been established to maintain target chlorine residuals throughout the transmission system of 0.5 mg/L or greater. The secondary disinfection facilities receiving SCFP water frequently have an incoming chlorine residual high enough that boosting is not required.

Table 11 summarizes the performance of the secondary disinfection facilities in 2024.

Table 11: Performance of Secondary Disinfection Facilities

Facility	Branch Main	Average Free Chlorine (mg/L)	Range of Free Chlorine (mg/L)	Discussion
Clayton	Whalley/Clayton	1.24	0.93-1.73	Supplied by CWTP water. During July 2024, a flow meter was installed on the chlorine injection lines.
	Jericho/Clayton	1.26	1.02-1.89	
Chilco	Capilano No.4 and No.5	0.76	0.60-0.89	Supplied by SCFP water.
Pitt River	Haney Main No.2	1.26	1.04-1.85	Supplied by CWTP water. Haney Main No.3 injection line was out of service April 22 - May 2.
	Haney Main No.3	1.22	0.86-1.83	
Newton	Surrey Hickleton Main	1.17	0.87-1.41	Alternately supplied by SCFP and CWTP water.
Kersland	Capilano No.4 and No.5	0.82	0.53-1.11	Supplied by SCFP water. During May, work was done on the chlorine injection system and was unavailable for one week.
Central Park	South Burnaby Main No.1	0.87	0.70-1.04	Primarily supplied by SCFP water. Occasionally supplied by CWTP water, depending on flow demands.
	South Burnaby Main No.2	0.91	0.66-1.37	
Cape Horn	Coquitlam Main No.2	1.25	1.06-1.86	Supplied by CWTP water.
	Coquitlam Main No.3	1.25	0.89-1.82	
Vancouver Heights	Boundary Road Main No.5	0.83	0.70-0.92	Supplied by SCFP water.

2.4. Corrosion Control

Metro Vancouver's corrosion control program began in the 1990s, and involves several steps to reduce pipe corrosion. As part of the current *Corrosion Control Program: Copper Pipes Protection* initiative, further changes in pH and alkalinity were made in June 2021 to help reduce pipe corrosion through the addition of natural minerals. Corrosion control parameters are continually monitored to assess need for future adjustments.

The untreated water from all three sources had a pH lower than the limit of the GCDWQ of pH 7.0.

In the SCFP process, filtered water is dosed with calcium hydroxide (hydrated lime) to raise its pH and alkalinity before it enters the Clearwell. To achieve the desired alkalinity, the resultant pH is trimmed using CO_2 to bring it down to target levels.

At the CWTP, sodium carbonate (soda ash) is added to raise the pH and neutralize the remaining ozone in the water prior to it entering the UV units. Similar to the SCFP, CO_2 is used to trim the resultant pH to desired target levels.

During 2024, the average pH of the treated water leaving SCFP and CWTP was 8.5 and 8.4, respectively.

Performance of the corrosion control facilities is summarized in Table 12.

Table 12: Performance of Corrosion Control Facilities

Facility	Performance	Discussion
SCFP Corrosion Control	pH ranged from 7.9 – 9.8	The annual average pH was 8.5, as continually monitored with online instrumentation, and was within the GCDWQ range.
CWTP Corrosion Control	pH ranged from 6.8 – 9.4	The annual average pH was 8.4, as continually monitoring with online instrumentation. The GCDWQ of 7.0-10.5 was not met on May 21, 2024 for one hour due to a power surge causing a loss of soda ash dosing, the pH dropped to 6.8.

3.0 Transmission/Distribution System Water Quality

Schedule A of the BC *Drinking Water Protection Regulation* (DWPR) contains standards for the bacteriological quality of potable water in the Province. There are three components of this standard that apply to large utilities such as GVWD and GVWD supplied systems. These are:

Part 1: No sample should be positive for *E. coli*.

Part 2: Not more than 10% of the samples in a 30-day period should be positive for total coliform bacteria when more than one sample is collected.

Part 3: No sample should contain more than 10 total coliform bacteria per 100 mL.

The DWPR does not contain any water standards other than the three limits for *E. coli* and total coliform bacteria. Information on the significance of the detection of these organisms can be found in the GCDWQ – Supporting Documents, specifically:

"E. coli is a member of the total coliform group of bacteria and is the only member that is found exclusively in the faeces of humans and other animals. Its presence in water indicates not only recent faecal contamination of the water but also the possible presence of intestinal disease-causing bacteria, viruses and protozoa."

"The presence of total coliform bacteria in water in the distribution system (but not in water leaving the treatment plant) indicates that the distribution system may be vulnerable to contamination or may simply be experiencing bacterial regrowth."

To summarize, the detection of an *E. coli* bacteria in a sample of treated water is an indication of a potentially serious risk. The detection of total coliform bacteria may indicate intrusion into the system, or it may indicate that these bacteria are growing in the system itself (regrowth).

In 2024, 99.9% of the samples tested were negative for coliforms, which is a good indicator of effective water treatment and good transmission and distribution system water quality.

3.1. Microbiological Water Quality in the GVWD System

3.1.1. GVWD Water Mains

Water quality in GVWD water mains is monitored from the point leaving the source and throughout the transmission system. In 2024, there were approximately 4,400 samples collected and tested for the presence of indicator bacteria. The percentage of samples from the GVWD water mains that were positive for total coliform bacteria was well below the 10% standard. Three samples tested positive for total coliforms of which none had more than 10 CFU/100mL. In all instances the residual chlorine values were high and follow up samples did not detect any total coliforms. No samples were positive for *E. coli* bacteria. The compliance of monitoring results from GVWD water mains with the BCDWPR criteria is shown in Figure 8.

There were another 419 samples collected from sampling stations where only chlorine residuals are measured. In addition, there are inline stations collecting chlorine data every 10-minutes after chlorination at each source, but these samples are not included in the calculations for compliance monitoring.

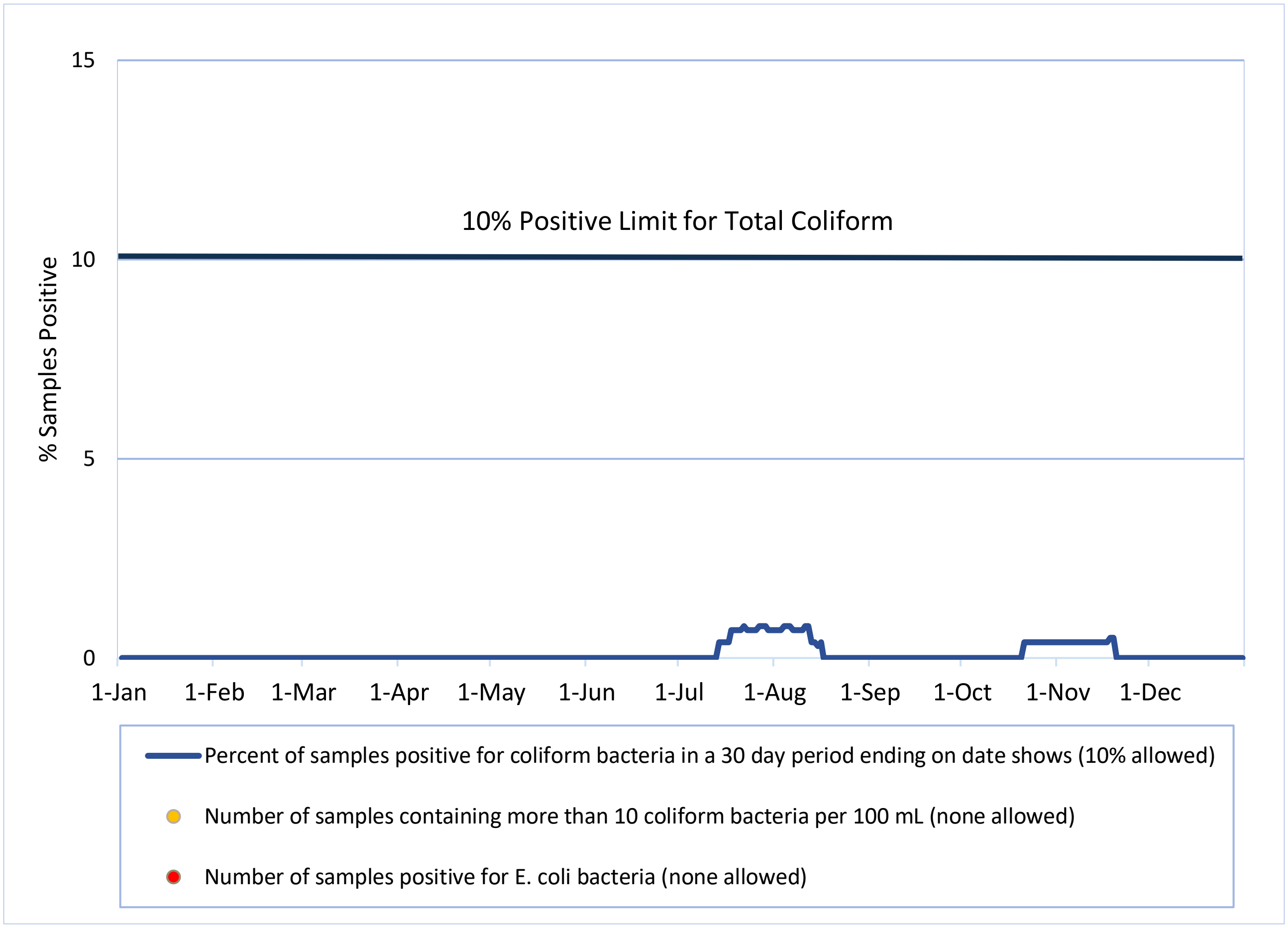


Figure 8: Bacteriological Quality of Water in GVWD Water Mains

3.1.2. GVWD In-System Reservoirs

In 2024, over 1,700 samples were collected from in-system reservoirs that are located throughout the GVWD transmission system. Two samples were positive for total coliforms. No sample from a reservoir was positive for *E. coli*.

The compliance of 2024 monitoring results from GVWD reservoirs with the criteria in the DWPR is shown in Figure 9.

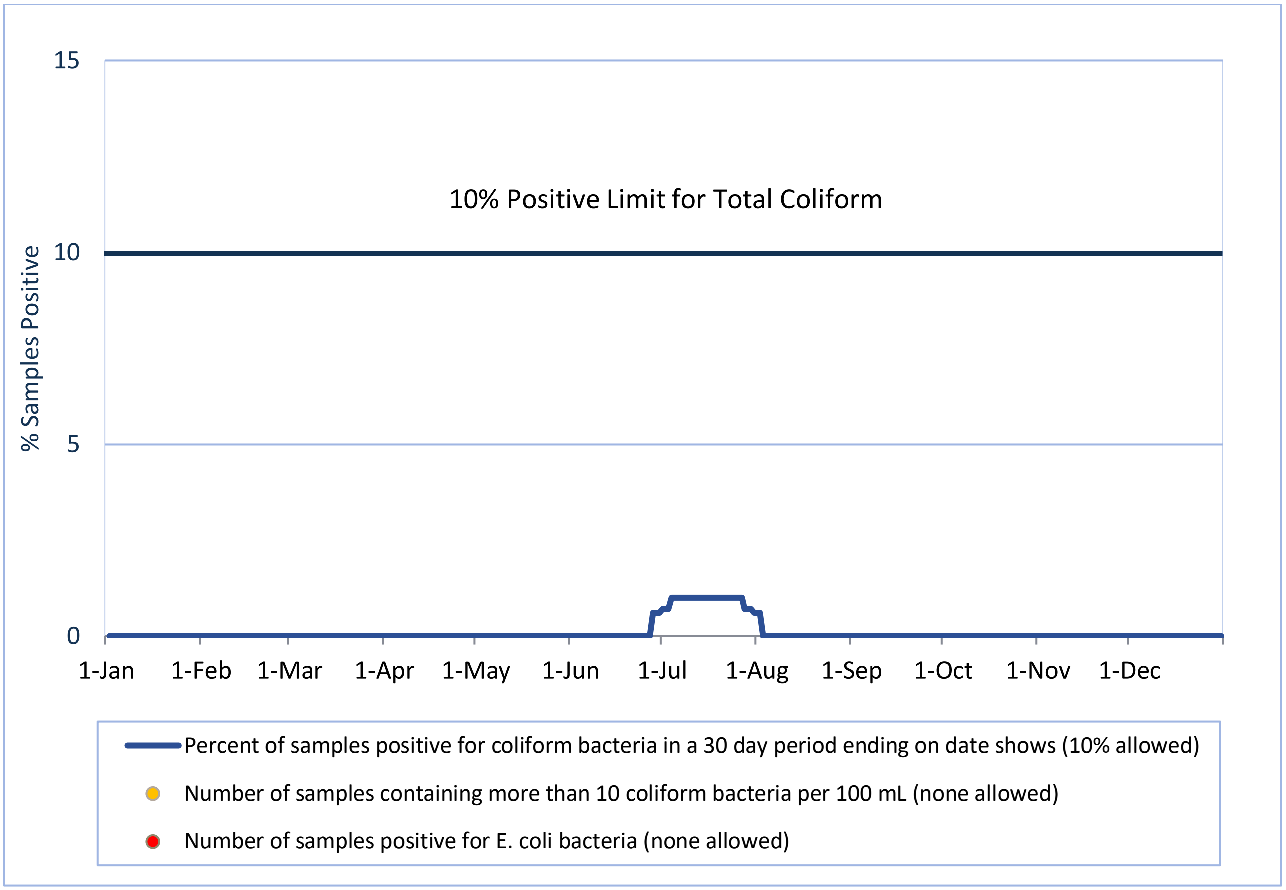


Figure 9: Bacteriological Quality of Water in GVWD In-System Reservoirs

Reservoir water quality is optimized using secondary disinfection coupled with an active reservoir cycling (fill and draw) and cleaning program. As a minimum, weekly monitoring of chlorine residuals and bacteriology results is conducted, which helps inform the need for operational changes to filling cycles.

Table 13 provides an overview of the status of the GVWD reservoirs from 2021 to 2024. During certain times of the year, it is not possible to cycle reservoirs as often as desired due to operational constraints. Despite this constraint, only two out of more than 1,600 samples taken from in-system reservoirs contained total coliforms. The water quality as determined by coliform bacteria was excellent in all reservoirs.

