Interim Draft Liquid Waste Management Plan

November 2024

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.

Territorial Acknowledgment

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: q̓iċəy̓ (Katzie), q̓ʷɑːn̓ƛ̓ən̓ (Kwantlen), kʷikʷəƛ̓əm (Kwikwetlem), máthxwi (Matsqui), xʷməθkʷəy̓əm (Musqueam), qiqéyt (Qayqayt), Semiahmoo, Sḵwx̱wú7mesh Úxwumixw (Squamish), scəẇaθən 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.

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Co-development of the Liquid Waste Management Plan

Metro Vancouver, as the Greater Vancouver Sewerage and Drainage District (GVS&DD), and its member jurisdictions work together closely to plan and manage wastewater collection and treatment across the region.

The Liquid Waste Management Plan reflects this collaborative relationship. It was co-developed by Metro Vancouver and GVS&DD member jurisdictions between 2021 and 2025, and reflects the priorities and significant contributions of the local governments that will be responsible for implementing the plan.

Metro Vancouver Members

GVS&DD Members

Village of Anmore	District of North Vancouver
City of Burnaby	City of Pitt Meadows
City of Coquitlam	City of Port Coquitlam
City of Delta	City of Port Moody
Electoral Area A	City of Richmond
City of Langley	City of Surrey
Township of Langley	City of Vancouver
City of Maple Ridge	District of West Vancouver
City of New Westminster	City of White Rock
City of North Vancouver	

Village of Belcarra
Bowen Island Municipality
Village of Lions Bay
scəẇaθən məsteyəxʷ (Tsawwassen First Nation)

Introduction

Executive Summary

The purpose of all liquid waste management plans (LWMPs) is to protect public health and the environment. This LWMP includes community-specific solutions for Metro Vancouver and its member jurisdictions to manage wastewater and address growing pressures in the region.

This plan reflects the priorities of communities across the region who shared their perspectives during extensive engagement. It outlines Metro Vancouver's commitment to involve First Nations in wastewater management, and includes new actions developed in collaboration with First Nations governments.

This LWMP lays out a path toward meeting these *Municipal Wastewater Regulation* standards set by the Province:

- **Wastewater treatment.** The Province requires all Metro Vancouver wastewater treatment plants to provide secondary treatment at a minimum. Metro Vancouver plans to upgrade the North Shore and Iona Island wastewater treatment plants to secondary treatment by 2030 and 2040, respectively.
- **Combined sewer overflows.** Provincial policy requires the elimination of all combined sewer overflow systems. The *Municipal Wastewater Regulation* requires reducing the volume of combined sewer overflows from storm or snowmelt events with a less than five-year return period, by an average of 1 per cent per year. Combined sewer overflows will be eliminated by 2050 in the Vancouver Sewerage Area and by 2075 in the Fraser Sewerage Area.
- **Sanitary sewer overflows.** Provincial policy requires reducing the volume of sanitary sewer overflows from storm or snowmelt events with a less than five-year return period, by an average of 10 per cent per year. Metro Vancouver and member jurisdictions are reducing sanitary sewer overflows through actions that keep rainwater and groundwater from entering the sanitary system (inflow and infiltration).

This plan responds to the challenges facing our region – climate change, population growth, affordability, and the impacts of urban development. Many actions focus on reducing the amount of excess rainwater entering the system to avoid costly and unnecessary upsizing of major infrastructure in the future. These actions shift expenditures from Metro Vancouver to member jurisdictions, residents, and businesses, while resulting in a much lower total cost for the region to protect human health and the environment.

New and notable actions in the plan include:

- 1.3 Create master sewer servicing plans to accommodate growth and urban development
- 5.4 Provide incentives to homeowners for replacing private sewer laterals
- 6.4 Review and adjust wet weather sewer pricing
- 8.8 Implement system operational changes to minimize sanitary sewage in combined sewer overflows
- 9.6 Remove flows from creeks, lakes, and underground streams from combined sewers
- 10.2 Involve First Nations in watershed planning
- 11.1 Dedicate municipal budget to rainwater management
- 15.2 Build a regional biosolids dryer

We all have a role to play in protecting our region's waterways. This plan outlines how Metro Vancouver and its member jurisdictions will do their part to achieve our vision of **Healthy Waters. For all. Forever.**

Vision

Healthy Waters

Protect the waters that sustain life and make this region a great place to be

For All

Protect these waters for all life

Forever

Protect these waters for generations to come

Goals

The overarching aim of the plan is to protect public health and the environment by effectively managing liquid waste. The plan also seeks to honour Metro Vancouver's commitment to reconciliation with Indigenous Peoples by actively involving First Nations in regional liquid waste management. This is achieved through five goals:

Prevent pollution

Preventing pollution from entering the environment involves collecting and treating wastewater. Wastewater treatment plants are designed to remove certain substances from sewage. For other substances that would pass through treatment systems, preventing their introduction at the source – i.e., drains and toilets – is the only practical solution. Reliable pollution prevention allows liquid waste infrastructure to be more resilient and prepared for climate change and evolving regulatory requirements.

Reduce demands

Reducing the inputs into the wastewater system – both volume of flow and loading of organic material – enables smaller infrastructure to serve a growing population. Lowering the demands on the system can defer expansions and increase infrastructure resilience, which saves money in the long run and keeps the system affordable.

Recover resources

Recovering valuable resources from wastewater such as biogas, heat, biosolids, nutrients, and reclaimed water supports the return to a cyclical approach to natural resource management. Turning waste into valuable products as part of a circular water economy can reduce dependence on fossil fuels and extraction of raw materials, and improve economic resilience.

Restore ecological systems

Restoring ecological systems involves revitalizing and rehabilitating natural environments that have been degraded or damaged, to return these areas to their natural functioning and improve the ability of habitat to support wildlife.

Reflect First Nations' priorities

This plan aspires to reflect First Nations' priorities and respect Indigenous Knowledge and the rights of Indigenous Peoples while collaborating on areas of shared significance to improve environmental and public health outcomes for all.

These goals are linked to the circular water economy (Figure 1), which is a system where water and wastewater are treated as valuable resources that are sustainably managed to reduce waste and protect water for future needs. There is much to be learned from Indigenous societies and Indigenous ways that predate the colonial imposition of the linear economy in the region.

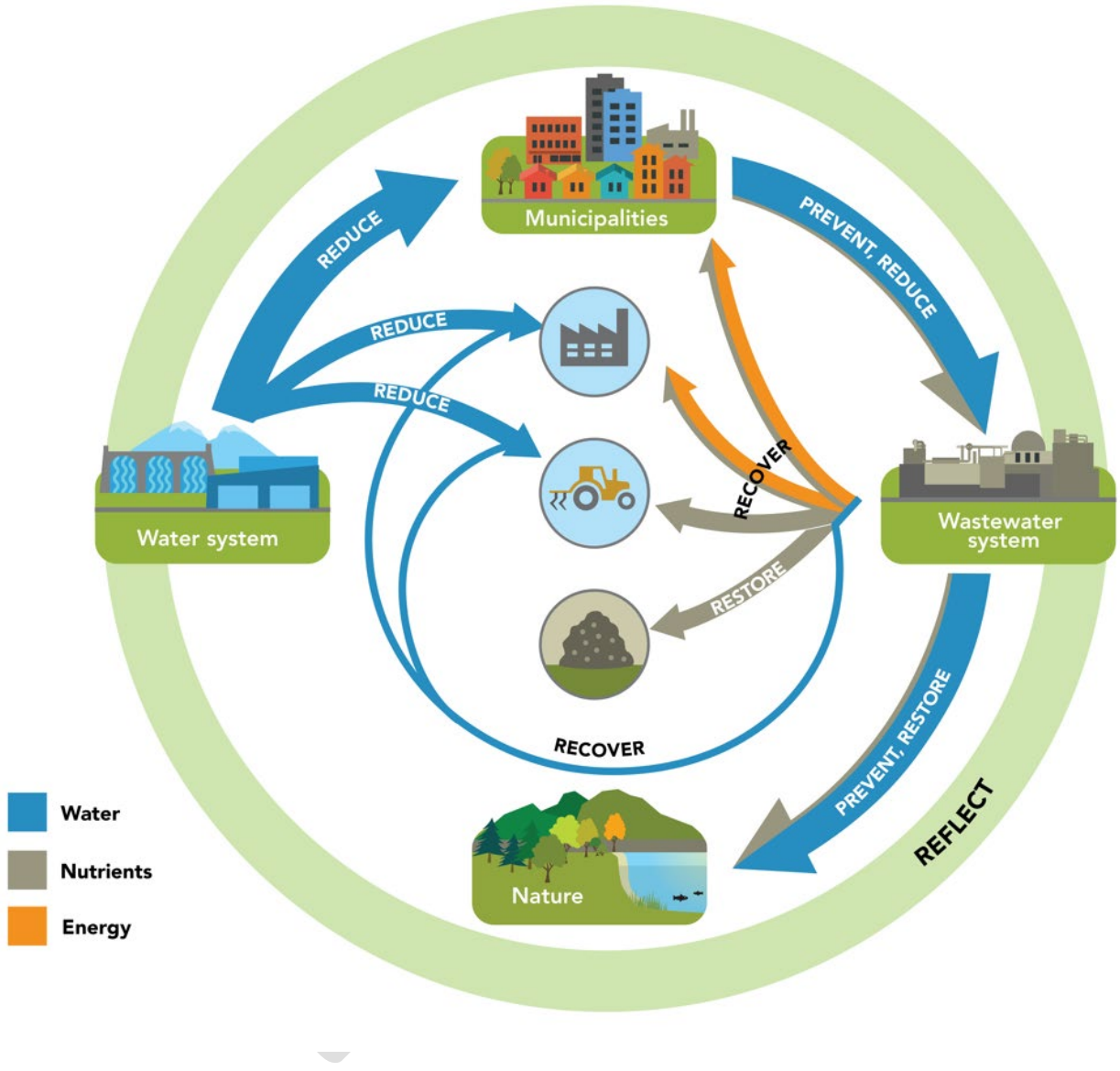


Figure 1 – Circular Water Economy

Plan Context

History

This LWMP has evolved over two decades to address the region's changing priorities and challenges in managing liquid waste.

The 2002 LWMP laid a comprehensive foundation by focusing on key areas such as water quality, combined sewer overflows, wastewater treatment plant upgrades, biosolids management, and source control. Key strategies included water conservation, asset maintenance, and maximizing environmental benefits per dollar spent. The plan emphasized interagency collaboration, continuous monitoring, and biennial reporting to measure progress and ensure environmental compliance. It also set deadlines for secondary treatment at major wastewater treatment plants and required member jurisdictions to develop stormwater management plans.

The 2011 LWMP built on the initial plan with a stronger emphasis on sustainability and resilience. It reset deadlines for secondary treatment and reinforced commitments to eliminating CSOs and sanitary sewer overflows. The plan introduced the Sustainable Region Initiative, focusing on the interconnectedness of local and global impacts, protecting natural and economic capital, and building community capacity. The new vision aimed for the long-term recovery of energy, nutrients, water, and other materials from liquid waste. The plan set three main goals: protecting public health and the environment, using liquid waste as a resource, and ensuring effective, affordable, and collaborative management. Additional performance measures were introduced to track progress toward these goals.

The new LWMP focuses on implementation and tangible results to meet current and future challenges. This plan streamlines initiatives to ensure timely and effective execution of key strategies, reducing complexity and focusing resources on the most impactful actions. It prioritizes adaptive infrastructure and programs to address climate change while continuing to use liquid waste as a valuable resource. The plan strengthens relationships with member jurisdictions, First Nations, the public, and interested parties to deliver reliable and equitable sewer infrastructure. Rigorous performance monitoring and reporting are maintained to track progress and make data-driven adjustments.

The new LWMP supersedes all previous LWMPs. Many of the actions in this LWMP are adapted from the 2002 and 2011 plans. A list of all previous actions and their status can be found in Appendices D and E respectively. Many actions also continue to be aligned with 2002 LWMP Policies while some have been superseded by updated federal or provincial regulations since that time. The 2002 LWMP Policies are listed in Appendix F.

Evolution of Liquid Waste Management in Metro Vancouver

1890s-1910s
Outbreaks of cholera, typhoid fever, and other diseases

1911
Beaches were closed in summer due to sewage pollution

Four municipalities form the Burrard Peninsula Joint Sewerage Commission to build regional sewer system

1913
R.S. Lea Report: first "Master Plan" to direct raw sewage discharges away from beach areas

1914
Vancouver & Districts Joint Sewerage & Drainage Board formed

1910s-1950s
Combined sewers are built despite R.S. Lea Report recommendation to build separated sewers

1953
A.M. Rawn Report: new "Master Plan" developed due to increasing water quality issues

Decision to build interceptors and wastewater treatment plants

1956
Greater Vancouver Sewerage & Drainage District Act establishes four sewerage areas

1961
Lions Gate WWTP opens

1963
Iona Island WWTP opens

1969
Updated A.M. Rawn report recommends treatment plants on Lulu Island and Annacis Island

1973
Lulu Island WWTP opens

1974
Interceptors are completed, ending the discharge of untreated sewage

1975
Annacis Island WWTP opens

1989
Stage 1 LWMP: Desire to further improve receiving water quality and end overflows of untreated sewage

1991
Inception of Metro Vancouver's biosolids beneficial use program

1998-1999
Secondary treatment implemented at Annacis Island WWTP and Lulu Island WWTP as mandated by the Province

1999
Stage 2 LWMP: Sewer separation strategy endorsed to eliminate combined sewer overflows

2001
LWMP establishes deadlines for separating combined sewers and eliminating combined sewer overflows, and sets requirement to eliminate sanitary sewer overflows at chronic sites

2002
Region's first LWMP approved by the Province, with ministerial conditions for future secondary treatment at Iona Island WWTP by 2020 and Lions Gate WWTP by 2030

2011
Increasing sanitary sewer overflows lead to additional actions in updated LWMP to eliminate overflows by addressing inflow and infiltration

Updated LWMP approved by the Province with ministerial conditions for secondary treatment at Lions Gate WWTP by 2020 and Iona Island WWTP by 2030

2010s to present
Efforts to mitigate wet weather flows unable to keep pace with climate change impacts, leading to planned expansions for increasing demand on conveyance and treatment systems

2013
Requirement for annual reporting of combined sewer overflows to federal government

2023
Wet weather cost allocation implemented

2025
Submission of new LWMP to Province for approval

2030
Planned secondary treatment implementation at North Shore WWTP

2035-2040
Planned secondary treatment implementation at Iona WWTP

2050
Planned combined sewer elimination in Vancouver Sewerage Area

2075
Planned combined sewer elimination in Fraser Sewerage Area

1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080

Iona Island Wastewater Treatment Plant

Working Collaboratively with First Nations

Metro Vancouver recognizes and respects that it operates on territory where First Nations have inherent rights, as recognized and affirmed in section 35 of the *Constitution Act, 1982*. In addition, both the governments of Canada and British Columbia have enacted legislation to affirm the application of the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) to laws within their jurisdiction.

In its preamble, UNDRIP states that "respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment."[1]

As part of our continued reconciliation efforts, Metro Vancouver is committed to meaningful engagement, dialogue, and collaboration with First Nations on our plans, programs, and projects, as outlined in Metro Vancouver's *Board Strategic Plan*, 2022-2026. We also continue to build and strengthen respectful and reciprocal relationships with First Nations, guided by the principles of UNDRIP "as a standard of achievement to be pursued in a spirit of partnership and mutual respect."[2]

Metro Vancouver would like to extend sincere thanks to the First Nations who were able to generously share their time, knowledge, and expertise in the engagement process for updating the LWMP. The opportunity to share and talk together has created learnings that go beyond the development of this plan and will continue to inform Metro Vancouver's work moving forward.

The LWMP seeks to honour the Board's commitment to reconciliation with Indigenous Peoples. The strategies and solutions in the plan reflect key themes heard during engagement with First Nations. The plan:

- Acknowledges that liquid waste management has impacts on First Nations communities and lands
- Outlines a commitment to work with First Nations to increase their influence on the projects and plans that affect their rights and interests
- Recognizes First Nations have an important role in stewardship of the region's land, water, and air
- Seeks to incorporate Indigenous Knowledge and actively involve First Nations in regional liquid waste management

These and other themes discussed with First Nations have been embedded throughout the strategies and actions of the LWMP. Metro Vancouver recognizes that each First Nation is unique, and we seek to work with First Nations individually to determine how best to move forward together. Metro Vancouver looks forward to working in collaboration with First Nations to achieve the goals of the LWMP.

[1] UNDRIP Preamble paragraph 11
[2] UNDRIP Preamble paragraph 24

Governance

The Province allows all local governments to develop and periodically update an LWMP. LWMPs, authorized and regulated through the *Environmental Management Act*, allow local governments to develop community-specific solutions for wastewater management providing a pathway towards meeting or surpassing existing regulations. There is also an opportunity to make mid-plan amendments during the approximately 10-year cycle of the LWMP, should any changes be required.

The Province's primary objectives for LWMPs are to protect public health and the environment and to properly consult the public and First Nations. Local governments are also encouraged to use LWMPs to show innovation and leadership on additional provincial objectives: water conservation, drinking water source protection, resources from waste, energy conservation, climate change adaptation and mitigation, and sustainable financing and asset management.

An LWMP for Metro Vancouver authorizes discharges to the environment — water, air, and land — associated with the management of liquid waste according to the criteria set out in the LWMP and in facility-specific Operational Certificates. Once each LWMP update is approved, it becomes part of local liquid waste regulation through the *Environmental Management Act*. In the absence of an approved LWMP, the provincial *Municipal Wastewater Regulation* governs. Where *Municipal Wastewater Regulation* standards are currently not met, an LWMP will establish a schedule for upgrading substandard facilities.

In addition, the Province has endorsed the Canadian Council of Ministers of the Environment (CCME) *Canada-wide Strategy for the Management of Municipal Wastewater Effluent* (CWS-MMWE). LWMPs should be consistent with the CWS-MMWE, which is designed to provide a harmonized framework to manage municipal wastewater discharges to surface waters with federal discharge criteria.

Roles and Responsibilities

The extent and complexity of the liquid waste systems, with roles and responsibilities being spread between broad levels of governance, require close coordination between all orders of government, businesses, institutions, and residents. This includes and is demonstrated by senior government cost sharing for major capital projects that benefit and support their mandates and regulations. The following entities have key roles and responsibilities in implementing this plan:

Federal government

- Environment and Climate Change Canada: regulates pollutants and protects species at risk
- Fisheries and Oceans Canada: mandated to protect fish populations and habitat in receiving waters and urban streams
- Housing, Infrastructure and Communities Canada: provides and administers infrastructure co-funding for local government projects

Provincial government

- Ministry of Environment and Climate Change Strategy: regulates discharges to the environment, regulates liquid waste, and approves LWMPs
- Ministry of Municipal Affairs: enables infrastructure financing and provides co-funding to local governments for civic projects
- Ministry of Health: regulates on-site wastewater treatment systems (such as septic tanks) and protects public health if sewage spills or if water quality becomes unsafe for recreation

Member jurisdictions

- Member jurisdictions of the Greater Vancouver Sewerage and Drainage District (GVS&DD): own and maintain collector sewers, implement member actions set out in the regional plan, manage rainwater in urban and rural watersheds, report on their progress on actions required in the plan, and establish local land use plans and community development standards

Metro Vancouver

- Metro Vancouver, as the GVS&DD: owns, maintains and operates regional trunk sewers and major wastewater treatment plants, regulates significant industrial discharges to sanitary sewers, implements required regional actions in its plans, reports on plan progress, and collaborates with others as appropriate

First Nations

- As stewards of water and land, First Nations have the right to work with all orders of government to advance improvements to regional water quality, to achieve environmental, cultural, spiritual, and economic goals for their communities, and to protect the health of all marine life

The Public

- Residents, businesses, institutions, and Crown corporations: own and maintain private property sewer connections and private stormwater management systems

Scope of the Plan

While the plan covers the geographic area of Metro Vancouver (Figure 2), the majority of its actions are specific to Metro Vancouver's wastewater collection and treatment systems, and the users connected to these systems, including municipalities, businesses, and residents. In addition, the plan sets specific actions for GVS&DD members in managing stormwater runoff. All actions outlined in the plan apply to the GVS&DD and its members.

Liquid waste management from sources such as on-site treatment and septic systems, agricultural runoff, and marine pump-out facilities for pleasure craft involves multiple jurisdictions. While the LWMP addresses these areas through collaboration with other government agencies and other parties, it excludes aspects regulated outside the Ministry of Environment and Climate Change Strategy, such as private septic systems governed by the Ministry of Health and marine pollution overseen by federal authorities.

Figure 2 – The Four Sewerage Areas of the Metro Vancouver Regional Liquid Waste System

Alignment and Linkages

Aligning with National Initiatives

Metro Vancouver and its members actively participated with the Canadian Council of Ministers of the Environment (CCME) to develop the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent* (CWS-MMWE) endorsed by the CCME in February 2009 and implemented in British Columbia by the Ministry of Environment in 2012.

Through the strategy, governments have sought to develop a consistent approach to managing wastewater across Canada that is protective of human health and the environment. The CWS-MMWE sets baseline wastewater management criteria, timelines and prioritization methodologies, and formalizes processes to assess environmental risk.

Arising from recommendations that were part of CWS-MMWE, *Wastewater Systems Effluent Regulations* to manage wastewater releases came into force in June 2012 under the *Fisheries Act*. *Wastewater Systems Effluent Regulations* set national baseline effluent quality standards that are achievable through secondary wastewater treatment and prohibit the discharge of effluent that is acutely lethal to rainbow trout. The regulations also specify requirements for carrying out effluent monitoring, reporting, and record keeping, and require owners or operators of wastewater systems with combined sewers to submit an annual report on the total volume and the number of days that wastewater is discharged per month via combined sewer overflow (CSO) points as a result of precipitation.

In addition to the *Fisheries Act*, the *Canadian Environmental Protection Act* is also used to prevent and manage risks posed by toxic and harmful substance. This legal framework may contribute to improved wastewater effluents by controlling substances that are otherwise difficult to treat. Under the *Canadian Environmental Protection Act*, owners or operators of wastewater treatment facilities that meet reporting requirements are required to report discharges to the National Pollutant Release Inventory.

Aligning with Provincial Initiatives

The goals, strategies, and actions have been aligned with provincial policies and positions to ensure that Metro Vancouver's and the Province's environmental and fiscal objectives and actions are mutually supportive and successful. Key plans and initiatives supported by this plan include:

- ***Environmental Management Act*** — ***Municipal Wastewater Regulation (2022)***. As noted previously, where Municipal Wastewater Regulation standards are currently not met, the LWMP establishes a roadmap towards compliance.
- ***Resources from Waste: A Guide to Integrated Resource Recovery (2009)*** — Guidebook on integrated resource recovery approach for local governments to maximize the environmental, social, and economic benefits of recovering waste resources generated by infrastructure through planning and management.
- ***CleanBC Roadmap to 2030 (2021)*** — The Province's plan to reach climate targets and continue on a path to net-zero emissions by 2050.

- ***Preparing for Climate Change: An Implementation Guide for Local Governments in British Columbia (2012)*** — Guide to assist local government elected officials and staff, including planners, engineers, chief administrative officers, financial officers, and others, to plan and act in ways that will make their communities more resilient to the impacts of climate change.
- ***BC Climate Action Charter (2007)*** — Under the Charter, local government signatories commit to becoming carbon neutral in their corporate operations, measuring and reporting their community's greenhouse gas emissions, and creating complete, compact, more energy efficient communities.
- ***BC Clean Energy Strategy (2024)*** — Outlines actions in 10 focus areas to accelerate the shift to made-in-British Columbia clean energy and achieve net zero emissions by 2050.
- ***BC Coastal Marine Strategy (2024)*** – Establishes the Province's first shared vision for the British Columbia coast that was co-developed with many First Nations from the coast, with goals for healthy coastal marine ecosystems, resilience to climate change, thriving coastal economies and communities, and informed governance.

Linkages with other Metro Vancouver plans

There is interdependence between the goals, strategies and actions in this plan and those in other regional plans.

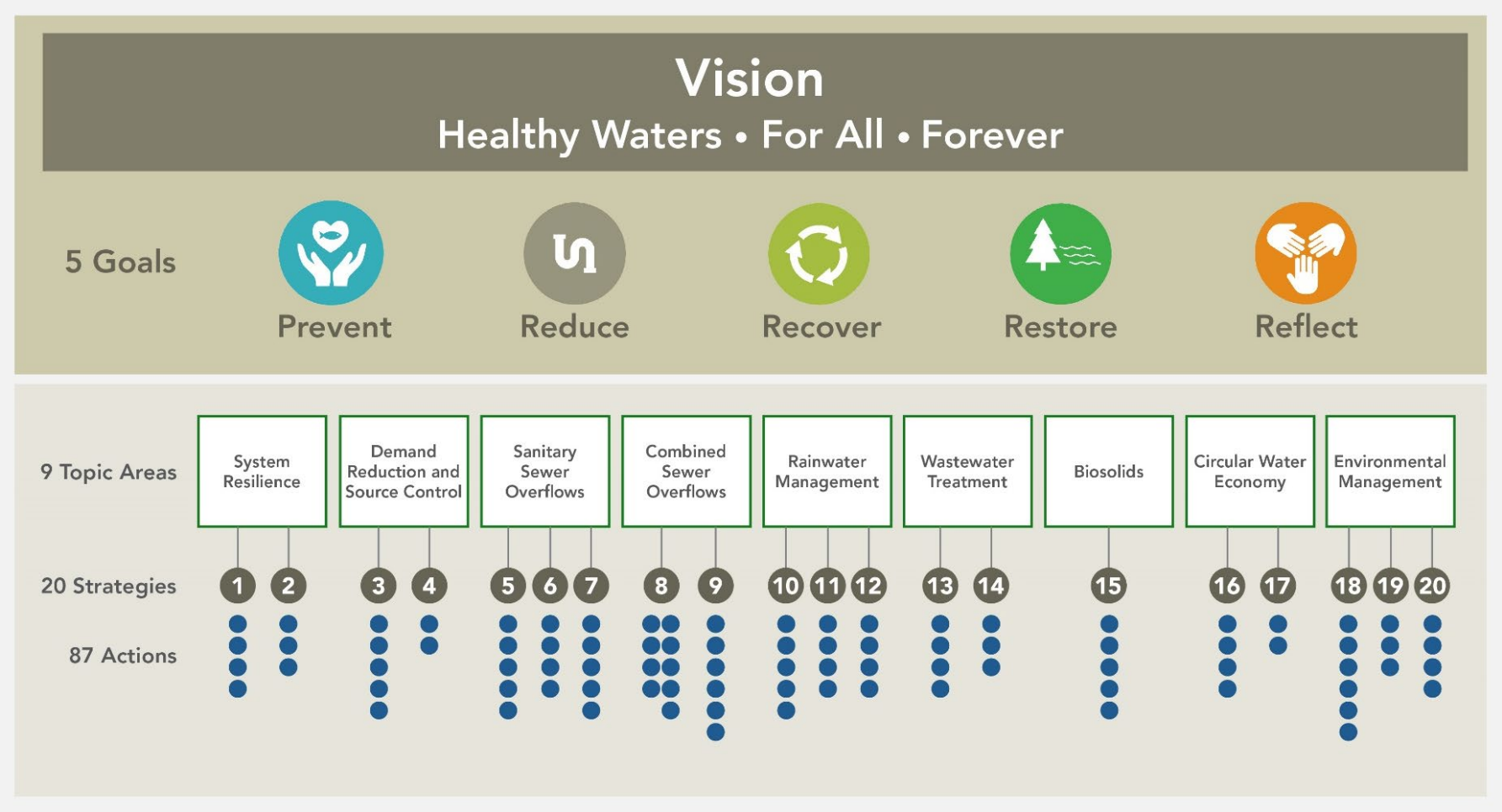
- ***Board Strategic Plan (2022-2026)*** — Annual work plans are prepared for Metro Vancouver's service areas that respond to the directions of the *Board Strategic Plan*. These work plans include high-level performance indicators that have been developed across the organization to evaluate trends, determine key actions for the coming year, and assist in long-term planning.
- ***Drinking Water Management Plan (2011)*** — An overarching plan for Metro Vancouver and its member jurisdictions, which sets the direction and priority for regional drinking water initiatives. This plan has three goals: provide high-quality drinking water; ensure the sustainable use of water resources; and ensure the efficient supply of water.
- ***Integrated Solid Waste and Resource Management Plan (2010)*** — Metro Vancouver's sustainability principles provide guidance for the regional solid waste plan. For Metro Vancouver, sustainability means tying together environmental, social, and economic interests. For managing solid waste this translates into protecting the receiving environment (air, land, and water).
- ***Metro 2050: Regional Growth Strategy (2022)*** — The region's collective vision for how growth will be managed to support the creation of complete, connected, and resilient communities, while protecting important lands and supporting the efficient provision of urban infrastructure like transit and utilities.
- ***Climate 2050 (2018-2019)*** — Metro Vancouver's *Climate 2050* strategy will guide climate change policy and action for Metro Vancouver for the next 30 years. *Climate 2050* prioritizes climate action in the region.
- ***Clean Air Plan (2021)*** — A plan for managing air quality and greenhouse gases over the next 10 years. The *Clean Air Plan* includes key actions to effectively reduce greenhouse gas emissions in this region, in pursuit of 2030 emissions targets. The regional *Clean Air Plan* aligns with the Province's *CleanBC Roadmap to 2030*, and represents a coordinated approach from local governments across the Metro Vancouver region. The *Clean Air Plan* includes significant next steps in moving towards regional carbon neutrality by 2050.