Table 13: Status of GVWD In-System Reservoirs (2021-2024)

Reservoir (Capacity in Million Litres)	Average free chlorine residual (mg/L)				Discussion
	2021	2022	2023	2024	
Burnaby Mountain Reservoir (13.2)	0.53	0.49	0.43	0.45	No operational issues.
Burnaby Tank (2.3)	0.57	0.56	0.52	0.56	No operational issues.
Cape Horn Reservoir (40.0)	0.71	0.78	0.82	0.74	No operational issues.
Central Park Reservoir (35.0)	0.54	0.56	0.43	0.59	No operational issues.
Clayton Reservoir (21.6)	1.1	1.05	1.09	1.06	Cell 1 no operational issues. Cell 2 began the year out of service, it was cleaned and disinfected before it was returned to service in March.
Glenmore Tanks (1.0)	0.73	0.67	0.68	0.68	No operational issues.
Grandview Reservoir (13.5)	0.85	0.84	0.71	0.76	No operational issues.
Greenwood Reservoir (8.8)	0.70	0.68	0.70	0.72	No operational issues.
Hellings Tank (4.3)	0.56	0.52	0.44	0.47	No operational issues.
Jericho Reservoir (20.0)	1.10	0.92	0.87	0.82	Cell 1 began the year out of service, it was cleaned and disinfected before it was returned to service in May. Cell 2 no operational issues.
Kennedy Reservoir (16.3)	0.65	0.60	0.57	0.55	No operational issues.
Kersland Reservoir (73.7)	0.65	0.61	0.53	0.56	No operational issues.
Little Mountain Reservoir (171.0)	0.69	0.66	0.65	0.65	No operational issues.
Maple Ridge Reservoir (20.0)	0.46	0.43	0.52	0.47	No operational issues.
Newton Reservoir (32.0)	0.44	0.64	0.45	0.48	Cell 1 began the year out of service, it was cleaned, disinfected and returned to service in April. Cell 2 no operational issues.
Pebble Hill Reservoir (42.2)	0.54	0.61	0.49	0.56	Cell 1 no operational issues. Cell 2 removed from service in mid-October due to low demand season. Cell 3 cleaned and disinfected before being returned to service in late-April.
Prospect Reservoir (4.4)	0.73	0.69	0.70	0.72	No operational issues.
Sasamat Reservoir (26.0)	0.62	0.61	0.50	0.44	Due to pump issues, the reservoir was only in service from July thru October when it was again removed from service for structural work.
Sunnyside Reservoir (22.7)	0.85	0.78	0.68	0.76	No operational issues.
Vancouver Heights Reservoir (43.0)	0.78	0.71	0.75	0.73	No operational issues.
Westburnco Reservoir (73.0)	0.60	0.65	0.55	0.67	Repairs to the roof were made and then the reservoir was cleaned, disinfected and returned to service in late-February.
Whalley Reservoir (33.4)	0.71	0.65	0.72	0.74	No operational issues.

3.2. Microbiological Water Quality in GVWD Supplied Systems

For samples collected from GVWD supplied systems, the percent positive-per-month for total coliform bacteria from 2021-2024 is shown in Figure 10.

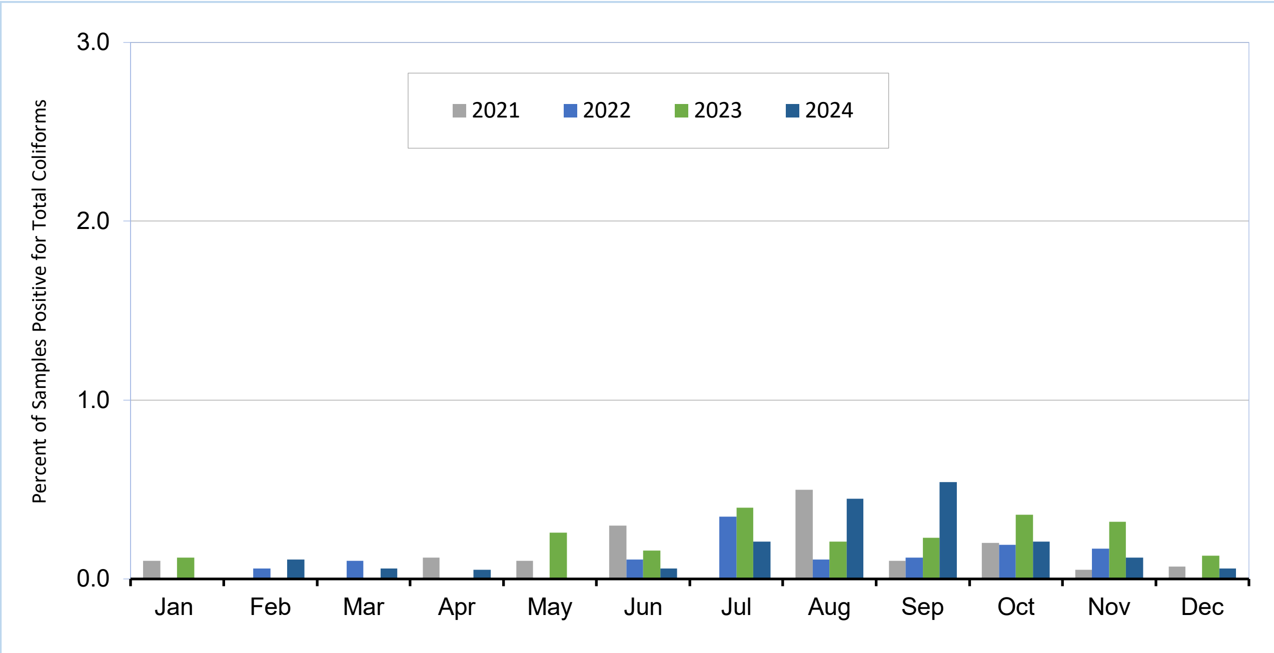


Figure 10: Bacteriological Quality of Water in GVWD Supplied Systems

The percentage of samples positive for total coliform bacteria continues to be low; the annual average in 2024 was 0.15%.

For Part 1 of the DWPR, no sample should be positive for *E. coli*. In September and November, single samples from separate GVWD supplied systems were positive for *E. coli.* All subsequent samples taken over the following days were negative.

For Part 2, not more than 10% of the samples in a 30-day period should be positive for total coliform bacteria when more than one sample is collected. While there were 33 samples with total coliforms detected out of over 21,500, none of the GVWD supplied systems had more than 10% of samples positive for total coliforms.

For Part 3, no sample should contain more than 10 total coliform bacteria per 100 mL; for samples from GVWD supplied systems, this requirement was met in 2024 with the following nine exceptions: one in April, two in July, one in August, two in September, two in October and one in November. Follow up samples did not detect any total coliforms.

Table 14 shows compliance with the bacteriological standards (3 parts) in the DWPR for samples taken within the distribution systems of the 21 water systems that are supplied with GVWD water.

Table 14: GVWD Connected Water Systems Water Quality Compared to the Provincial Bacteriological Standards

Month	Number of water systems that met Part 1 No sample should be positive for ***E.coli***	Number of water systems that met Part 2 Not more than 10% of the samples in a 30-day period should be positive for total coliform bacteria	Number of water systems that met Part 3 No sample should contain more than 10 total coliform bacteria per 100 mL	Number of water systems that met all requirements
January	21	21	21	21
February	21	21	21	21
March	21	21	21	21
April	21	21	20	20
May	21	21	21	21
June	21	21	21	21
July	21	21	19	19
August	21	21	20	20
September	20	21	19	19
October	21	21	19	19
November	20	21	21	21
December	21	21	21	21

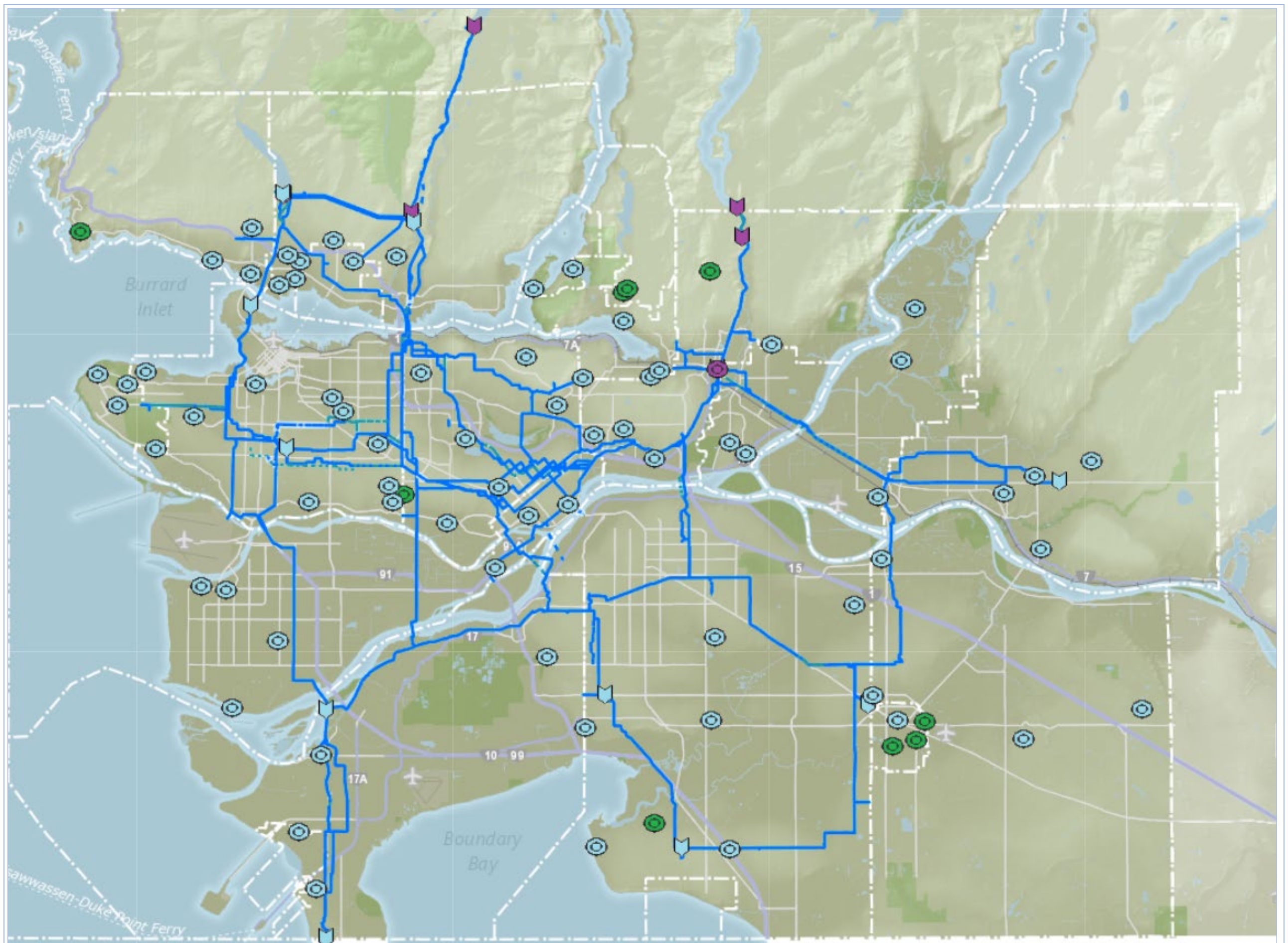
3.3. Disinfection By-Products in the Transmission/Distribution Systems

As the treated water moves through the GVWD transmission system and into the distribution systems infrastructure connected to the GVWD, changes in water quality occur. This is mainly due to the reaction between the chlorine in the water (added during primary and secondary disinfection) with naturally occurring organic matter in the water.

One of the most significant changes is the production of chlorinated Disinfection By-Products (DBPs). DBPs is a term used to describe a group of organic and inorganic compounds formed during water disinfection.

Reactions between dissolved natural organic matter and chlorine can lead to the formation of a variety of halogenated DBPs. There are two major groups of chlorinated DBPs: Trihalomethanes and Haloacetic Acids. Total Trihalomethanes (TTHMs) represent the four compounds: chloroform, bromodichloromethane, dibromochloromethane, and bromoform. Total Haloacetic Acids (THAAs) represents five of the compounds: dibromoacetic acid, dichloroacetic acid, momobromoacetic acid, momochloroacetic acid and trichloroacetic acid. Factors that affect DBP formation, include: amount of chlorine added to water, reaction time, concentration and characteristics of dissolved organic materials (precursors), water temperature, and water pH. In general, DBPs continue to form as long as chlorine and reactive DBP precursors are present in the water.

The MAC in the GCDWQ for TTHMs is a locational yearly running average of 100 µg/L (0.1 mg/L) based on quarterly samples. A comparison of TTHM levels in the GVWD and GVWD supplied systems in 2024 is shown in Figure 11. All results were below the MAC of 100 µg/L. In 2024, the annual average TTHM results for GVWD water mains and GVWD supplied systems were 24 µg/L (0.024 mg/L), and 34 µg/L (0.034 mg/L) respectively.



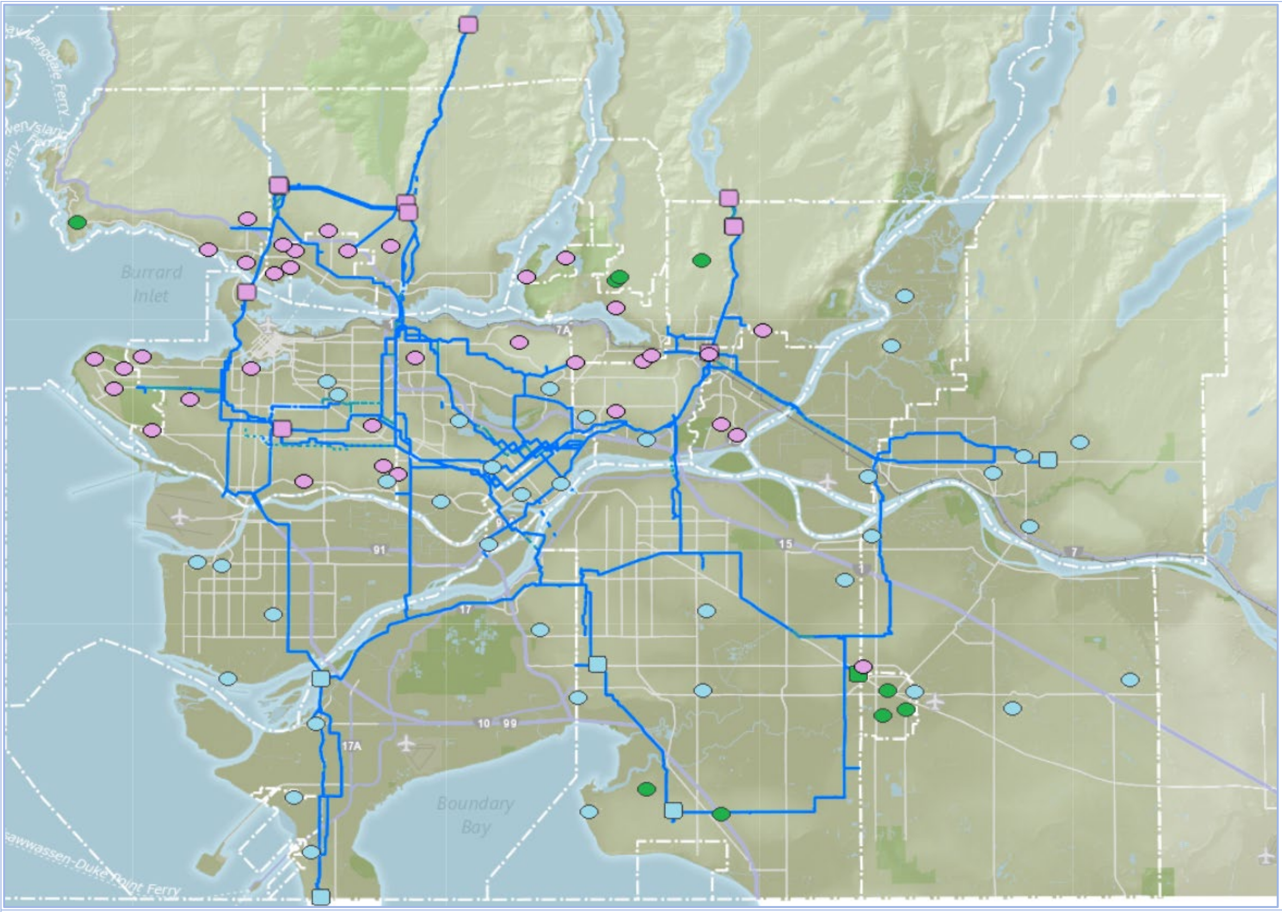
2024 Average GVWD System TTHM = 24 ppb
2024 Average GVWD Supplied Systems TTHM = 34 ppb

TTHM Levels for GVWD System Sites		TTHM Levels at GVWD Supplied Systems Sites	
(purple marker)	≥ 0 and < 20	(purple marker)	≥ 0 and < 20
(light blue marker)	≥ 20 and < 40	(light blue marker)	≥ 20 and < 40
(green marker)	≥ 40 and < 60	(green marker)	≥ 40 and < 60
(yellow marker)	≥ 60 and < 80	(yellow marker)	≥ 60 and < 80
(orange marker)	≥ 80 and < 100	(orange marker)	≥ 80 and < 100
(red marker)	≥ 100	(red marker)	≥ 100

MAC for TTHM values is 100 µg/L (or ppb)

Figure 11: Average Total Trihalomethane Levels

The other group of DBPs of interest is the THAA group. Comparison of THAA in the GVWD and GVWD supplied systems in 2024 is shown in Figure 12. In 2024, the annual average THAA results for GVWD water mains and GVWD supplied systems were 21 µg/L (0.021 mg/L), and 25 µg/L (0.025 mg/L), respectively. All results were below the MAC of 80 µg/L.



2024 Average GVWD System THAA = 21 ppb
2024 Average GVWD Supplied Systems THAA = 25 ppb

THAA Levels for GVWD System Sites		THAA Levels at GVWD Supplied Systems Sites	
Pink square	≥ 0 and < 20	Pink oval	≥ 0 and < 20
Light blue square	≥ 20 and < 40	Light blue oval	≥ 20 and < 40
Green square	≥ 40 and < 60	Green oval	≥ 40 and < 60
Yellow square	≥ 60 and < 80	Yellow oval	≥ 60 and < 80
Orange square	≥ 80 and < 100	Orange oval	≥ 80 and < 100
Red square	≥ 100	Red oval	≥ 100

MAC for THAA is 80 µg/L (or ppb)

Figure 12: Average Total Haloacetic Acid Levels

4.0 Quality Assurance/Quality Control

Since 1994, the Metro Vancouver Microbiology Laboratory has participated in the BC Centre for Disease Control Public Health Laboratory *Enhanced Water Quality Assurance Program*, and has been approved by the Provincial Medical Health Officer to perform microbiological analysis of drinking water as required in the DWPR. An ongoing requirement of this approval is successful participation in the provincial *Clinical Microbiology Proficiency Testing Program,* or its equivalent. Representatives of the Approval Committee for Bacteriology Laboratories inspect the Metro Vancouver Microbiology Laboratory at the Lake City Operations Centre on a routine basis as part of the on-going approval process by the Provincial Health Officer. The next inspection is planned for 2025.

In addition to the approval process discussed above, the Metro Vancouver Laboratories are accredited by the Canadian Association for Laboratory Accreditation (CALA) for the analysis of specific parameters to the ISO/IEC 17025 *General requirements for the competence of testing and calibrations laboratories* international standard.

Representatives from CALA have assessed the Metro Vancouver Laboratories bi-annually since 1995. The most recent on-site audit took place in September 2023, and the Metro Vancouver Laboratories have been granted accreditation until 2026. The next CALA assessment will take place in the fall of 2025. The Scope of Accreditation is available on the CALA website – www.cala.ca.

5.0 Results Summary

Source Water Quality

- The Capilano supply was in service for the entire year. October's atmospheric river event resulting in the source water turbidity rising to 20 NTU.
- The Seymour supply was in service for the entire year; this source's highest turbidity reading was 2.5 NTU.
- The Coquitlam supply was in service for the entire year. The unfiltered Coquitlam source water was greater than 1.0 NTU for 32 days, and exceeded 5.0 NTU for 3 days in October peaking at a daily average of 10.6 NTU.
- The unfiltered Coquitlam source water was greater than 1.0 NTU for 32 days in 2024, and exceeded 5.0 NTU for 3 days in October, peaking at a daily average of 10.6 NTU
- The microbiological quality of the three source waters was excellent. The levels of bacteria and protozoa detected were low, and indicative of high quality source water.
- Coquitlam source water quality met the bacteriological requirements for an unfiltered source supply as specified in the GCDWQ.
- Results of the source water analyses for herbicides, pesticides, volatile organic compounds and radionuclides were all found to be below the recommended limits as listed in the GCDWQ.

Water Treatment

- The Seymour Capilano Filtration Plant (SCFP) performance, as measured by the quality of the delivered water, was excellent. The daily average turbidity of water leaving the Clearwell to enter the GVWD transmission system was an average of 0.19 NTU.
- Turbidity levels for Individual Filter Effluent met the turbidity requirements of the GCDWQ with the exception of 40 seconds in October when one filter was greater than 1.0 NTU.
- Filtration consistently removed iron, colour, and naturally occurring organics from the Capilano and Seymour source water.
- There were no outages of disinfection treatment at the SCFP, or Coquitlam Water Treatment Plant (CWTP).
- In May, there was a one-hour outage of corrosion control at the CWTP, which resulted in a temporary low pH of 6.8 leaving the plant, as compared to the annual average pH of 8.3.
- The secondary disinfection stations boosted the residual chlorine when required.

Transmission/Distribution System Water Quality

- Bacteriological water quality was excellent in the GVWD transmission water mains and in-system storage reservoirs. The number of *E. coli* detected in samples from both GVWD and water systems supplied with GVWD water is typically very low. More than 29,800 samples were collected and analyzed for GVWD and GVWD supplied systems, of which only two member jurisdiction samples were positive for E. coli. Repeat samples were taken, and no additional *E. coli* were found.

- The average levels of the TTHM chlorine disinfection by-products measured in the delivered water in the GVWD and member jurisdiction systems were 24 µg/L (0.024 mg/L) and 34 µg/L (0.034 mg/L), respectively. The average levels for the THAA chlorine disinfection by-products measured in the delivered water in both the GVWD and member jurisdiction systems were 21 µg/L (0.021 mg/L) and 25 µg/L (0.025 mg/L), respectively. All DBP levels were below limits established in the GCDWQ.

Appendix A — Water Sampling Frequency

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Water Type	Parameter	Minimum Frequency
Untreated, Source Water	Total coliform and *E. coli*	Daily
	HPC	Daily
	pH	Daily
	Turbidity	Daily
	Giardia and *Cryptosporidium*	Monthly
	Alkalinity, Ammonia, colour, iron, organic carbon	Weekly
	Calcium, chloride, fluoride, hardness, magnesium, manganese, nitrate, nitrite, phosphorus, sulphate	Monthly
	Aluminum, residue, silica, sodium	Bi-monthly
	TTHMs, THAAs	Quarterly
	Antimony, arsenic, barium, boron, cadmium, chromium, copper, cyanide, lead, mercury, nickel, phenols, potassium, selenium, silver, uranium. zinc	Semi-annually
	Pesticides and herbicides	Annually
	PAHs, BTEX	Annually
	PFOS, PFOA, PFAS (sum of 25 compounds)	Annually
	VOCs	Annually
	Radionuclides	Annually
Treated Water before Transmission	Total coliform and *E. coli*	Daily
	Free chlorine, pH, temperature	Daily
	Turbidity	Daily
	Alkalinity, Ammonia, colour, conductivity, iron, organic carbon, aluminum at SCFP only	Weekly
	Aluminum, sodium, total and suspended solids (residue)	Bi-Monthly
	TTHMs, THAAs	Quarterly at selected sites
	Antimony, arsenic, barium, boron, cadmium, chromium, copper, cyanide, lead, mercury, nickel, phenols, selenium, silver, zinc	Semi-annually
GVWD Water Mains	Total coliform and *E. coli,* HPC	Weekly
	Free chlorine, pH, temperature	Weekly
	TTHMs, THAAs	Quarterly at selected sites
	PAHs, BTEX, vinyl chloride	Semi-annually at selected sites
GVWD Reservoirs	Total coliform and *E. coli,* HPC	Weekly
	Turbidity	Weekly
GVWD Supplied Distribution Systems	Total coliform and *E. coli,* HPC	Weekly
	Free chlorine, temperature	Weekly
	Turbidity	Weekly
	TTHMs, THAAs, pH	Quarterly at selected sites
	Aluminum, antimony, arsenic, barium, boron, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, selenium, silver, sodium, zinc, vinyl chloride	Semi-annually at selected sites

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Appendix B — Chemical and Physical Analysis Summaries

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Physical and Chemical Analysis of Water Supply

2024 – Capilano Water System

Parameter	Untreated[1] Average	Treated[2] Average	Treated[2] Range	Canadian Guideline Days Exceeded	Canadian Guideline Limit[3]	Canadian Guideline Reason Established
Alkalinity as $CaCO_3$ (mg/L)	3.2	21	18-23	N/A	None	N/A
Aluminum Dissolved (µg/L)	57	27	15-53	N/A	None	N/A
Aluminum Total (µg/L)	145	29	15-58	0	2,900	Health
Antimony Total (µg/L)	<0.5	<0.5	<0.5	0	6	Health
Arsenic Total (µg/L)	<0.5	<0.5	<0.5	0	10 (ALARA)	Health
Barium Total (µg/L)	3.0	2.9	1.9-3.7	0	2,000	Health
Boron Total (µg/L)	<10	<10	<10	0	5,000	Health
Bromate (µg/L)	<10	<10	<10	0	10	Health
Bromide (µg/L)	<10	<10	<10	N/A	None	N/A
Cadmium Total (µg/L)	<0.2	<0.2	<0.2	0	7	Health
Calcium Total (µg/L)	1240	8390	7,690-9,410	N/A	None	N/A
Carbon Organic - Dissolved (mg/L)	1.7	0.7	0.5-0.9	N/A	None	N/A
Carbon Organic - Total (mg/L)	1.7	0.7	0.5-1.1	N/A	None	N/A
Chlorate (µg/L)	<10	95	21-250	0	1,000	Health
Chloride (mg/L)	<0.5	2.9	2.2-3.6	0	≤250	Aesthetic
Chromium Total (µg/L)	0.07	<0.09	<0.05-0.39	0	50	Health
Cobalt Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Colour - Apparent (ACU)	15	<2	<2-3	N/A	None	N/A
Colour - True (TCU)	10	<1	<1-2	0	≤15	Aesthetic
Conductivity (µmhos/cm)	11	54	48-62	N/A	None	N/A
Copper Total (µg/L)	4.3	<0.5	<0.5	0	2,000/1,000	Aesthetic
Cyanide Total (mg/L)	<0.02	<0.02	<0.02	0	0.2	Health
Cyanobacterial Toxins – Microcystin – LR (µg/L)	<0.20	N/A	N/A	0	1.5	Health
Fluoride (mg/L)	<0.05	<0.05	<0.05	0	1.5	Health
Haloacetic Acids Total (µg/L)	<1	13	10-16	0	80 (ALARA)	Health
Hardness as $CaCO_3$ (mg/L)	3.8	22.4	21.1-24.4	N/A	None	N/A
Iron Dissolved (µg/L)	43	<5	<5	N/A	None	N/A
Iron Total (µg/L)	158	<7	<5-13	0	≤300	Aesthetic
Lead Total (µg/L)	<0.5	<0.5	<0.5	0	5 (ALARA)	Health
Magnesium Total (µg/L)	181	228	194-306	N/A	None	N/A
Manganese Dissolved (µg/L)	5.9	2.2	1.3-3.4	N/A	None	N/A
Manganese Total (µg/L)	8.3	5.5	3.0-11.5	0	120/20	Aesthetic
Mercury Total (µg/L)	<0.05	<0.05	<0.05	0	1	Health
Molybdenum Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Nickel Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Nitrogen - Ammonia as N (mg/L)	<0.02	<0.02	<0.02	N/A	None	N/A
Nitrogen - Nitrate as N (mg/L)	0.06	0.05	0.03-0.09	0	10	Health
Nitrogen - Nitrite as N (mg/L)	<0.01	<0.01	<0.01	0	1	Health
pH (pH units)	6.5	8.1	7.8-8.3	0	7.0-10.5	Aesthetic
Phenol (mg/L)	<0.005	<0.005	<0.005	N/A	None	N/A
Potassium Total (µg/L)	206	182	137-249	N/A	None	N/A
Residue Total (mg/L)	16	35	32-40	N/A	None	N/A
Residue Total Dissolved (TDS) (mg/L)	10	30	30-40	0	≤500	Aesthetic
Residue Total Fixed (mg/L)	9	28	24-32	N/A	None	N/A
Residue Total Volatile (mg/L)	7	8	6-10	N/A	None	N/A
Selenium Total (µg/L)	<0.5	<0.5	<0.5	0	50	Health
Silica as SiO_2 (mg/L)	3.5	3.5	2.6-4.3	N/A	None	N/A
Silver Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Sodium Total (µg/L)	618	1,820	1,540-2,430	0	≤200,000	Aesthetic
Trihalomethanes Total (µg/L)	<4	22	17-24	0	100	Health
Turbidity (NTU)	1.5	0.17	0.10-0.42	N/A	None[4]	N/A
Uranium Total (µg/L)	<0.5	<0.5	<0.5	0	20	Health
UV Absorbance 254 nm (Abs/cm)	0.069	0.011	0.009-0.016	N/A	None	N/A
Zinc Total (µg/L)	<3	<3	<3	0	≤5,000	Aesthetic

[1]Untreated water is sampled from the source intake.
[2]Treated water is sampled prior to entering the Capilano transmission system.
[3]Limits are from the *Guidelines for Canadian Drinking Water Quality*.
[4]*Guidelines for Canadian Drinking Water Quality* recommends that water entering the distribution system does not have turbidity levels exceeding 1.0 NTU.