- ***Regional Greenways 2050 (2020)*** — The expansion of the greenway network provides opportunities to promote ecosystem connectivity by protecting some of the region's remaining natural areas, integrating green infrastructure, and increasing regional tree canopy cover.

Strategies and Actions

Snapshot

The five goals provide direction for the strategies in the plan. The strategies are grouped under nine topic areas that encompass liquid waste management from source to system to sea.



The following table shows how each of the plan's strategies contribute to the five goals.

	Prevent	Reduce	Recover	Restore	Reflect
System Resilience					
Strategy 1: Ensure system can serve a growing population in a changing climate	✓				✓
Strategy 2: Improve resilience of wastewater system to climate change and natural hazards	✓				✓
Demand Reduction and Source Control					
Strategy 3: Reduce flows and loadings into the system	✓	✓			
Strategy 4: Prevent pollution at the source	✓				✓
Sanitary Sewer Overflows					
Strategy 5: Reduce excess rainwater entering into private lateral sewers		✓			
Strategy 6: Enhance transparency and accountability for reducing inflow and infiltration		✓			
Strategy 7: Minimize impacts of sanitary sewer overflows on human health and environment	✓				✓
Combined Sewer Overflows					
Strategy 8: Assess impact of combined sewer overflows on receiving environment	✓				✓
Strategy 9: Separate combined sewers to eliminate overflows	✓				✓
Rainwater Management					
Strategy 10: Manage rainwater and urban development for watershed health				✓	✓
Strategy 11: Update and harmonize municipal tools for rainwater management				✓	
Strategy 12: Enhance interagency collaboration to improve watershed health across the region				✓	✓

	Prevent	Reduce	Recover	Restore	Reflect
Wastewater Treatment					
Strategy 13: Treat wastewater so effluent meets or surpasses regulatory requirements					
Strategy 14: Operate and maintain wastewater treatment plants to meet or surpass regulatory requirements					
Biosolids					
Strategy 15: Diversify options to beneficially use Nutrifor biosolids					
Circular Water Economy					
Strategy 16: Implement proven resource recovery technologies					
Strategy 17: Research and pilot innovative technologies to advance the circular water economy					
Environmental Management					
Strategy 18: Minimize impacts of liquid waste management on the atmosphere and air quality					
Strategy 19: Environmental monitoring to protect public health and the environment					
Strategy 20: Collaborate on regional environmental management initiatives					

System Resilience

Metro Vancouver and its members collect and treat wastewater in the region as a fundamental local government function to protect human health and the environment. Population growth, changes to land use, and a changing climate all increase the volume of liquid waste and can strain existing infrastructure. Proactive planning is needed to ensure that the collection, conveyance and treatment systems can accommodate growth, extreme weather events, and rising water levels, since replacement and expansion of infrastructure takes decades.

Metro Vancouver and members update regional and municipal population projections on a regular basis to guide land use and infrastructure planning. The figure below shows three growth scenarios that capture varying assumptions about an uncertain future. The medium-growth scenario is considered to have the highest probability. The region is expected to grow by nearly 50,000 net new residents annually. As a result, the region's population is projected to reach 4 million by the mid-2040s.

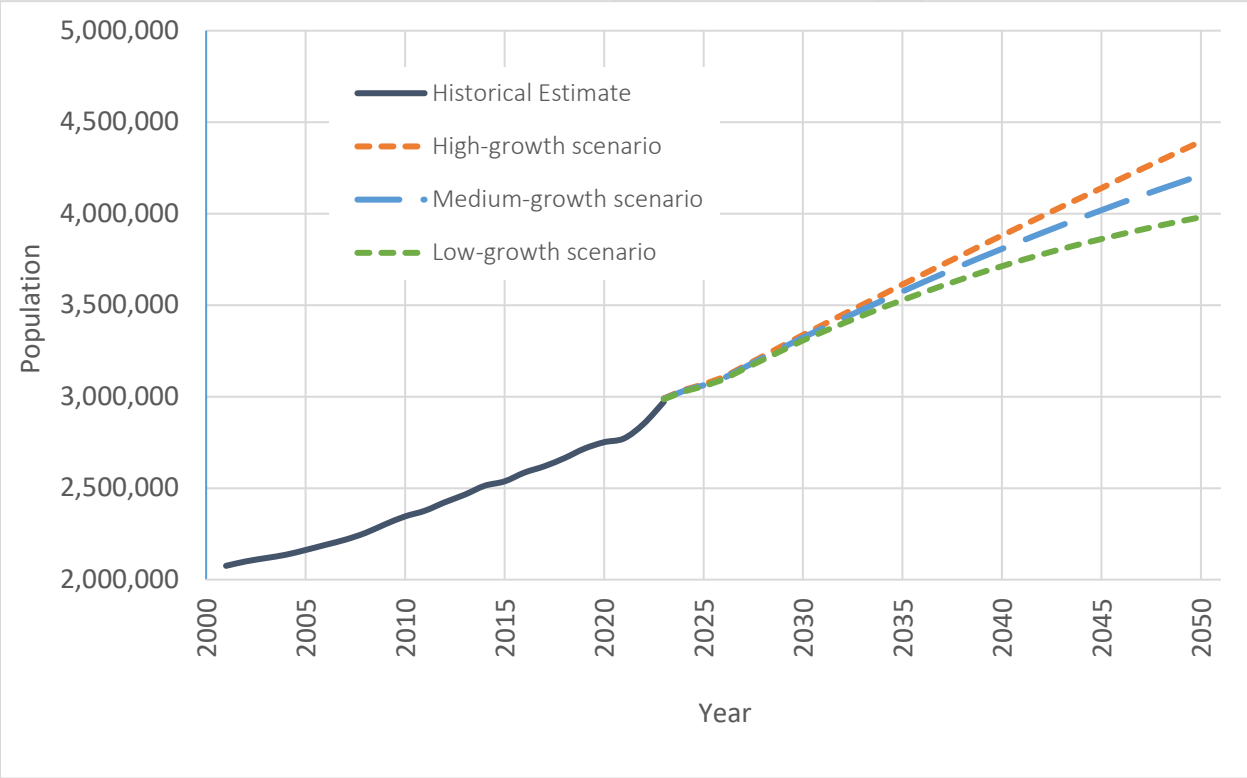


Figure 3 – Metro Vancouver population growth and projections from 2000 to 2050

Strategy 1 Ensure system can serve a growing population in a changing climate

In a region with a growing population, strong economy, constrained land base, and a changing climate, proactive planning for the provision of sanitary collection and treatment services is necessary. Asset management plans will be critical to ensure our infrastructure assets are properly maintained, repaired, replaced, and upgraded to minimize lifecycle costs while delivering the required level of service. Master Sewer Servicing Plans establish and assess existing sewer service levels, incorporate future growth and development forecasts, evaluate alternative solutions to maintain or enhance current service levels, include opportunities for feedback from those involved and affected, and provide an implementation roadmap. These plans serve as a vital tool to guide land use decisions, infrastructure planning, and budget allocation for municipal decision-makers to ensure wastewater infrastructure is adequate to support current and future growth and are aligned with regional goals and objectives.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

1.1 Metro Vancouver and members will maintain the condition and performance of the sewerage system to serve a growing population in a changing climate by:

a) inspecting sanitary sewers on a 20-year cycle;

b) maintaining current maps of sewerage inspection, condition, and repairs; and

c) continuing to develop and implement asset management plans that address risks, including climate change and seismic events, and target a 100-year replacement or rehabilitation cycle for sewerage infrastructure.

Metro Vancouver will use the National Association of Sewer Service Companies' Pipeline Assessment Certification Program and Manhole Assessment Certification Program for (a) and (b). Members are encouraged to use these programs for (a) and (b) to ensure a consistent approach.

Timeline: ongoing
Adapted from: C19, 1.3.1, 1.3.11, 3.1.1, 3.1.4, 3.1.5, 3.1.6, 3.1.7, 3.1.8
Aligned with: P8

1.2 Members and Metro Vancouver will seek to accommodate population growth and land use changes:

- Members will provide local collector sanitary sewer capacity for peak dry weather flow plus an inflow and infiltration allowance of 11,200 L/ha/d on average at point of connection to Metro Vancouver infrastructure, to ensure hydraulic grade lines stay within safe operating levels.
- Metro Vancouver will provide regional trunk sanitary sewer capacity and wastewater treatment plant hydraulic capacity for peak dry weather flow plus an inflow and infiltration allowance of 11,200 L/ha/d, to ensure hydraulic grade lines stay within safe operating levels.

Note, the inflow and infiltration allowance of 11,200 L/ha/d corresponds to storms with return period of less than five years.

Timeline: ongoing
Adapted from: C19, 1.3.2, 3.1.3, 3.1.7
Aligned with: P8, P9

1.3 Metro Vancouver and members will create and update Master Sewer Servicing Plans to accommodate growth and urban development:

a) Metro Vancouver in collaboration with members will develop a framework for creating and updating Master Sewer Servicing Plans. At a minimum, the framework will identify required content and deliverables, deadlines, and the frequency of updates.

b) Metro Vancouver and members will create or update Master Sewer Servicing Plans in accordance with the framework. Metro Vancouver and members will continue to ensure that First Nations are engaged appropriately.

Timeline: (a) within three years; (b) as determined in (a)
New action; engagement with First Nations continuing per 2011 MC10.

1.4 Metro Vancouver and members' provision of liquid waste infrastructure and services will be consistent with the Regional Growth Strategy and coordinated with municipal Official Community Plans.
Timeline: ongoing
Adapted from: 3.4.3, 3.4.6

Performance Indicators

1A Percentage of sanitary sewer pipe inspected annually
Responsibility: Metro Vancouver and members
Replaces 2011 performance measure: metres of sewer pipe inspected and renewed annually

Strategy 2 Improve resilience of wastewater system to climate change and natural hazards

Most wastewater and rainwater infrastructure was not originally designed with climate change in mind. Wastewater infrastructure in the region is expected to face a range of hazards from climate change, including rising water levels, more extreme rainfall events, longer dry spells in summer, and increased precipitation in other seasons, among others. Climate change impacts and other natural hazards like earthquakes must be considered during design and upgrades of infrastructure to avoid creating vulnerabilities that make climate change adaptation more difficult and expensive for future generations. Metro Vancouver and members have been taking action to prepare for climate change impacts for well over a decade, and will continue to design, build, and operate more resilient and adaptable systems.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

2.1 Metro Vancouver and members will collaborate with other jurisdictions and organizations to share climate data and to regularly update regional climate projections, to improve understanding of the future climate for infrastructure planning.
Timeline: ongoing
New action

2.2 Metro Vancouver will conduct climate change and natural hazard vulnerability assessments and will prepare adaptation plans for Metro Vancouver infrastructure, assets, and operations in each sewerage area to enhance resilience to future climate conditions.
Timeline: begin within one year
New action

2.3 Metro Vancouver and members will continue to plan, locate, design, and adapt infrastructure, assets, and operations to address identified hazards, risks, and vulnerabilities, including climate change impacts.
Timeline: ongoing
Adapted from: 1.3.1, 1.3.11, 3.4.1, 3.4.5

Performance Indicators

None proposed for this strategy.

Demand Reduction and Source Control

Wastewater treatment and conveyance infrastructure are critical assets for the region that require billions of dollars in investments to construct, operate, maintain, and upgrade. Reducing demands on the system involves encouraging households, businesses, and industries to reduce flows and loads to the sewer system, which reduces operational costs and can defer the need for costly infrastructure expansions. Shifting behaviours towards more sustainable practices requires effective education and incentives. Source control, which reduces loadings and prevents the introduction of contaminants into the sewage system, is often more effective and less costly than treatment. Source control is critical to address harmful substances that are difficult to treat, to prevent them from impacting the water quality of receiving environments.

Strategy 3 Reduce flows and loadings into the system

Wastewater flow and organics loading are the main drivers for designing and sizing wastewater treatment plant upgrades and expansions, as well as dictating day-to-day operational needs and affecting system performance. Larger flows and loadings mean the need to build larger and costlier infrastructure. The amount of wastewater produced by users also affects the capacity of the collection system to accommodate growth, wet weather, and the consequences of climate change.

Residential, commercial, and industrial users all have a role to play in improving the quantity and quality of the wastewater they produce. Metro Vancouver and members will assess and implement demand side management actions that help extend the useful life of existing facilities, defer expansion, and prevent system overflows, while reducing costs for the region. Identifying the best opportunities for reduction and implementing multi-pronged approaches tailored to each sector will help the regional wastewater system run as efficiently as possible.

The actions in this strategy reduce dry weather flow (i.e., flows from inside buildings) and organics loading. Strategies and actions to reduce wet weather flow (i.e., inflow and infiltration) are described in Strategies 5 and 6 in the Sanitary Sewer Overflows section.

Supports Goals: Prevent pollution, Reduce demands

Actions

3.1 Metro Vancouver will pursue reductions in residential wastewater flow and loading through improving education and awareness, starting with discouraging disposal of food waste down drains, by encouraging reduction of food waste in general and encouraging use of green bins for kitchen scraps. Members will provide input and assist with implementation.
Timeline: within two years
Adapted from: C28, C29, 1.1.4, 1.1.5, 1.1.17

3.2 Metro Vancouver will pursue reductions in commercial wastewater flow and loading through collaboration with businesses, starting with working with restaurants to improve grease interceptor maintenance practices, to prevent introduction of grease into the sewer system. Members will provide input and assist with implementation.
Timeline: within three years
Adapted from: C28
Aligned with: P15

3.3 Metro Vancouver will pursue reductions in industrial wastewater flow and loading, starting with updating fees in bylaws to create financial incentives that motivate industries to minimize their wastewater discharges.
Timeline: within five years
Adapted from: C25, C28, 1.1.1
Aligned with: P17, P20

3.4 Metro Vancouver will work with members to prevent the introduction of fats, oils, and grease into the system.

a) Metro Vancouver will improve monitoring and coordination with members to address fats, oils, and grease hot spots in the region.
b) Metro Vancouver will improve grease interceptor requirements for high grease producing restaurants within Metro Vancouver's *Food Sector Grease Interceptor Bylaw*.
c) Metro Vancouver will provide guidance to enable members to manage fats, oils, and grease through their own bylaws.

Timeline: within two years
Adapted from: C28, 1.1.14

3.5 a) Member jurisdictions are strongly encouraged to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce potable water use.
b) Metro Vancouver, in partnership with member jurisdictions, is encouraged to pursue a region-wide water conservation program targeting the industrial, commercial, institutional and agricultural sectors as part of its updated *Drinking Water Management Plan*. Remaining municipalities in the region that have not implemented metering for these sectors are encouraged to do so.

Timeline: a) ongoing; b) Drinking Water Management Plan anticipated to be ready for Board endorsement by 2026.
Adapted from: C28, C32, 2011 MC2, 2011 MC3, 1.1.13
Aligned with: P19

Performance Indicator

3A Per capita average dry weather flow [L/person/day], total influent Biochemical Oxygen Demand (BOD) [g/person/day], and total influent Total Suspended Solids (TSS) [g/person/day], at each wastewater treatment plant.

Responsibility: Metro Vancouver
New indicator

Low-flow water fixtures reduce wastewater flows

Plumbing code updates in the 1990s and 2000s have successively decreased the maximum flow rates of faucets, showerheads, toilets and urinals. The introduction of low-flow water fixtures has reduced per capita drinking water consumption in the region. Since wastewater comes from drinking water that people put down drains and toilets, this has resulted in decreasing per capita wastewater flows, as shown in Figure 4 below.

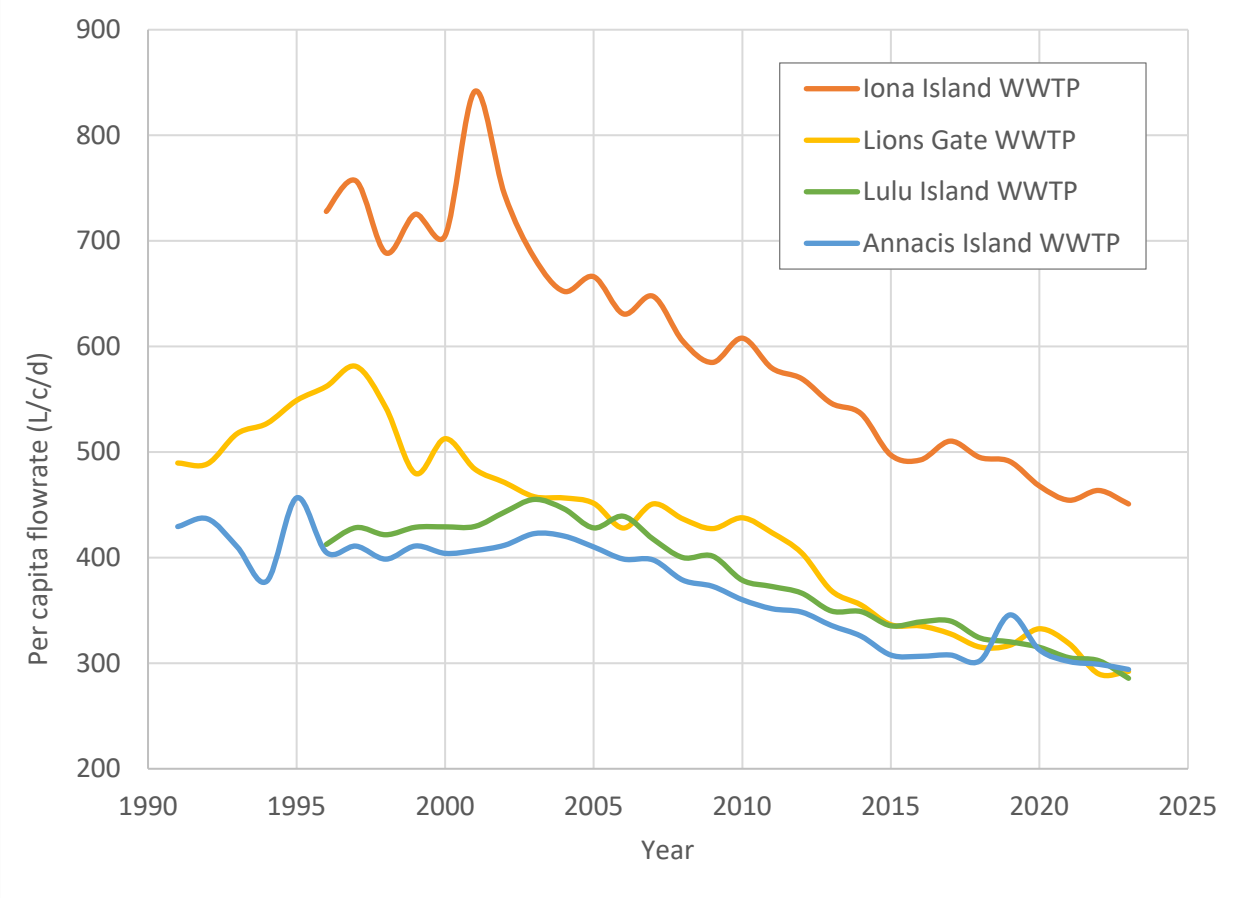


Figure 4 – Wastewater flows into Metro Vancouver wastewater treatment plants 1990 to 2023

The downward trend of wastewater flow means higher populations can be served by existing infrastructure and helps preserve system capacity for additional growth, deferring the requirement for costly expansions.

Strategy 4 Prevent pollution at the source

Metro Vancouver's source control program uses a suite of tools that include regulations and bylaws, education, community outreach, and advocacy for increased regulations. Examples of past and ongoing source control efforts include updating the sewer use bylaw to reflect the most recent scientific and technical information and best practices, the "Unflushables" campaign educating residents about items that should not be flushed, guides that communicate best wastewater management practices for various commercial and industrial sectors, and "Our Ocean Thanks You" campaign targeting reduction of microfibers in laundry. Through this strategy, the source control program will continue to prevent pollution from different sectors — residential, commercial, and industrial — in the region.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

4.1 Metro Vancouver will prioritize contaminants for source control using the Canadian Council of Ministers of Environment (CCME) *Canada-wide Strategy for Management of Municipal Wastewater Effluent* (CWS-MMWE) Environmental Risk Management Framework. Metro Vancouver will take further source control actions such as educating target sectors to reduce their discharges to sewers, advocating for increased provincial and federal regulations on the manufacturing and use of products with contaminants, and updating Metro Vancouver's bylaws for industrial and commercial dischargers. Metro Vancouver will work with First Nations that choose to participate on advocating for increased provincial and federal regulations on the manufacturing and use of products with contaminants.

Timeline: ongoing
Adapted from: C25, C33, 2011 MC5, 2011 MC10, 1.1.1
Aligned with: P15

4.2 Metro Vancouver and members will continue to motivate residents and businesses to prevent pollution at the source by properly managing what they send down drains and toilets.

a) Metro Vancouver will continue outreach programs that include youth education programs.
b) Members will continue to promote and support Metro Vancouver's regional outreach and education efforts.
c) Metro Vancouver will work with First Nations as desired on such outreach and education.

Timeline: ongoing
Adapted from: C29, 2011 MC10, 1.1.5, 1.1.17
Aligned with: P15

Performance Indicators

None proposed for this strategy.

Sanitary Sewer Overflows

Sanitary sewers collect wastewater from toilets and drains in homes and businesses, and carry it to wastewater treatment plants for processing before being released into the environment. A sewer overflow occurs when wastewater is discharged directly into the environment — usually the nearest water body, or sometimes onto land — instead of being processed at a wastewater treatment plant. Overflows from sanitary sewers can happen when heavy rainfall overloads the sewer system, in both municipal and regional sewer systems. Metro Vancouver reports sanitary sewer overflows immediately to the federal and provincial governments, regional health authorities, the First Nations Health Authority, and associated municipalities.

Metro Vancouver and members are working to identify neighbourhoods where damaged pipes and improperly connected roof and foundation drains let in rainwater and groundwater that does not belong in sanitary sewers. This inflow and infiltration occurring on individual properties can add up to create serious challenges downstream: it contributes to sanitary sewer overflows, sewer backups and basement flooding in private property, and greatly increases the volume that must be processed at wastewater treatment plants.

Private lateral sewers connect homes, business, and institutions to the municipal and regional systems, and account for about half of the estimated 15,000 km of sewers in the region. While public sewers have ongoing maintenance programs, private lateral sewers have not been part of any comprehensive strategy. Previous construction of storage facilities and capacity upgrades have partially mitigated risks to the environment with additional facilities currently scheduled in Metro Vancouver's long range plan. However, continually building larger infrastructure to accommodate leaky pipes is financially unsustainable and has not achieved the elimination of sanitary sewer overflows. Reducing inflow and infiltration through inspection, maintenance, and repair of all sewers with particular focus on private lateral sewers as part of regular maintenance cycles and redevelopment over the coming decades will eliminate overflows.

Sanitary Sewer Overflow Storage Tanks

The conveyance capacity of sewers and pump stations can be exceeded during substantial rain storms due to leaky sewers allowing rainwater into the system. Storage tanks can be used to temporarily hold excess flow that cannot be completely conveyed during significant wet weather events, which is then pumped back into the conveyance system after the storm. This can prevent the occurrence of sanitary sewer overflows in areas with high inflow and infiltration. To date, storage tanks have been constructed in Surrey and Maple Ridge, and another is planned for North Surrey at a cost approaching $100 million.

Continuing with the current approach would require 15 to 20 more storage tanks over the next three decades. While storage tanks offer temporary relief from overflows, they only address the symptom of the problem. A better solution is to address the root cause of overflows – leaky sewers and improperly connected roof or foundation drains. Reducing the entry of excess rainwater into sewers at the source will prevent overflows and result in a system that is more resilient against large storm events.

Cloverdale Sanitary Sewer Overflow Storage Tank under construction in Surrey

Strategy 5 Reduce excess rainwater entering into private lateral sewers

Studies show that over half of all inflow and infiltration originates on private property. Improving the water-tightness of lateral sewers and ensuring that roof and foundation drains are not improperly connected to sanitary sewers reduces the amount of excess rainwater and groundwater entering the sanitary sewer system. Keeping additional water out of sanitary sewers helps retain the capacity of existing infrastructure to convey and treat sewage from a growing population, leading to lower costs for infrastructure expansions.

Building on previous plans, Metro Vancouver will strengthen actions to reduce rainfall-derived inflow and infiltration from lateral sewers on private properties by addressing potential problems throughout their lifecycle. Actions at the time of construction, through the useful lifespan, and at times of replacement will help ensure that laterals are watertight.

Supports Goals: Reduce demands

Actions

5.1 Metro Vancouver and members will conduct public education and outreach on the relationship between inflow and infiltration and efficient liquid waste management, showing that investing in water-tight private laterals is an effective demand side management strategy that can reduce regional infrastructure costs.
Timeline: within two years
New action

5.2 Members will require inspection, testing, repair and/or replacement of private laterals when new construction or redevelopment occurs:

a) Metro Vancouver will draft sample bylaw wording for members to use to require repair or replacement of private laterals at the time of new construction or redevelopment.

b) Members will develop and implement processes for inspections during construction of new homes and buildings to inspect the section of the lateral between the building and the sewer that can be exposed during construction.

c) Members and Metro Vancouver will advocate to other levels of government for support and changes to building codes that will facilitate these processes.

Timeline: within three years
Adapted from: C28, 1.1.7

5.3 Members will conduct inspections of private laterals in existing properties:

a) Members in coordination with Metro Vancouver will determine which areas have the highest inflow and infiltration and will prioritize those areas for inspection.

b) Members will develop a standardized method for gaining access to properties and for inspecting connections to laterals and condition of laterals on properties with existing buildings.

c) Members will conduct inspections of existing buildings' connections to laterals and condition of laterals in those priority areas identified under (a).

Timeline: begin conducting inspections within five years
Adapted from: C28, 1.1.7

5.4 Members in coordination with Metro Vancouver will develop programs to provide incentives or funding assistance to qualified property owners for rehabilitation of leaky private laterals.

a) Metro Vancouver will explore and analyze various approaches for incentives or funding assistance for members to consider.

b) Members may then develop programs tailored to their specific needs and capacities to provide incentives or funding assistance to qualified property owners.

Timeline: develop programs within two years; provide funding within four years
New action

5.5 Members will direct staff and officers to enforce bylaws on private property, using existing legal authority and/or via proposing any necessary amendments to bylaws, to prevent the unauthorized discharge of rainwater and groundwater to sanitary sewers, through the issuance of notices of bylaw violation, municipal ticket information, prosecution, and/or requirements for remedial action, for properties where either of the following conditions are not met:

- roof and foundation drain connections are properly configured to not direct rainwater to sanitary laterals, or
- sanitary laterals are in good condition and watertight.

Timeline: within five years
Adapted from: C28, 1.1.7, 1.1.19

Performance Indicators

5A Peak wet weather flow, average dry weather flow, and ratio of peak wet weather flow to average dry weather flow at key regional monitoring points and at wastewater treatment plants

Responsibility: Metro Vancouver
Replaces 2011 performance measures: wet weather peaking factors at key regional monitoring points; average [24 hour] flows at regional flow monitoring stations and at wastewater treatment plants

Strategy 6 Enhance transparency and accountability for reducing inflow and infiltration

Reducing inflow and infiltration is a gradual process that involves action by all concerned. Interim targets for progressive reductions can help motivate and track action while gradually moving towards long-term targets. Meaningfulness of reporting will be improved by using metrics that capture both actions taken and how the system performs in wet weather. Increased frequency of reporting will spur Metro Vancouver and members to update and accelerate actions if observed progress is slow.

A measure to gauge demands on the system from excess rainwater is by tracking municipal sewer levies that are tied to wet weather flows. In 2024 Metro Vancouver introduced wet weather sewer pricing that is being phased in over 10 years. Member jurisdictions pay fees that reflect the sewer capacity they use during wet weather. This user-pay approach means that communities with higher inflow and infiltration contribute more toward the regional sewer system. The goal of wet weather sewer pricing is for every community to pay for the amount of water they send through the sewer system. It also aims to ensure that the region is investing in expanding sewer and treatment capacity only when needed to accommodate population growth, and not to address lack of infrastructure maintenance.

Supports Goals: Reduce demands

Actions

6.1 Members will complete inflow and infiltration management plans:

a) Members in coordination with Metro Vancouver will set new interim targets for progressive inflow and infiltration reduction.

b) Metro Vancouver and members will collaboratively develop a consistent inflow and infiltration dashboard with standardized metrics and will incorporate it into the inflow and infiltration management plan template.

c) Members will complete inflow and infiltration management plans, based on the updated template, that include the new interim inflow and infiltration reduction targets.

Timeline: (a), (b) within three years; (c) within five years
Adapted from: C23, 1.1.6, 1.1.8, 1.1.18

6.2 Members will use the inflow and infiltration dashboard to track progress in reducing inflow and infiltration:

a) Members will publicly report their inflow and infiltration dashboard data annually.

b) The public reporting will also include a summary of the results of inspections of sewer laterals in Actions 5.3 and 5.4, and of the enforcement actions and outcomes in Action 5.5.

c) Members and Metro Vancouver will review progress in reducing inflow and infiltration by evaluating trends in their dashboard metrics every four years.