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Physical and Chemical Analysis of Water Supply

2024 – Seymour Water System

Parameter	Untreated[1] Average	Treated[2] Average	Treated Range	Canadian Guideline Days Exceeded	Limit[3]	Reason Established
Alkalinity as $CaCO_3$ (mg/L)	4.0	21	18-24	N/A	None	N/A
Aluminum Dissolved (µg/L)	48	26	15-53	N/A	None	N/A
Aluminum Total (µg/L)	88	29	15-60	0	2,900	Health
Antimony Total (µg/L)	<0.5	<0.5	<0.5	0	6	Health
Arsenic Total (µg/L)	<0.5	<0.5	<0.5	0	10 (ALARA)	Health
Barium Total (µg/L)	3.4	3.2	2.9-3.7	0	2,000	Health
Boron Total (µg/L)	<10	<10	<10	0	5,000	Health
Bromate (µg/L)	<10	<10	<10	0	10	Health
Bromide (µg/L)	<10	<10	<10	N/A	None	N/A
Cadmium Total (µg/L)	<0.2	<0.2	<0.2	0	7	Health
Calcium Total (µg/L)	1,690	8,520	7,750-9,380	N/A	None	N/A
Carbon Organic - Dissolved (mg/L)	1.5	0.7	0.5-0.9	N/A	None	N/A
Carbon Organic - Total (mg/L)	1.6	0.7	0.6-1.0	N/A	None	N/A
Chlorate (µg/L)	<10	95	21-250	0	1,000	Health
Chloride (mg/L)	<0.5	2.8	2.2-3.7	0	≤250	Aesthetic
Chromium Total (µg/L)	<0.05	<0.05	<0.05	0	50	Health
Cobalt Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Colour - Apparent (ACU)	15	<2	<2-3	N/A	None	N/A
Colour - True (TCU)	10	<1	<1-2	0	≤15	Aesthetic
Conductivity (µmhos/cm)	13	54	47-60	N/A	None	N/A
Copper Total (µg/L)	18.6	<0.5	<0.5	0	2,000/1,000	Aesthetic
Cyanide Total (mg/L)	<0.02	<0.02	<0.02	0	0.2	Health
Cyanobacterial Toxins – Microcystin – LR (µg/L)	<0.20	N/A	N/A	0	1.5	Health
Fluoride (mg/L)	<0.05	<0.05	<0.05	0	1.5	Health
Haloacetic Acids Total (µg/L)	<1	11	10-13	0	80 (ALARA)	Health
Hardness as $CaCO_3$ (mg/L)	4.8	22.3	20.7-24.3	N/A	None	N/A
Iron Dissolved (µg/L)	60	<5	<5	N/A	None	N/A
Iron Total (µg/L)	151	9	5-14	0	≤300	Aesthetic
Lead Total (µg/L)	<0.5	<0.5	<0.5	0	5 (ALARA)	Health
Magnesium Total (µg/L)	153	238	212-308	N/A	None	N/A
Manganese Dissolved (µg/L)	4.4	3.0	2.1-4.6	N/A	None	N/A
Manganese Total (µg/L)	7.2	5.7	3.5-9.7	0	120/20	Aesthetic
Mercury Total (µg/L)	<0.05	<0.05	<0.05	0	1	Health
Molybdenum Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Nickel Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Nitrogen - Ammonia as N (mg/L)	<0.02	<0.02	<0.02	N/A	None	N/A
Nitrogen - Nitrate as N (mg/L)	0.05	0.05	0.03-0.09	0	10	Health
Nitrogen - Nitrite as N (mg/L)	<0.01	<0.01	<0.01	0	1	Health
pH (pH units)	6.6	8.0	7.7-8.2	0	7.0-10.5	Aesthetic
Phenol (mg/L)	<0.005	<0.005	<0.005	N/A	None	N/A
Potassium Total (µg/L)	188	201	156-250	N/A	None	N/A
Residue Total (mg/L)	17	36	31-40	N/A	None	N/A
Residue Total Dissolved (TDS) (mg/L)	10	30	30-40	0	≤500	Aesthetic
Residue Total Fixed (mg/L)	10	29	23-33	N/A	None	N/A
Residue Total Volatile (mg/L)	6	7	5-11	N/A	None	N/A
Selenium Total (µg/L)	<0.5	<0.5	<0.5	0	50	Health
Silica as SiO_2 (mg/L)	3.4	3.5	2.6-4.3	N/A	None	N/A
Silver Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Sodium Total (µg/L)	560	1840	1,540-2,430	0	≤200,000	Aesthetic
Trihalomethanes Total (µg/L)	<4	20	15-22	0	100	Health
Turbidity (NTU)	0.60	0.19	0.09-0.48	N/A	None[4]	N/A
Uranium Total (µg/L)	<0.5	<0.5	<0.5	0	20	Health
UV Absorbance 254 nm (Abs/cm)	0.063	0.011	0.009-0.017	N/A	None	N/A
Zinc Total (µg/L)	<3	<3	<3	0	≤5,000	Aesthetic

[1]Untreated water is sampled prior to the Seymour Capilano Filtration Plant.
[2]Treated water is sampled prior to entering the Seymour transmission system.
[3]Limits are taken from *the Guidelines for Canadian Drinking Water Quality*.
[4]*Guidelines for Canadian Drinking Water Quality* recommends that water entering the distribution system have turbidity levels of 1.0 NTU or less.

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Physical and Chemical Analysis of Water Supply

2024 – Coquitlam Water System

Parameter	Untreated[1]	Treated[2]		Canadian Guideline		
	Average	Average	Range	Days Exceeded	Limit[3]	Reason Established
Alkalinity as $CaCO_3$ (mg/L)	2.0	21	19-23	N/A	None	N/A
Aluminum Dissolved (µg/L)	57	61	43-73	N/A	None	N/A
Aluminum Total (µg/L)	77	77	51-105	0	2,900	Health
Antimony Total (µg/L)	<0.5	<0.5	<0.5	0	6	Health
Arsenic Total (µg/L)	<0.5	<0.5	<0.5	0	10 (ALARA)	Health
Barium Total (µg/L)	2.2	2.2	2.0-2.5	0	2,000	Health
Boron Total (µg/L)	<10	<10	<10	0	5,000	Health
Bromate (µg/L)	<10	<10	<10	0	10	Health
Bromide (µg/L)	<10	<10	<10	N/A	None	N/A
Cadmium Total (µg/L)	<0.2	<0.2	<0.2	0	7	Health
Calcium Total (µg/L)	844	835	798-919	N/A	None	N/A
Carbon Organic - Dissolved (mg/L)	1.6	1.6	1.3-2.1	N/A	None	N/A
Carbon Organic - Total (mg/L)	1.8	1.6	1.3-2.3	N/A	None	N/A
Chlorate (µg/L)	<10	150	19-370	0	1,000	Health
Chloride (mg/L)	<0.5	2.5	1.9-3.3	0	≤250	Aesthetic
Chromium Total (µg/L)	<0.05	<0.05	<0.05	0	50	Health
Cobalt Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Colour - Apparent (ACU)	12	<2	<2-7	N/A	None	N/A
Colour - True (TCU)	9	<1	<1-4	0	≤15	Aesthetic
Conductivity (µmhos/cm)	8	51	46-55	N/A	None	N/A
Copper Total (µg/L)	<0.5	<0.5	<0.5	0	2,000/1,000	Aesthetic
Cyanide Total (mg/L)	<0.02	<0.02	<0.02	0	0.2	Health
Cyanobacterial Toxins – Microcystin – LR (µg/L)	<0.20	N/A	N/A	0	1.5	Health
Fluoride (mg/L)	<0.05	<0.05	<0.05	0	1.5	Health
Haloacetic Acids Total (µg/L)	<1	8	5-16	0	80 (ALARA)	Health
Hardness as $CaCO_3$ (mg/L)	2.5	2.5	2.3-2.7	N/A	None	N/A
Iron Dissolved (µg/L)	14	15	9-26	N/A	None	N/A
Iron Total (µg/L)	48	46	26-276	0	≤300	Aesthetic
Lead Total (µg/L)	<0.5	<0.5	<0.5	0	5 (ALARA)	Health
Magnesium Total (µg/L)	95	95	82-103	N/A	None	N/A
Manganese Dissolved (µg/L)	3.5	2.5	1.7-3.5	N/A	None	N/A
Manganese Total (µg/L)	4.1	3.2	2.3-4.3	0	120/20	Aesthetic
Mercury Total (µg/L)	<0.05	<0.05	<0.05	0	1	Health
Molybdenum Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Nickel Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Nitrogen - Ammonia as N (mg/L)	<0.02	<0.02	<0.02	N/A	None	N/A
Nitrogen - Nitrate as N (mg/L)	0.07	0.07	0.05-0.09	0	10	Health
Nitrogen - Nitrite as N (mg/L)	<0.01	<0.01	<0.01	0	1	Health
pH (pH units)	6.3	8.3	7.7-8.7	0	7.0-10.5	Aesthetic
Phenol (mg/L)	<0.005	<0.005	<0.005	N/A	None	N/A
Potassium Total (µg/L)	120	121	114-132	N/A	None	N/A
Residue Total (mg/L)	13	37	33-44	N/A	None	N/A
Residue Total Dissolved (TDS) (mg/L)	10	40	30-40	0	≤500	Aesthetic
Residue Total Fixed (mg/L)	7	25	21-27	N/A	None	N/A
Residue Total Volatile (mg/L)	6	12	10-17	N/A	None	N/A
Selenium Total (µg/L)	<0.5	<0.5	<0.5	0	50	Health
Silica as SiO_2 (mg/L)	2.6	2.6	2.4-2.8	N/A	None	N/A
Silver Total (µg/L)	<0.5	<0.5	<0.5	N/A	None	N/A
Sodium Total (µg/L)	461	10,500	9,500-11,300	0	≤200,000	Aesthetic
Trihalomethanes Total (µg/L)	<4	7.4	4-14	0	100	Health
Turbidity (NTU)	0.57	0.51	0.13-10	N/A	None[4]	N/A
Uranium Total (µg/L)	<0.5	<0.5	<0.5	0	20	Health
UV Absorbance 254 nm (Abs/cm)	0.063	0.019	0.015-0.048	N/A	None	N/A
Zinc Total (µg/L)	<3	<3	<3	0	≤5,000	Aesthetic

[1]Untreated water is sampled from the source intake.
[2]Treated water is sampled prior to entering the Coquitlam transmission system.
[3]Limits are taken from the *Guidelines for Canadian Drinking Water Quality*.
[4] *Guidelines for Canadian Drinking Water Quality* recommends that water entering the distribution system have turbidity levels of 1.0 NTU or less.