Timeline: (a), (b) within three years; (c) every four years thereafter
Adapted from: C23, 1.1.10

6.3 Members will monitor municipal sewer flows and levels in their existing network to inform their inflow and infiltration dashboards. Members will expand the monitoring network if needed to better understand where inflow and infiltration is happening.
Timeline: ongoing
Adapted from: 3.3.3, 3.3.8

6.4 Metro Vancouver will review the wet weather sewer pricing formula every four years, and will adjust it if needed to further incentivize inflow and infiltration reductions by members.
Timeline: every four years, starting in 2028
Adapted from: 3.1.2, 3.1.7

Performance Indicators

Performance indicators will be reported by members through the new inflow and infiltration dashboards developed in 6.1 and 6.2.

Wet Weather Pricing

The Greater Vancouver Sewerage and Drainage District (GVS&DD) has four distinct sewerage areas as follows: i) North Shore Sewerage Area, ii) Vancouver Sewerage Area, iii) Fraser Sewerage Area, iv) Lulu Island Sewerage Area (see Figure 2). The apportionment of expenditures within each sewerage area are determined in accordance to the *Cost Apportionment Bylaw* that defines a number of cost categories.

For costs to be apportioned within a given sewerage area, the formulation has historically been based on dry weather flows (or a proxy thereof) generated by each member. However, this does not adequately reflect the actual system use during wet weather events as those with low wet weather flows are effectively subsidizing those with excessive wet weather flows that take up more than their share of system capacity.

Apportioning costs based on wet weather flows better reflects the full regional costs of serving each member. This strengthens the "user-pay" principle for allocating costs and motivates members to stay on top of their inflow and infiltration programs to help prevent sanitary sewer overflows.

The GVS&DD Board approved amendments to the *Cost Apportionment Bylaw* that incorporate wet weather pricing, to be phased in over 10 years starting in 2024.

Strategy 7 Minimize impacts of sanitary sewer overflows on human health and the environment

As actions on reducing inflow and infiltration in private laterals are long-term initiatives, sanitary sewer overflows will continue to occur. Metro Vancouver will continue to assess the effects of sanitary sewer overflows on the receiving environment and reduce the impacts of overflows on human health and the environment.

Metro Vancouver reports sanitary sewer overflows immediately to the federal and provincial governments, regional health authorities, and associated municipalities. Metro Vancouver also provides real-time information about sanitary sewer overflows so that local First Nations and residents can make informed decisions about fishing, cultural and ceremonial use, harvesting, and recreational activities near areas where overflows occur.

Supports Goals: Prevent pollution

Actions

7.1 Metro Vancouver will continue to post real-time sanitary sewer overflow information on the Metro Vancouver website.
Timeline: ongoing
New action

7.2 Metro Vancouver will continue to, and members will, inform the Province, regional health authorities, and the First Nations Health Authority of any sanitary sewer overflows as soon as they occur.
Timeline: ongoing
Adapted from: 3.5.6, 3.5.9

7.3 Metro Vancouver and members will report annually on the number and location of sanitary sewer overflows, and, where feasible, the estimated volumes and probable causes.
Timeline: ongoing
Adapted from: C23, 3.3.5, 3.3.7, 3.5.6, 3.5.9
Aligned with: P10

7.4 Metro Vancouver will conduct risk assessments at any new significant regional sanitary sewer overflow locations and will holistically compare the risk assessments of all sanitary sewer overflow locations to determine their relative risk, considering risks to public health and the environment. Metro Vancouver will use the results of the sanitary sewer overflow risk assessments to prioritize mitigation efforts, to optimize the operation of the regional liquid waste collection system, and to provide input into decisions regarding capital improvements and upgrades.

Timeline: ongoing
Adapted from: C4, 2011 MC4
Aligned with: P12

7.5 Metro Vancouver and members will continue to develop and implement municipal-regional sanitary overflow management plans to eliminate overflows at chronic locations. Metro Vancouver will report on progress toward the implementation of these management plans including an updated list of infrastructure constructed to manage wet weather.
Timeline: ongoing; report on progress within two years
Adapted from: 2002 MC4, 1.2.4, 1.2.5

Performance Indicators

7A Number, duration, and estimated volume of sanitary sewer overflow discharge events at chronic overflow sites, where feasible; and, total number of sanitary sewer overflow discharge events and total volume of sanitary sewer overflow discharges for entire system.

Responsibility: Metro Vancouver and members
Adapted from 2011 performance measure: number of sanitary sewer overflows – frequency, location, volume

Combined Sewer Overflows

Combined sewers carry both sanitary wastewater and rainwater in a single pipe and exist only in older parts of Vancouver, Burnaby, and New Westminster. During dry weather, combined sewers convey all sanitary wastewater to wastewater treatment plants, where treated effluent is released to local water bodies. During heavy rainfall, excess rainwater in the system can cause combined sewage to overflow into local water bodies. This is because combined sewers were designed to provide system relief and avoid sewage backups into homes and businesses.

Metro Vancouver monitors its combined sewers continuously and reports overflows annually to Environment Canada. To address the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent* (CWS-MMWE) and the *Municipal Wastewater Regulation*, Metro Vancouver and members with combined systems (Vancouver, Burnaby, and New Westminster) are working on separating all combined sewers to improve the water quality of our local water bodies while increasing system resilience.

History of Combined Sewers

In the 1913 *Vancouver and Districts Joint Sewerage and Drainage Board Report*, R.S. Lea recommended that municipalities build separated sewer systems:

> Whilst nearly every modern Sanitarian admits that the separate is the better system, it is looked on as somewhat of a luxury. It must not be forgotten, however, that the luxury of to-day becomes the necessity of to-morrow, and in considering a scheme of this magnitude, the trend of modern practice must be taken into account rather than the actual methods in use at the present time.

However, combined sewers were built because municipalities at the time deemed that separated sewers would be too costly. Combined sewers continued to be constructed in Vancouver, Burnaby and New Westminster until the 1950s when the decision was made to build regional interceptors and wastewater treatment plants.

The City of Vancouver began separating existing combined sewers in the early 1970s when its oldest sewers, in the West End, first came due for replacement. The City of Burnaby and the City of New Westminster began separating their sewer systems in 2002, when the first LWMP required separation. The sewers in those municipalities are about a generation younger than in Vancouver, owing to their more recent development.

The LWMP sets sewer separation deadlines of 2050 in the Vancouver Sewerage Area and 2075 in the Fraser Sewerage Area. A combined sewer overflow storage tank built by the City New Westminster and Metro Vancouver enabled the 2075 deadline.

Strategy 8 Assess impact of combined sewer overflows on receiving environment

Members with combined systems (Vancouver, Burnaby, and New Westminster) and Metro Vancouver can reduce the impact of combined sewer overflows on the receiving environment by better prioritizing action. The current metric of using combined sewer overflow volumes simply tracks the severity of the rainfall event, with higher rainfalls causing more volume but also more dilute overflows. The result is a weak correlation to the impact on the environment by combined sewer overflows. Prioritizing action based on characterizing the quality (including sanitary loading) of the overflows, in addition to combined sewer overflow volumes and frequencies, should result in better correlation to receiving environment monitoring data. This will allow better assessment of the effects of combined sewer overflows on receiving waters and of the progress of corrective measures.

As separation of combined sewers continues, Metro Vancouver and members with combined systems will develop and implement system optimization projects in the near term that decrease sewage discharges to receiving waters. This will involve the use of models to evaluate various system management measures, giving preference to higher concentrations of sewage for treatment, and assessing their potential environmental benefits.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

8.1 Metro Vancouver will continue to post real-time information on regional combined sewer overflow location, flow volume, and duration on the Metro Vancouver website.
Timeline: ongoing
New action

8.2 Metro Vancouver will continue to estimate and report annually on the frequency, location, and volume of sewage overflows from regional combined sewers, and where feasible identify and address the probable causes.
Timeline: ongoing
Adapted from: C14, 3.3.5
Aligned with: P7

8.3 Metro Vancouver will continue to monitor combined sewer overflow flows and characterize samples from combined sewer overflow discharges. Members with combined systems will begin to monitor combined sewer overflow flows and characterize samples from combined sewer overflow discharges.
Timeline: within five years
Adapted from: 2011 MC6
Aligned with: P7

8.4 Members with combined systems will report on combined sewer overflows.

a) Members with combined systems will continue to estimate and report annually on the frequency, location, and volume of combined sewer overflows from municipal sewers, and where feasible identify and address the probable causes.

b) Members with combined systems will begin reporting combined sewer overflow flow monitoring and characterization and assessment of environmental impacts, or pursue an alternate approach approved by the Ministry of Environment and Climate Change Strategy.

Timeline: within five years
Adapted from: C14, 3.3.7

8.5 Metro Vancouver will continue to assess change in receiving environment water quality resulting from any measures taken to address combined sewer overflow discharges. Metro Vancouver will report out, as applicable, in the *Environmental Management and Quality Control Annual Report*.
Timeline: ongoing
Adapted from: C4, 2011 MC4
Aligned with: P7

8.6 Metro Vancouver and members with combined systems will use available information and environmental management tools to inform the prioritization of sewer separation and near term combined sewer overflow mitigation measures.
Timeline: ongoing
Adapted from: 2011 MC4

8.7 Metro Vancouver will use sewer separation data supplied by members with combined systems in a sewer system model to estimate the relative proportion of sanitary and rainwater flows in combined sewer overflows at outfalls. Metro Vancouver will use the model results to evaluate system management measures for reducing combined sewer overflow sanitary loading to the receiving environment.
Timeline: within three years
New action

8.8 Metro Vancouver and members with combined systems will continue to develop and implement system optimization projects in the near term to minimize combined sewer overflow sanitary sewage loading and minimize total combined sewer overflow volume spilled, using information from 8.4, 8.5, 8.6, and 8.7.

a) Metro Vancouver will update its system operation control strategies so that regional interceptors preferentially convey flows with higher concentrations of sanitary sewage to wastewater treatment plants.

b) Metro Vancouver and members with combined systems will implement operational improvements that minimize total volume and sanitary sewage loading in overflows, while considering interactions of the regional and municipal sewer systems.

Timeline: within five years
Adapted from: C13, C16
Aligned with: P11

8.9 Metro Vancouver and members with combined systems will maintain monitors at combined sewer overflow sites.

a) Metro Vancouver will maintain installed monitors to estimate overflow volume and frequency. Metro Vancouver will ensure the number and location of monitors is sufficient for characterizing discharges [see 8.3] and modelling sanitary flows [see 8.7] to prioritize combined sewer overflow mitigation actions [see 8.8].

b) Members with combined systems will maintain installed monitors to estimate overflow volume and frequency.

Timeline: ongoing

Adapted from: C12, 3.3.3

Performance Indicators

8A Number, duration and volume of combined sewer overflow discharge events at each combined sewer overflow site; and, total number of combined sewer overflow discharge events and total volume of combined sewer overflow discharges for entire system.

Responsibility: Metro Vancouver and members

New indicator

8B Sanitary wastewater volume (m^3) and loading* in combined sewer overflow discharges.

Responsibility: Metro Vancouver

Frequency: every two to four years

Replaces 2011 indicator: sanitary sewage volumes in combined sewer overflows

*Note, loading will be determined using best available information from either monitoring [see 8.3] or modelling [see 8.7]. Parameters and units of reporting to be determined.

Strategy 9 Separate combined sewers to eliminate overflows

Metro Vancouver and members with combined sewers (Burnaby, New Westminster, and Vancouver) have committed to eliminate combined sewer overflows by 2050 in the Vancouver Sewerage Area and by 2075 in the Fraser Sewerage Area.

To demonstrate continuing progress towards eliminating combined sewer overflows, Metro Vancouver in consultation with members will develop and submit intermediate targets for separation of combined catchments to the Ministry of Environment and Climate Change Strategy every five years. To guide this work, Metro Vancouver will engage with Burnaby, New Westminster, Vancouver, and local First Nations to develop a framework to prioritize sewer separation projects. The intermediate targets will be used to track progress of project delivery.

Historically, some creeks and streams in the region were buried with their flow piped into combined (and sometimes sanitary) sewers. Similarly, some lakes and ponds were connected to combined sewers to maintain water levels. These incoming extraneous flows discharge continuously and occupy pipe capacity designed for conveyance of sanitary sewage, adding unnecessary operational and financial costs for conveyance and treatment. Due to climate change, increases in rainfall and consequently extraneous flows will increase the risk of combined sewer overflows, system surcharging, and potential flooding. Disconnecting these extraneous flows from the sewer system can also facilitate daylighting of streams, which restores habitat and cultural value for First Nations, and creates public amenities.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

9.1 Members will ensure that no new combined sewer laterals will be constructed on private or public property. Burnaby, New Westminster, and Vancouver will replace existing combined sewers with separate systems during redevelopment or significant renovations.
Timeline: ongoing
Adapted from: 1.2.1
Aligned with: P6

9.2 Metro Vancouver will develop intermediate targets on a five-year interval for municipal and regional separation of prioritized combined catchments. The targets will be based on a framework to be developed with Burnaby, New Westminster, Vancouver, and First Nations, that considers key factors such as cultural value, population, redevelopment rates, and operational considerations. Metro Vancouver will submit the targets to the Ministry of Environment and Climate Change Strategy.
Timeline: within five years
Adapted from: C15, 2011 MC10, 1.2.1, 1.2.2, 1.2.3
Aligned with: P6

9.3 Burnaby, New Westminster, and Vancouver will continue to work with Metro Vancouver to develop and implement Sewer Separation and Combined Sewer Overflow Elimination Plans to prevent combined sewer overflows, and in the interim, support the intermediate targets developed in action 9.2 by:

a) prioritizing combined catchments for separation;
b) sequencing the separation of regional trunk sewers and municipal collector sewers in the prioritized catchments; and
c) developing a strategy to separate combined sewer connections from private properties.

Burnaby, New Westminster, and Vancouver will separate municipal collector sewers according to the Sewer Separation and Combined Sewer Overflow Elimination Plans, such that:

- Vancouver Sewerage Area members will prevent combined sewer overflows by 2050 by replacing combined sewers with separate sanitary and storm sewers at an average rate of 1 per cent of the system per year.
- Fraser Sewerage Area members will prevent combined sewer overflows by 2075 by replacing combined sewers with separate sanitary and storm sewers at an average rate of 1.5 per cent of the system per year.

Timeline: ongoing
Adapted from: C15, 1.2.2, 1.2.6

9.4 Metro Vancouver or the member will replace combined regional trunk sewers with separated sanitary and storm sewers as determined by the Sewer Separation Plans.
Timeline: ongoing
Adapted from: 1.2.3

9.5 Members with combined systems will show progress of sewer separation and reduction of the sanitary loadings in combined sewer overflows by reporting the percentage of population with 100 per cent sanitary sewage delivered to Metro Vancouver interceptors. To do so, those members will develop and maintain a database of properties where private side plumbing is separated and feeds into separated municipal and regional sewers.
Timeline: within five years
New action

9.6 Members with combined systems will remove extraneous flows from creeks, lakes, and underground streams that discharge continuously into combined or sanitary sewers, in alignment with Sewer Separation and Combined Sewer Overflow Elimination Plans outlined in Action 9.3:
a) Members with combined systems will develop plans to remove extraneous flows.
b) Members with combined systems will implement the plans to remove the extraneous flows and provide progress updates every five years.
Timeline: (a) within three years
New action

Performance Indicators

9A Percentage of public sewer system that is separated
Responsibility: Metro Vancouver and members
New indicator

Note: This performance indicator will be supplemented by the "Percentage of population with 100 per cent sanitary sewage delivered to Metro Vancouver interceptors" within five years, as per action 9.5.

Rainwater Management

In urban areas, most rainwater and melting snow go into storm sewers (via the grated drains in streets), which typically empty into rivers, creeks, and adjacent lowland agricultural areas, or directly into the ocean. As rainwater travels along paved and unpaved surfaces to storm sewers, it can pick up pollution along the way. Urban rainwater can carry motor oil, gasoline, animal excrement, garbage, fertilizer, and other contaminants directly into the nearest body of water, where these materials can be harmful to plants, wildlife, and humans. Heavy storms can also introduce a lot of rainwater into streams and creeks in a short period of time, causing erosion and stirring up sediment, which makes it hard for fish to breathe.

In nature, trees and earth help absorb rain slowly, breaking down pollutants, refilling groundwater and keeping waterways healthy. In urban areas, buildings, roads, and other impervious surfaces do not allow rainwater to soak into the ground. The figure below illustrates the differences in the water cycle.

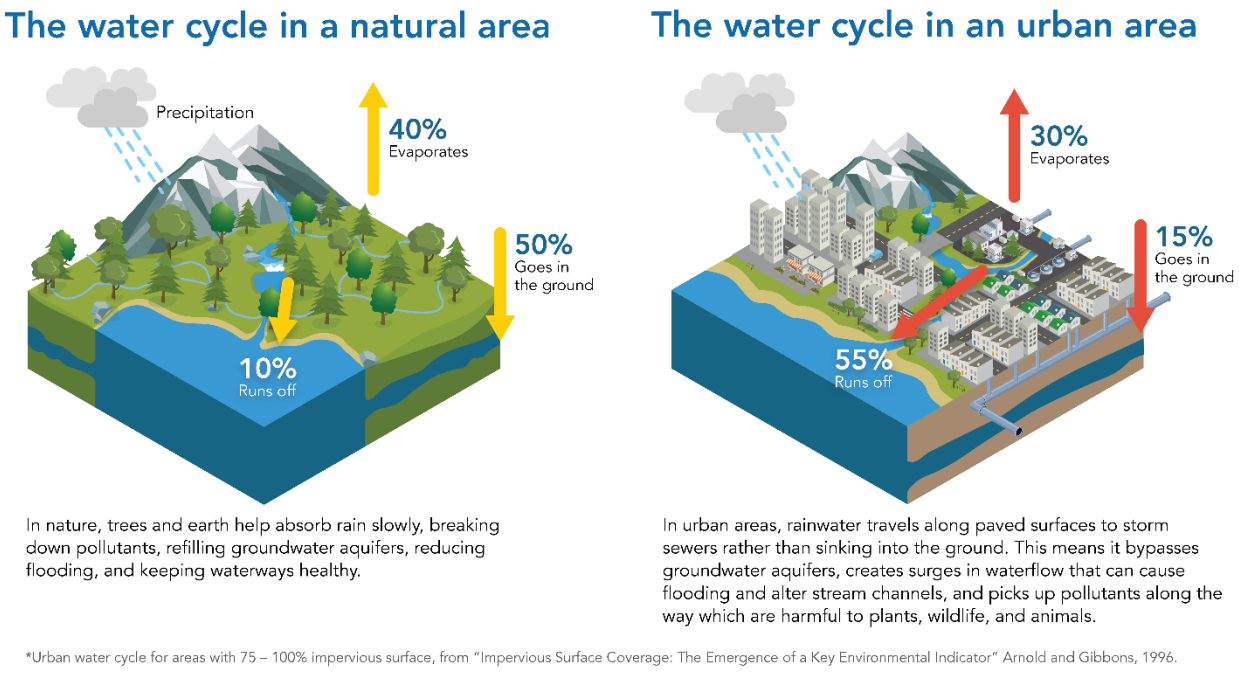


Figure 5 – The water cycle in a natural area vs. an urban area

Approaches that mimic natural processes using green infrastructure, blue infrastructure and thoughtful development patterns allow rainwater to soak into the ground or be released more slowly into local waterways. These approaches are combined with grey infrastructure (sewers and pumps) to help protect against flood risk, especially during higher intensity rain events and in lower elevation areas. Climate change will increase the frequency and intensity of rainfall events, adding stress to the system. From a hydrological perspective, the combined capacity of the green, blue and grey infrastructure needs to be able to absorb the increasing rainfall to avoid flooding.

Metro Vancouver members have been using Integrated Stormwater Management Plans (ISMPs) to manage rainwater with the aim of keeping waterways and lands healthy. Metro Vancouver supports

them by facilitating information sharing, helping develop tools and resources, and liaising with regulators. In collaboration with specific local governments, Metro Vancouver provides drainage services within the Still Creek–Brunette River Drainage Area and the Port Moody–Coquitlam Drainage Area.

Strategy 10 Manage rainwater and urban development for watershed health

The region contains over 100 watersheds with creeks and rivers of all sizes that provide habitat for fish and wildlife as well as recreation for communities. The health of these watersheds is also integral to First Nations food security and sovereignty. Integrated Watershed Management Plans (IWMPs), considered more holistic than the previously named Integrated Stormwater Management Plans (ISMPs), are tailored to each watershed to guide land use and development while prioritizing watershed and stream health. IWMPs must recognize the role that First Nations play in stewarding the land and water. Developing IWMPs presents an opportunity to build strong, collaborative, and respectful relationships with First Nations based on mutual understanding and shared objectives.

The Stormwater Monitoring and Adaptive Management Framework (AMF) was implemented in 2014 as guidance for monitoring and improving watershed health, and as a tool for evaluation of effectiveness of ISMPs. Integrating the AMF as a core component of IWMPs will establish it as an ongoing dynamic evaluation tool to improve IWMPs and best allocate resources. Using this integrated framework allows for dynamic adaptation: if positive watershed health indicators emerge, IWMP renewal periods can be extended; conversely, if degradation occurs, timely corrective actions can be taken.

A critical aspect of watershed health is groundwater, a vital drinking water source for parts of Metro Vancouver. Green infrastructure solutions mimic natural systems that slowly infiltrate rainwater into the ground, allow plants and soil to filter out pollutants, and replenish aquifers with clean groundwater. The development of standards for green infrastructure reflects our deepening understanding of interconnected environmental systems. By working together through IWMPs and the AMF, we can support healthy watersheds and sustainable groundwater resources.

Supports Goals: Restore ecological systems, Reflect First Nations' priorities

Actions

10.1 Members will use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health:

a) Metro Vancouver will coordinate revising the existing Integrated Watershed Management Plan (IWMP) template, with input from First Nations that have chosen to participate, to incorporate the AMF.

b) Members will adopt the revised IWMP template and the associated AMF.

c) Members will implement AMF monitoring programs and will use AMF monitoring findings to continuously improve the IWMPs by (i) establishing criteria to define watershed health, (ii) comparing AMF findings against the watershed health criteria to determine the timing of IWMP review, and (iii) updating IWMP actions when review is triggered. The IWMP review period may be extended from 12 years to a maximum of 15 years when monitoring shows a healthy or improving watershed.

Timeline: (a) within two years; (b) within three years; (c) ongoing
Adapted from: C4, C39, 2011 MC6, 2011 MC7, 2011 MC9, 2011 MC10, 3.3.3, 3.5.6, 3.5.9
Aligned with: P25

10.2 Members will continue to develop, review and update Integrated Watershed Management Plans (IWMPs):

a) Members will prioritize watersheds for IWMP development with First Nations that have chosen to participate, using AMF criteria and additional criteria co-developed with First Nations that consider cultural significance and Aboriginal rights and interests.
b) First Nations will participate in IWMP development, monitoring, and review, as desired and mutually agreed upon, including sharing information about their respective land use plans as appropriate.
c) Members will continue to create, review, and update IWMPs for all watersheds with developed area currently above 20 per cent and will begin to create, review and update IWMPs for watersheds planned to have future developed area above 20 per cent, according to the prioritization sequence defined under (a).

Timeline: (a) within five years; (b), (c) ongoing
Adapted from: C17, 2011 MC10, 3.3.3
Aligned with: P25

10.3 Members will ensure IWMPs integrate rainwater and groundwater management, consider agricultural land rainwater runoff, and reflect the provisions of the Province's *Watershed Security Strategy* once it is launched.
Timeline: ongoing
Adapted from: C47, C48, 2011 MC9
Aligned with: P30

10.4 Members will align land-use planning and development with IWMPs to ensure development decisions support watershed health objectives, including protecting riparian areas and agricultural areas.
Timeline: TBD
Adapted from: 2011 MC6, 2011 MC9, 3.4.7

10.5 Members will expand the use of green infrastructure, blue infrastructure, and other practices to mimic natural watersheds, reduce runoff and discharge, improve water quality and increase climate resilience.
Timeline: TBD
Adapted from: C17

Performance Indicators

A complete set of performance metrics for this strategy will be presented in Rainwater Dashboards once they are created under Action 11.3.

10A Number of IWMPs completed, the area (hectares) they cover, and status or percentage complete of each IWMP action.

Responsibility: Members
Adapted from 2011 performance measure: number and area [hectares] of integrated stormwater management plans completed

Strategy 11 Update and harmonize municipal tools for rainwater management

Long-term success in managing urban watersheds and rainwater systems hinges on three pillars: consistent funding, clear policies, and effective programs.

Dedicated funding specifically tailored to each community's unique needs is crucial. This empowers local authorities to proactively plan for, respond to, and mitigate rainwater challenges. Funding sources can include general tax revenue, utility fees, parcel taxes, or other innovative options.

Watersheds do not respect jurisdictional boundaries. Harmonizing rainwater policies, programs, and bylaws across jurisdictions will create a unified regional direction for managing rainwater and watersheds.

Previously, the LWMP biennial report was the sole method for reporting on Integrated Watershed Management Plans (IWMPs) and the Adaptive Management Framework (AMF). A more dynamic approach is proposed: replacing the report with a rainwater dashboard. This shift towards data transparency and accessibility would enhance accountability by providing continuous access to IWMP progress and data collected through AMF monitoring programs.

Supports Goals: Restore ecological systems

Actions

11.1 Members will each establish dedicated funding to ensure consistent and reliable service delivery for rainwater management.
Timeline: within three years
New action

11.2 Members will update rainwater policies, programs, and bylaws in a harmonized manner:

a) Metro Vancouver will coordinate the development of a guidance document to aid members in harmonizing rainwater policies, programs, and bylaws.

b) Members will then review and update rainwater policies, programs and bylaws.

c) Metro Vancouver and members will coordinate and advocate with other levels of government to resolve rainwater policy conflicts and barriers.

Timeline: (a) within two years; (b) within five years after (a); (c) ongoing.
Adapted from: C38, 1.1.12.b, 1.1.12.e, 1.1.12.f, 1.1.14, 1.1.16, 1.1.20

11.3 Metro Vancouver will coordinate the development of a template for an online rainwater dashboard for members to report on IWMP progress, including contributions to watershed health (e.g., percentage impervious area, length of daylighted waterways, etc.). Members will then implement the online rainwater dashboards.
Timeline: implement dashboards within three years
New action

11.4 Metro Vancouver will coordinate, with members, an approach for seeking to update the Master Municipal Construction Documents such that green infrastructure guidelines become standards.
Timeline: within five years
Adapted from: C20, 1.1.12.f, 1.1.21

Performance Indicators

Performance indicators will be reported by members through the new rainwater dashboards developed in 11.3. Members will select key rainwater indicators to be reported annually in the LWMP dashboard as well (see Monitoring and Reporting section).

Strategy 12 Enhance interagency collaboration to improve watershed health across the region

Formed in 2002, the Stormwater Interagency Liaison Group has played a valuable role in implementing rainwater management actions outlined in the LWMP. However, to better address evolving environmental challenges, climate change, urban development realities, evolving regulatory roles, and First Nations rights and interests, the group requires a refresh.

Updating the interagency group's terms of reference and mandate will renew its vision and will position the group as a unified voice for the region to engage with provincial authorities on rainwater management. This includes ensuring alignment with diverse mandates and initiatives, particularly in the critical area of balancing plans to increase housing density with the need to protect watershed health. The interagency group will coordinate with participating First Nations to provide feedback on IWMPs to Metro Vancouver and members.

Supports Goals: Restore ecological systems, Reflect First Nations' priorities

Actions

12.1 Metro Vancouver will coordinate a revision of the interagency group's terms of reference, possibly to operate as a sub-committee under the Regional Engineer's Advisory Committee (REAC), to lead local research on rainwater management, to be the primary regional advocate with regulators, to promote education and outreach on rainwater management, and to coordinate region-wide accountability on IWMP actions. Metro Vancouver and members will actively participate in the revitalized interagency group.
Timeline: revise terms of reference within one year
Adapted from: C36, 1.1.12.a, 3.5.2, 3.5.10

12.2 Members and Metro Vancouver, as the interagency group, will conduct a regional study of the impacts of densification on watershed health. Members will use the study results to make informed decisions that balance urban growth and ecological resilience.
Timeline: within two years
Adapted from: 2011 MC6, 2011 MC9.b

12.3 Members and Metro Vancouver, as the interagency group, will conduct a cost-benefit analysis to quantify the benefits of green infrastructure and associated lifecycle costs in the region.
Timeline: within three years
New action

12.4 Members and Metro Vancouver, as the interagency group, will host a forum at regular intervals to report progress on IWMPs and LWMP rainwater actions, and to foster collaboration and knowledge sharing among members, First Nations, and interested parties.
Timeline: at least every three years
Adapted from: C37, 2011 MC10

Performance Indicators

None proposed for this strategy.