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Appendix C — Analysis of Water for Organic Components and Radionuclides

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Analysis of Source Waters for Herbicides, Pesticides, and other Organic Compounds

Parameter	Capilano (µg/L) June 4	Seymour (µg/L) June 4	Coquitlam (µg/L) June 4	MAC (µg/L)	AO (µg/L)
Herbicides					
2,4-Dichlorophenoxyacetic acid (2,4-D)	<1.0	<1.0	<1.0	100	None
Bromoxynil	<0.50	<0.50	<0.50	30	None
Dicamba	<1.0	<1.0	<1.0	110	None
Diclofop-methyl	<0.90	<0.90	<0.90	None	None
Diquat	<7.0	<7.0	<7.0	50	None
Diuron	<10	<10	<10	None	None
Glyphosate	<10	<10	<10	280	None
4-Chloro-2-methylphenoxyacetic acid (MCPA)	<10	<10	<10	350	None
Metribuzin (Sencor)	<5.0	<5.0	<5.0	80	None
Paraquat	<1.0	<1.0	<1.0	None	None
Picloram	<5.0	<5.0	<5.0	None	None
Pesticides					
Atrazine	<0.50	<0.50	<0.50	5	None
Carbaryl	<5.0	<5.0	<5.0	None	None
Carbofuran	<5.0	<5.0	<5.0	None	None
Chlorpyrifos (Dursban)	<1.0	<1.0	<1.0	90	None
Diazinon	<1.0	<1.0	<1.0	None	None
Dimethoate	<2.5	<2.5	<2.5	20	None
Guthion (Azinphos-methyl)	<2.0	<2.0	<2.0	None	None
Malathion	<5.0	<5.0	<5.0	290	None
Metolachlor	<0.50	<0.50	<0.50	None	None
Phorate (Thimet)	<0.50	<0.50	<0.50	None	None
Simazine	<1.0	<1.0	<1.0	None	None
Terbufos	<0.50	<0.50	<0.50	None	None
Trifluralin	<1.0	<1.0	<1.0	None	None
Other Organic Compounds					
Phenolics					
2,3,4,6-tetrachlorophenol	<0.50	<0.50	<0.50	None	None
2,4,6-trichlorophenol	<0.50	<0.50	<0.50	5	≤2
2,4-dichlorophenol	<0.25	<0.25	<0.25	None	None
Pentachlorophenol	<0.50	<0.50	<0.50	60	≤30

Analysis of Source Waters for Herbicides, Pesticides, and other Organic Compounds Continued

Parameter	Capilano (µg/L)	Seymour (µg/L)	Coquitlam (µg/L)	MAC (µg/L)	AO (µg/L)
	June 4	June 4	June 4		
Volatile Organics					
1,1-dichloroethene	<0.50	<0.50	<0.50	None	None
1,2-dichlorobenzene	<0.50	<0.50	<0.50	None	None
1,2-dichloroethane	<0.50	<0.50	<0.50	5	None
1,4-dichlorobenzene	<0.50	<0.50	<0.50	5	≤1
Benzene	<0.40	<0.40	<0.40	5	None
Carbon tetrachloride	<0.50	<0.50	<0.50	2	None
Chlorobenzene	<0.50	<0.50	<0.50	None	None
Dibromomethane	<0.90	<0.90	<0.90	None	None
Dichloromethane	<2.0	<2.0	<2.0	50	None
Ethylbenzene	<0.40	<0.40	<0.40	140	1.6
Methyl-tert-butylether (MTBE)	<4.0	<4.0	<4.0	None	≤15
Tetrachloroethene	<0.50	<0.50	<0.50	10	None
Toluene	<0.40	<0.40	<0.40	60	24
Trichloroethene	<0.50	<0.50	<0.50	5	None
Vinyl chloride	<0.50	<0.50	<0.50	2 (ALARA)	None
m & p-Xylene	<0.40	<0.40	<0.40	None	None
o-Xylene	<0.40	<0.40	<0.40	None	None
Xylenes (Total)	<0.40	<0.40	<0.40	90	20
Miscellaneous					
Nitrilotriacetic acid (NTA) (mg/L)	<0.050	<0.050	<0.050	0.4 mg/L	None
N-Nitrosodimethylamine (NDMA) (ng/L)	<1.9	<1.9	<1.9	40 ng/L	None

Monitoring of Selected GVWD Water Mains for BTEX

Parameter	Maple Ridge Main (µg/L)		Barnston Island Main at Willoughby Pump Station (µg/L)		Jericho Clayton Main (µg/L)		South Burnaby Main No. 2 (µg/L)		MAC (µg/L)	AO (µg/L)
	Jun 10	Nov 28	Jun 14	Dec 10	Jun 14	Nov 21	Jun 11	Dec 4		
Benzene	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	None
Ethyl Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	140	1.6
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	60	24
m & p-Xylene	<1	<1	<1	<1	<1	<1	<1	<1	None	None
o-Xylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	None	None
Total Xylenes	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	90	20
Total BTEX	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	None	None

Analysis of Source Water for PAHs

Parameter	Capilano (µg/L)			Seymour (µg/L)			Coquitlam (µg/L)		
	April 16	June 4	Sept 17	April 15	June 4	Sept 23	Apr 16	June 4	Sept 17
1-Methylnaphthalene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
2-Methylnaphthalene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acridine	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene[1]	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b&j)fluoranthene	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Benzo(g,h,i)perylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Dibenz(a,h)anthracene	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Fluoranthene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Naphthalene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Pyrene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Quinoline	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total PAHs	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

[1]Benzo(a)pyrene is the only PAH compound that has a GCDWQ limit. Maximum Acceptable Concentration of Benzo(a)pyrene is 0.04 µg/L.

Analysis of Selected GVWD Mains for PAHs

Parameters	Coquitlam Main No. 2 (µg/L)		Westburnco Reservoir (µg/L)		Barnston Island Main (µg/L)		Annacis Main No. 4 (µg/L)		Whalley - Kennedy Link Main (µg/L)		Haney Main No. 2 (µg/L)		36 Ave. Main (µg/L)	
	Apr 17	Sept 15	April 15	Sept 16	April 17	Sept 18	Apr 18	Sept 19	Apr 15	Sept 17	April 16	Sept 19	Apr 16	Sept 19
1-Methylnaphthalene	<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
2-Methylnaphthalene	<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
Acenaphthene	<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
Acenaphthylene	<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
Acridine	<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
Anthracene	<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
Benz[a]anthracene	<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
Benzo[a]pyrene	<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
Benzo[b+j]fluoranthene	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Benzo[g,h,i]perylene	<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
Benzo[k]fluoranthene	<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
Chrysene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Dibenz[a,h]anthracene	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Fluoranthene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	<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
Indeno[1,2,3-c,d]pyrene	<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
Naphthalene	<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
Phenanthrene	<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
Pyrene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Quinoline	<0.020	<0.020	<0.020	<0.020	<0.020	0.022	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.032
Total PAHs	<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

[1]Benzo(a)pyrene is the only PAH compound that has a GCDWQ limit. Maximum Acceptable Concentration of Benzo(a)pyrene is 0.04 µg/L.

Analysis of Source Water for Radionuclides

Parameter	Capilano (Bq/L)	Seymour (Bq/L)	Coquitlam (Bq/L)	MAC (Bq/L)
	Nov 21	Nov 21	Nov 21	
Gross Alpha	<0.10	<0.10	<0.10	0.5
Gross Beta	<0.10	<0.10	<0.10	1
Cesium-134	<1	<1	<1	None
Cesium-137	<1	<1	<1	10
Iodine-131	<1	<1	<1	6
Lead-210	<0.10	<0.10	<0.10	0.2
Manganese-54	<1	<1	<1	None
Radium-226	<0.010	<0.010	<0.010	0.5
Radon-222	<10	<10	<10	None
Strontium-90	<0.10	<0.10	<0.10	5
Tritium	<20	<20	<20	7,000
Zinc-65	<1	<1	<1	None

Analysis of Source Water for PFAS

Analysis	Units	Capilano		Seymour		Coquitlam	
		Untreated	Treated	Untreated	Treated	Untreated	Treated
		21-Nov	21-Nov	21-Nov	21-Nov	21-Nov	21-Nov
11CL-PF3OUDS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
4:2 FTS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
6:2 FTS	ng/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
8:2 FTS	ng/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
9Cl-PF3ONS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ADONA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
HFPO-DA	ng/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
NFDHA	ng/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
PFBA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFBS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFDA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFDoA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFEESA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFHpA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFHpS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFHxA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFHxS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFMBA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFMPA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFNA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFOA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFOS	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFPEA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFPes	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
PFUnA	ng/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Appendix D — Metro Vancouver Detection of Waterborne *Cryptosporidium* and *Giardia* Annual Report January – December 2024

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Metro Vancouver
Detection of Waterborne *Cryptosporidium* and *Giardia*

Annual Report
January - December 2024

February 2025

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Environmental Microbiology
BCCDC Public Health Laboratory
Provincial Health Services Authority

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Metro Vancouver
Detection of Waterborne *Cryptosporidium and Giardia*
Annual Report, January - December 2024

Purpose

To detect and quantify *Cryptosporidium* oocysts and *Giardia* cysts from Metro Vancouver reservoirs (Capilano, Coquitlam and Seymour), as well as from the Recycled Clarified Water (RCW) from Seymour-Capilano Filtration Plant (SCFP).

Introduction

On behalf of Metro Vancouver, the Environmental Microbiology Laboratory at BCCDC Public Health Laboratory (BCCDC PHL) examined the source water of Capilano, Coquitlam and Seymour reservoirs, as well as Recycled Clarified Water (RCW) at the Seymour-Capilano Filtration Plant (SCFP) for the presence of *Cryptosporidium* oocysts and *Giardia* cysts under the waterborne parasite surveillance program. All sample collection, testing, analysis and reporting occurred on a monthly basis using a validated method.

Methods

All testing was performed at the Environmental Microbiology Laboratory at BCCDC PHL, conforming to the United States Environmental Protection Agency (USEPA) Method 1623.1: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA (4) for the detection of oocysts and cysts in water. As stated by Method 1623.1, the performance is based on the method applicable for the quantification of *Cryptosporidium* and *Giardia* in aqueous matrices. It requires the filtration of a large volume of water, elution off the filter, and immunomagnetic separation (IMS) to concentrate and purify the oocysts and cysts from sample material captured. After the IMS purification, immunofluorescence microscopy was performed to identify and enumerate oocysts and cysts. 4’-6-diamidino-2-phenylindole staining (DAPI) and differential interference contrast microscopy (DIC) are used to confirm internal structures of the cysts and oocysts.

Raw water samples were collected by Metro Vancouver at specific sampling sites at the reservoirs and filtration plants on the scheduled date each month. Water samples were filtered in the field using Pall Life Science Envirochek high volume (HV) filters. After collection/filtration, the Envirochek HV filters were transported to the Environmental Microbiology Laboratory at BCCDC PHL, where they were processed and analysed within 96 hours. Positive and negative controls were included for the entire process to assess the performance of the method. Matrix spike testing was also performed annually, at scheduled collection periods, for baseline assessment.

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Results & Discussion

In 2024, 48 Envirochek HV sample filters were submitted and examined in total:

- 12 from Capilano Reservoir
- 12 from Coquitlam Reservoir
- 12 from SCFP-RCW
- 12 from Seymour Reservoir

Table 1 and Figures 1 to 4 show the summary of all results. Detailed results per collection site can be found in Tables A1-A4 in Appendix A.

Table 1. Metro Vancouver Filter Result Summary in 2024

	Capilano Reservoir		Coquilam Reservoir		Seymour Capilano Filtration		Seymour Reservoir	
# of Filter Tested	12		12		12		12	
Average volume (L) Filtered per Month	50.0		50.0		149.0		50.0	
Average Detection Limit (oo)cysts per 100 L	2.54		2.00		0.99		2.62	
	Cryptosporidium	*Giardia*	*Cryptosporidium*	*Giardia*	*Cryptosporidium*	*Giardia*	*Cryptosporidium*	*Giardia*
# Positive Filters	0	1	0	0	0	0	0	3
% Positive Filters	0%	8%	0%	0%	0%	0%	0%	25%
Max Count (oo)cysts per 100 L	0	4	0	0	0	0	0	6

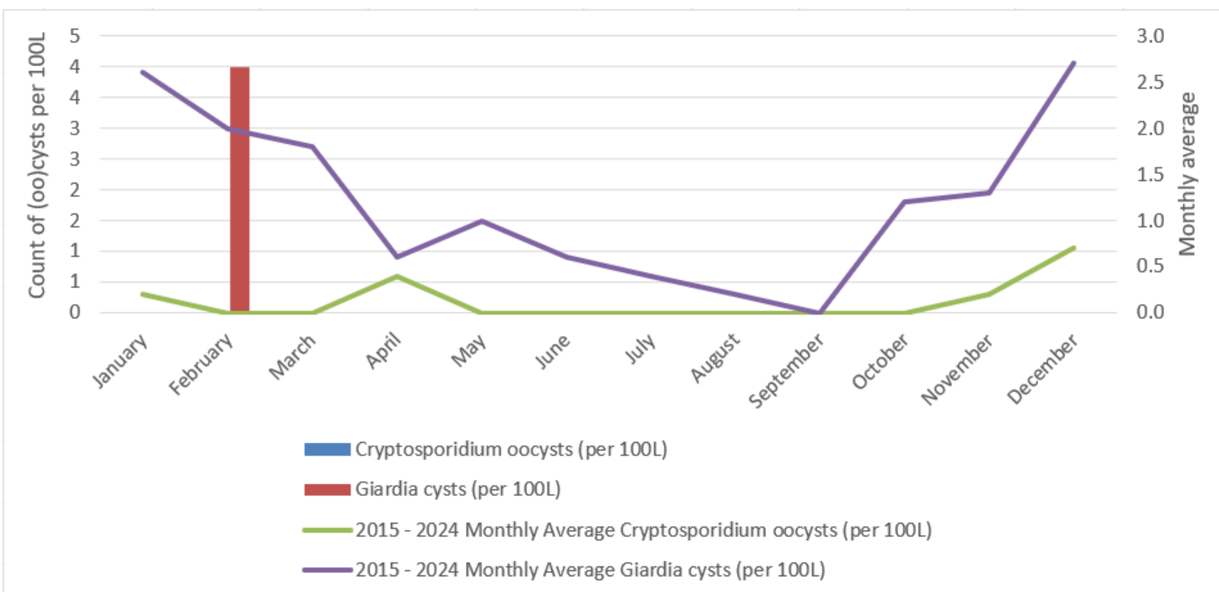

Figure 1. Capilano Reservoir *Cryptosporidium* Oocysts and *Giardia* Cysts Counts per 100 Litres of Raw Water in 2024

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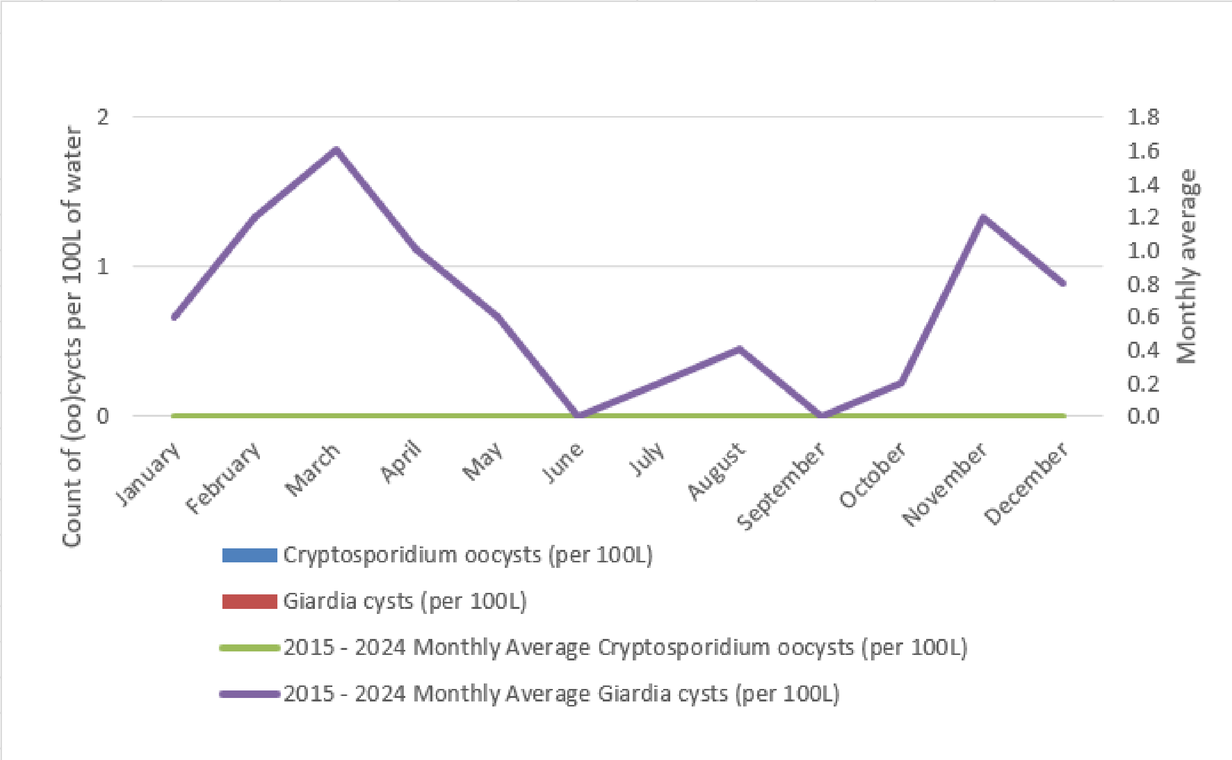