Wastewater Treatment

Metro Vancouver operates five wastewater treatment plants that currently process over one billion litres of wastewater every day. Wastewater contains different compounds and waste products including soap, food scraps, human waste, oils, and other chemicals. Treating wastewater removes substances that can harm human health and the environment. During and after treatment, wastewater is tested to ensure that treatment plant processes are working effectively and meeting regulations. Treated wastewater, or effluent, is released into the Fraser River, Burrard Inlet, or Strait of Georgia.

Wastewater Treatment Processes

- Primary treatment removes materials that float or readily settle out by gravity.
- Secondary treatment uses biological processes to remove 90 per cent of the organic materials.
- Tertiary treatment removes specific substances, such as ammonia or fine solids, after secondary treatment. Tertiary treatment can involve physical, chemical, or biological processes.
- Tertiary filtration is a physical process that improves treated wastewater quality beyond that achieved by primary or secondary treatment by removing additional suspended solids and associated organic matter.
- In British Columbia, advanced treatment means any form of treatment other than dilution that produces effluent with BOD_5 and TSS both less than 10 mg/L, which are measures of organic material and suspended solids, respectively.

Three of Metro Vancouver's wastewater treatment plants currently perform secondary treatment: Annacis Island, Lulu Island, and Northwest Langley. Metro Vancouver is upgrading both of its primary treatment plants, Iona Island and Lions Gate, to secondary treatment to conform with Ministerial Conditions from previous LWMPs and the Canadian Council of Ministers of the Environment (CCME) *Canada-wide Strategy for Management of Municipal Wastewater* (CWS-MMWE).

Metro Vancouver follows the CWS-MMWE Environmental Risk Management Framework to determine effluent discharge objectives and meet National Performance Standards. If this prescribed process identifies potential environmental risk, it may lead to actions such as source control initiatives, treatment process optimization, and wastewater treatment plant improvements and upgrades. When considering level of treatment for wastewater treatment plant improvements and upgrades, Metro Vancouver considers factors including funding availability, First Nations' concerns, societal values, and other input from engagement on projects.

The site-specific effluent discharge objectives are set for Metro Vancouver wastewater treatment plants based on relevant water quality guidelines, including site-specific water quality objectives where available. When the federal or provincial governments review these water quality objectives/guidelines, First Nations are invited by the presiding government to provide input, and can provide direct feedback on water quality objectives/guidelines.

Strategy 13 Treat wastewater so effluent meets or surpasses regulatory requirements

Metro Vancouver will continue to follow the CWS-MMWE Environmental Risk Management Framework to reduce risks to human health and the environment that may be identified through ongoing monitoring and assessment programs. Metro Vancouver will identify and pursue risk mitigation approaches as appropriate, including source control, treatment process optimization, and, when required, treatment upgrades.

Metro Vancouver has planned wastewater treatment projects to improve effluent quality and accommodate a growing population. These include upgrades such as upgrading a plant from primary to secondary treatment, or expansions such as increasing the plant's capacity to treat a higher maximum capacity. Future wastewater treatment projects and their estimated dates of initiation and operation are presented in the Wastewater Treatment Plant Upgrade and Expansion Schedule in Appendix A. Other wastewater treatment plant infrastructure projects not listed in these schedules may be driven by factors such as maintenance or resilience, and are captured in Metro Vancouver's Long Range Capital Plan that is updated annually as part of the budgeting process.

Table 1 shows the current and planned future level of treatment at each wastewater treatment plant. The level of treatment is selected to meet or surpass the regulatory requirements of Operational Certificates issued by the Province and to be consistent with the requirements of the CWS-MMWE. Table 1 also identifies additional treatment beyond secondary treatment planned for future upgrades, including ammonia removal and tertiary filtration.

Table 1 Levels of Treatment

Current level of treatment	**Wastewater treatment plant**	**Planned future level of treatment**
Primary	Iona Island	Secondary† (membrane filtration), or‡ Secondary† plus tertiary filtration (cloth media filters)
	Lions Gate (current) / North Shore (future)	Secondary† plus tertiary filtration (cloth media filters)
Secondary	Annacis Island	Secondary plus ammonia removal
	Lulu Island	Secondary
	Northwest Langley	Secondary (biological nutrient removal) plus tertiary filtration (cloth media filters)

† The designs for the Iona Island Wastewater Treatment Plant secondary upgrade and the North Shore Wastewater Treatment Plant include future-proofing to enable ammonia removal by adjusting operation of secondary treatment processes. Ammonia removal will begin when it is identified as required by the CWS-MMWE Environmental Risk Management Framework.

‡The specific technology for Iona Island Wastewater Treatment Plant will be selected during preliminary design.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

13.1 Metro Vancouver will plan, design, operate, and maintain wastewater treatment infrastructure using the CWS-MMWE Environmental Risk Management Framework to address and adapt to identified risks and long term needs, and will additionally incorporate risks associated with climate change into the framework.
Timeline: ongoing
Adapted from: C9, 1.3.4, 1.3.5, 1.3.6, 1.3.7, 3.4.1

13.2 Metro Vancouver will continue to monitor the quantity and characteristics of Metro Vancouver's wastewater treatment plant effluent discharges and assess effluent quality in accordance with the CWS-MMWE.
Timeline: ongoing
Adapted from: C4, C11, 1.3.7, 3.3.2
Aligned with: P2

13.3 Metro Vancouver will continue to monitor influent and the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required.
Timeline: ongoing
Adapted from: C4, C9, C11, 2011 MC6, 1.3.7, 3.3.1
Aligned with: P2, P3

13.4 Metro Vancouver will upgrade wastewater treatment processes and plants according to the Wastewater Treatment Plant Upgrade and Expansion Schedule.

a) Metro Vancouver will update the Wastewater Treatment Plant Upgrade and Expansion Schedule and will report the updates to the Ministry of Environment and Climate Change Strategy.
b) Metro Vancouver will engage with First Nations on planned wastewater treatment upgrades when preparing and updating the Wastewater Treatment Plant Upgrade and Expansion Schedule, and will do so in a manner that is consistent with applicable federal and provincial law, and according to the level of First Nations interest.
c) Metro Vancouver will engage with the public and other interested parties on planned wastewater treatment upgrades when preparing and updating the Wastewater Treatment Plant Upgrade and Expansion Schedule.
d) Metro Vancouver will upgrade wastewater treatment plants in accordance with the timelines shown in the Wastewater Treatment Plant Upgrade and Expansion Schedule.

Timeline: (a) every two years; (b), (c), (d) ongoing.
Adapted from: 2011 MC10, 1.3.5

Performance Indicator
Results from monitoring of Metro Vancouver's wastewater treatment plant influent and effluent quantity and characteristics will continue to be reported in the Environmental Management and Quality Control Annual Report.

Strategy 14 Operate and maintain wastewater treatment plants to meet or surpass regulatory requirements

Effective operation and maintenance of Metro Vancouver's wastewater treatment plants is critical to meet regulatory requirements and to provide high quality effluent for discharge or reuse. Consistent compliance requires continuous monitoring, testing, and adjustment of treatment processes.

Supports Goals: Prevent pollution

Actions

14.1 Metro Vancouver will operate wastewater treatment plants to meet or surpass requirements specified in each facility's Operational Certificate and CWS-MMWE National Performance Standards for wastewater effluent.
Timeline: ongoing
Adapted from: 1.3.4, 1.3.6

14.2 Metro Vancouver will update and implement asset management plans to enhance the operational efficiency of wastewater treatment plants, maintain the reliability of the existing infrastructure and equipment for wastewater treatment plants that address risks including climate change and seismic events, and maintain performance in wet weather.
Timeline: ongoing
Adapted from: 3.1.5
Aligned with: P3

14.3 Metro Vancouver will report on bypass conditions that occur at wastewater treatment plants in the *Environmental Management and Quality Control Annual Report*. The report on each activity will include a description of the event, cause, and environmental effect.
Timeline: ongoing
Adapted from: 2011 MC8

Performance Indicator

14A Compliance with BOD and TSS limits specified in Operational Certificates for wastewater treatment plants (percentage of time)
Responsibility: Metro Vancouver
Adapted from 2011 performance measure: compliance with parameters specified in the Operational Certificates for wastewater treatment plants

Biosolids

Biosolids are the treated organic material that is recovered from wastewater treatment. The end result is an earth-like product that is rich in nutrients and organic matter. Biosolids can be used to improve soil health, or as source of energy. Nutrifor™ is the brand name for the biosolids that Metro Vancouver produces. Currently, Nutrifor biosolids are applied to land within the region and around the province as a fertilizer or as an ingredient to build healthy soil.

Metro Vancouver plans for the current and future management of biosolids by taking into account growth in the region, wastewater treatment infrastructure upgrades, and new technologies. The stability and resilience of biosolids management in the region depends on ensuring a diversity of best available technologies and customer markets, a solid scientific foundation, and a commitment to the environment, public health, and future generations.

Strategy 15 Diversify options to beneficially use Nutrifor biosolids

Population growth and wastewater treatment plant upgrades will significantly increase the amount of biosolids produced, and the greenhouse gas emissions to manage biosolids may also increase. Diversifying markets and best available technologies will ensure beneficial use of all Nutrifor biosolids to avoid landfill disposal of a valuable resource. New options can also recover energy and minimize greenhouse gas emissions.

Supports Goals: Recover resources, Restore ecological systems, Reflect First Nations' priorities

Actions

15.1 Metro Vancouver will grow the land application program and will increase public outreach and education, including to First Nations, on how Nutrifor biosolids are used safely and responsibly as fertilizer and as an ingredient to build healthy soil.
Timeline: ongoing
Adapted from: C34, C35, 2011 MC10, 2.1.1.a.5
Aligned with: P21

15.2 Metro Vancouver will beneficially use dried Nutrifor biosolids pellets:

a) Metro Vancouver will build a regional biosolids dryer to produce granular pellets that can be used as a low carbon fuel and as a fertilizer product.

b) Metro Vancouver will work with the Province to certify the pellets as a retail-grade organic matter product under OMRR or other regulation as appropriate.

Timeline: (a) by 2032-2037
Adapted from: 2.1.1.a.4, 2.1.1.a.5
Aligned with: P21

15.3 Metro Vancouver will explore technologies that displace the production of Nutrifor biosolids, such as thermal technologies that convert sludge to low carbon fuel with a net positive energy balance and net greenhouse gas emissions reduction.
Timeline: ongoing
Adapted from: 2.1.1.a.4

Aligned with: P21

15.4 Metro Vancouver will process Nutrifor biosolids at Metro Vancouver's Waste-to-Energy Facility to maintain contingency management options when other markets or uses cannot be accessed.
Timeline: ongoing
Adapted from: 2.1.1.a.4
Aligned with: P21

15.5 Members will continue to use Nutrifor landscaping soil in municipal projects when feasible.
Timeline: continuing
Adapted from: 2.1.1.a.5, 2.1.4

Performance Indicators

15A Beneficial use of Nutrifor biosolids (percentage of total biosolids generated)
Responsibility: Metro Vancouver
New indicator

15B In-region use of Nutrifor biosolids (percentage of total biosolids generated)
Responsibility: Metro Vancouver
New indicator

Circular Water Economy

Wastewater is rich in resources, including energy, nutrients, and water. A circular water economy recovers and recycles these resources to provide value for citizens, the environment, and businesses. Metro Vancouver already recovers energy from wastewater in the form of biogas and heat, nutrients in the form of Nutrifor biosolids, and water for use in wastewater treatment plants. Innovative technologies are being developed that can recover even more resources from wastewater and propel the transition to a circular water economy.

Strategy 16 Implement proven resource recovery technologies

Metro Vancouver will continue to implement proven technologies for resource recovery at its wastewater treatment plants and in its collection system when there is a good business case. Recovering resources from wastewater creates revenue while reducing environmental footprint. Successful resource recovery projects rely on a strong and diverse network of partners including member jurisdictions to address challenges such as regulatory issues, public perception, and market integration of recovered resources.

Supports Goals: Recover resources

Actions

16.1 Metro Vancouver will recover energy from the liquid waste system to reduce regional greenhouse gas emissions and support the region's transition to clean energy.

a) Metro Vancouver will continue to identify and implement best uses of biogas from wastewater treatment plant digesters. This includes use at Metro Vancouver wastewater treatment plants and upgrading biogas for sale to other parties as renewable natural gas, when appropriate.

b) Metro Vancouver will continue to recover thermal energy from sewage and treated effluent for use at Metro Vancouver facilities, when appropriate.

c) Metro Vancouver will continue to provide access to sewage and effluent for heat recovery to members, First Nations, and district energy providers, when appropriate.

d) Metro Vancouver will continue to invest in sewer heat recovery and effluent heat recovery projects, when appropriate.

Timeline: ongoing

Adapted from: 2011 MC10, 2.1.1.a, 2.1.2, 2.1.3

16.2 Metro Vancouver will recover water from the liquid waste system.

a) Metro Vancouver will continue to use treated wastewater in Metro Vancouver's wastewater treatment plants, which reduces use of potable water in plant processes.

b) Metro Vancouver will review and recommend revisions and extensions to Board policy on reclaimed water use, to provide guidance on enabling use of treated wastewater by other off-site parties throughout the region. Potential uses include sewer flushing, hydro-excavation, irrigation, vehicle washing, dust suppression, and other beneficial uses.

c) Metro Vancouver will construct and operate facilities to provide reclaimed water from wastewater treatment plants for on-site use or to other parties for use at off-site locations, when financially and environmentally appropriate.

Timeline: ongoing
Adapted from: 2.1.1.a, 2.1.2, 2.1.3

16.3 Metro Vancouver will recover nutrients and other materials from liquid waste.

a) Metro Vancouver will continue to periodically evaluate the business case for recovering nutrients and other materials from liquid waste.

b) Metro Vancouver will implement promising technologies when financially and environmentally appropriate.

Timeline: ongoing
Adapted from: 2.1.1.a, 2.1.2, 2.1.3

16.4 Members will use recovered energy and water when feasible.

a) Members will continue to explore recovery of thermal energy from sewage and treated effluent for use in district energy systems, and will implement heat recovery projects in collaboration with Metro Vancouver when financially and environmentally appropriate.

b) Members will identify potential uses of reclaimed treated wastewater and rainwater by institutions and businesses throughout the region such as sewer flushing, hydro-excavation, irrigation, vehicle washing, dust suppression, and other beneficial uses, and will support and establish facilities and programs to use reclaimed water when financially and environmentally appropriate.

Timeline: ongoing
Adapted from: 2.1.4

Performance Indicators

16A Amount of energy recovered from liquid waste system (GJ)§

Responsibility: Metro Vancouver and members
Adapted from 2011 performance measure: quantities and types of energy and materials recovered from the liquid waste system.

§ Sum of GJ from all energy types (e.g., biogas, sewer heat, biocrude), recovered by Metro Vancouver or members, for use by any end customer.

Strategy 17 Research and pilot innovative technologies to advance the circular water economy

Metro Vancouver can support exploration of new resource recovery technologies and approaches that reduce operational risks, improve performance, increase resilience, and decrease costs. Promising solutions need to be piloted in a real-world wastewater environment as a critical step in progressing from lab-scale testing to full-scale adoption. Investing in research and pilots of new technologies not only ensures sustainable wastewater management for Metro Vancouver, but can also cultivate the next generation of researchers and boost economic growth in the region.

Supports Goals: Recover resources

Liquid Waste as a Resource

The liquid waste system is rich in resources that can be recovered, including:

- Biogas from existing wastewater processes, which can be upgraded for use as renewable natural gas
- Low-carbon biofuel from new sludge conversion technology, which can replace diesel for transportation
- Heat from sewage or treated wastewater effluent, which can be used to heat buildings in areas with district energy systems
- Nutrients such as nitrogen or phosphorous, which can be used for fertilizer
- Reclaimed (treated) water, which can be used for non-potable purposes like sewer flushing, street sweeping, landscape watering, or agricultural purposes
- Alternative fuels, such as hydrogen or ammonia, that could be used for heavy-duty transportation
- Carbon dioxide that can be recovered from biogas, for industrial use

New resources and novel uses may emerge as research progresses.

Actions

17.1 Metro Vancouver will research, develop and pilot new methods to expand the recovery and use of energy, nutrients, water and other emerging resources from the liquid waste system, by:

a) Hosting pilots in wastewater treatment plants and the collection system
b) Collaborating with researchers at academic institutions
c) Collaborating with other utilities and water research organizations
d) Partnering with water technology developers
e) Collaborating with First Nations on pilot projects as desired
f) Conducting public outreach and education about resource recovery, including to First Nations

Timeline: ongoing
Adapted from: 2011 MC10, 2.1.1.a, 3.2.2

17.2 Metro Vancouver will foster circular water economy innovation within the liquid waste system by:

a) Leveraging the Lulu Island Wastewater Treatment Plant Pilot Digestion Optimization Facility as a platform for piloting and developing new technologies and enhancements
b) Embedding spaces for future treatment technology pilots into the upgraded Iona Island Wastewater Treatment Plant
c) Integrating circular water economy principles into Metro Vancouver wastewater facility plans
d) Promoting circular water economy innovation and research through sharing our story and actively participating in industry organizations and regional networks

Timeline: ongoing
New and Adapted from: 3.2.2

Performance Indicators

None proposed for this strategy.

Environmental Management

Many environmental management strategies and actions have been integrated into each of the preceding sections. This section contains environmental management strategies and actions that either apply across a number of preceding sections or do not specifically apply to any one section.

Strategy 18 Minimize impacts of liquid waste management on the atmosphere and air quality

Managing greenhouse gas emissions from wastewater systems aligns with regional, provincial, and federal climate goals. Metro Vancouver and members will continue to quantify and manage greenhouse gas emissions, other air emissions including potential air contaminants, and odours associated with operating and maintaining the liquid waste system. Reducing air pollution improves environmental quality and public health. Reducing air contaminants and odours is also a stated high priority for First Nations leadership and communities.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

18.1 Metro Vancouver and members will continue to develop and implement programs and policies to track greenhouse gas emissions associated with the construction and operation of wastewater collection and treatment systems, including developing and implementing new monitoring plans where necessary.
Timeline: ongoing
Adapted from: 3.3.4, 3.3.6

18.2 Metro Vancouver and members will continue to develop and implement programs and procurement policies to reduce greenhouse gas emissions associated with the design, construction, operation, and management of wastewater collection and treatment systems, to help achieve federal, provincial, and Metro Vancouver greenhouse gas reduction targets, using business case analysis techniques to assess opportunities and options.
Timeline: ongoing
Adapted from: 1.3.10, 1.3.17

18.3 Metro Vancouver and members will manage air emissions from standby power generators:

a) Metro Vancouver will continue to develop and implement air emissions management programs for standby power generators, including assessment of desirability of retrofit and accelerated asset replacement where appropriate.

b) Members will continue to develop and implement air emissions management programs for standby power generators at municipal sewer pump stations.

Timeline: ongoing
Adapted from: 1.3.9, 1.3.16

18.4 Metro Vancouver will develop and undertake a program to characterize emissions from various processes at wastewater treatment plants (e.g., digesters, exhausts, stacks) during operation, preventative maintenance, and emergency maintenance. Metro Vancouver will identify potential concerns, and, where appropriate, undertake studies of best economically feasible control processes or technologies.
Timeline: ongoing
Adapted from: 1.3.9

18.5 Metro Vancouver will continue odour management programs at wastewater treatment plants and targeted facilities in the regional sewer system. These programs are driven by community acceptance and industry best practices, and are designed to: establish the current odour levels through monitoring; set targets for future odour levels through modelling; and, identify and implement the steps to achieve the targets through mitigation.
Timeline: ongoing
Adapted from: 1.3.8, 3.3.4, 3.3.6

18.6 Members will continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities.
Timeline: ongoing
Adapted from: 1.3.15, 3.3.4, 3.3.6

Performance Indicators

18A Greenhouse gas emissions from operation of Metro Vancouver's liquid waste management system (tonnes CO_2e per year).

Responsibility: Metro Vancouver
New indicator

Strategy 19 Environmental monitoring to protect public health and the environment

Metro Vancouver regularly tests and monitors areas where treated wastewater is released into the environment and the overall health of the aquatic environment. The Environmental Monitoring Committee was established under the 2002 LWMP to provide scientific advice and recommendations on the effect of liquid waste discharges on the receiving environment and monitoring of the environmental health of the receiving environment. The committee members are staff with scientific and technical expertise from federal and provincial government, academic institutions, Metro Vancouver, and member jurisdictions.

Metro Vancouver monitors the water quality of local recreational waters from May to September, testing beaches at least once a week. Water samples are taken from over 100 sites in 40 locations across the region. Metro Vancouver provides test results to regional health authorities, who then determine whether notices should be posted at beaches to inform of possible risk for swimming.

The environmental monitoring and reporting actions in this strategy continue to provide information for use in assessments to protect public health and the environment.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

19.1 Metro Vancouver will continue to receive advice from the Environmental Monitoring Committee. The Committee will continue to be responsible for reviewing the scope and design of monitoring programs, review of monitoring results, predictive modelling, and risk assessments of waste discharges.
Timeline: ongoing
Adapted from: C2, 3.5.2, 3.5.10
Aligned with: P2

19.2 Metro Vancouver will continue to monitor recreational water quality (seasonal beach monitoring) throughout the region, will continue to share this information with municipal beach operators and local Health Authorities, and will share this information with the First Nations Health Authority.
Timeline: ongoing
Adapted from: C4, 2011 MC6, 2011 MC10

19.3 Metro Vancouver will continue to monitor substances of interest in effluent and environmental fate of priority contaminants and their potential for adverse effects.
Timeline: ongoing
Adapted from: 2002 MC7

Performance Indicators

19A Beach advisory days per year and locations (number of days)

Responsibility: Metro Vancouver
Copy of 2011 performance measure

Testing Wastewater for COVID-19 and Other Viruses

Metro Vancouver is working with the BC Centre for Disease Control and the University of British Columbia to track the presence of respiratory viruses in the region's wastewater. Respiratory virus particles are shed in the feces of people who have the virus and can be detected in wastewater.

Untreated wastewater entering each of Metro Vancouver's five wastewater treatment plants is sampled and tested three times a week for these respiratory viruses:

- SARS-CoV-2, commonly known as COVID-19
- Influenza A and Influenza B, commonly known as the flu
- Respiratory Syncytial Virus (RSV), a common respiratory virus that usually causes mild, cold-like symptoms

While wastewater testing cannot tell us the number of people who are infected or contagious, it can tell us which respiratory viruses are present and how viral levels might be changing over time. This information may help health authorities evaluate the effectiveness of measures to control the virus in the community.

Strategy 20 Collaborate on regional environmental management initiatives

These actions support collaboration with interested parties on environmental management initiatives for the protection of public health and the environment.

Supports Goals: Prevent pollution, Reflect First Nations' priorities

Actions

20.1 Metro Vancouver will participate in relevant collaborative environmental program(s) for regional water bodies (i.e., Fraser River, Burrard Inlet, Strait of Georgia) along with members, First Nations, senior governments, and interested parties.
Timeline: ongoing
Adapted from: 2011 MC10, 3.3.1, 3.5.3

20.2 Metro Vancouver will continue to participate, and members may participate, in provincial processes to review and establish water uses and water quality objectives for specific water bodies within Metro Vancouver.
Timeline: ongoing
Adapted from: C1, C49, 2011 MC10, 1.3.18, 3.3.1

20.3 Members will work with private marina operators, the Province, and the federal government to develop and implement regulations to ensure all new marinas and marinas where planned renovations exceed 50 per cent of the assessed existing improvement value have pleasure craft pump-out facilities.
Timeline: ongoing
Adapted from: C41, 1.3.13

20.4 Members will require all pleasure craft pump-out facilities to connect to a municipal sanitary sewerage system or a provincially permitted on-site treatment and disposal system or have established enforceable protocols for transporting liquid waste for disposal at a permitted liquid waste management facility.
Timeline: ongoing
Adapted from: C42, 1.3.14

Performance Indicators

None proposed for this strategy.

Water Quality Objectives for səlilwət / Burrard Inlet

Water Quality Objectives (WQOs) are developed for waterbodies of regional, provincial, inter-provincial, international, and Indigenous significance. WQOs establish levels for substances in waterbodies to protect water quality, guide resource management decisions, and support the responsible stewardship of water resources.

> *Tsleil-Waututh (səlilwətaɬ) means "People of the Inlet". Since time out of mind, səlilwətaɬ people have used, occupied, governed, and stewarded their territory. səlilwətaɬ hold a sacred, legal obligation and responsibility to protect, defend, and steward the lands and waters of their territory, in accordance with səlilwətaɬ law, for past, present, and future generations. This stewardship responsibility requires restoring conditions that provide the environmental, cultural, spiritual, and economic foundation for səlilwətaɬ people to thrive.*
>
> *— səlilwətaɬ (Tsleil-Waututh Nation)*

WQOs for Burrard Inlet were initially developed in 1990 by the Province. In 2017, səlilwətaɬ published the Burrard Inlet Action Plan to summarize scientific knowledge, identify priority issues and gaps related to environmental degradation, foster environmental stewardship, and identify near-term actions to improve the health and integrity of the inlet. The first of six strategic priorities was to update the WQOs for Burrard Inlet.

səlilwətaɬ led the update of the WQOs in collaboration with the Province. This update combines səlilwətaɬ Indigenous science and knowledge, improved western science, and more recent monitoring data, to lay the foundation for further efforts to protect the water quality and values in Burrard Inlet. Metro Vancouver and members participated in the Burrard Inlet Water Quality Technical Working Group and Roundtable for this update. Action 20.2 in this LWMP continues Metro Vancouver's and members' commitment to participating in the review and update of WQOs when they occur. Several strategies in this plan commit to monitoring the impacts of wastewater discharges to the environment, including whether WQOs are being met.

The updated Water Quality Objectives for Burrard Inlet are co-signed by the Province and səlilwətaɬ. The vision is to increase the benefits of Burrard Inlet for all in the region by reducing stressors and improving water quality, balancing ecological, social, economic, health, and First Nation cultural values. The water values to be protected in the Burrard Inlet include: human consumption of shellfish and finfish, aquatic life, wildlife, cultural practices, recreational uses, and institutional uses.

Monitoring and Reporting

Monitoring and reporting the progress on LWMP actions is important to ensure that Metro Vancouver and members are implementing actions as planned; continuing to be transparent and accountable to the Province, First Nations, the public, and interested parties; and meeting regulatory obligations. This process also helps Metro Vancouver and member jurisdictions to reflect on their progress, share successes and challenges, learn from each other, and collaborate to find solutions.

This updated LWMP introduces new reporting approaches to improve ease of understanding, accountability, transparency, and collaboration:

- a streamlined annual report to the Province with a snapshot view of progress;
- increased public access to LWMP performance indicators through online dashboards;
- regular collaborative meetings between Metro Vancouver and member jurisdictions; and,
- regular meetings between Metro Vancouver and the Province to share progress and discuss challenges.

The following sections explain how Metro Vancouver and member jurisdictions will use the new LWMP Annual Report, LWMP Dashboard, and Progress Meetings to ensure progress toward LWMP goals.

LWMP Annual Report

Metro Vancouver will submit an Annual Report to the Province outlining the progress of Metro Vancouver and member jurisdictions in implementing LWMP actions. Once approved by the Province, the report will be posted publicly on Metro Vancouver's website. The report will contain the following three elements, which are described in detail in Appendix C:

1. **Action Status Table**
   This is a snapshot showing the current status ('Complete,' 'In Progress,' or 'Not Started') of each action and sub-action in the LWMP, for Metro Vancouver and each member jurisdiction. Evidence supporting the reported status of actions will be provided by Metro Vancouver or member jurisdictions should the Province request it.

2. **Performance Indicators Table**
   This table will show the numerical values of the LWMP performance indicators (listed in Appendix B) for Metro Vancouver and member jurisdictions, compiled annually.

3. **LWMP Progress Context and Insights**
   Metro Vancouver and members will prepare contextual information and insights on implementation of select LWMP actions. Content will include:
   - Progress on key priority LWMP actions and highlights for ongoing actions (the 30 actions to be reported in this section are shown in Appendix C, Table C.1)
   - Explanations of missed deadlines for action completion
   - Changes in approach from the original approved LWMP actions

- 2002 LWMP reporting commitments C14, C18, C23 and 2011 LWMP reporting commitments 3.5.4 (b) and 3.5.8 (b) will continue to be reported unless different reporting requirements are agreed to with the Province.

Metro Vancouver will create templates for all three elements of the LWMP Annual Report that members will complete, and will coordinate the compilation of submissions from Metro Vancouver and each member jurisdiction on an annual basis. The timing for completion will be established through discussion with the Province and member jurisdictions and will be aligned with completion of the Environmental Management and Quality Control (EMQC) Annual Report.

The EMQC Annual Report will continue to be prepared and posted publicly to meet Metro Vancouver's regulatory reporting requirements. Some LWMP actions refer to the EMQC Annual Report directly and will be reported upon primarily in the EMQC Annual Report to reduce redundancies. Table C.1 in Appendix C indicates which LWMP actions will continue to be reported in the EMQC Annual Report.

LWMP Dashboard

LWMP performance indicators will be compiled into an easily accessible dashboard format on Metro Vancouver's website (see example in Appendix C). The format of the LWMP Dashboard will be improved, integrated, and updated over time in alignment with other Metro Vancouver dashboards.

The full list of LWMP performance indicators is shown in Appendix B. The LWMP Dashboard will contain performance indicators for both Metro Vancouver and member jurisdictions. The numerical values displayed in the LWMP Dashboard will be updated at least annually, in alignment with the LWMP Annual Report. Metro Vancouver will coordinate the compilation and publishing of information on Metro Vancouver's website. There will also be links to the inflow and infiltration dashboards, inflow and infiltration public reports and the rainwater dashboards once they are created (see Actions 6.1, 6.2 and 11.3). Key rainwater indicators from the rainwater dashboards will be included directly in the LWMP Dashboard (as described in Strategy 11 and Appendix B).

Progress Meetings

Regular meetings are planned as a key element in monitoring progress on LWMP actions, aimed at improving accountability and collaboration. See Appendix C for further details on the planned meetings:

1. **Metro Vancouver – Member Jurisdiction Meetings**
   Metro Vancouver and member jurisdictions will use staff-to-staff meetings to update each other on progress on actions, reach consensus on how to implement shared actions, learn from each other about successes and challenges, and collaborate on solutions. Metro Vancouver will coordinate meeting to discuss the LWMP at least once per year.

2. **Metro Vancouver – Ministry of Environment and Climate Change Strategy Meetings**
   Metro Vancouver and the Ministry of Environment and Climate Change Strategy currently meet quarterly to discuss Metro Vancouver's liquid waste function. Following adoption of this LWMP, at two of these meetings per year, Metro Vancouver will include LWMP progress reporting on

the agenda to highlight successes, discuss challenges, and receive input from the ministry on proposed solutions.

There may be LWMP topics that warrant the scheduling of additional meetings between the ministry, Metro Vancouver, and interested First Nations.

Monitoring and Reporting Roles and Responsibilities

Through the LWMP Annual Report, LWMP Dashboard, and Progress Meetings, Metro Vancouver and member jurisdictions will streamline regulatory reporting requirements, improve transparency and accountability, and formalize opportunities for collaboration on implementation of actions.

The following table provides an overview of roles and responsibilities for monitoring and reporting on LWMP Progress:

Item	Frequency	Roles and Responsibilities				
		Metro Vancouver	**Member Jurisdictions**	**Province (Ministry [§])**	**First Nations**	**Public**
LWMP Annual Report	Annual	Contribute and compile	Contribute	Receive and review	Access on website	Access on website
LWMP Dashboard	Annual (at least)	Contribute and compile	Contribute	N/A	Access on website	Access on website
LWMP Progress Meetings – Metro Vancouver and Member Jurisdictions	Annual (at least)	Coordinate and participate	Coordinate and participate	N/A	Invited periodically according to mutually agreed schedules	N/A
LWMP Progress Meetings – Metro Vancouver and Ministry[§]	Twice per year	Coordinate and participate	N/A	Participate	Invited periodically according to mutually agreed schedules	N/A

[§]Ministry of Environment and Climate Change Strategy

Financial Implications

Overview

The updated LWMP continues Metro Vancouver's longstanding commitment to achieving compliance with the *Municipal Wastewater Regulation* in a manner that is fiscally responsible and fair across generations. The plan acknowledges the broader financial pressures on taxpayers, who are also contributing to other essential services in the region such as hospitals and transportation infrastructure. The LWMP actions balance progress towards *Municipal Wastewater Regulation* compliance with the need to manage costs effectively.

Through the LWMP update process, new actions have been identified and efforts related to ongoing initiatives have been expanded to accelerate progress toward full compliance under the *Municipal Wastewater Regulation*. The financial impact of these new and expanded actions were assessed to understand the financial implications on the GVS&DD levy.

Several initiatives will primarily be carried out using current staff resources that are funded through existing sources in annual program budgets, resulting in no net increase in spending. Additional funding of approximately $5 million annually will be necessary for new actions and to expand existing programs. A significant portion of the additional funding will be allocated to enhancing environmental management programs. This funding will support LWMP commitments and address feedback received from First Nations and interested parties, including the public advisory committee. The increases will have a minimal impact on the overall GVS&DD operating budget, as they represent less than 1 per cent of the total budget for the liquid waste function.

Capital and Member Jurisdiction Cost Exclusions

No additional capital projects are anticipated to fulfill the LWMP commitments during the plan's 10-year implementation period. The financial projections in this LWMP exclude existing capital projects that are already included in Metro Vancouver's Five-Year Financial Plan and Ten-Year Projections. For example, the North Shore Wastewater Treatment Plant and the Iona Island Wastewater Treatment Plant secondary upgrade are already included. Furthermore, member costs have been excluded from these estimates due to significant variation in resources and funding approvals across different member jurisdictions. The focus of this section is to understand implications on the GVS&DD levy due to new and revised actions identified in this LWMP.

Reducing Demand and Shifting Responsibilities

The LWMP emphasizes strategies to reduce demand on the system, such as managing inflow and infiltration in private laterals, which will help reduce the need for costly expansion to regional infrastructure. These strategies will gradually shift some financial responsibilities from the regional level to private property owners or individual members, allowing for a more localized approach to addressing system capacity and compliance challenges. The end result is a net reduction in costs for the region due to a shift in costs from regional infrastructure expansions to management of inflow and infiltration at the municipal level.

Summary

While the LWMP outlines significant new actions and improvements, the overall financial impact on the GVS&DD budget is minimal. Most funding is integrated into existing programs, with a marginal increase

required for environmental management programs. This approach ensures continued environmental leadership and progress toward *Municipal Wastewater Regulation* compliance while keeping household costs manageable and avoiding major impacts on regional budgets.

Glossary

Adaptive Management Framework (AMF) provides an approach for monitoring watershed health, monitoring the progress and effectiveness of Integrated Watershed Management Plans (IWMPs), identifying impacts and threats to watershed health, and identifying mitigation approaches. It is a continuous improvement process that promotes flexible decision making that can be adjusted over time as the outcomes of IWMP actions are better understood.

Advanced treatment, in British Columbia, means any form of treatment other than dilution that produces effluent with BOD_5 and TSS both less than 10 mg/L, which are measures of organic material and suspended solids, respectively.

Air contaminants are any substances emitted into the air that do or could harm public health (including material physical discomfort) and property, damage the environment (including the climate), impede normal business operations, or impair visual air quality.

Ammonia is a compound of nitrogen and hydrogen (NH_3) commonly found in wastewater. It is an indicator of organic pollution and can be toxic to aquatic life at high concentrations.

Asset management plans are developed by utilities and municipalities to maintain and replace infrastructure assets, such wastewater systems, to ensure their reliability, sustainability, and cost-effectiveness over their life cycle.

Average dry weather flow is the average daily flow of wastewater in a sewer system or input to a treatment plant during dry weather conditions, which indicates the flow of sanitary sewage and excludes additional flow from rainfall or snowmelt infiltration.

Biochemical Oxygen Demand (**BOD)** is a measure of the amount of oxygen that microorganisms need to decompose the organic material present in wastewater. If it were not removed, BOD would use up the oxygen in the water that fish and other aquatic life need. BOD_5 is the BOD measured over a 5-day period, and is one of the parameters regulated in effluent from Metro Vancouver's wastewater treatment plants.

Biogas is a mixture of methane and carbon dioxide produced by the anaerobic digestion of sewage sludge at a wastewater treatment plant. Biogas can be cleaned up for use as renewable natural gas.

Biosolids are the treated solids recovered from wastewater. The solids have been treated by microorganisms and heat to eliminate pathogens and reduce odours. The final product is similar to soil and is rich in nutrients and organic matter.

Blue infrastructure refers to natural and engineered systems that manage water, including natural water bodies like rivers, lakes, and wetlands, as well as engineered solutions such as constructed wetlands and retention ponds.

Canadian Council of Ministers of Environment Canada-wide Strategy for Management of Municipal Wastewater (CCME CWS-MMWW) provides a harmonized framework to manage municipal wastewater discharges to surface waters with federal discharge criteria. It articulates the collective agreement reached by the 14 ministers of environment in Canada to ensure that wastewater facility owners have

regulatory clarity in managing municipal wastewater effluent discharges under a consistent framework that is protective of human health and the environment.

Catchment refers to an area of land where collected rainwater and groundwater feed to a single point in the sewer system.

Circular economy is a system that retains and recovers value from resources through reusing, repairing, repurposing, recycling and remanufacturing products and materials. The circular economy tackles climate change and other environmental challenges by decoupling economic activity from the consumption of finite resources, by eliminating waste and pollution, and helping to regenerate natural systems.

Circular water economy is an approach to wastewater management that emphasizes the recovery, reuse, and recycling of wastewater and the resources it contains, including energy, nutrients and water, to create a sustainable and resilient wastewater system that provides value for citizens, the environment, and businesses.

Climate change adaptation means anticipating, planning for and responding to the adverse effects of climate change and taking appropriate action to prevent or minimize the damage it can cause, or taking advantage of opportunities that may arise. It has been shown that well planned, early adaptation action saves money and lives later.

Climate change mitigation means working to limit the amount of climate change that occurs by reducing greenhouse gas emissions into the atmosphere.

Climate projections refers to the future temperature and precipitation patterns in the region due to the impacts of climate change.

Climate resilience describes the capacity of ecosystems, economies, infrastructure, and communities to absorb the impacts of climate change while maintaining essential services and functions needed to support health and well-being. In some cases, climate resilience involves changing services and functions so they are more sustainable.

Climate vulnerability assessments identify areas or populations most likely to be impacted by projected changes in climate and build an understanding of why these areas are vulnerable, including the interaction between climate change, non-climatic stressors, and cumulative impacts. Assessments evaluate the effectiveness of previous coping strategies and target potential adaptation measures.

Climate vulnerability is the degree to which ecosystems, economies, infrastructure, and communities are susceptible to, or unable to cope with, the adverse effects of climate change. Vulnerability varies based on exposure, sensitivity, and adaptive capacity. Geographic location, socio-economic conditions, and other factors can impact susceptibility to harm and adaptive capacity.

Collection system is the network of pipes, pumps, and other equipment used to collect and transport wastewater from homes, businesses, and industries to a treatment plant. The collection system can refer to sanitary sewers or combined sewers.

Combined sewers carry both sanitary wastewater and rainwater in a single pipe and exist only in older parts of Vancouver, Burnaby, and New Westminster. During dry weather, combined sewers convey all sanitary wastewater to wastewater treatment plants.

Combined sewer overflow is a discharge of sewage from a combined sewer into a water body, caused by excess water entering the combined sewer system during heavy rainfall. The combined sewer system was designed to overflow in this manner to avoid sewage backups into homes and businesses.

Conveyance is the process of transporting wastewater in sewers from its source to a treatment plant or discharge point.

Daylighting is the practice of uncovering and restoring buried urban streams to their natural state, which improves water quality, reduces peak flows, and improves ecosystem health.

Effluent is treated wastewater that is released from a wastewater treatment plant into the Fraser River, Burrard Inlet, or Strait of Georgia.

Gigajoule (GJ) is a unit of energy equal to one billion Joules, commonly used to measure the energy content of fuels.

Grease interceptor a device installed in a plumbing system to capture grease and solids before they enter the sewer system, preventing blockages and treatment issues.

Green infrastructure includes natural, enhanced and engineered systems and practices that manage rainwater and mitigate negative impacts of urban development. These natural assets (e.g., forests, wetlands, and soil), enhanced assets (e.g., urban trees and bioswales), and engineered systems (e.g., green roofs, rain gardens, and permeable pavement) help absorb and filter stormwater to reduce flooding, improve water quality, and enhance urban biodiversity.

Greenhouse gases are air contaminants that trap heat and cause climate change. Greenhouse gases include carbon dioxide and nitrous oxide, as well as short-lived climate forcers such as methane.

Grey infrastructure means engineered infrastructure, such as pipes, pumps, and treatment plants, used to manage rainwater and wastewater. For rainwater management, grey infrastructure includes storm sewers and retention basins.

Hydraulic gradeline is a line representing the level to which water would rise in a system of pipes, channels, and other conduits in the sewer collection system or treatment plant, reflecting the total energy of the water; hydraulic grade lines above basement or ground surface elevations can result in flooding.

Infiltration is rainwater or groundwater that enters a sanitary sewer due to leaky or damaged pipes.

Inflow is rainwater that enters a sanitary sewer due to improperly connected roof or foundation drains.

Integrated Watershed Management Plans (IWMPs) provide direction for future development to balance land use planning, stormwater engineering, flood and erosion protection, and environmental protection. IWMPs were formerly referred to as Integrated Stormwater Management Plans.

Interceptors are large pipes in combined sewer systems that are designated by Metro Vancouver to convey sanitary flow from areas that have separated sewers and the dry weather portion of combined flow from areas that still have combined sewers to the treatment plant.

Land application is the practice of applying biosolids to land to improve soil health and provide nutrients for vegetation or crops, governed by British Columbia's *Organic Matter Recycling Regulation.*

Master Municipal Construction Documents is a standardized set of general conditions, standard specifications and drawings, and design guidelines for the design, construction, and management of municipal infrastructure projects in British Columbia.

Master Sewer Servicing Plan is a comprehensive plan outlining the development, maintenance, and improvement of a municipality's sewer system to meet current and future needs.

Monitors are devices or meters used to measure and record environmental parameters, such as flow rates, water quality, and pollution levels in wastewater systems.

Natural hazards include rainstorms, extreme weather, storm surges, landslides, and floods – which are made worse by climate change – and seismic events.

Nature-based solutions are approaches to rainwater management that use natural processes and green infrastructure to enhance ecosystem health, improve water quality, and provide multiple benefits to communities.

Nutrients are substances such as nitrogen and phosphorus that are essential for the growth of plants and animals, but can cause water quality issues when present in excessive amounts.

Nutrifor is the brand name for the biosolids that Metro Vancouver produces.

Official Community Plan is a comprehensive policy document adopted by a municipal council or regional board that outlines the long-term vision, objectives, and policies for land use, development, and infrastructure within a community. An Official Community Plan addresses various aspects of community planning, including housing, transportation, parks, and utilities, and provides guidance on managing growth and development in a sustainable and orderly manner. The plan must align with provincial legislation and regional growth strategies.

Operational Certificate is issued by the Ministry of Environment and Climate Change Strategy for each treatment plant. The Operational Certificate requires effluent released from the treatment plant to meet certain standards.

Organics loading is the amount of organic matter, measured as BOD, entering a wastewater treatment plant, which influences the plant's design and operation.

Peak dry weather flow is the highest flow rate of wastewater observed during dry weather conditions, used for the design and capacity assessment of sewer collection and treatment systems.

Primary treatment removes materials that float or readily settle out by gravity, and up to 50 per cent of dissolved organic materials.

Private laterals are pipes that connect buildings on private property to municipally owned sewers. Private laterals are typically maintained by property owners.

Rainfall-derived inflow and infiltration comes from rainwater that enters pipes, as opposed to infiltration from groundwater sources (see Inflow and Infiltration).

Rainwater is water that originates from precipitation events, including rain and snowmelt, which flows over land surfaces. In urban areas, rainwater becomes stormwater when it runs off impervious surfaces such as rooftops, roads, and parking lots, and is typically directed into storm sewers.

Receiving environment means the natural water bodies, such as rivers or oceans, into which treated wastewater is discharged (or untreated wastewater in the case of overflows).

Reclaimed water refers to wastewater that has been treated and purified to a level suitable for reuse for various non-potable purposes, such as industrial processes, landscaping, or agricultural irrigation. British Columbia's *Municipal Wastewater Regulation* establishes prescriptive water quality requirements to ensure reclaimed water is safe for its intended uses.

Regional Growth Strategy for the Metro Vancouver region, Metro 2050, is the region's shared vision of how projected population, housing, and job growth will be managed over the next 30 years, to create complete, connected, and resilient communities, while protecting important lands and supporting the efficient provision of urban infrastructure like transit and utilities.

Renewable natural gas is created from biogas that has been cleaned up so that it is mostly methane and can be injected into the natural gas distribution network for use in homes and businesses.

Sanitary loading refers to the portion of sewage in combined sewers that originates from residential, commercial or industrial sources, excluding rainwater.

Sanitary sewage is generated from domestic activities, such as toilets, sinks, showers, and washing machines, as well as from commercial and industrial processes; it excludes rainwater and stormwater.

Sanitary sewers collect wastewater from residential, commercial, and industrial sources, and transport it to wastewater treatment plants for processing.

Sanitary sewer overflow occurs when untreated wastewater is improperly discharged directly into the environment – usually the nearest water body, or sometimes onto land – instead of being processed at a wastewater treatment plant. Sanitary sewer overflows can happen when inflow and infiltration from heavy rainfall overloads the sanitary sewer system.

Secondary treatment uses biological processes to remove 90 per cent or more of materials, including soluble organic materials and small suspended solids that do not readily settle.

Sewer separation replaces combined sewers with separate pipes for sanitary sewage and stormwater, reducing the risk of overflows.

Stormwater is water from rain or melting snow that is not absorbed into the ground. In urban areas, stormwater runs off impervious surfaces such as rooftops, roads, and parking lots, and is typically directed into storm sewers, which empty directly into creeks, rivers, or the ocean.

Stormwater Interagency Liaison Group is mandated in the LWMP since 2002 to advise and work through technical stormwater issues with Metro Vancouver member jurisdictions, and senior government agencies.

Surcharging is a condition in which the pressure in a sewer system causes the water level to rise above the top of the pipe, usually due to excessive flow, leading to potential overflows or backups.

Tertiary filtration is a physical treatment process that improves treated wastewater quality beyond that achieved by primary or secondary treatment by removing additional suspended solids and associated organic matter.

Tertiary treatment removes specific substances including solids, nutrients such as ammonia, and contaminants, after secondary treatment as needed to protect receiving waters where effluent is discharged. Tertiary treatment can involve physical, chemical or biological processes.

Total Suspended Solids (TSS) is a measure of the solids in water that are too small to settle out by gravity. The wastewater treatment process is designed to remove suspended solids, because otherwise the suspended solids would block light in the water and interfere with the growth of aquatic life. TSS is one of the parameters regulated in effluent from Metro Vancouver's wastewater treatment plants.

Trunk sewers are Metro Vancouver sewers designated to convey both sanitary and stormwater flows in areas of the region with combined sewers. Dry weather flow (i.e., sanitary flow) is discharged to interceptor sewers while excess wet weather flows are discharged to receiving waters as combined sewer overflows.

Wastewater is used water that is collected from toilets and drains in homes and businesses, and conveyed in sewers to wastewater treatment plants for processing. Wastewater can contain various pollutants and waste products, including soap, food scraps, human waste, oils and other chemicals.

Wastewater treatment removes substances that can harm human health and the environment before releasing treated wastewater, or effluent, to receiving water bodies. Wastewater treatment processes can be classified as primary, secondary, tertiary, or advanced.

Water metering is the practice of measuring the volume of potable water used by households, businesses, or industries, often for billing and conservation purposes.

Watershed is a land area where all rainwater and snowmelt drains into a common water body such as a creek, river, or ocean.

Appendix A – Wastewater Treatment Plant Upgrade and Expansion Schedule

Project name and scope	Increase in maximum discharge rate in OC	Authorization classification			Anticipated project initiation date [b]	Anticipated operational date [b]
		LWMP Amendment [a]	Operational Certificate Amendment	New Operational Certificate		
North Shore Wastewater Treatment Plant Phase 1 • New preliminary, primary and secondary treatment, tertiary filtration and solids treatment facilities	<0.01%		Y		2011	2030
Annacis Island Wastewater Treatment Plant Stage 5 • Additional preliminary, primary and secondary and solids treatment capacity	55%		Y		2012	2030 – 2035
Northwest Langley Wastewater Treatment Plant Phase 1 • Additional preliminary, primary and secondary treatment capacity • New solids treatment capacity and tertiary filtration	636% [c]	Y	Y		2014	2030 – 2035
Annacis Island Wastewater Treatment Plant Regional Biosolids Dryer • Dryer will process biosolids to produce granular pellets that can be used as low carbon fuel and as fertilizer product	N/A			Y [d]	2019	2032 – 2037
Iona Island Wastewater Treatment Plant Stage 7 • Preliminary, primary and secondary treatment and tertiary filtration facilities • Additional solids treatment capacity • Scope refinement – phasing and existing wastewater treatment plant re-use options assessment	0%		Y		2015	2035 – 2040
Annacis Island Wastewater Treatment Plant Partial Ammonia Removal • Scope to be determined	0%		Y		2024	2038 – 2043
Annacis Island Wastewater Treatment Plant Stage 7 [e] • Scope to be determined	17%	Y	Y		2025 – 2035	2040 – 2050
Northwest Langley Wastewater Treatment Plant Phase 2 [e] • Scope to be determined	88%	Y	Y		2030 – 2040	2045 – 2055
Lulu Island Wastewater Treatment Plant Stage 5 • Scope to be determined	18%	Y	Y		2035 – 2045	After 2050

(a) An Environmental Impact Study will be performed for projects listed as an LWMP amendment.
(b) Anticipated dates will be adjusted subject to engineering studies.
(c) This increase includes flow from new developments and diversion of some flow from Annacis Island Wastewater Treatment Plant to Northwest Langley Wastewater Treatment Plant.
(d) This is a new, additional, separate Operational Certificate for the dryer.
(e) Timing of upgrade is subject to Master Sewer Servicing Plan.

Appendix B – Performance Indicators

Performance indicators listed under each strategy are compiled here for ease of reference.

Issue Area	Strategy	No.	Description	Units	Frequency	Responsibility	Status
System Resilience	1. Provide services for a growing population in a changing climate	1A	Percentage of sanitary sewer pipe inspected annually	%	Annual	Metro Vancouver and members	Adapted from 2011 Performance Measure: Metres of sewer pipe inspected and renewed annually
Demand Side Management and Source Control	3. Use demand side management to reduce flows and loadings	3A	Average dry weather flow per capita, total influent TSS per capita per day, and total influent BOD per capita per day; at each wastewater treatment plant	L/person/day g/person/day g/person/day	Annual	Metro Vancouver	New
Sanitary Sewer Overflows	5. Reduce rainfall-derived inflow and infiltration into private lateral sewers	5A	Peak wet weather flow, average dry weather flow, and ratio of peak wet weather flow to average dry weather flow; at key regional monitoring points and at wastewater treatment plants	MLD MLD ratio peak wet weather flow to average dry weather flow	Annual	Metro Vancouver	Adapted from 2011 Performance Measures: Wet weather peaking factors at key regional monitoring points; Average (24 hour) flows at regional flow monitoring stations and at wastewater treatment plants
Sanitary Sewer Overflows	7. Minimize impacts of sanitary sewer overflows on human health and environment	7A	Number, duration, and estimated volume of sanitary sewer overflow discharge events at chronic overflow sites, where feasible; and, total number of sanitary sewer overflow discharge events and total volume of sanitary sewer overflow discharges for entire system.	#, hours, m^3 #, m^3	Annual	Metro Vancouver and members	Adapted from 2011 Performance Measure: Number of sanitary sewer overflows – frequency, location, volume
Combined Sewer Overflows	8. Assess combined sewer overflows' impact on receiving environment	8A	Number, duration and volume of combined sewer overflow discharge events at each combined sewer overflow site; and, total number of combined sewer overflow discharge events and total volume of combined sewer overflow discharges for entire system.	#, hours, m^3 #, m^3	Annual	Metro Vancouver, Burnaby, New Westminster, and Vancouver	New
Combined Sewer Overflows	8. Assess combined sewer overflows' impact on receiving environment	8B	Sanitary wastewater volume and loading* in combined sewer overflow discharges *Note, loading will be determined using best available information from either monitoring [action 8.3] or modelling [action 8.7]. Parameters and units of reporting to be determined.	m^3, loading units TBD	Every 2-4 years (TBD)	Metro Vancouver	Adapted from 2011 Performance Measure: Sanitary sewage volumes in combined sewer overflows.
Combined Sewer Overflows	9. Separate combined sewers to eliminate combined sewer overflows	9A	Percentage of public sewer system that is separated Note: this indicator will transition to "Percentage of population with 100 per cent sanitary sewage delivered to Metro Vancouver interceptors" within five years.	%	Annual	Metro Vancouver, Burnaby, New Westminster, and Vancouver	New

Issue Area	Strategy	No.	Description	Units	Frequency	Responsibility	Status
Rainwater	10. Manage rainwater and development for watershed health	10A	Number of IWMPs completed, the area that completed IWMPs cover, and percentage of IWMP activities implemented Note: additional performance indicators will be added upon development of the rainwater dashboards.	# hectares %	Annual	Members	Adapted from 2011 Performance Measure: Number and area [hectares] of integrated stormwater management plans completed.
Wastewater Treatment	14. Operate and maintain wastewater treatment plants to meet or surpass regulatory requirements	14A	Compliance with BOD and TSS limits specified in Operational Certificates for wastewater treatment plants	% of time	Annual	Metro Vancouver	Adapted from 2011 Performance Measure: Compliance with parameter specified in the Operational Certificate for wastewater treatment plants
Biosolids	15. Diversify options to beneficially use Nutrifor biosolids	15A	Beneficial use of Nutrifor biosolids (percentage of total biosolids generated)	%	Annual	Metro Vancouver	New
Biosolids	15. Diversify options to beneficially use Nutrifor biosolids	15B	In-region use of Nutrifor biosolids (percentage of total biosolids generated)	%	Annual	Metro Vancouver	New
Circular Water Economy	16. Implement proven technologies towards a circular economy	16A	Amount of energy recovered from liquid waste system [Sum of GJ from all energy types (e.g., biogas, sewer heat, biocrude), recovered by Metro Vancouver or members, for use by any end customer]	GJ	Annual	Metro Vancouver and members	Adapted from 2011 Performance Measure: Quantities and types of energy and materials recovered from the liquid waste system.
Environmental Management	18. Minimize impacts of liquid waste management on atmosphere and air quality	18A	Greenhouse gas emissions from operation of Metro Vancouver's liquid waste management systems	tonnes CO_2e	Annual	Metro Vancouver	New
Environmental Management	19. Environmental monitoring to protect public health and the environment	19A	Number of beach closure days per year and locations	#	Annual	Metro Vancouver	Adapted from 2011 Performance Measure: Beach closure days and locations

Appendix C – Reporting on LWMP Actions

This appendix provides further details on the reporting elements in the 'Monitoring and Reporting' section.

Annual Report

1. **Action Status Table**
   This table will have a row for each action and sub-action in the LWMP, and columns for Metro Vancouver and each member jurisdiction. Metro Vancouver and member jurisdictions will annually report on the status of all actions and sub-actions applicable to them as 'Complete,' 'In Progress,' or 'Not Started.' If the LWMP specified a due date for completing an action, this will be entered into the 'Timeline' column. If context is needed to supplement the action status, this can be provided under the '3. LWMP Progress Context and Insights' section, as described below.

   Excerpt from example Action Status Table:

Action	Sub-Action	Timeline	Metro Vancouver	Member Jurisdiction
5.1	n/a	Within two years		
5.2	a)	Within three years		
	b)	Within three years		

Legend:	**Complete**	In Progress	Not Started	Not applicable

   This approach to reporting on actions intentionally does not include explanatory comments, to provide an at-a-glance snapshot for readers to quickly understand general progress among Metro Vancouver and member jurisdictions.

   For actions noted as 'Complete,' Metro Vancouver and member jurisdictions will be prepared to provide the Province with evidence of completion. This may be a report, metrics, maps, or other data or information as appropriate for the particular action.

   In cases where a timeline is not met or an action has not changed for a long period of time from 'Not Started' or 'In Progress,' Metro Vancouver and member jurisdictions will be prepared to provide explanation, rationale, evidence of works in progress or reasons for delays to the Province as necessary.

2. **Performance Indicators Table**
   LWMP performance indicators for Metro Vancouver and member jurisdictions will be compiled annually into a single table that contains numerical values arranged in a format similar to the Action Status Table. The full list of performance indicators is available in Appendix B. Key

indicators from rainwater dashboards (as described in Strategy 11 and Appendix B) will also be included in this table.

3. LWMP Progress Context and Insights

Metro Vancouver and members will prepare contextual information and insights on implementation of select LWMP actions. Content in this section will include:

- *Progress on key priority LWMP actions and highlights for ongoing actions*
  An initial set of 30 out of 87 LWMP actions are proposed for reporting in this qualitative section. The initial list is available in Table C.1 but may change over time through discussion with the Province and member jurisdictions.

  Priority actions selected for reporting include some on inflow and infiltration, combined sewer overflows, integrated watershed management planning and wastewater treatment plant upgrade schedules.

  Some actions are ongoing and can never be considered 'Complete' – for example, some actions related to circular water economy and environmental management. In these cases, when action status is not expected to ever change from 'In Progress,' highlights from the past year's activities will be reported in this section.

  Metro Vancouver and member jurisdictions will use this section to describe work completed, work underway on actions in progress, challenges and successes, provide links to completed reports or documents, and explain quantitative data if needed.