Figure 2: Coquitlam Reservoir *Cryptosporidium* Oocysts and *Giardia* Cysts Counts per 100 Litres of Raw Water in 2024

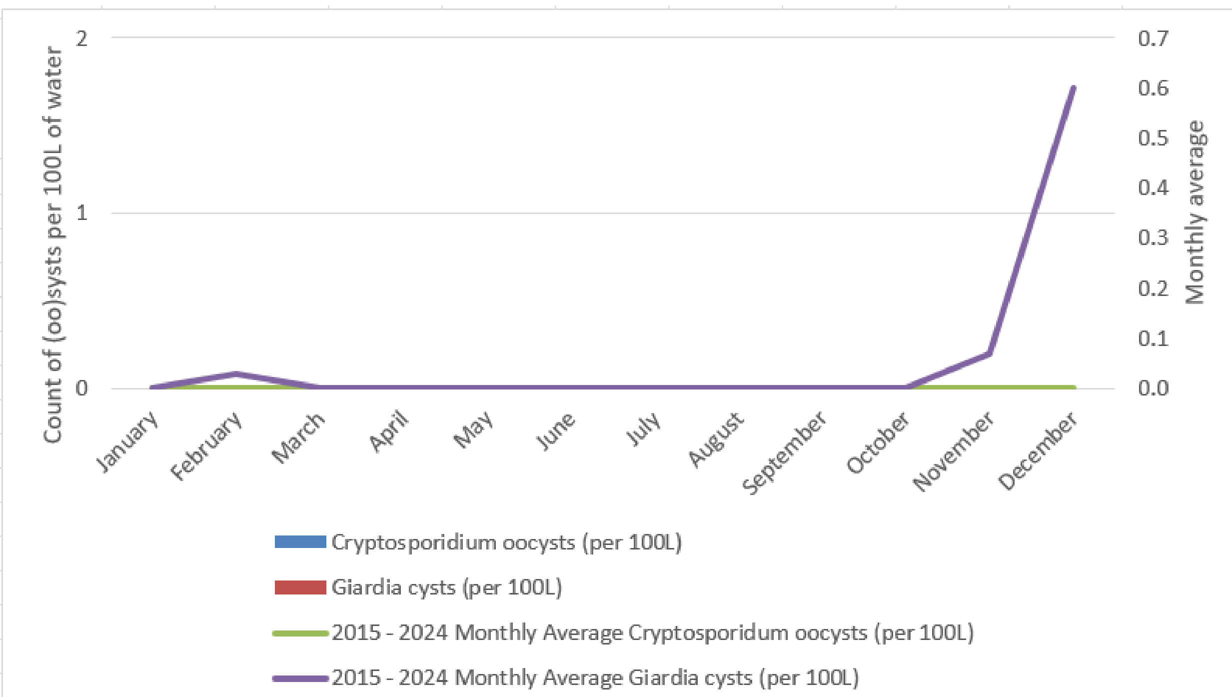

Figure 3: Seymour Capilano Filtration Plant - Recycled Clarified Water *Cryptosporidium* Oocysts and *Giardia* Cysts Counts per 100 Litres of Raw Water in 2024

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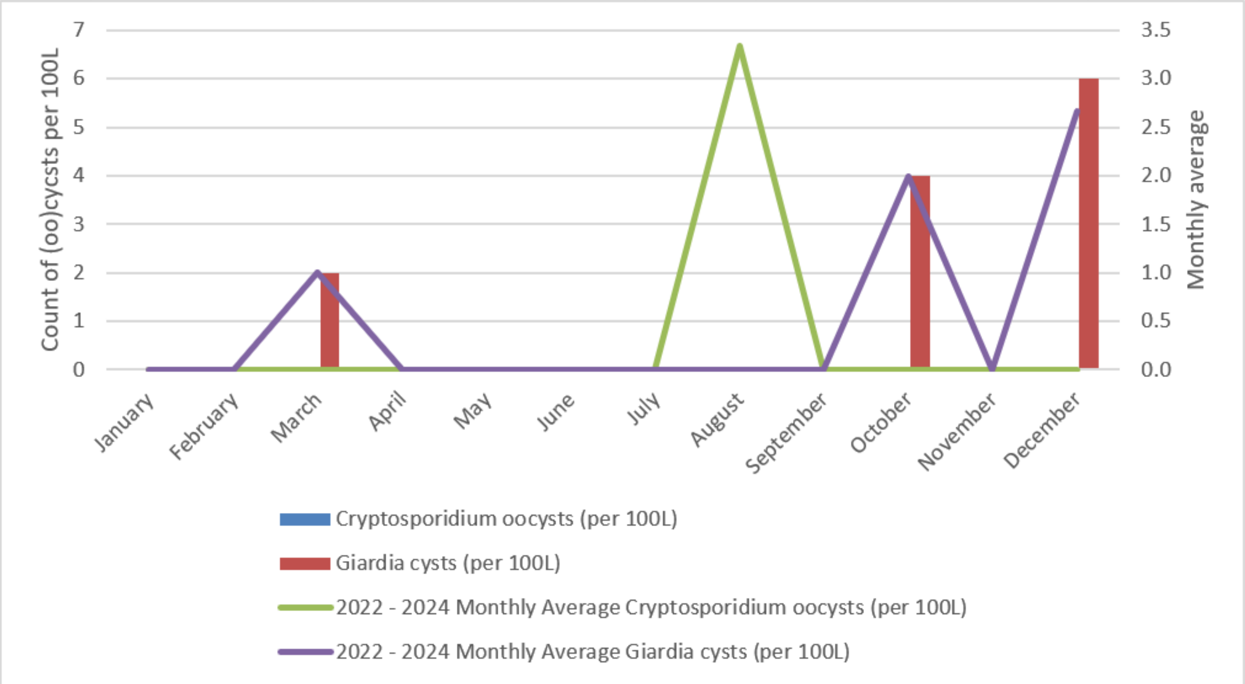

Figure 4: Seymour Reservoir *Cryptosporidium* Oocysts and *Giardia* Cysts Counts per 100 Litres of Raw Water in 2024
Note: Monthly average calculations start from July 2022.

Summaries of the morphological results are listed in Tables 2 and 3. Detailed results for every identified cyst and oocyst are found in Tables A5-A12 in Appendix A.

Table 2. 2024 Summary of morphological results for *Cryptosporidium* oocysts observed under fluorescence microscope

Site	Count of oocysts	DAPI -	DAPI +		DIC		
		Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Nuclei stained sky blue	Empty oocysts	Oocysts with amorphous structure	Oocysts with internal structure, sporozoites
Capilano	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coquitlam	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
SCFP-RCW	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Seymour	0	0	0	0	0	1	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 3: 2024 Summary of morphological results for *Giardia* cysts observed under fluorescence microscope

Site	Count of cysts	DAPI -	DAPI +		DIC				
		Light blue internal staining, no distinct	Intense blue internal staining	Nuclei stained sky blue	Empty cysts	Cysts with amorphous structure	Cysts with internal structure		
							Nuclei	Median Body	Axoneme
Capilano	1	0	1	0	0	1	0	0	0
		0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
Coquitlam	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
SCFP-RCW	0	0	0	0	0	0	0	0	0
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Seymour	3	3	0	0	1	2	0	0	0
		100.0%	0.0%	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%

Both DAPI and DIC microscopy are used for confirmation of the internal structures of *Cryptosporidium* oocysts and *Giardia* cysts. DAPI staining is also used as an indicator of cyst/oocyst integrity by staining nucleic DNA. The absence of nuclei is indicative of an aged, damaged or non-infective cell. Most oocysts and cysts observed across all sites had no visible nuclei indicating that they were aged and likely subjected to environmental degradation (Table 4). However, these oocysts/cysts were likely previously in an infective state. DIC microscopy serves as an indicator of oocysts/cysts cytoplasm and cell wall integrity. While no median body (or axoneme) was observed for all *Giardia* cysts detected, the cytoplasm was observed in the majority, indicating that the cysts were not empty and could have been viable.

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Table 4: 2023 Number of nuclei in each *Cryptosporidium* oocysts and *Giardia* cysts.
*DAPI negative or only intense blue internal staining.

Number of Nuclei per (oo)cyst	0*	1	2	3	4	Total # of (oo)cyst
***Cryptosporidium* oocysts**						
Capilano	0	0	0	0	0	0
Coquitlam	0	0	0	0	0	0
SCFP-RCW	0	0	0	0	0	0
Seymour	0	0	0	0	0	0
***Giardia* cysts**						
Capilano	1	0	0	0	0	1
Coquitlam	0	0	0	0	0	0
SCFP-RCW	0	0	0	0	0	0
Seymour	3	0	0	0	0	3

Due to the variations of water chemistry and organic matters between geographical area and temporally within each sampling sites, a matrix spike is performed annually to provide recovery rate estimation from each site. The results of the matrix spike recovery (2007-2024) are compiled in Table 5. Matrix recovery rates fluctuate from year-to-year, even within each site. This variation is not uncommon for the test and has been noted in USEPA's Method 1623.1.

Matrix testing in 2024 was performed in the summer and fall/winter for each site. 50L were provided from each site and the percentage recovery for *Cryptosporidium* oocysts and *Giardia* cysts and were noted in Table 5.

Table 5: Matrix recovery results from 2007 – 2024.

Year	Capilano		Coquitlam		SCFP - Recycled Clarified Water		Seymour	
	Cryptosporidium % Recovery	*Giardia* % Recovery	*Cryptosporidium* % Recovery	*Giardia* % Recovery	*Cryptosporidium* % Recovery	*Giardia* % Recovery	*Cryptosporidium* % Recovery	*Giardia* % Recovery
2007	27.6%	37.4%	28.0%	54.0%	not collected		not collected	
2008	25.0%	55.0%	28.0%	39.0%	not collected		not collected	
2009	10.0%	40.0%	16.0%	37.0%	not collected		not collected	
2010	28.0%	43.0%	26.0%	49.0%	17.0%	13.0%	not collected	
2011	27.0%	44.0%	22.0%	47.0%	1.0%	0.0%	not collected	
2012	38.4%	76.5%	35.0%	49.0%	7.0%	13.7%	not collected	
2013	22.4%	59.4%	16.3%	64.4%	6.1%	14.9%	not collected	
2014	not collected		55.0%	39.4%	18.0%	14.1%	not collected	
2015	26.3%	40.4%	2.0%	60.6%	9.1%	26.5%	not collected	
2016	35.4%	47.5%	22.2%	50.5%	9.1%	14.0%	not collected	
2017	20.2%	38.4%	22.2%	21.2%	0.0%	2.0%	not collected	
2018	43.4%	75.8%	17.1%	59.6%	1.0%	11.1%	not collected	
2019	0.0%	43.0%	1.0%	55.0%	0.0%	4.1%	not collected	
2020	5.1%	37.4%	8.1%	59.8%	0.0%	4.0%	not collected	
2021 June	2.0%	53.0%	0.0%	35.0%	5.1%	38.0%	not collected	
2021 November	11.1%	52.0%	15.2%	80.0%	0.0%	8.0%	not collected	
2022 Summer	12.1%	17.0%	4.0%	13.0%	0.0%	11.0%	0.0%	19.0%
2022 Fall/Winter	0.0%	12.2%	5.1%	49.0%	1.0%	36.7%	not collected	
2023 Fall/Winter	0.0%	32.0%	0.0%	41.4%	0.0%	6.1%	1%	59.6%
2024 Summer	1.0%	9.2%	2.0%	41.4%	0.0%	27.3%	3.0%	37.4%
2024 Fall/Winter	0.0%	16.2%	0.0%	61.2%	0.0%	9.2%	15.1%	37.8%

Summary

In brief, we reported:

1. Positivity rates were on trend with previous years across all sites, Capilano Reservoir, Coquitlam Reservoir, SCFP-RCW and Seymour Reservoir.
2. *Cryptosporidium* oocysts were not detected from any of the four sites.
3. *Giardia* cysts were not detected from Coquitlam Reservoir or SCFP-RCW but was detected in 1 of 12 filters (8%) from Capilano and 3 of 12 filters (25%) from Seymour Reservoir.
4. The highest concentration of *Giardia* cysts detected in 2024 was 6 cysts per 100 L from Seymour reservoir in December.
5. All *Giardia* cysts detected showed evidence of environmental degradation, based on microscopic examination.
6. More data is required from Seymour Reservoir to establish reliable trends.
7. Matrix recovery for *Cryptosporidium* oocyst continued to be low, which is consistent with previous years. The additional matrix collections in the summer did not confirm

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suspected seasonality variabilities. Further summer matrix collections are recommended to continue this investigation.

These *semi-quantitative* data (reported oocyst and cyst levels) should be interpreted in the context of, and with the understanding that the current standard laboratory method, USEPA Method 1623.1, used for detecting and analysing parasites in water matrices has its limitations, with variable recovery rates depending on the water matrix and environmental conditions.

Acknowledgements

The BCCDC Public Health Laboratory thanks Metro Vancouver for their ongoing support of this program and other related projects. In particular, the assistance of Vila Goh, Eileen Butler, and Melody Sato of the Metro Vancouver, Water Quality Department are greatly appreciated.