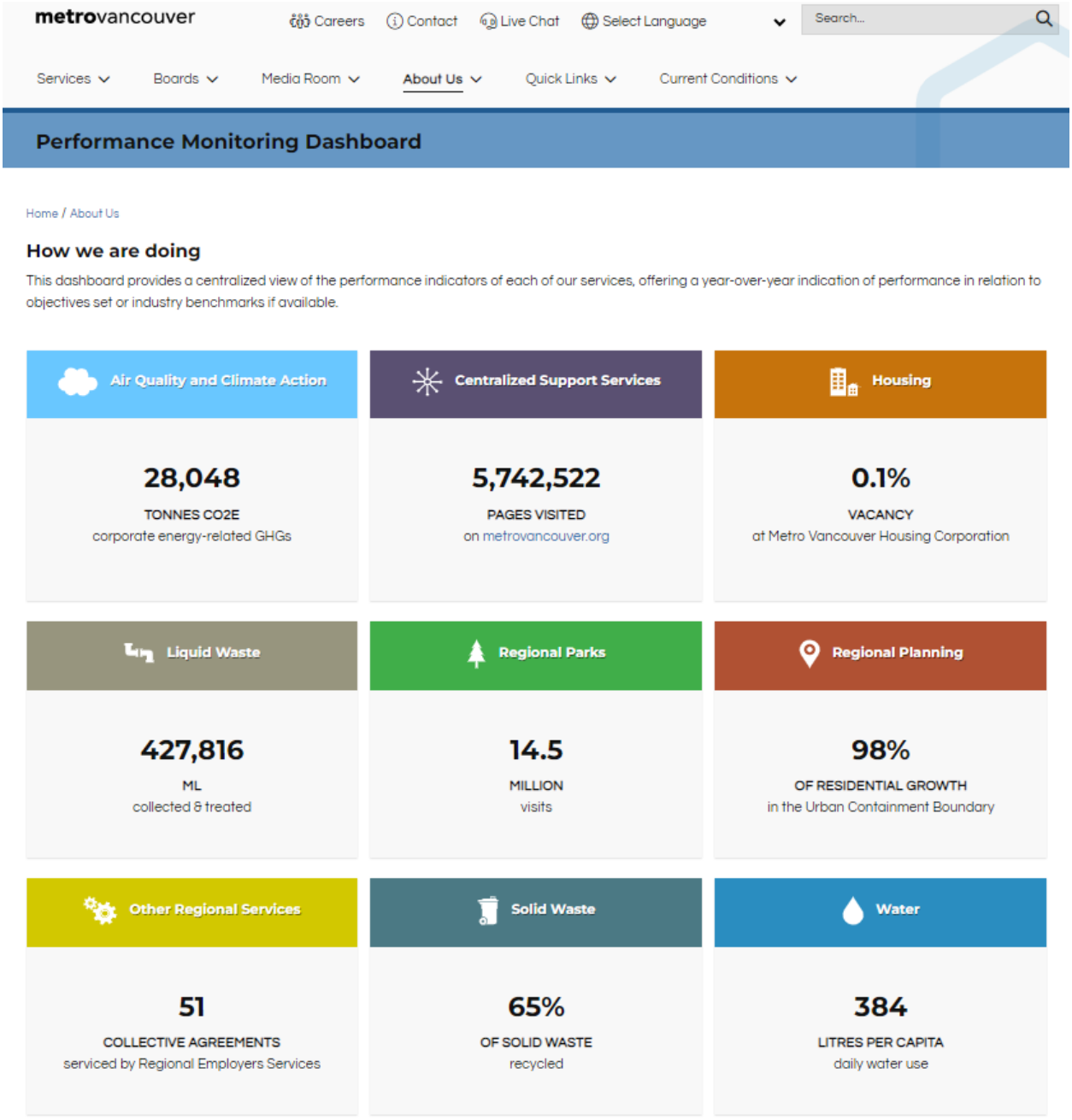
- *Explanations of missed deadlines for action completion.*
  Some actions have specific timeframes for completion. If implementation has been delayed, explanations will be provided in this section and new timelines established.

- *Changes in approach from the original approved LWMP actions.*
  Sometimes, actions that were drafted initially and approved in the LWMP may be later discovered to not be fully feasible or not be the best approach to achieving intended objectives. This section will describe cases where Metro Vancouver or members are proposing to modify individual actions, the impact of the proposed change, and, how First Nations, the public, and interested parties will be engaged regarding the change.

- 2002 LWMP reporting commitments C14, C18, C23 and 2011 LWMP reporting commitments 3.5.4 (b) and 3.5.8 (b) will continue to be reported unless different reporting requirements are agreed to with the Province (refer to 2002 and 2011 past actions in Appendix D for descriptions of these commitments).

LWMP Dashboard

Initially, the format will be similar to other Metro Vancouver Performance Monitoring Dashboards. The screenshot below shows an example of a Metro Vancouver performance monitoring dashboard.



Progress Meetings

1. **Metro Vancouver – Member Jurisdiction Meetings**
   The existing Regional Engineers Advisory Committee (REAC) Liquid Waste Sub-Committee comprises Metro Vancouver and member jurisdiction liquid waste staff and typically meets six times per year.
   - This will be the primary forum for member jurisdictions and Metro Vancouver to discuss progress on LWMP action implementation.
   - The content and timing of LWMP progress updates at these meetings will be established through discussion between Metro Vancouver and member jurisdictions.
   - Outcomes from REAC Liquid Waste Sub-Committee meetings are reported to REAC and, ultimately, to the GVS&DD Board if needed.

   Strategies and actions related to rainwater (i.e., stormwater and watershed) management have been drafted with additional emphasis towards improving how progress is measured, including actions specifically committing to oversight. The approach for meetings is described in Strategy 12: *Enhance interagency collaboration to improve watershed health across the region* through actions that commit member jurisdictions and Metro Vancouver to:
   - Coordinate revision of the terms of reference for the interagency group (currently called the Stormwater Interagency Liaison Group) to include coordination of region-wide accountability on Integrated Watershed Management Plan (IWMP) actions; and,
   - Host a forum at regular intervals (at least every three years) to report progress on IWMPs and LWMP rainwater actions, and to foster collaboration and knowledge sharing among members, First Nations, and interested parties.

2. **Metro Vancouver – Ministry of Environment and Climate Change Strategy Meetings**
   Discussing the LWMP at two meetings per year of the four regularly-scheduled quarterly meetings between the Province and Metro Vancouver will help ensure Metro Vancouver is meeting its regulatory obligations and allow for more frequent communication with the Province regarding:
   - how timelines for action implementation may be changing;
   - whether actions require revisions; and,
   - planned engagement activities if timelines or actions may be revised.

Table C.1

This table shows how each action, sub-action, and performance indicator will be reported over the duration of the LWMP.

Action and sub-action		**LWMP Annual Report**		**Other Reporting Mechanism**	**Performance Indicators** (LWMP Annual Report and Dashboard)
		Action Status Table	**Context and Insights Section**		
Strategy 1: Provide services for a growing population in a changing climate.					1A
1.1	a)	✓			
	b)	✓			
	c)	✓			
1.2	-	✓			
1.3	a)	✓			
	b)	✓			
1.4	-	✓			
Strategy 2: Improve resilience of wastewater system to climate change and natural hazards					
2.1	-	✓			
2.2	-	✓ Reported by sewerage area			
2.3	-	✓			
Strategy 3: Use demand side management to reduce flows and loadings					3A
3.1	-	✓			
3.2	-	✓			
3.3	-	✓			
3.4	a)	✓			
	b)	✓			
	c)	✓			
3.5	-	✓	✓ Describe progress and results		
Strategy 4: Prevent pollution at the source					
4.1	-	✓			
4.2	a)	✓			
	b)	✓			
	c)	✓			
Strategy 5: Reduce rainfall-derived inflow and infiltration into private lateral sewers					5A
5.1	-	✓	✓		
5.2	a)	✓	✓		
	b)	✓	✓		
	c)	✓	✓		
5.3	a)	✓	✓		
	b)	✓	✓		
	c)	✓	✓		
5.4	a)	✓	✓		
	b)	✓	✓		
5.5		✓	✓		
Strategy 6: Enhance transparency and accountability for reducing inflow and infiltration					Inflow and Infiltration Dashboards
6.1	a)	✓	✓ Describe progress and results		
	b)	✓	✓ Describe progress and results		
	c)	✓	✓ Describe progress and results		
6.2	a)	✓	✓ Describe progress and results	✓ Inflow and Infiltration Dashboard, Progress Meetings	
	b)	✓	✓ Describe progress and results	✓ Inflow and Infiltration Dashboard, Progress Meetings	
	c)	✓	✓ Describe progress and results	✓ Inflow and Infiltration Dashboard, Progress Meetings	
6.3	-	✓		✓ Inflow and Infiltration Dashboard, Progress Meetings	
6.4	-	✓	✓ Wet weather pricing findings and modifications		
Strategy 7: Minimize impacts of sanitary sewer overflows on human health and the environment					7A
7.1	-	✓		✓ Posted on website	
7.2	-	✓			
7.3	-	✓	✓ Report on sanitary sewer overflows (volumes, causes)		

Action and sub-action		LWMP Annual Report		Other Reporting Mechanism	Performance Indicators (LWMP Annual Report and Dashboard)
		Action Status Table	Context and Insights Section		
7.4	-	✓		✓ Assessments available to Ministry of Environment and Climate Change Strategy	
7.5	-	✓	✓ Describe progress and results		
Strategy 8: Assess impact of combined sewer overflows on receiving environment					8A, 8B
8.1	-	✓		✓ Posted on website	
8.2	-	✓	✓ Report on combined sewer overflows (volumes, causes)		
8.3	-	✓			
8.4	a)	✓	✓ Report on combined sewer overflows (volumes, causes)		
	b)	✓	✓ Report on combined sewer overflows (impacts)		
8.5	-	✓		✓ EMQC Annual Report	
8.6	-	✓			
8.7	-	✓			
8.8	a)	✓	✓ Describe progress and results		
	b)	✓	✓ Describe progress and results		
8.9	a)	✓	✓ Describe progress and results		
	b)	✓	✓ Describe progress and results		
Strategy 9: Separate combined sewers to eliminate overflows					9A
9.1	-	✓			
9.2	-	✓	✓ Targets will be reported		
9.3	a)	✓			
	b)	✓			
	c)	✓			
9.4	-	✓			
9.5	-	✓			
9.6	a)	✓			
	b)	✓			
Strategy 10: Manage rainwater and urban development for watershed health					10A, Rainwater Dashboards
10.1	a)	✓		✓ Progress Meetings	
	b)	✓			
	c)	✓		✓ Rainwater Dashboards	
10.2	a)	✓			
	b)	✓			
	c)	✓			
10.3	-	✓			
10.4	-	✓			
10.5	-	✓			
Strategy 11: Update and harmonize municipal tools for rainwater management					Rainwater Dashboards
11.1	-	✓	✓Progress toward dedicated funding		
11.2	a)	✓			
	b)	✓			
	c)	✓			
11.3	-	✓	✓Progress on rainwater dashboards	✓ Rainwater Dashboards	
11.4	-	✓			
Strategy 12: Enhance interagency collaboration to improve watershed health across the region					
12.1	-	✓			
12.2	-	✓			
12.3	-	✓			
12.4	-	✓			
Strategy 13: Treat wastewater so effluent meets or surpasses regulatory requirements					
13.1	-	✓			
13.2	-	✓		✓ EMQC Annual Report	
13.3	-	✓		✓ EMQC Annual Report	
13.4	a)	✓	✓ Progress or changes year over year		
	b)	✓	✓ Progress or changes year over year		
	c)	✓	✓ Progress or changes year over year		
	d)	✓	✓ Progress or changes year over year		
Strategy 14: Operate and maintain wastewater treatment plants to meet or surpass regulatory requirements					14A

Action and sub-action		LWMP Annual Report		Other Reporting Mechanism	Performance Indicators (LWMP Annual Report and Dashboard)
		Action Status Table	Context and Insights Section		
14.1	-	✓			
14.2	-	✓			
14.3	-	✓		✓ EMQC Annual Report	
Strategy 15: Diversify options to beneficially use Nutrifor biosolids					15A, 15B
15.1	-	✓			
15.2	a)	✓			
	b)	✓			
15.3	-	✓			
15.4	-	✓			
15.5	-	✓			
Strategy 16: Implement proven resource recovery technologies					16A
16.1	a)	✓	✓ Select highlights from Strategy 16		
	b)	✓	✓ Select highlights from Strategy 16		
	c)	✓	✓ Select highlights from Strategy 16		
	d)	✓	✓ Select highlights from Strategy 16		
16.2	a)	✓	✓ Select highlights from Strategy 16		
	b)	✓	✓ Select highlights from Strategy 16		
16.3	a)	✓	✓ Select highlights from Strategy 16		
	b)	✓	✓ Select highlights from Strategy 16		
16.4	a)	✓	✓ Select highlights from Strategy 16		
	b)	✓	✓ Select highlights from Strategy 16		
Strategy 17: Research and pilot innovative technologies to advance the circular water economy					
17.1	a)	✓	✓ Select highlights from Strategy 17		
	b)	✓	✓ Select highlights from Strategy 17		
	c)	✓	✓ Select highlights from Strategy 17		
	d)	✓	✓ Select highlights from Strategy 17		
	e)	✓	✓ Select highlights from Strategy 17		
	f)	✓	✓ Select highlights from Strategy 17		
17.2	a)	✓	✓ Select highlights from Strategy 17		
	b)	✓	✓ Select highlights from Strategy 17		
	c)	✓	✓ Select highlights from Strategy 17		
	d)	✓	✓ Select highlights from Strategy 17		
Strategy 18: Minimize impacts of liquid waste management on the atmosphere and air quality					18A
18.1	-	✓			
18.2	-	✓			
18.3	a)	✓			
	b)	✓			
18.4	-	✓			
18.5	-	✓	✓ Describe progress and results		
18.6	-	✓	✓ Describe progress and results		
Strategy 19: Environmental monitoring to protect public health and the environment					19A
19.1	-	✓			
19.2	-	✓		✓ EMQC Annual Report	
19.3	-	✓		✓ EMQC Annual Report	
Strategy 20: Collaborate on regional environmental management initiatives					
20.1	-	✓	✓ Describe progress of programs		
20.2	-	✓	✓ Describe progress and results		
20.3	-	✓			
20.4	-	✓			

Appendix D – Status of Past Actions from 2011 LWMP

Ministerial Conditions (MC)	Status	Rationale
MC 1 The Ministry supports upgrading to secondary level treatment the Lions Gate wastewater treatment plant by 2020 and Iona Island wastewater treatment plant as soon as possible, but no later than 2030 and not contingent on the availability of senior government funding. The Ministry of Environment is not a funding agency. While I understand the cost of the upgrades is significant, they are necessary to meet current environmental standards. The Ministry will support Metro Vancouver pursuing senior government and alternative funding options, but cannot guarantee any provincial commitment in that regard, nor compromise the Ministry's mandate to protect the environment.	Removed	Removed. Metro Vancouver is including a Wastewater Treatment Plant Upgrade and Expansion Schedule in this LWMP that shows the planned timing and treatment levels for wastewater treatment plants. Refer to Appendix A for this table. The method for the funding of wastewater treatment plant upgrades is not prescribed in this LWMP because capital programs are established and approved through GVS&DD bylaws, policies, and annual budgets as adopted by the GVS&DD Board.
MC 2 Member municipalities are strongly encouraged to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce potable water use.	Continuing	Continuing in Action 3.5. (verbatim)
MC 3 Metro Vancouver, in partnership with member municipalities, is encouraged to pursue a region-wide water conservation program targeting the industrial, commercial, institutional and agricultural sectors as part of its new Drinking Water Management Plan. Remaining municipalities in the region that have not implemented metering for these sectors are encouraged to do so.	Continuing	Continuing in Action 3.5. (verbatim)
MC 4 Metro Vancouver must use receiving environment and effluent monitoring data from combined sewer overflow (CSO) and sanitary sewer overflow (SSO) in the regional system to interpret the overall status of CSOs and SSOs. Metro Vancouver will continue the fate and effects studies on CSOs with the Clarke Drive location and other significant sites as determined by the Environmental Management Committee. Metro Vancouver will establish similar studies representative of significant SSO locations, in particular the Cloverdale, Katzie and Lynn locations. The interpretation and assessment should demonstrate whether there has been any improvement or degradation along with any measures taken to address such discharges. Metro Vancouver will report out in the Quality Control Annual Report.	Continuing	Continuing in Action 7.4 (conduct risk assessments at any new significant regional sanitary sewer overflow locations and will holistically compare the risk assessments of all sanitary sewer overflow locations to determine their relative risk, considering risks to public health and the environment. Metro Vancouver will use the results of the sanitary sewer overflow risk assessments to prioritize mitigation efforts, to optimize the operation of the regional liquid waste collection system, and to provide input into decisions regarding capital improvements and upgrades); Action 8.5 (Metro Vancouver will continue to assess change in receiving environment water quality resulting from any measures taken to address combined sewer overflow discharges. Metro Vancouver will report out, as applicable, in the *Environmental Management and Quality Control Annual Report*); and Action 8.6 (Metro Vancouver and members with combined systems will use available information and environmental management tools to inform the prioritization of sewer separation and near term combined sewer overflow mitigation measures).
MC 5 Metro Vancouver is encouraged to continue to build upon previous studies associated with studying endocrine-disrupting chemicals, persistent organic pollutants and other micro-contaminants found in wastewater by developing source control initiatives through education (for example, target outreach), regulation and inspection programs.	Continuing	Continuing in Action 4.1 (Metro Vancouver will prioritize contaminants for source control using the Canadian Council of Ministers of Environment (CCME) *Canada-wide Strategy for Management of Municipal Wastewater Effluent* (CWS-MMWE) Environmental Risk Management Framework. Metro Vancouver will take further source control actions such as educating target sectors to reduce discharges, advocating for increased provincial and federal regulations on the manufacturing and use of products with contaminants, and updating Metro Vancouver's bylaws for industrial and commercial dischargers. Metro Vancouver will work with First Nations as desired on advocating for increased provincial and federal regulations on the manufacturing and use of products with contaminants.

MC 6 (Metro Vancouver will continue the receiving and ambient monitoring programs specified in the approved 2002 LWMP, including, but not limited to, recreational water quality (beach monitoring); monitoring near the outfalls for all five wastewater treatment plants, including the extensive deep sea monitoring near the Iona Island plant; and CSO effluent quality and monitoring of small urban streams relating to impacts from urbanization and stormwater.	Continuing	Continuing in Action 8.3 (monitor combined sewer overflow flows and characterize samples from combined sewer overflow discharges); Action 10.1 (Members will use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health); Action 10.4 (align land-use planning and development with IWMPs to ensure development decisions support watershed health objectives, including protecting riparian areas and agricultural areas); Action 12.2 (conduct a regional study of the impacts of densification on watershed health. Members will use the study results to make informed decisions that balance urban growth and ecological resilience.); Action 13.3 (Metro Vancouver will continue to monitor influent and the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required); Action 19.2 (Metro Vancouver will continue to monitor recreational water quality (seasonal beach monitoring) throughout the region, will continue to share this information with municipal beach operators and local Health Authorities, and will share this information with the First Nations Health Authority)
MC 7 Member municipalities will, with MV planning and coordination, and to the satisfaction of the Regional Manager, develop a coordinated program to monitor stormwater and assess and report the implementation and effectiveness of Integrated Storm Water Management Plans (ISMP). The program will use a weight-of-evidence performance measurement approach and will report out in the Biennial Report. The Regional Manager may extend the deadline for completion of ISMP by municipalities from 2014 to 2016 if satisfied that the assessment program could result in improvement of ISMP and protect stream health.	Continuing	Continuing in Action 10.1 (Members will use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health.); Action 11.3 (Members will implement online rainwater dashboards to report on IWMP progress, including contributions to watershed health). The Biennial Report is being replaced with a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' Section of this LWMP.
MC 8 Bypass conditions that occur at wastewater treatment plants will be reported out in the annual quality control report. The report on each activity will include a description of the event, cause, environmental effect and monitoring that occurred and any mitigation measures undertaken to prevent reoccurrence and remediate detrimental environment effect.	Continuing	Continuing in Action 14.3 (Metro Vancouver will report on bypass conditions that occur at wastewater treatment plants in the Environmental Management and Quality Control Annual Report. The report on each activity will include a description of the event, cause, and environmental effect.)
MC 9 The ILWRMP has a goal of protecting public health and the environment. In keeping with this goal and to ensure alignment with other national, provincial and regional initiatives, Metro Vancouver and member municipalities are encouraged to:		
MC 9(a) Have local land use planning consider the direction provided by the ISMPs;	Continuing	Continuing in Action 10.3 (Members will ensure IWMPs integrate rainwater and groundwater management, consider agricultural land rainwater runoff, and reflect the provisions of the Province's *Watershed Security Strategy* once it is launched); Action 10.4 (Members will align land-use planning and development with IWMPs to ensure development decisions support watershed health objectives, including protecting riparian areas and agricultural areas.)
MC 9(b) Consider how the degree, type and location of land development within a drainage can affect the long-term health of the watershed;	Continuing	Continuing in Action 12.2 (Members and Metro Vancouver, as the interagency group, will conduct a regional study of the impacts of densification on watershed health. Members will use the study results to make informed decisions that balance urban growth and ecological resilience.)
MC 9(c) Consider how to protect the stream, including the riparian areas that exert an influence on the stream, from long-term cumulative impacts; and	Continuing	Continuing in Action 10.1 (use the Stormwater Monitoring and Adaptive Management Framework to monitor watershed health); Action 10.3 (Members will ensure IWMPs integrate rainwater and groundwater management, consider agricultural land rainwater runoff, and reflect the provisions of the Province's *Watershed Security Strategy* once it is launched); Action 10.4 (Members will align land-use planning and development with IWMPs to ensure development decisions support watershed health objectives, including protecting riparian areas and agricultural areas).

MC 9(d) Use scenarios and forecasting to systematically consider environmental consequences/benefits of different land use approaches prior to build-out (for example, Alternative Future type approaches).	Continuing	Continuing in Action 10.3 (Members will ensure IWMPs integrate rainwater and groundwater management, consider agricultural land rainwater runoff, and reflect the provisions of the Province's *Watershed Security Strategy* once it is launched); Action 10.4 (Members will align land-use planning and development with IWMPs to ensure development decisions support watershed health objectives, including protecting riparian areas and agricultural areas).
MC 10 Metro Vancouver will continue to consult with First Nations during the implementation of the Plan – in particular, engaging, as appropriate, with First Nations likely to be impacted by the secondary upgrades.	Continuing	Continuing in many actions throughout the plan including Actions 1.3 (Metro Vancouver and members will create and update Master Sewer Servicing Plans to accommodate growth and urban development and will continue to ensure that First Nations are engaged appropriately); Action 4.1 (Metro Vancouver will work with First Nations as desired on advocating for increased provincial and federal regulations on the manufacturing and use of products with contaminants.); Action 4.2 (Metro Vancouver and members will continue to motivate residents and businesses to prevent pollution at the source by properly managing what they send down drains and toilets. Metro Vancouver will work with First Nations as desired on such outreach and education.); Action 9.2 (Metro Vancouver will develop intermediate targets on a five-year interval for municipal and regional separation of prioritized combined catchments. The targets will be based on a framework to be developed with Burnaby, New Westminster, Vancouver, and First Nations, that considers key factors such as cultural value, population, redevelopment rates, and operational considerations. Metro Vancouver will submit the targets to the Ministry.); Action 10.1 (Members will use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health: Metro Vancouver will coordinate revising the existing Integrated Watershed Management Plan (IWMP) template, with input from First Nations that have chosen to participate, to incorporate the AMF); Action 10.2 (Members will continue to develop, review and update Integrated Watershed Management Plans (IWMPs): (b) First Nations will participate in IWMP development, monitoring, and review, as desired and mutually agreed upon, including sharing information about their respective land use plans as appropriate); Action 12.4 (Members and Metro Vancouver, as the interagency group, will host a forum at regular intervals to report progress on IWMPs and LWMP rainwater actions, and to foster collaboration and knowledge sharing among members, First Nations, and interested parties.); Action 13.4 (b) (Metro Vancouver will engage with First Nations on planned wastewater treatment upgrades when preparing and updating the Wastewater Treatment Plant Upgrade and Expansion Schedule, and will do so in a manner that is consistent with applicable federal and provincial law, and according to the level of First Nations interest.); Action 15.1 (Metro Vancouver will grow the land application program and will increase public outreach and education, including to First Nations, on how Nutrifor biosolids are used safely and responsibly as fertilizer and as an ingredient to build healthy soil.); Action 16.1 (c) (Metro Vancouver will continue to provide access to sewage and effluent for heat recovery to members, First Nations, and district energy providers, when appropriate.); Action 17.1 (Metro Vancouver will research, develop and pilot new methods to expand the recovery and use of energy, nutrients, water and other emerging resources from the liquid waste system, by: (e) Collaborating with First Nations on pilot projects as desired, and, (f) Conducting public outreach and education about resource recovery, including to First Nations); Action 19.2 (Metro Vancouver will continue to monitor recreational water quality (seasonal beach monitoring) throughout the region, will continue to share this information with municipal beach operators and local Health Authorities, and will share this information with the First Nations Health Authority.); Action 20.1 (Metro Vancouver will participate in relevant collaborative environmental program(s) for regional water bodies (i.e., Fraser River, Burrard Inlet, Strait of Georgia) along with members, First Nations, senior government, and interested parties); and, Action 20.2 (Metro Vancouver will continue to participate, and members may participate, in the Ministry of Environment and Climate Change Strategy processes to review and establish water uses and water quality objectives for specific water bodies within Metro Vancouver.)

Action	Status	Rationale
1.1.1 Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the *Canadian Environmental Protection Act*.	Continuing	Continuing in Action 3.3 (pursue reductions in industrial wastewater flow and loading, starting with updating fees in bylaws to create financial incentives that motivate industries to minimize their wastewater discharges) and Action 4.1 (use CWS MMWE risk framework to prioritize contaminants and develop source control actions).
1.1.2 Develop new regulatory instruments, such as Pollution Prevention Plans to complement existing regulations.	Completed	Completed as reported in 2018 Biennial Report Volume 1 (Pollution prevention plan bylaws for different sectors were assessed for feasibility and the *Hospital Pollution Prevention Bylaw* was adopted in 2018).
1.1.3 Increase resources for permitting, and inspection to support and enforce sewer use bylaws.	Completed	Completed as reported in 2015 Biennial Report Appendix A (Between 2010 and 2012, four new enforcement officer positions were created, a new regulatory database was created that improved enforcement efficiency, and paper permitting processes were automated.)
1.1.4 Investigate the implications of the use of domestic food grinders.	Completed Continuing	Completed as reported in 2015 Biennial Report Appendix A (Investigations were completed in 2012 and 2015 and found that grinders were already installed in almost half the residential properties in the region - efforts will continue to reduce the generation of food waste and reduce the disposal of food to sewer). Continuing in Action 3.1 (pursue reductions in residential wastewater flow and loading through improving education and awareness, starting with discouraging disposal of food waste down drains. Members will provide input and assist with implementation).
1.1.5 Develop and implement targeted outreach plans to support liquid waste source control programs.	Completed Continuing	Completed as reported in 2019 Biennial Report Volume 1 and 2023 Biennial Report Volume 1 (several wastewater management guides for commercial operations were published and distributed in 2017 and 2018; and several public communication campaigns — 'Unflushables,' 'Wipe It, Green Bin It,' 'Our Ocean Thanks You,' and others — were conducted from 2019 to 2022). Continuing in Action 3.1 (pursue reductions in residential wastewater flow and loading through improving education and awareness, starting with discouraging disposal of food waste down drains, by encouraging reduction of food waste in general and encouraging use of green bins for kitchen scraps. Members will provide input and assist with implementation) and Action 4.2 (continue to motivate residents and businesses to prevent pollution at the source by properly managing what they send down drains and toilets and continue outreach programs that include youth education programs).
1.1.6 Develop a template to guide the preparation and implementation of inflow and infiltration management plans as part of broader asset management plans and to support sanitary sewer overflow reduction strategies.	Completed Continuing	Completed as reported in 2015 Biennial Report Appendix A (template created in 2011) and as reported in 2023 Biennial Report Volume 1 (template updated in 2022). Continuing in Action 6.1 (develop a consistent inflow and infiltration dashboard with standardized metrics and will incorporate it into the inflow and infiltration management plan template)
1.1.7 Work with the real estate industry and their regulators, and the municipalities to develop and implement a process for the inspection and certification of private sewer laterals being in good condition as a required component of real estate transactions within Metro Vancouver.	Continuing	Continuing in Action 5.2 (require inspection, testing, repair and/or replacement of private laterals when new construction or redevelopment occurs); Action 5.3 (members will conduct inspections of private laterals in existing properties); and Action 5.5 (members to enforce bylaws that require sanitary laterals to be in good condition).

1.1.8 Develop and implement inflow and infiltration management plans that identify reduction strategies and timelines to ensure wet weather inflow and infiltration are within targeted levels.	Completed Continuing	Completed to varying extents by different member jurisdictions (see 2023 Biennial Report Volume 2 - Municipal Reports). Continuing in Action 6.1 (members will complete inflow and infiltration management plans).
1.1.9 Work with municipalities to review historical data and adjust as necessary the average inflow and infiltration allowance for regional trunk sewers and wastewater treatment plants and develop associated target allowances for municipal sewer catchments associated with a 1:5 year return frequency storm event for sanitary sewers to a level that ensures environmental and economic sustainability.	Completed	Completed as reported in 2015 Biennial Report Volume 1. The review of the inflow and infiltration allowance was completed in 2014 and approved by the Regional Engineers Advisory Committee. The regional inflow and infiltration allowance remains unchanged at 11,200 L/ha/d.
1.1.10 Review progress in reducing inflow and infiltration every four years	Continuing	Continuing in Action 6.2 c) (review progress in reducing inflow and infiltration every four years).
1.1.11 Enhance enforcement of sewer use bylaw prohibition against the unauthorized discharge of rainwater and groundwater to sanitary sewers.	Completed	Completed as reported in 2013 Biennial Report Appendix A (*GVS&DD Sewer Use Bylaw No. 299, 2007* contains the prohibition of discharges of stormwater and groundwater to sanitary sewers from industrial, commercial and institutional sources unless authorized in a waste discharge permit).
1.1.12 Work with municipalities to:		
1.1.12 (a) facilitate research on watershed-based stormwater management approaches;	Completed Continuing	Completed as reported in 2013, 2019, and 2023 Biennial Reports. Watershed-based stormwater management approaches were explored and implemented to varying degrees throughout the last plan - especially through the Stormwater Interagency Liaison Group. Continuing in Action 12.1 (interagency group will lead local research on rainwater management).
1.1.12 (b) identify improvements to stormwater bylaws to include on-site rainwater management requirements;	Continuing	Continuing in Action 11.2 (a guidance document will be developed to aid members in harmonizing rainwater policies, programs and bylaws; members will review and update rainwater policies, programs and bylaws).
1.1.12 (c) develop model utility design standards and options for neighbourhood design guidelines;	Completed	Completed in 2012 (reported in 2013 Biennial Report, Appendix A). Stormwater Source Control Design Guidelines were updated to include sizing and design methodologies for members to reference, incorporate, or adapt for their standards and guidelines. See https://metrovancouver.org/services/liquid-waste/Documents/stormwater-source-control-design-guidelines-2012.pdf
1.1.12 (d) establish region-wide baseline criteria for on-site rainfall management including variations for localized geology, rainfall and watershed conditions;	Completed	Completed in 2017 (reported in 2019 Biennial Report, Volume 1). See https://metrovancouver.org/services/liquid-waste/Documents/region-wide-baseline-onsite-stormwater-management-report-2017-02.pdf
1.1.12 (e) establish mechanisms to ensure continued performance of on-site rainwater management systems; and	Completed Continuing	Completed in 2012 and 2017 as part of Actions 1.1.12 (c) and (d). Generalized performance requirements for on-site stormwater management were identified in 2012 and following GVS&DD Board endorsement of the Region-wide Baseline for On-Site Stormwater Management in 2017, the Stormwater Interagency Liaison Committee continued to work to identify specific issues and mechanisms that support the long-term performance of on-site rainwater management systems. Continuing in Action 11.2 (review and update rainwater bylaws, programs and policies).

1.1.12 (f) work with senior governments and industry to develop codes of practice, certification, guidelines and standards which support this plan.	Continuing	Continuing in Action 11.2 c) (coordinate and advocate with other levels of government to resolve rainwater policy conflicts and barriers) and Action 11.4 (coordinate an approach for updating the Master Municipal Construction Documents).
1.1.13 Decrease liquid waste volumes through complementary initiatives in the Metro Vancouver Drinking Water Management Plan to reduce potable water consumption.	Continuing	Continuing in Action 3.5 (Metro Vancouver and members will advance water conservation and water metering).
1.1.14 Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the *Canadian Environmental Protection Act*.	Completed Continuing	This member action was completed to varying extents by different member jurisdictions through revisions and updates to municipal stormwater, sediment and sewer and drainage system bylaws (see 2023 Biennial Report Volume 2). Continuing in Action 3.4 (provide guidance to enable members to manage fats, oils, and grease through their own bylaws) and Action 11.2 (update rainwater policies, programs, and bylaws in a harmonized manner).
1.1.15 Continue existing programs of permitting and inspection to support and enforce sewer use bylaws.	Removed	This member action is removed from the LWMP because, being unique to the City of Vancouver as the only member jurisdiction with GVS&DD Board designated enforcement officers, the coordination of GVS&DD regulatory bylaw enforcement is completed between City of Vancouver and Metro Vancouver on an ongoing basis, separate from the LWMP.
1.1.16 Identify and regulate pesticides and lawn care products which negatively affect rainwater runoff quality and urban stream health	Completed Continuing	Completed to varying extents by different member jurisdictions through revisions and updates to municipal stormwater, sediment and sewer and drainage system bylaws (see 2023 Biennial Report Volume 2). Continuing in Action 11.2 (coordinate the development of a guidance document to aid members in harmonizing rainwater policies, programs and bylaws; members will review and update rainwater policies, programs and bylaws).
1.1.17 Continue outreach plans to support liquid waste source control programs.	Completed Continuing	Completed to varying extents by different member jurisdictions (see 2023 Biennial Report Volume 2 - Municipal Reports). Continuing in Action 3.1 (pursue reductions in residential wastewater flow and loading through improving education and awareness) and Action 4.2 (continue to motivate residents and businesses to prevent pollution at the source through outreach programs that include youth education programs).
1.1.18 Develop and implement inflow and infiltration management plans, using the Metro Vancouver template as a guide, to ensure wet weather inflow and infiltration volumes are within Metro Vancouver's allowances as measured at Metro Vancouver's flow metering stations.	Completed Continuing	Completed to varying extents by different member jurisdictions (see 2023 Biennial Report Volume 2). Continuing in Action 6.1 (members will complete inflow and infiltration management plans).
1.1.19 Enhance enforcement of sewer use bylaw prohibition against the unauthorized discharge of rainwater and groundwater to sanitary sewers.	Continuing	Continuing in Action 5.5 (members to enforce bylaws on private property to prevent the unauthorized discharge of rainwater and groundwater to sanitary sewers).

1.1.20 Update municipal bylaws to require on-site rainwater management sufficient to meet criteria established in municipal integrated stormwater plans or baseline region-wide criteria.	Completed Continuing	Completed to varying extents by different member jurisdictions (see 2023 Biennial Report Volume 2 - Municipal Reports). Continuing in Action 11.2 (coordinate the development of a guidance document to aid members in harmonizing rainwater policies, programs and bylaws; members will review and update rainwater policies, programs and bylaws).
1.1.21 Update municipal utility design standards and neighbourhood design guidelines to enable and encourage on-site rainwater management.	Completed Continuing	Completed to varying extents by different member jurisdictions (see 2023 Biennial Report Volume 2 - Municipal Reports). Continuing in Action 11.4 (coordinate an approach for seeking to update the Master Municipal Construction Documents such that green infrastructure guidelines become standards).
1.2.1 Prohibit the construction of new combined sewer systems other than those functioning as part of a strategy to reduce combined sewer overflows or to manage stormwater quality.	Continuing	Continuing in Action 9.1 (ensure that no new combined sewer laterals will be constructed on private or public property).
1.2.2 Address the Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE) by working with Burnaby, New Westminster and Vancouver to develop and implement: priorities for sewer separation of catchments tributary to combined sewer outfalls; regional and municipal sequence for trunk and collector sewer separation; strategic use of existing combined sewers to manage rainwater quality runoff; and a strategy to separate combined sewer connections from private properties.	Continuing	Continuing in Action 9.2 and Action 9.3 (develop targets for separation on five-year intervals; develop and implement Sewer Separation and Combined Sewer Overflow Elimination Plans to prevent combined sewer overflows, and in the interim, support the intermediate targets developed in action 9.2).
1.2.3 Replace combined regional trunk sewers with separated sanitary and storm sewers as determined by the plans developed in 1.2.2.	Continuing	Continuing in Action 9.2 and Action 9.4 (develop targets for separation on five-year intervals; replace combined regional trunk sewers with separated sanitary and storm sewers as determined by the Sewer Separation Plans).
1.2.4 Work with municipalities to develop and implement municipal-regional sanitary overflow management plans which will: prevent sanitary overflows resulting from heavy rain and snowmelt occurring less than once every five years (for a 24 hour duration event); reduce emergency overflows due to power outages; and identify locations and schedules for appropriate system capacity improvements, wet weather containment, and point treatment and discharge to receiving waters of chronic overflows, including Cloverdale Pump Station, Katzie Pump Station, Lynn Pump Station.	Completed Continuing	Completed to varying extents by members and Metro Vancouver as reported in 2023 Biennial Report (for example, in the work of the REAC Liquid Waste Sub-Committee SSO Working Group). Continuing in Action 7.5 (continue to develop and implement municipal-regional sanitary overflow management plans to eliminate overflows at chronic locations).
1.2.5 Work with Metro Vancouver to develop and implement municipal-regional sanitary overflow management plans as set out in 1.2.4.	Completed Continuing	Completed to varying extents by members and Metro Vancouver as reported in 2023 Biennial Report (for example, in the work of the REAC Liquid Waste Sub-Committee SSO Working Group). Continuing in Action 7.5 (continue to develop and implement municipal-regional sanitary overflow management plans to eliminate overflows at chronic locations).

1.2.6 Burnaby, New Westminster and Vancouver will work with Metro Vancouver to give effect to 1.2.2 and, specifically, implement plans to prevent combined sewer overflows by 2050 for the Vancouver Sewerage Area and 2075 for the Fraser Sewerage Area and separate combined sewers at an average rate of 1 per cent and 1.5 per cent of the system per year in the Vancouver Sewerage Area and Fraser Sewerage Area respectively.	Continuing	Continuing in Action 9.3 (Burnaby, New Westminster, and Vancouver continue to work with Metro Vancouver to develop and implement Sewer Separation and Combined Sewer Overflow Elimination Plans to prevent combined sewer overflows, and in the interim, support the intermediate targets developed in action 9.2).
1.3.1 Develop and implement operational plans for sewerage and wastewater treatment facilities to ensure infrastructure reliability and optimal performance.	Continuing	Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate) and Action 2.3 (plan, locate, design, and adapt infrastructure, assets, and operations to address identified hazards, risks, and vulnerabilities, including climate change impacts).
1.3.2 Maintain trunk sanitary sewer capacity for dry weather sewage conveyance levels plus the Metro Vancouver target inflow and infiltration allowance; as necessary upgrade trunk sewer systems to maintain hydraulic gradelines and safe operating levels which have been established based on measured flow.	Continuing	Continuing in Action 1.2 (regional and municipal systems will seek to accommodate population growth and land use changes by providing sanitary sewer capacity and wastewater treatment plant hydraulic capacity for peak dry weather flow plus an inflow and infiltration allowance of 11,200 L/ha/d).
1.3.3 Work with municipalities to develop and implement emergency sanitary sewer overflow plans including contingency plans to minimize impacts of unavoidable sanitary sewer overflows resulting from extreme weather, system failures or unusual events.	Removed	Removed. Emergency management planning is regularly conducted as part of ongoing operations as required under British Columbia's *Emergency and Disaster Management Act* and no longer needs to be included in the LWMP.
1.3.4 Operate wastewater treatment plants which have secondary level treatment (Annacis Island, Lulu Island, North West Langley wastewater treatment plants) to meet requirements specified in each facility's Operating Certificate and the Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE) National Performance Standards for wastewater effluent, including:	Continuing	Continuing in Action 13.1 (wastewater treatment infrastructure will be operated using the CWS-MMWE Environmental Risk Management Framework) and 14.1 (wastewater treatment plants will meet or surpass requirements specified in each facility's Operational Certificate and the CWS-MMWE National Performance Standards for wastewater effluent).
1.3.4 (a) monthly average maximum Carbonaceous Biochemical Oxygen Demand (CBOD5): 25 mg/L; and	Removed	Specific wastewater treatment plant effluent quality criteria are established in Operational Certificates issued by the Province for each wastewater treatment plant and may be revised from time to time. These specific concentrations should be removed from the LWMP to prevent them from becoming outdated if/when Operational Certificates are revised or updated.
1.3.4 (b) monthly average maximum Total Suspended Solids (TSS): 25 mg/L.	Removed	Specific wastewater treatment plant effluent quality criteria are established in Operational Certificates issued by the Province for each wastewater treatment plant and may be revised from time to time. These specific concentrations should be removed from the LWMP to prevent them from becoming outdated if/when Operational Certificates are revised or updated.
1.3.5 Upgrade or replace Lions Gate (North Shore Sewerage Area) and Iona Island (Vancouver Sewerage Area) wastewater treatment plants to secondary level treatment to meet Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE) requirements and timelines.	Continuing	Continuing in Action 13.1 (wastewater treatment infrastructure will be operated using the CWS-MMWE Environmental Risk Management Framework). Continuing in Action 13.4 (upgrade wastewater treatment processes and plants according to the Wastewater Treatment Plant Upgrade and Expansion Schedule).

1.3.5 (a) The intended site for the North Shore Sewerage Area secondary facility is the Metro Vancouver owned property located between Pemberton, Philips, and McKeen Avenues and West First Street in the District of North Vancouver. The existing outfall will be retained as part of the upgraded facility. The outfall discharges to embayed marine waters as defined in the *Environmental Management Act*, *Municipal Sewage Regulation*.	Removed	This sub-action is removed from the LWMP as specifics regarding the siting of the North Shore Wastewater Treatment Plant and outfall are outdated.
1.3.5 (b) The intended site for the Vancouver Sewerage Area is the property immediately adjacent and east of the existing Iona Island plant in the City of Richmond. The existing outfall will be retained as part of the upgraded facility. The outfall discharges to open marine waters as defined in the *Environmental Management Act, Municipal Sewage Regulation*.	Removed	This sub-action is removed from the LWMP as specifics regarding the siting of the Iona Island Wastewater Treatment Plant and outfall are addressed separately.
1.3.5 (c) Based on the CWS-MMWE and the assessment made by the Environmental Monitoring Committee, the Lions Gate upgrade should be completed within 10-years subject to the appropriate financial arrangements being in place as indicated in the Financial Plan.	Removed	This sub-action is removed from the LWMP as specifics regarding the North Shore Wastewater Treatment Plant (previously Lions Gate) upgrade are addressed separately.
1.3.5 (d) Based on the CWS-MMWE and the assessment made by the Environmental Monitoring Committee, the Iona Island upgrade should be completed within 20 years. In spite of this, Metro Vancouver has a strong desire to accelerate the completion of the Iona Island upgrade as soon as is reasonably possible in a 10 to 20 year timeframe, because of the significance of this upgrade to Metro Vancouver's Sustainable Region Initiative. The Region will strive to the greatest extent possible to achieve this. Risk factors to overcome include resolution of technical and land tenure issues, construction logistics and will be subject to appropriate financial arrangements being in place as indicated in the Financial Plan. In collaboration with provincial and federal governments, Metro Vancouver will engage in resolving these obstacles to complete the Iona Island upgrade at the earliest practicable time.	Removed	This sub-action is removed from the LWMP as specifics regarding the Iona Island Wastewater Treatment Plant upgrade are addressed separately.
1.3.5 (e) Metro Vancouver will seek assistance from both senior levels of government in resolving First Nations rights and title issues associated with these secondary treatment plant upgrades.	Continuing	Continuing in Action 13.4 (b) (Metro Vancouver will engage with First Nations on planned wastewater treatment upgrades when preparing and updating the Wastewater Treatment Plant Upgrade and Expansion Schedule, and will do so in a manner that is consistent with applicable federal and provincial law, and according to the level of First Nations interest).
1.3.6 Maintain interim maximum daily concentration limits for wastewater effluent of 130 mg/L BOD_5 at both Lions Gate and Iona Island plants and 130 mg/L TSS at Lions Gate and 100 mg/L TSS at Iona Island until such time as secondary treatment is operational, and operate the plants to meet requirements specified in each facility's Operating Certificate.	Continuing	Continuing in Action 13.1 (wastewater treatment infrastructure will be operated using the CWS-MMWE Environmental Risk Management Framework) and 14.1 (wastewater treatment plants will meet or surpass requirements specified in each facility's operating certificate and the CWS-MMWE National Performance Standards for wastewater effluent).

1.3.7 Assess environmental monitoring results (see Strategy 3.3) to determine whether any actions are required to meet Ministry of Environment/ Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE) requirements.	Continuing	Continuing in Action 13.1 (wastewater treatment infrastructure will be operated using the CWS-MMWE Environmental Risk Management Framework), Action 13.2 (continue to monitor the quantity and characteristics of Metro Vancouver's wastewater treatment plant effluent discharges and assess effluent quality in accordance with the CWS-MMWE) and Action 13.3 (continue to monitor influent and the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required).
1.3.8 Continue odour control programs at wastewater treatment plants and implement odour control programs for targeted facilities in the regional sewer system and for relevant energy and material recovery processes (see Action 3.3.4).	Continuing	Continuing in Action 18.5 (continue odour management programs at wastewater treatment plants and targeted facilities in the regional sewer system).
1.3.9 Develop and implement air emissions management programs for standby power generators and biogas production, including assessment of desirability of retrofit and accelerated asset replacement where appropriate.	Continuing	Continuing in Action 18.3 (manage air emissions from standby power generators) and Action 18.4 (develop and undertake a program to characterize emissions from various processes at wastewater treatment plants (e.g., digesters, exhausts, stacks) during operation, preventative maintenance, and emergency maintenance. Metro Vancouver will identify potential concerns, and, where appropriate, undertake studies of best economically feasible control processes or technologies).
1.3.10 Develop and implement programs to reduce greenhouse gas emissions from the regional liquid waste management systems to help achieve federal, provincial and Metro Vancouver greenhouse gas targets (see Action 3.3.4).	Continuing	Continuing in Action 18.2 (continue to develop and implement programs and procurement policies to reduce greenhouse gas emissions associated with the design, construction, operation, and management of wastewater collection and treatment systems, to help achieve federal, provincial, and Metro Vancouver greenhouse gas reduction targets).
1.3.11 Develop and implement operational plans for municipal sewerage facilities to ensure infrastructure reliability and optimal performance.	Continuing	Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate) and Action 2.3 (continue to plan, locate, design, and adapt infrastructure, assets, and operations to address identified hazards, risks, and vulnerabilities, including climate change impacts).
1.3.12 Work with Metro Vancouver to develop and implement emergency sanitary sewer overflow plans including contingency plans to minimize impacts of unavoidable sanitary sewer overflows resulting from extreme weather, system failures or unusual events.	Removed	Removed. Emergency management planning is regularly conducted as part of ongoing operations as required under British Columbia's *Emergency and Disaster Management Act* and no longer needs to be included in the LWMP.
1.3.13 Work with private marina operators, Ministry of Environment and Environment Canada to develop and implement regulations to ensure all new marinas and marinas where planned renovations exceed 50 % of the assessed existing improvements value have pleasure craft pump-out facilities.	Completed Continuing	Completed to varying extents if applicable by different member jurisdictions as reported in Biennial reports. Continuing in Action 20.3 (same as 2011 ILWRMP).
1.3.14 Require all pleasure craft pump out facilities to connect to a municipal sanitary sewerage system or a provincially permitted on-site treatment and disposal system or have established enforceable protocols for transporting liquid waste for disposal at a permitted liquid waste management facility.	Completed Continuing	Completed to varying extents if applicable by different member jurisdictions as reported in Biennial reports. Continuing in Action 20.4 (same as 2011 ILWRMP).

1.3.15 Continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities (see Action 3.3.4).	Completed Continuing	Completed to varying extents by different member jurisdictions as reported in Biennial reports. Continuing in Action 18.6 (continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities).
1.3.16 Develop and implement air emissions management programs for standby power generators at municipal sewer pump stations.	Continuing	Continuing in Action 18.3 (continue to develop and implement air emissions management programs for standby power generators at municipal sewer pump stations).
1.3.17 Develop and implement programs to reduce greenhouse gas emissions from municipal liquid waste management systems to help achieve federal, provincial and municipal greenhouse gas targets (see Action 3.3.4).	Continuing	Continuing in Action 18.2 (continue to develop and implement programs and procurement policies to reduce greenhouse gas emissions associated with the design, construction, operation, and management of wastewater collection and treatment systems, to help achieve federal, provincial, and Metro Vancouver greenhouse gas reduction targets).
1.3.18 Include Metro Vancouver and municipalities in the Ministry's processes to review and establish official water uses and official water quality objectives for specific water bodies within Metro Vancouver.	Completed Continuing	Completed as reported in 2023 Biennial Report Volume 1 (Metro Vancouver was invited by the Ministry of Environment and Climate Change Strategy and səlilwətaɬ (Tsleil-Waututh Nation) to participate in the review of Burrard Inlet Water Quality Objectives and has provided monitoring, other data, and feedback on the proposed objectives). Continuing in Action 20.2 (participate in provincial processes to review and establish water uses and water quality objectives for specific water bodies within Metro Vancouver).
2.1.1 Assess each sewerage area using an integrated resource recovery business case model that:	Completed	Integrated Resource Recovery business case models and reports were completed for all four sewerage areas from 2011 to 2023.
2.1.1 (a) evaluates opportunities to expand the recovery of energy, nutrients and water from the liquid waste system; specifically:		
2.1.1 (a) 1 · energy from biogas at wastewater treatment plants including investigating new sludge and wastewater treatment technologies and the co-digestion of other organic wastes such as organics in municipal solid waste, oils and greases;	Completed Continuing	Completed as reported in 2013, 2015, and 2019 Biennial reports - trucked liquid wastes were evaluated for energy-generating potential through the Annacis Co-Digestion Program and a review of Metro Vancouver's Trucked Liquid Waste Program. Findings indicated that Metro Vancouver cannot compete with the private sector for the types of waste best suited for co-digestion and energy generation. Continuing in Action 16.1 (recover energy from the liquid waste system); Action 17.1 (new methods to expand recovery and use of energy, nutrients, water, and other resources from the liquid waste system).
2.1.1 (a) 2 · heat energy from new pump stations, sewer replacement and rehabilitation and major wastewater treatment plant projects;	Continuing	Continuing in Action 16.1 (recover energy from the liquid waste system); Action 17.1 (new methods to expand recovery and use of energy, nutrients, water, and other resources from the liquid waste system).
2.1.1 (a) 3 · biodiesel from trucked liquid waste, waste grease and sewer grease.	Completed	Completed as reported in 2013, 2015, and 2019 Biennial reports - trucked liquid wastes were evaluated for energy-generating potential through the Annacis Co-Digestion Program and a review of Metro Vancouver's Trucked Liquid Waste Program. Findings indicated that Metro Vancouver cannot compete with the private sector for the types of waste best suited for co-digestion and energy generation.

2.1.1 (a) 4 · energy from biosolids and sludge;	Continuing	Continuing in Action 15.2 (beneficially use dried Nutrifor biosolids pellets as a low carbon fuel and fertilizer product); Action 15.3 (explore technologies that convert sludge to low carbon fuel), Action 15.4 (process biosolids at Metro Vancouver Waste-to-Energy Facility when other markets or uses cannot be accessed); Action 16.1 (recover energy from the liquid waste system); Action 17.1 (new methods to expand recovery and use of energy, nutrients, water, and other resources from the liquid waste system).
2.1.1 (a) 5 · nutrients, such as phosphorous from liquid waste and biosolids; and	Continuing	Continuing in Action 15.1 (grow the land application program); Action 15.2 (beneficially use dried Nutrifor biosolids pellets as a low carbon fuel and fertilizer product); Action 16.3 (recover nutrients and other materials from liquid waste); Action 17.1 (new methods to expand recovery and use of energy, nutrients, water, and other resources from the liquid waste system).
2.1.1 (a) 6 · alternatives to potable water for non-drinking purposes, such as rainwater harvesting, greywater reuse and reclaimed treated wastewater;	Continuing	Continuing in Action 16.2 (recover water from the liquid waste system); Action 17.1 (new methods to expand recovery and use of energy, nutrients, water, and other resources from the liquid waste system).
2.1.1 (b) identifies linkages between liquid waste resource recovery opportunities and other systems (solid waste, drinking water, land use/buildings, parks, air quality, energy); and	Completed	Completed as reported in 2022 biennial report. Linkages between liquid waste resource recovery opportunities and other systems (solid waste, drinking water, land use/buildings, parks, air quality, energy) were assessed in Integrated Resource Recovery studies completed for each sewerage area from 2011 to 2023. Linkages between the liquid waste system and other regional systems are described in the 'Alignment and Linkages' section of this LWMP.
2.1.1 (c) develops and evaluates business cases for integrated resource recovery/use opportunities.	Completed	Integrated Resource Recovery business case models and reports were completed for all four sewerage areas from 2011 to 2023.
2.1.2 Implement appropriate business cases based on the results of 2.1.1.	Continuing	Continuing in Action 16.1 (recover energy from the liquid waste system); Action 16.2 (recover water from the liquid waste system); Action 16.3 (recover nutrients and other materials from liquid waste).
2.1.3 Work with municipalities to adapt plans and infrastructure for long term needs based on the results of 2.1.1.	Continuing	Continuing in Action 16.1 (recover energy from the liquid waste system); Action 16.2 (recover water from the liquid waste system); Action 16.3 (recover nutrients and other materials from liquid waste).
2.1.4 Work with Metro Vancouver to give effect to 2.1.1, 2.1.2 and 2.1.3.	Continuing	Continuing in Action 15.5 (members will continue to use Nutrifor landscaping soil in municipal projects when feasible); Action 16.4 (members will recover and use recovered energy and water when feasible)
3.1.1 Assess the performance and condition of regional sewerage systems by:	Continuing	Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate).
3.1.1 (a) inspecting regional sanitary sewers on a twenty-year cycle; and	Continuing	Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate).
3.1.1 (b) maintaining current maps of sewerage inspection, condition, and repairs.	Continuing	Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate).

3.1.2 Create incentives to reduce inflow and infiltration by adjusting Tier I sewerage cost allocation formulae within each sewerage area from an average dry weather flow basis (25th percentile) to average wet weather flow (75th percentile) with appropriate adjustments for combined sewerage areas. Tier II cost allocation would remain unchanged.	Completed Continuing	Completed as reported in 2023 Biennial Report Volume 1 (Wet Weather Pricing was approved by the GVS&DD Board in February 2023). Continuing in Action 6.4 (Metro Vancouver will review the wet weather sewer pricing formula every four years, and will adjust if needed to further incentivize inflow and infiltration reductions by members).
3.1.3 In consultation with municipalities, review Metro Vancouver's safe-operating head for regional sewers.	Continuing	Continuing in Action 1.2 (provide sanitary sewer and wastewater treatment plant hydraulic capacity for peak dry weather flow plus an inflow and infiltration allowance of 11,200 L/ha/d, to ensure hydraulic gradelines stay within safe operating levels).
3.1.4 Develop and implement asset management plans targeting a 100 year replacement or rehabilitation cycle for regional sewerage infrastructure.	Continuing	Continuing in Action 1.1 c) (continue to develop and implement asset management plans that address risks, including climate change and seismic events, and target a 100-year replacement or rehabilitation cycle for sewerage infrastructure).
3.1.5 Update and implement asset management plans for wastewater treatment plants which address risks, including climate change and seismic events, and maintain performance in wet weather.	Continuing	Continuing in Action 1.1 (continue to develop and implement asset management plans that address risks, including climate change and seismic events, and target a 100-year replacement or rehabilitation cycle for sewerage infrastructure) and Action 14.2 (update and implement asset management plans to enhance the operational efficiency of wastewater treatment plants, maintain the reliability of the existing infrastructure and equipment for wastewater treatment plants that address risks, including climate change and seismic events, and maintain performance in wet weather).
3.1.6 Assess the performance and condition of municipal sewerage systems by:	Continuing	Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate).
3.1.6 (a) inspecting municipal sanitary sewers on a twenty-year cycle;	Continuing	Continuing in Action 1.1 a) (maintain the condition and performance of the sewerage system by inspecting sanitary sewers on a 20-year cycle;)
3.1.6 (b) maintaining current maps of sewerage inspection, condition and repairs; and	Continuing	Continuing in Action 1.1 b) (maintain the condition and performance of the sewerage system by maintaining current maps of sewerage inspection, condition, and repairs;)
3.1.6 (c) using the Metro Vancouver "Sewer Condition Reporting Template Standard Report, November 2002" as a guide to ensure a consistent approach to sewer system evaluation and reporting.	Continuing	Continuing in Action 1.1 (Metro Vancouver will use the National Association of Sewer Service Companies Pipeline Assessment Certification Program and Manhole Assessment Certification Program for (a) and (b). Members are encouraged to use these programs for (a) and (b) to ensure a consistent approach).
3.1.7 Work with Metro Vancouver to give effect to 3.1.2, 3.1.3 and 3.1.4.	Completed Continuing	Completed as reported in 2023 Biennial Report Volume 1 (Wet Weather Pricing was approved by the GVS&DD Board in February 2023). Continuing in Action 1.1 (continue to develop and implement asset management plans that address risks, including climate change and seismic events, and target a 100-year replacement or rehabilitation cycle for sewerage infrastructure); Action 1.2 (provide sanitary sewer and wastewater treatment plant hydraulic capacity for peak dry weather flow plus an inflow and infiltration allowance of 11,200 L/ha/d, to ensure hydraulic gradelines stay within safe operating levels); and Action 6.4 (review the wet weather sewer pricing formula every four years, and adjust if needed to further incentivize inflow and infiltration reductions my members).