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Appendix A

Table A1. Capilano Reservoir Monthly Filter Results in 2024

Lab #	Site Sampled	Month	Date Sampled	Volume filtered (L)	Detection Limit (per 100L)	*Cryptosporidium* oocysts (per 100L)	*Giardia* cysts (per 100L)	2015 - 2024 Monthly Average	
								Cryptosporidium oocysts (per 100L)	*Giardia* cysts (per 100L)
8405	Capilano Reservoir	January	January 15, 2024	50	<2.0	0	0	0.2	2.6
8413	Capilano Reservoir	February	February 12, 2024	50	<4.0	0	4	0.0	2.0
8420	Capilano Reservoir	March	March 18, 2024	50	<2.0	0	0	0.0	1.8
8429	Capilano Reservoir	April	April 15, 2024	50	<2.0	0	0	0.4	0.6
8440	Capilano Reservoir	May	May 13, 2024	50	<2.0	0	0	0.0	1.0
8448	Capilano Reservoir	June	June 17, 2024	50	<4.0	0	0	0.0	0.6
8456	Capilano Reservoir	July	July 15, 2024	50	<2.0	0	0	0.0	0.4
8465	Capilano Reservoir	August	August 19, 2024	50	<2.0	0	0	0.0	0.2
8474	Capilano Reservoir	September	September 16, 2024	50	<2.5	0	0	0.0	0.0
8480	Capilano Reservoir	October	October 29, 2024	50	<4.0	0	0	0.0	1.2
8488	Capilano Reservoir	November	November 18, 2024	50	<2.0	0	0	0.2	1.3
8496	Capilano Reservoir	December	December 16, 2024	50	<2.0	0	0	0.7	2.7
			2024 Average	50.0	2.54	0	0.3		

Table A2. Coquitlam Reservoir Monthly Filter Results in 2024

Lab #	Site Sampled	Month	Date Sampled	Volume filtered (L)	Detection Limit (per 100L)	*Cryptosporidium* oocysts (per 100L)	*Giardia* cysts (per 100L)	2015 - 2024 Monthly Average	
								Cryptosporidium oocysts (per 100L)	*Giardia* cysts (per 100L)
8406	Coquitlam Reservoir	January	January 15, 2024	50	<2.0	0	0	0.0	0.6
8414	Coquitlam Reservoir	February	February 12, 2024	50	<2.0	0	0	0.0	1.2
8421	Coquitlam Reservoir	March	March 18, 2024	50	<2.0	0	0	0.0	1.6
8430	Coquitlam Reservoir	April	April 15, 2024	50	<2.0	0	0	0.0	1.0
8441	Coquitlam Reservoir	May	May 13, 2024	50	<2.0	0	0	0.0	0.6
8449	Coquitlam Reservoir	June	June 17, 2024	50	<2.0	0	0	0.0	0.0
8457	Coquitlam Reservoir	July	July 15, 2024	50	<2.0	0	0	0.0	0.2
8466	Coquitlam Reservoir	August	August 19, 2024	50	<2.0	0	0	0.0	0.4
8475	Coquitlam Reservoir	September	September 16, 2024	50	<2.0	0	0	0.0	0.0
8481	Coquitlam Reservoir	October	October 29, 2024	50	<2.0	0	0	0.0	0.2
8489	Coquitlam Reservoir	November	November 18, 2024	50	<2.0	0	0	0.0	1.2
8497	Coquitlam Reservoir	December	December 16, 2024	50	<2.0	0	0	0.0	0.8
			2024 Average	50.0	2.00	0	0		

Table A3. Seymour Capilano Filtration Plant - Recycled Clarified Water (SCFP-RCW) Monthly Filter Results in 2024

Lab #	Site Sampled	Month	Date Sampled	Volume filtered (L)	Detection Limit (per 100L)	*Cryptosporidium* oocysts (per 100L)	*Giardia* cysts (per 100L)	2015 - 2024 Monthly Average	
								Cryptosporidium oocysts (per 100L)	*Giardia* cysts (per 100L)
8407	SCFP - Recycled Clarified Water	January	January 16, 2024	64.4	<1.55	0	0	0.0	0.0
8416	SCFP - Recycled Clarified Water	February	February 13, 2024	169.6	<0.59	0	0	0.0	0.0
8423	SCFP - Recycled Clarified Water	March	March 19, 2024	191.9	<0.52	0	0	0.0	0.0
8432	SCFP - Recycled Clarified Water	April	April 16, 2024	52.3	<1.9	0	0	0.0	0.0
8442	SCFP - Recycled Clarified Water	May	May 14, 2024	69.4	<1.44	0	0	0.0	0.0
8451	SCFP - Recycled Clarified Water	June	June 18, 2024	586	<0.17	0	0	0.0	0.0
8459	SCFP - Recycled Clarified Water	July	July 16, 2024	146.5	<0.68	0	0	0.0	0.0
8468	SCFP - Recycled Clarified Water	August	August 20, 2024	138.1	<0.72	0	0	0.0	0.0
8477	SCFP - Recycled Clarified Water	September	September 17, 2024	92	<1.09	0	0	0.0	0.0
8483	SCFP - Recycled Clarified Water	October	October 28, 2024	97.3	<1.0	0	0	0.0	0.0
8491	SCFP - Recycled Clarified Water	November	November 19, 2024	90	<1.1	0	0	0.0	0.1
8499	SCFP - Recycled Clarified Water	December	December 17, 2024	90.7	<1.1	0	0	0.0	0.6
			2024 Average	149.0	0.99	0	0		

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Table A4. Seymour Reservoir Monthly Filter Results in 2024. Note: Monthly average is calculated from 2022 onwards only.

Lab #	Site Sampled	Month	Date Sampled	Volume filtered (L)	Detection Limit (per 100L)	*Cryptosporidium* oocysts (per 100L)	*Giardia* cysts (per 100L)	2022 - 2024 Monthly	
								Cryptosporidium oocysts (per 100L)	*Giardia* cysts (per 100L)
8410	Seymour Reservoir	January	January 23, 2024	50	<2.0	0	0	0.0	0.0
8415	Seymour Reservoir	February	February 12, 2024	50	<2.0	0	0	0.0	0.0
8422	Seymour Reservoir	March	March 18, 2024	50	<2.0	0	2	0.0	1.0
8431	Seymour Reservoir	April	April 15, 2024	50	<2.0	0	0	0.0	0.0
8445	Seymour Reservoir	May	May 27, 2024	50	<2.0	0	0	0.0	0.0
8450	Seymour Reservoir	June	June 17, 2024	50	<1.43	0	0	0.0	0.0
8458	Seymour Reservoir	July	July 15, 2024	50	<2.0	0	0	0.0	0.0
8467	Seymour Reservoir	August	August 19, 2024	50	<2.0	0	0	3.3	0.0
8476	Seymour Reservoir	September	September 16, 2024	50	<2.0	0	0	0.0	0.0
8482	Seymour Reservoir	October	October 29, 2024	50	<4.0	0	4	0.0	2.0
8490	Seymour Reservoir	November	November 18, 2024	50	<4.0	0	0	0.0	0.0
8498	Seymour Reservoir	December	December 16, 2024	50	<6.0	0	6	0.0	2.7
			2024 Average	50.0	2.62	0	1.0		

Table A5. Capilano Reservoir Slide Examination Results - *Cryptosporidium* 2024

			Cryptosporidium								
			Cryptosporidium			DAPI -	DAPI +		DIC		
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty oocysts	Oocysts with amorphous structure	Oocysts with internal structure, Number of sporozoites
8405	Capilano Reservoir	January 14, 2024	0								
8413	Capilano Reservoir	February 11, 2024	0								
8420	Capilano Reservoir	March 17, 2024	0								
8429	Capilano Reservoir	April 14, 2024	0								
8440	Capilano Reservoir	May 12, 2024	0								
8448	Capilano Reservoir	June 16, 2024	0								
8456	Capilano Reservoir	July 14, 2024	0								
8465	Capilano Reservoir	August 18, 2024	0								
8474	Capilano Reservoir	September 15, 2024	0								
8480	Capilano Reservoir	October 29, 2024	0								
8488	Capilano Reservoir	November 17, 2024	0								
8496	Capilano Reservoir	December 15, 2024	0								

Table A6. Coquitlam Reservoir Slide Examination Results - *Cryptosporidium* 2024

Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty oocysts	Oocysts with amorphous structure	Oocysts with internal structure, Number of sporozoites
8406	Coquitlam Reservoir	January 14, 2024	0								
8414	Coquitlam Reservoir	February 11, 2024	0								
8421	Coquitlam Reservoir	March 17, 2024	0								
8430	Coquitlam Reservoir	April 14, 2024	0								
8441	Coquitlam Reservoir	May 12, 2024	0								
8449	Coquitlam Reservoir	June 16, 2024	0								
8457	Coquitlam Reservoir	July 14, 2024	0								
8466	Coquitlam Reservoir	August 18, 2024	0								
8475	Coquitlam Reservoir	September 15, 2024	0								
8481	Coquitlam Reservoir	October 29, 2024	0								
8489	Coquitlam Reservoir	November 17, 2024	0								
8497	Coquitlam Reservoir	December 15, 2024	0								

Table A7. Seymour Capilano Filtration Plant – Recycled Clarified Water Slide Examination Results - *Cryptosporidium* 2024

			Cryptosporidium								
			Cryptosporidium			DAPI -	DAPI +		DIC		
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty oocysts	Oocysts with amorphous structure	Oocysts with internal structure, Number of sporozoites
8407	SCFP - Recycled Clarified Water	January 16, 2024	0								
8416	SCFP - Recycled Clarified Water	February 13, 2024	0								
8423	SCFP - Recycled Clarified Water	March 19, 2024	0								
8432	SCFP - Recycled Clarified Water	April 16, 2024	0								
8442	SCFP - Recycled Clarified Water	May 14, 2024	0								
8451	SCFP - Recycled Clarified Water	June 18, 2024	0								
8459	SCFP - Recycled Clarified Water	July 16, 2024	0								
8468	SCFP - Recycled Clarified Water	August 20, 2024	0								
8477	SCFP - Recycled Clarified Water	September 17, 2024	0								
8483	SCFP - Recycled Clarified Water	October 28, 2024	0								
8491	SCFP - Recycled Clarified Water	November 19, 2024	0								
8499	SCFP - Recycled Clarified Water	December 17, 2024	0								

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Table A8. Seymour Reservoir Slide Examination Results - *Cryptosporidium* 2024

			Cryptosporidium								
			Cryptosporidium			DAPI -	DAPI +		DIC		
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty oocysts	Oocysts with amorphous structure	Oocysts with internal structure, Number of sporozoites
8410	Seymour Reservoir	January 21, 2024	0								
8415	Seymour Reservoir	February 11, 2024	0								
8422	Seymour Reservoir	March 17, 2024	0								
8431	Seymour Reservoir	April 14, 2024	0								
8445	Seymour Reservoir	May 26, 2024	0								
8450	Seymour Reservoir	June 16, 2024	0								
8458	Seymour Reservoir	July 14, 2024	0								
8467	Seymour Reservoir	August 18, 2024	0								
8476	Seymour Reservoir	September 15, 2024	0								
8482	Seymour Reservoir	October 29, 2024	0								
8490	Seymour Reservoir	November 17, 2024	0								
8498	Seymour Reservoir	December 15, 2024	0								

Table A9. Capilano Reservoir Slide Examination Results - *Giardia* 2024 (P = present)

			Giardia										
			Giardia			DAPI -	DAPI +		DIC				
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty cysts	Cysts with amorphous structure	Number of nuclei	Median Body	Axoneme
8405	Capilano Reservoir	January 14, 2024	0										
8413	Capilano Reservoir	February 11, 2024	#1	oval	17x9		P			P			
8420	Capilano Reservoir	March 17, 2024	0										
8429	Capilano Reservoir	April 14, 2024	0										
8440	Capilano Reservoir	May 12, 2024	0										
8448	Capilano Reservoir	June 16, 2024	0										
8456	Capilano Reservoir	July 14, 2024	0										
8465	Capilano Reservoir	August 18, 2024	0										
8474	Capilano Reservoir	September 15, 2024	0										
8480	Capilano Reservoir	October 29, 2024	0										
8488	Capilano Reservoir	November 17, 2024	0										
8496	Capilano Reservoir	December 15, 2024	0										

Table A10. Coquitlam Reservoir Slide Examination Results - *Giardia* 2024 (P = present)

			Giardia										
			Giardia			DAPI -	DAPI +		DIC				
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty cysts	Cysts with amorphous structure	Number of nuclei	Median Body	Axoneme
8406	Coquitlam Reservoir	January 14, 2024	0										
8414	Coquitlam Reservoir	February 11, 2024	0										
8421	Coquitlam Reservoir	March 17, 2024	0										
8430	Coquitlam Reservoir	April 14, 2024	0										
8441	Coquitlam Reservoir	May 12, 2024	0										
8449	Coquitlam Reservoir	June 16, 2024	0										
8457	Coquitlam Reservoir	July 14, 2024	0										
8466	Coquitlam Reservoir	August 18, 2024	0										
8475	Coquitlam Reservoir	September 15, 2024	0										
8481	Coquitlam Reservoir	October 29, 2024	0										
8489	Coquitlam Reservoir	November 17, 2024	0										
8497	Coquitlam Reservoir	December 15, 2024	0										

Table A11. Seymour Capilano Filtration Plant – Recycled Clarified Water Slide Examination Results - *Giardia* 2024

			Giardia										
			Giardia			DAPI -	DAPI +		DIC				
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty cysts	Cysts with amorphous structure	Number of nuclei	Median Body	Axoneme
8407	SCFP - Recycled Clarified Water	January 16, 2024	0										
8416	SCFP - Recycled Clarified Water	February 13, 2024	0										
8423	SCFP - Recycled Clarified Water	March 19, 2024	0										
8432	SCFP - Recycled Clarified Water	April 16, 2024	0										
8442	SCFP - Recycled Clarified Water	May 14, 2024	0										
8451	SCFP - Recycled Clarified Water	June 18, 2024	0										
8459	SCFP - Recycled Clarified Water	July 16, 2024											
8459	SCFP - Recycled Clarified Water	July 16, 2024	0										
8468	SCFP - Recycled Clarified Water	August 20, 2024	0										
8477	SCFP - Recycled Clarified Water	September 17, 2024	0										
8483	SCFP - Recycled Clarified Water	October 28, 2024	0										
8491	SCFP - Recycled Clarified Water	November 19, 2024	0										
8499	SCFP - Recycled Clarified Water	December 17, 2024	0										

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BCCDC Public Health Lab

BC Centre for Disease Control
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Table A12. Seymour Reservoir Slide Examination Results - *Giardia* 2024

			Giardia										
			Giardia			DAPI -	DAPI +		DIC				
Lab #	Site name	Date sampled	Object located by FA	Shape (oval or round)	Size L x W (µm)	Light blue internal staining, no distinct nuclei, green rim	Intense blue internal staining	Number of nuclei stained sky blue	Empty cysts	Cysts with amorphous structure	Number of nuclei	Median Body	Axoneme
8410	Seymour Reservoir	January 21, 2024	0										
8415	Seymour Reservoir	February 11, 2024	0										
8422	Seymour Reservoir	March 17, 2024	1	oval	13x10	p			p				
8431	Seymour Reservoir	April 14, 2024	0										
8445	Seymour Reservoir	May 26, 2024	0										
8450	Seymour Reservoir	June 16, 2024	0										
8458	Seymour Reservoir	July 14, 2024	0										
8467	Seymour Reservoir	August 18, 2024	0										
8476	Seymour Reservoir	September 15, 2024	0										
8482	Seymour Reservoir	October 29, 2024	#1	oval	10x7	P				P			
8490	Seymour Reservoir	November 17, 2024	0										
8498	Seymour Reservoir	December 15, 2024	#1	OVAL	13X9	P				P			

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Water Committee

From: Shellee Ritzman, Division Manager, Corporate Communications
Dana Carlson, Project Coordinator, Corporate Communications

Date: April 2, 2025 Meeting Date: April 16, 2025

Subject: **Drinking Water Conservation Plan: 2025 Communications and Public Outreach**

RECOMMENDATION
That the Water Committee receive for information the report dated April 2, 2025, titled "Drinking Water Conservation Plan: 2025 Communications and Public Outreach."

EXECUTIVE SUMMARY
Metro Vancouver's annual water conservation communications educates residents on the value of drinking water and prompts behaviour change to reduce overall demand. Metro Vancouver began communicating about the Stage 1 water restrictions that come into effect on May 1, beginning the week of March 24. Promotional materials are distributed to member jurisdictions to support public education and enforcement programs. In addition to education, consistent enforcement of the water restrictions across the region is essential to ensure compliance. Enforcement of the restrictions, though local bylaws, is a responsibility of the member jurisdictions.

Within the context of an increasing population combined with unpredictable weather impacts related to climate change, the "It's All Drinking Water" campaign encourages mindful water use to ensure that drinking water is available all season long for where it's needed most: drinking, cooking, and cleaning.

PURPOSE
To update the Water Committee on regional communications to support the 2025 water restrictions, water conservation campaign, and Water Wagon program.

BACKGROUND
Successful conservation of drinking water in the high demand season of May to October relies on both education and enforcement initiatives. Metro Vancouver's water conservation communications support public education of the *Drinking Water Conservation Plan* and *Water Supply Outlook 2120* through three complementary initiatives:

- Water restrictions: remind and educate residents about the annual restrictions
- Water conservation campaign: reduce outdoor use of treated drinking water
- Water Wagon outreach: promote the region's high-quality drinking water

Metro Vancouver, in collaboration with the member jurisdictions of the Greater Vancouver Water District, provides high-quality drinking water to over 3 million residents and associated businesses, institutions, and industries in the region. The member jurisdictions have an important role to play in enforcement of the Drinking Water Conservation Plan restrictions.

Collectively, Metro Vancouver's residents and businesses use an average of 1 billion litres of drinking water per day. Population growth combined with climate change will continue to impact the drinking water supply and system. Water conservation is key to managing the water supply, especially in the summer months when demand can increase by 50 per cent, up to over 1.5 billion litres of drinking water per day, due to increased outdoor water use such as lawn watering.

Public education encouraging behaviour change along with enforcement of the annual water restrictions helps ensure the growing region will have drinking water for where it is needed most: drinking, cooking, and cleaning.

WATER CONSERVATION COMMUNICATIONS

The water restrictions promotion and water conservation campaign work in tandem to reduce the overall demand for drinking water.

Approach and Timing

Metro Vancouver brings awareness to the annual outdoor water use restrictions that are in effect from May 1 to October 15 by:

- Distributed water restriction information to industry stakeholders the week of March 24
- Supplied promotional materials to member jurisdictions the week of March 24
- Issued a media release April 4 and another when restrictions begin May 1
- Alerting the public of the restrictions via social media from April through October 15
- Sending a direct mail postcard the week of July 1
- Running paid media placements June 23 to September 1

Water Restrictions Communications

The communication materials that Metro Vancouver makes available to member jurisdictions supplements the members' public education and bylaw enforcement programs. Items include social media, posters, rack cards, door hangers, translated items, and other materials upon request. A direct mail postcard outlines the lawn watering restrictions and conservation tips and is delivered to single-family houses and townhomes — which typically have lawns — across the region. All materials lead to the water restrictions web page, metrovancouver.org/lawns (Reference 1).

Water Conservation Campaign

The water conservation campaign, "It's All Drinking Water," reminds residents that Metro Vancouver's treated, high-quality drinking water is a precious resource that is not to be wasted. Combined with key messaging "Water one hour a week for a healthy lawn," and water conservation tips such as "Let your lawn go dormant," the campaign places conservation top of mind for residents, who play a critical role ensuring drinking water lasts through the summer and into the fall.

The campaign will launch in June. The paid media placements as part of the water conservation campaign typically include digital (e.g., display ads, social media), outdoor (e.g., billboards, transit shelter ads), and broadcast (e.g., radio, television).

Two secondary social media promotions round out water conservation communications:

- A spring promotion about the source of Metro Vancouver's drinking water to increase awareness of Metro Vancouver's drinking water system
- Spring and fall maintenance tips to help lawns thrive with less water in the summer

All promotional materials lead to the campaign website, www.itsalldrinkingwater.ca (Reference 2) for lawn watering restrictions information, lawn care tips, water conservation tips, and information about Metro Vancouver water sources and system. See Attachment 1 for examples of promotional material supporting these initiatives.

Water Wagon

The Water Wagon provides free water bottle refills at community events across the region at no charge to event organizers. Outreach staff engage residents through displays to highlight the water system, promote the region's high-quality drinking water, and reduce single-use bottled water.

Starting in March, members can request the wagon for their events. Unclaimed dates/weekends will be available to other community requests. The Water Wagon will be engaged for approximately 35 event days, plus an additional 15 days at Metro Vancouver's exhibit at the PNE Fair.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The 2025 water restrictions communications, water conservation campaign, and Water Wagon program have a total budget of $563,469. These costs are included in the 2025 Water Services communication program budget managed by External Relations.

CONCLUSION

Metro Vancouver supports the annual water restrictions with communications including materials for member jurisdictions and media releases, followed by social media. The conservation campaign will launch in June. The Water Wagon will be engaged for approximately 35 event days, plus an additional 15 days at the PNE Fair to promote the region's high-quality tap water and reduce single-use bottled water.

ATTACHMENT

1. Water Conservation Communications and Public Outreach Materials Examples.

REFERENCES

1. Metro Vancouver. (2025). *Lawn watering restrictions*. Retrieved March 24, 2025, from https://www.metrovancouver.org/lawns.
2. Metro Vancouver. (n.d.). *It's All Drinking Water*. https://www.itsalldrinkingwater.ca.

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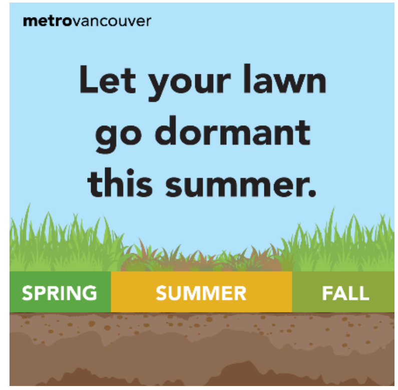
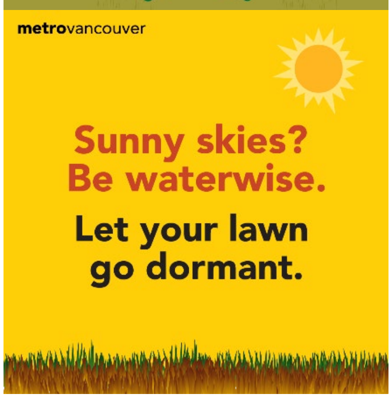
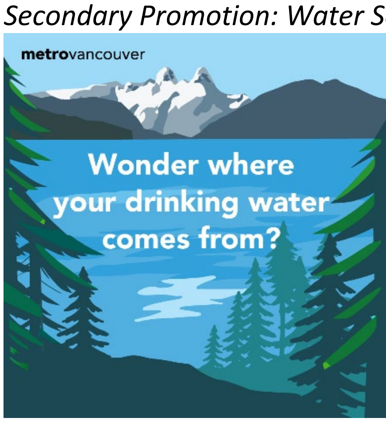
2025 Water Conservation Communications and Public Outreach Materials – Examples

Primary Promotion: Water Conservation Campaign

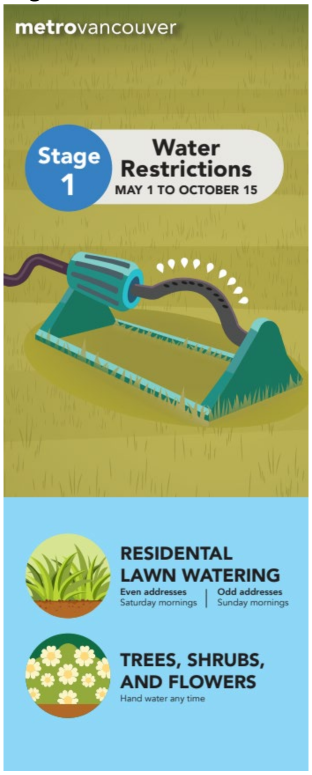




Secondary Promotion: Water Source and Seasonal (Spring/Fall) Lawn Care



Stage 1 Water Restrictions



Rack Card Front

Rack Card Back

Social Media Story Image

Postcard Front

Postcard Back

To: Water Committee

From: Marilyn Towill, General Manager, Water Services

Date: April 1, 2025 Meeting Date: April 16, 2025

Subject: **Manager's Report**

RECOMMENDATION

That the Water Committee receive for information the report dated April 1, 2025, titled "Manager's Report".

1. Water Main Break in New Westminster: Response and Recovery

On February 13, 2025, at approximately 11:30 p.m., a water main break occurred in New Westminster, resulting in significant flooding, evacuations, property damage, and temporary road closures. Metro Vancouver crews worked closely with the City of New Westminster and emergency responders to mitigate impacts and restore services.

Metro Vancouver was notified shortly after midnight on February 14 and arrived on-site by 1:30 a.m. Staff immediately began coordinating an isolation strategy with New Westminster staff. Isolation efforts began at approximately 4:00 am and involved manually and remotely operating valves from both Metro Vancouver and New Westminster's systems. The process required the gradual closure of a dozen large-diameter Metro Vancouver valves across a 12-kilometer stretch, along with five key New Westminster connection valves. Full isolation was achieved by 11:30 am on February 14.

The affected water main, Sapperton Main No. 1, is a 36-inch welded steel pipe installed in the early 1960s. Repairs to the damaged section of the water main are now complete, and the main has been restored to normal service. In addition to the repairs, Metro Vancouver engaged experts to assess adjacent sections of the water main for potential damage and areas of concern. These experts are also conducting a detailed causation analysis on the removed section of the pipe. The findings from this analysis will help inform future maintenance strategies and infrastructure planning.

Sapperton Main No. 1 was previously considered to be in generally good condition, with an estimated 40 years of useful life remaining. The cause of the break remains under investigation, and Metro Vancouver will provide updates as more information becomes available. This incident highlights the significant impact of infrastructure failures and underscores the importance of continued investment in the region's aging water infrastructure.

2. 2025 Water Committee Work Plan

ATTACHMENT:

1. 2025 Water Committee Work Plan.

Water Committee 2025 Work Plan

Report Date: April 16, 2025

Priorities

1st Quarter	**Status**
Advancing Water Metering in the Region	Pending
Water Supply Area Fisheries Initiatives Annual Update	Completed
Contract Approvals as per the *Procurement and Asset Disposal Authority* Policy	Completed
Transaction Approvals as per the *Real Estate Authority* Policy	Completed
Water Policies (as applicable)	Completed
2nd Quarter	
2024 Year End Financial Performance Results Review	Pending
Coquitlam Water Main Project Update	Pending
GVWD 2024 Dam Safety Program Annual Update	Pending
GVWD 2024 Water Supply System Annual Update	In Progress
GVWD 2024 Water Quality Annual Report	In Progress
Implications of Increased Population on Water Utility Planning	Pending
Water Supply Update for Summer 2025	Pending
Wildfire Preparedness Update	Pending
Contract Approvals as per the *Procurement and Asset Disposal Authority* Policy	In Progress
Transaction Approvals as per the *Real Estate Authority* Policy	In Progress
Water Policies (as applicable)	In Progress
3rd Quarter	
Drinking Water Customer Service Guide	Pending
GVWD Electrical Energy Use, Generation, and Management	Pending
Health Canada PFAS Guidelines	Pending
Palisade Lake: Outlet Works Rehabilitation	Pending
Water Supply Tunnels Projects Update	Pending
Contract Approvals as per the *Procurement and Asset Disposal Authority* Policy	Pending
Transaction Approvals as per the *Real Estate Authority* Policy	Pending
Water Policies (as applicable)	Pending
4th Quarter	
Coquitlam Lake Water Supply Project Update	Pending
Drinking Water Management Plan Update	Pending
GVWD Annual Budget and 5-Year Financial Plan	Pending
Water Communications and Public Outreach Results	Pending
Water Supply Performance for Summer 2025	Pending
Water Use by Sector Report	Pending
Contract Approvals as per the *Procurement and Asset Disposal Authority* Policy	Pending
Transaction Approvals as per the *Real Estate Authority* Policy	Pending
Water Policies (as applicable)	Pending

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