3.1.8 Develop and implement asset management plans targeting a 100 year replacement or rehabilitation cycle for municipal sewerage infrastructure and provide copies of such plans to Metro Vancouver.	Continuing	Continuing in Action 1.1 (c) (continue to develop and implement asset management plans that address risks, including climate change and seismic events, and target a 100-year replacement or rehabilitation cycle for sewerage infrastructure).
3.2.1 With financial support from provincial and federal governments and the University of British Columbia, develop the Annacis Island Sustainability Academy to support innovative research and demonstration projects in liquid waste management.	Completed	Completed as reported in 2023 Biennial Report Volume 1 (The Annacis Research and Event Centre supports technology trials, training, conferences and education with wastewater treatment technology projects conducted in partnership with the University of British Columbia, the Vancouver Aquarium and other agencies, private firms, and academic institutions).
3.2.2 Collaborate with local and senior governments, academic institutions and industry in research on wastewater treatment technology and stormwater management and associated demonstration projects, training and development of educational toolkits.	Completed Continuing	Completed as reported in 2023 Biennial Report Volume 1 (Three innovative wastewater treatment technology research and pilot projects were highlighted: Hydrothermal Processing Demonstration facility, Lulu Island Pilot Digestion Optimization Facility, Advanced Resource Recovery from Wastewater [a five-year Industry Research Chair program at the University of British Columbia Okanagan co-funded by Natural Sciences and Engineering Research Council and Metro Vancouver]). Continuing in Action 17.1 (research, develop and pilot new methods through collaborating with researchers at academic institutions and other utilities and water research organizations); Action 17.2 (foster circular water economy innovation within the liquid waste system by promoting circular water economy innovation and research through sharing our story and actively participating in industry organizations and regional networks).
3.2.3 Undertake an annual internal audit of best practices of one regional liquid waste management sub program and environmental management system to identify opportunities for innovation and improvements.	Removed	Removed. Replaced by updated actions that require ongoing continuous improvement, monitoring and accountability. For more information, see 'Monitoring and Reporting' Section of this LWMP.
3.2.4 Undertake a tri-annual internal audit of best practices of one municipal liquid waste management sub-program in each municipality to identify opportunities for innovation and improvements.	Removed	Removed. Replaced by updated actions that require ongoing continuous improvement, monitoring and accountability. For more information, see 'Monitoring and Reporting' Section of this LWMP.
3.3.1 Continue to monitor the ambient environment conditions of relevant water bodies in the region in conformance with the Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE) requirements, and work with the Ministry of Environment in developing Environmental Quality Objectives.	Continuing	Continuing in Action 13.3 (continue to monitor influent and the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required); Action 20.2 (Metro Vancouver will continue to participate, and members may participate, in provincial processes to review and establish water uses and water quality objectives for specific water bodies within Metro Vancouver).
3.3.2 (Part 1) Continue to monitor the quantity and characteristics of Metro Vancouver's liquid waste point discharges to the environment	Continuing	Continuing in Action 13.2 (continue to monitor the quantity and characteristics of Metro Vancouver's wastewater treatment plant effluent discharges and assess effluent quality in accordance with the CWS-MMWE).

3.3.2 (Part 2) Continue to monitor Metro Vancouver's conformance with the Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE) requirements to meet Environmental Discharge Objectives.	Continuing	Continuing in Action 13.2 (continue to monitor the quantity and characteristics of Metro Vancouver's wastewater treatment plant effluent discharges and assess effluent quality in accordance with the CWS-MMWE).
3.3.3 Continue to operate its regional data collection network for sewers, rainfall and streams and use that data to assess the effectiveness of actions taken under this plan.	Continuing	Continuing in Action 6.3 (monitor municipal sewer flows and levels in their existing network to inform their inflow and infiltration dashboards. Members will expand the monitoring network if needed to better understand where inflow and infiltration is happening); Action 8.9 (maintain monitors at combined sewer overflow sites); Action 10.1 (use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health); Action 10.2 (continue to develop, review and update Integrated Watershed Management Plans (IWMPs)).
3.3.4 In collaboration with municipalities, estimate and document the greenhouse gas emissions and odours associated with the operation of the municipal and regional liquid waste management systems (see Actions 1.3.8, 1.3.10, 1.3.15, and 1.3.17).	Continuing	Continuing in Action 18.5 (continue odour management programs at wastewater treatment plants and targeted facilities in the regional sewer system); Action 18.6 (continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities); Action 18.1 (develop and implement programs and policies to track greenhouse gas emissions associated with the construction and operation of wastewater collection and treatment systems, including developing and implementing new monitoring plans where necessary).
3.3.5 Estimate and report on the frequency, location and volume of sewage overflows from regional combined and sanitary sewers, and where feasible identify and address the probable causes.	Continuing	Continuing in Action 7.3 (report annually on the number and location of sanitary sewer overflows, and, where feasible, the estimated volumes and probable causes); and Action 8.2 (estimate and report annually on the frequency, location and volume of sewage overflows from regional combined sewers, and where feasible identify and address the probable causes)
3.3.6 In collaboration with Metro Vancouver, estimate and document the greenhouse gas emissions and odours associated with the operation of the municipal and regional liquid waste management systems.	Continuing	Continuing in Action 18.5 (continue odour management programs at wastewater treatment plants and targeted facilities in the regional sewer system); Action 18.6 (continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities); Action 18.1 (develop and implement programs and policies to track greenhouse gas emissions associated with the construction and operation of wastewater collection and treatment systems, including developing and implementing new monitoring plans where necessary).
3.3.7 Estimate and report on the frequency, location and volume of sewage overflows from municipal combined and sanitary sewers, and where feasible identify and address the probable causes.	Continuing	Continuing in Action 7.3 (report annually on the number and location of sanitary sewer overflows, and, where feasible, the estimated volumes and probable causes); and Action 8.4 (Members with combined systems will continue to estimate and report annually on the frequency, location and volume of combined sewer overflows from municipal sewers, and where feasible identify and address the probable causes).
3.3.8 Maintain and, if necessary, expand the existing municipal sewer flow and sewer level monitoring network.	Continuing	Continuing in Action 6.3 (monitor municipal sewer flows and levels in their existing network to inform their inflow and infiltration dashboards. Members will expand the monitoring network if needed to better understand where inflow and infiltration is happening).
3.4.1 Design and adapt infrastructure and operations to address identified risks and long-term needs including risks associated with climate change.	Continuing	Continuing in Action 13.1 (plan, design, operate and maintain wastewater treatment infrastructure using the CWS-MMWE Environmental Risk Management Framework to address and adapt to identified risks and long term needs, and will additionally incorporate risks associated with climate change into the framework).

3.4.2 In collaboration with municipalities and the Integrated Partnership for Regional Emergency Management (IPREM), develop emergency management strategies and response plans for municipal and regional wastewater collection and treatment systems, including identifying and maintaining a system of emergency wastewater overflow locations.	Removed	Removed. Emergency management planning is regularly conducted as part of ongoing operations as required under British Columbia's *Emergency and Disaster Management Act* and no longer needs to be included in the LWMP.
3.4.3 Ensure liquid waste infrastructure and services are provided in accordance with the Regional Growth Strategy and coordinated with municipal Official Community Plans.	Continuing	Continuing in Action 1.4 (Metro Vancouver and members' provision of liquid waste infrastructure and services will be consistent with the Regional Growth Strategy and coordinated with municipal Official Community Plans).
3.4.4 In collaboration with Metro Vancouver and the Integrated Partnership for Regional Emergency Management (IPREM), develop emergency management strategies and response plans for municipal and regional wastewater collection and treatment systems.	Removed	Removed. Emergency management planning is regularly conducted as part of ongoing operations as required under British Columbia's *Emergency and Disaster Management Act* and no longer needs to be included in the LWMP.
3.4.5 Adapt infrastructure and operations to address risks and long-term needs.	Continuing	Continuing in Action 2.3 (continue to plan, locate, design, and adapt infrastructure, assets, and operations to address identified hazards, risks, and vulnerabilities, including climate change impacts).
3.4.6 Ensure liquid waste infrastructure and services are provided in accordance with the Regional Growth Strategy and coordinated with municipal Official Community Plans.	Continuing	Continuing in Action 1.4 (Metro Vancouver and members' provision of liquid waste infrastructure and services will be consistent with the Regional Growth Strategy and coordinated with municipal Official Community Plans).
3.4.7 Develop and implement integrated stormwater management plans at the watershed scale that integrates with land use to manage rainwater runoff	Continuing	Continuing in Action 10.4 (align land-use planning and development with IWMPs to ensure development decisions support watershed health objectives, including protecting riparian areas and agricultural areas).
3.5.1 Establish a new overarching committee, the Integrated Utility Management Advisory Committee (IUMAC), to advise Metro Vancouver on plan implementation, particularly from the perspectives of integrated planning and resource recovery across utility systems.	Removed	The structure of the Integrated Utility Management Advisory Committee was appropriate for the 2011 LWMP at the time of development and adoption. The REAC Liquid Waste Sub-Committee (staff representatives from Metro Vancouver and member jurisdictions) is better suited to track ongoing progress on member actions in the LWMP. Progress on Metro Vancouver actions in this LWMP will be discussed and tracked through meetings with the Province. Refer to 'Monitoring and Reporting' section of the LWMP for more information.
3.5.2 Continue to receive advice from the Environmental Monitoring Committee (EMC) and Stormwater Interagency Liaison Group (SILG) as subcommittees under the IUMAC.	Removed Continuing	The Integrated Utility Management Advisory Committee no longer exists so reference to this committee is removed. Continuing in Action 12.1 (coordinate a revision of the interagency group's terms of reference, possibly to operate as a sub-committee under the Regional Engineer's Advisory Committee (REAC), to lead local research on rainwater management, to be the primary regional advocate with regulators, to promote education and outreach on rainwater management, and to coordinate region-wide accountability on IWMP actions); and Action 19.1 (continue to receive advice from the Environmental Monitoring Committee).

3.5.3 Use the Burrard Inlet Environmental Action Program and the Fraser River Estuary Management Program Management Committee (BIEAP-FREMP) as the senior level forum for discussion of policy and assessment of the scientific work related to the plan, and for resolving toxicity concerns and any disputes among its members related to implementing the plan.	Continuing	Continuing in Action 20.1 (participate in relevant collaborative environmental program(s) for regional water bodies (i.e., Fraser River, Burrard Inlet, Strait of Georgia) along with First Nations, senior government, and interested parties).
3.5.4 Biennially produce a progress report on plan implementation for distribution to the Ministry of the Environment that:	Removed	Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' Section of this LWMP.
3.5.4 (a) summarizes progress from the previous two years on plan implementation for all Metro Vancouver actions, including the status of performance measures	Removed	Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' Section of this LWMP.
3.5.4 (b) includes summaries and budget estimates for proposed LWMP implementation programs for the subsequent two calendar years.	Removed	Removed. Replaced with reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
3.5.5 Hold a public accountability session based on the biennial reports (Actions 3.5.4 and 3.5.8) by making the report available through Metro Vancouver's website and by holding a special meeting of the Metro Vancouver Waste Management Committee to receive public comments and input on the report.	Removed	Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
3.5.6 Report directly to the Ministry of Environment annual progress on integrated stormwater management plan implementation and all occurrences of sanitary sewer overflows.	Continuing	Continuing in Action 7.2 (inform the Province, regional health authorities, and the First Nations Health Authority of any sanitary sewer overflows as soon as they occur); Action 7.3 (report annually on the number and location of sanitary sewer overflows, and, where feasible, the estimated volumes and probable causes); Action 10.1 (use the Stormwater Monitoring and Adaptive Management Framework to monitor watershed health). Refer to reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
3.5.7 In collaboration with members and the Ministry of Environment, undertake a comprehensive review and update of the plan on an eight year cycle.	Removed	Removed. This action is superseded due to a provision from the Ministry of Environment and Climate Change Strategy to make mid-plan amendments during the approximately 10-year cycle of the LWMP, should any changes be required.
3.5.8 Biennially, through Metro Vancouver, produce a progress report on plan implementation for distribution to the Ministry of the Environment that:	Removed	Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
3.5.8 (a) summarizes progress from the previous two years on plan implementation for all municipal actions, including the status of performance measures.	Removed	Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
3.5.8 (b) includes summaries and budget estimates for proposed LWMP implementation programs for the subsequent two calendar years.	Removed	Removed. Replaced with reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
3.5.9 Report through Metro Vancouver to the Ministry of Environment annual progress on integrated stormwater management plan implementation and all occurrences of sanitary sewer overflows.	Continuing	Continuing in Action 7.2 (inform the Province, regional health authorities, and the First Nations Health Authority of any sanitary sewer overflows as soon as they occur); Action 7.3 (Members will report annually on the number and location of sanitary sewer overflows, and, where feasible, the estimated volumes and probable causes); Action 10.1 (use the Stormwater Monitoring and Adaptive Management Framework to monitor watershed health). Refer to reporting commitments described in 'Monitoring and Reporting' section of this LWMP.

3.5.10 Work with Metro Vancouver to give effect to 3.5.2, 3.5.5 and 3.5.7.	Removed Continuing	The Integrated Utility Management Advisory Committee no longer exists so reference to this committee is removed. Reporting actions removed (3.5.5 and 3.5.7). Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' Section of this LWMP. 2011 LWMP Action 3.5.2 is continuing in Action 12.1 (coordinate a revision of the interagency group's terms of reference, to possibly operate as a sub-committee under the Regional Engineer's Advisory Committee (REAC), to lead local research on rainwater management, to be the primary regional advocate with regulators, to promote education and outreach on rainwater management, and to coordinate region-wide accountability on IWMP actions. Metro Vancouver and members will actively participate in the revitalized interagency group); and Action 19.1 (continue to receive advice from the Environmental Monitoring Committee).

Appendix E – Status of Past Actions from 2002 LWMP

Actions - Ministerial Conditions (MCs)	Status	Rationale
MC 1 Provide an opportunity for the public to have meaningful input into the implementation of the LWMP. Within two months of the publication of the biennial report referred to on page 55 of the LWMP, the district will notify the public of the existence of the report and receive comments and submissions at a special meeting of the district's Sewerage and Drainage Committee. The district will forward the minutes of this meeting, and copies of any submissions made, to Douglas Pope, Regional Environmental Protection Manager (the manager).	Completed Removed	Completed as reported in 2010 biennial report (a special meeting was held on March 11, 2009 to receive public input on the September 2008 Biennial Report, minutes from which were forwarded to the Ministry). Removed as an action, superseded by more recent direction from the Province regarding engagement and public involvement, and replaced with reporting commitments described in 'Monitoring and Reporting' section of this LWMP.
MC 2 Develop the environmental "triggers" used in the monitoring process by January 31, 2004, recognizing that the environmental monitoring process in the LWMP is based on discharge indicator trend analysis such that action will be implemented before Water Quality Objectives or other criteria are met or exceeded. The monitoring program shall include sediment quality, bioaccumulation of contaminants in marine life forms and structure of biological community, in addition to water quality parameters;	Completed Removed	Completed as reported in 2010 biennial report (Metro Vancouver submitted the “Cautions, Warnings, and Triggers Process” to the Ministry of Environment. A version of the triggers process similar to Metro Vancouver’s environmental triggers concept was also adopted by the CCME CWS-MMWE (Canada Wide Strategy for the Management of Municipal Wastewater Effluent) through its Risk Management Strategy in 2009). Removed as an action, superseded by the CCME CWS-MMWE and the development of Effluent Discharge Objectives (EDOs).
MC 3 Establish a linkage between biosolids quality and the effectiveness of source control programs;	Completed	Completed as reported in 2008 biennial report (Metro Vancouver has worked to eliminate batch discharge of materials at point sources which can cause rapid metal concentrations in liquid waste discharges. Increasing awareness of downstream impacts with industrial and commercial dischargers through visible sewer monitoring and targeted education programs have successfully prevented metals spikes that were more frequent before implementation of these programs).
MC 4 Eliminate chronic sanitary sewer overflows at Cloverdale and Maillardville by January 31, 2005 and eliminate all sanitary sewer overflows in the district that occur during storm or snowmelt events with less than a 5-year return period, by January 31 , 2012;	Removed Continuing	Removed. With aging infrastructure and more frequent extreme weather events, the locations of chronic sanitary sewer overflows are changing over time so these may be outdated. Continuing in Action 7.5 (continue to develop and implement municipal-regional sanitary overflow management plans to eliminate overflows at chronic locations).
MC 5 a) Modify C8 contained in the Policy and Commitment Document relating to upgrading schedule and toxicity as follows: a) Commitment C8 of Addendum No. 1 shall include a requirement that the district will upgrade Iona Island and Lions Gate sewage treatment plants to full secondary treatment no later than 2020 and 2030, respectively;	Removed	Removed and replaced with Wastewater Treatment Plant Upgrade and Expansion Schedule in this LWMP that will show the planned timing and treatment levels for wastewater treatment plants. Refer to Appendix A for this table.

MC 5 b) Modify C11 contained in the Policy and Commitment Document relating to upgrading schedule and toxicity as follows: Third paragraph of Commitment C11 shall be revised to read, '' ... The district will determine whether the cause of failed bioassay toxicity tests on effluent from Lions Gate and Iona Island treatment plants is only due to ammonia. The district shall, in consultation with the Environmental Monitoring Committee, evaluate options to address non-ammonia-related toxicity, and prepare and submit to the manager within 90 days an action plan to significantly reduce non-ammonia-related acute toxicity at the point of discharge. The action plan shall include a repetitive process for continuous improvements both upstream and to treatment if acute toxicity has not been significantly reduced once the original action plan is implemented."	Completed	Completed as reported in 2010 biennial report (In 2008 and 2009, all unsuccessful bioassay tests at Annacis and Lulu Island, Lions Gate, and Northwest Langley wastewater treatment plants were shown to be due to ammonia/pH shift. At the Iona Island Wastewater Treatment Plant, high oxygen demand and resulting low oxygen concentrations was the cause of all unsuccessful bioassay test results. Methods to prevent toxicity were implemented).
MC 6 Complete, by January 31 , 2007, each of the following: a) cost/benefit studies directed at implementing effective water conservation measures, including evaluating implementation of a universal water metering system throughout the district;	Completed	Completed as reported in the 2008 biennial report (economic analysis concluded that certain demand management measures were cost effective and sustainable and these were included as actions in the 2005 *Drinking Water Management Plan*).
MC 6 Complete, by January 31 , 2007, each of the following: b) reclaimed water projects at the treatment plants and elsewhere within the district; and	Completed	Completed as reported in the 2008 biennial report (construction of the Annacis effluent reclamation plant was completed in 2005 to demonstrate that water, suitable for a variety of applications, can be reclaimed from wastewater effluent thereby reducing the overall demand for high quality potable water).
MC 6 Complete, by January 31 , 2007, each of the following: c) a biosolids management plan.	Completed	Completed as reported in the 2010 biennial report (Key strategies for biosolids management contained in the Biosolids Management Plan Framework, submitted to the Ministry in late 2006, have been incorporated into the update of the LWMP).
MC 7 By January 31, 2003, establish a program to study endocrine disrupting chemicals (EDCs), persistent organic pollutants (POPs) and other microcontaminants such as pharmaceutical drugs found in regional (the district) liquid waste, and their potential environmental impacts. This should include, but not be limited to, effluent characterization to identify and quantify the contaminants and biological assays using new techniques such as gene chip arrays to determine their sublethal impacts. It would be coupled with determining the environmental fate of priority contaminants and be carried out in consultation with the district LWMP Environmental Monitoring Committee. The district will work with the Capital Regional District on such studies if the Capital Regional District undertakes similar work.	Completed	Completed as reported in the 2010 biennial report (As part of Metro Vancouver's comprehensive program to characterize the effluent from its five wastewater treatment plants, Metro Vancouver collaborates with Simon Fraser University, the University of British Columbia, and Environment Canada on studying micro-contaminants in treated wastewater).
Actions - Commitments (C)	**Status**	**Rationale**
Receiving Environment		
C1. Official Designation for Water Uses The District and municipalities will take an active role in providing information to the Ministry of Environment, Lands and Parks (MELP) so that appropriate water uses receive official designation from MELP through a consultative process for each of the major water bodies within the region. A review of a designated water use may be initiated by the District or a member municipality. The consultative process will follow Track 1 – Setting Guidelines from Principles as documented in the Ministry of Environment, Lands and Parks Guidelines and Standards Procedure, dated October 7, 1997. The process as outlined in Track 1 requires the preparation of a draft report by the Ministry. The following process will apply to local government participation during the preparation of the draft report to be prepared by the Ministry under the Guidelines and Standards Procedure:	Continuing	Continuing in Action 20.2 (continue to participate, and members may participate, in provincial processes to review and establish water uses and water quality objectives for specific water bodies within Metro Vancouver).

1. The Ministry will advise the District and its member municipalities, in writing, when a water use or water quality objective initiative is commenced. 2. The Ministry will develop the scope of work for their draft report in consultation with the Environmental Monitoring Committee. The Ministry will review the draft report work progress with the Environmental Monitoring Committee on a regular basis. The Environmental Monitoring Committee will play an active role in the development of the report and cost implications to the District and member municipalities will be provided for inclusion in the report. 3. The cost and benefit of designated water uses, or proposed changes to designated water uses, and their associated water quality objectives will be fully documented in the draft report and the GVRD Board and municipal councils will have the opportunity to review and comment on the draft report.		
C2. Establishment of an Environmental Monitoring Committee The District will establish an Environmental Monitoring Committee comprised of members from the District, municipalities, B.C. Ministry of Environment, Lands, and Parks, Environment Canada, Fisheries and Oceans Canada, research institutions, and public (dependent on interest). The committee will be responsible for reviewing the scope and design of monitoring programs, review of monitoring results, predictive modelling, and risk assessments of waste discharges. The committee's recommendations with respect to upgraded service levels will be considered by the District and member municipalities during an options assessment process.	Continuing	Continuing in Action 19.1 (continue to receive advice from the Environmental Monitoring Committee. The Committee will continue to be responsible for reviewing the scope and design of monitoring programs, review of monitoring results, predictive modelling, and risk assessments of waste discharges).
C3. Development Of Discharge Indicators The District will continue to develop and refine indicators of environmental effects related to wastewater discharges and stormwater runoff within the region. These indicators will be used to guide the collection and interpretation of environmental information by the District and municipalities. The District report, "Discharge Rating Measures for LWMP Discharges," included in Appendix C, will form an initial basis for this work.	Removed	Superseded by several LWMP actions that monitor or assess receiving environments. For examples, see actions in Strategy 7 Minimize impacts of sanitary sewer overflows on human health and environment; Strategy 8 Assess combined sewer overflows' impact on receiving environment; Strategy 10 Manage rainwater and urban development for watershed health; Strategy 19 Environmental monitoring to protect public health and the environment.
C4. Monitoring Programs The District and member municipalities will undertake monitoring, assessment and forecasting to evaluate the effects of wastewater and stormwater discharges to receiving environments - Effluent quality monitoring at all treatment plants for selected physico-chemical and biological characteristics (e.g., BOD, TSS, ammonia, and trace metals as well as appropriate bioassays and fecal coliform). Detailed effluent characterization of trace organic contaminants will be conducted periodically at the recommendation of the Environmental Monitoring Committee. - Routine monitoring of bacteriological water quality of beach areas within Burrard Inlet, Sturgeon Banks, Roberts Bank, and Boundary Bay. Sampling sites and frequency will be modified to provide a better understanding of point and non-point contaminant sources. - Ambient receiving environment monitoring in areas where water quality (as indicated by water quality objective criteria) is potentially affected by wastewater and/or stormwater. The Iona Island deep-sea outfall receiving environment program will be maintained. The need for, and details associated with, additional programs will be determined in consultation with the Environmental Monitoring Committee. - Occurrence and duration monitoring of CSO events at all District owned outfalls. Detailed effluent characterization of trace contaminants at a limited number of outfalls will be conducted periodically at the	Continuing	Continuing in Action 7.4 (conduct risk assessments at any new significant regional sanitary sewer overflow locations and will holistically compare the risk assessments of all sanitary sewer overflow locations to determine their relative risk, considering risks to public health and the environment); Action 8.5 (continue to assess change in receiving environment water quality resulting from any measures taken to address combined sewer overflow discharges. Metro Vancouver will report out, as applicable, in the *Environmental Management and Quality Control Annual Report*); Action 10.1 (use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health); Action 13.2 (continue to monitor the quantity and characteristics of Metro Vancouver's wastewater treatment plant effluent discharges and assess effluent quality in accordance with the CWS-MMWE), Action 13.3 (continue to monitor influent and the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required); Action 19.2 (continue to monitor recreational water quality (seasonal beach monitoring) throughout the region , will continue to share this information with municipal beach operators and local Health Authorities, and will share this information with the First Nations Health Authority)

recommendation of the Environmental Monitoring Committee. - Monitoring and assessment of sensitive receiving environments following the discharge of SSOs.		
C5. Risk Assessment for Fraser River Irrigation Water Use The District will undertake an analysis of risks associated with the use of Fraser River water for agricultural irrigation within the GVRD area. Options for managing the defined risks will be developed and assessed.	Completed	Completed as reported in 2010 Biennial Report (study titled *Preliminary Risk Assessment for Use of Fraser River Water for Irrigation in the Greater Vancouver Regional District, December 2002*).
C6. Harmonization with Federal Legislation The District will work with the Federal Government to harmonize approaches regarding municipal discharges. The District will assist in the development of a national municipal effluent strategy, which is being led by Environment Canada.	Completed	Completed as reported in 2010 Biennial Report (Metro Vancouver has worked with senior governments and contributed to the development of a Canada-wide strategy for the management of municipal wastewater effluent. The strategy was developed by the Canadian Council of Ministers of the Environment (CCME), and endorsed by the CCME on February 17, 2009).
C7. Data Sharing and Communication The District will share environmental information and knowledge with member municipalities, other agencies, and the public in an open and timely fashion. Moreover, the District will proactively seek out venues, technologies, and media through which to efficiently communicate environmental information to the public.	Completed Removed Continuing	Completed as reported in 2010 Biennial Report (Metro Vancouver posts monthly data on effluent quality from the wastewater treatment plants on its website and provides annual reports on the monitoring programs for wastewater, biosolids and receiving water quality on the following website: https://metrovancouver.org/services/liquid-waste/reports-and-resources). Data from the Recreational (beach) Water Monitoring Program is shared with Vancouver Coastal Health, Fraser Health, (and municipalities, if requested) on an ongoing basis and the data is used by the public health authorities to help determine the suitability of beaches for primary contact recreation. All final reports for environmental monitoring work are placed in Metro Vancouver's Harry Lash Library for public access). Removed as an action in this LWMP. Continuing as described in the 'Monitoring and Reporting' section of this LWMP. LWMP Annual Report, dashboards, and the *Environmental Management and Quality Control Annual Report* will be posted publicly on Metro Vancouver's website.
Treatment Plants		
C8. Upgrading of Iona Island and Lions Gate Treatment Plants The District will upgrade the Iona Island and Lions Gate treatment plants by adding facilities for chemical addition (enhanced primary treatment) if necessary to maintain the established base level of treatment as defined by Policy P4. The District will construct facilities for biological treatment in the following circumstances: − if necessary to address environmental concerns in accordance with Policy P2. − to maintain effluent concentration and loading levels which are beyond the capability of enhanced primary treatment.	Completed Removed	Completed as reported in the 2010 biennial report (project definition reports and conceptual designs for new wastewater treatment plants were initiated). Removed and replaced with Wastewater Treatment Plant Upgrade and Expansion Schedule in this LWMP that shows the planned timing and treatment levels for wastewater treatment plants. Refer to Appendix A for this table.

C9. Treatment Plant Upgrading Projections The District will monitor plant influent and effluent to determine plant performance and trends and maintain a minimum 10-year future projection to determine the adequacy of plant process components and to establish process component design capacities for Operating Certificates .	Continuing	Continuing in Action 13.1 (plan, design, operate and maintain wastewater treatment infrastructure using the CWS-MMWE Environmental Risk Management Framework to address and adapt to identified risks and long term needs); Action 13.3 (continue to monitor influent and the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required).
C10. Secondary Effluent Disinfection The District will undertake engineering investigations examining the potential for effluent disinfection using ultraviolet light as an alternative to the use of chlorine at its Northwest Langley, Annacis Island, and Lulu Island wastewater treatment plants.	Completed	Completed as reported in 2010 Biennial report.
C11. Treatment Plant Effluent Toxicity Assessment For treatment plant effluent the District will undertake toxicity assessments to determine the probable cause of effluent toxicity and its significance relative to the receiving environment as described by Policy P2. The District will conduct monthly 96-hour acute bioassays on full strength effluent at each of the five wastewater treatment plants and review the results with the Environmental Monitoring Committee. The District will examine the results of the bioassay tests at Lions Gate and Iona Island treatment plants to determine the cause of effluent toxicity. Within the limitations of the existing liquid waste management treatment process and infrastructure, the District will evaluate options for improving the results of the bioassay tests. The selection of any option by the District will be made in consultation with the Environmental Monitoring Committee.	Completed Continuing	Completed as reported in the 2010 Biennial report (toxicity assessments at all five wastewater treatment plants in 2008 and 2009). Continuing in Action 13.2 (continue to monitor the quantity and characteristics of Metro Vancouver's wastewater treatment plant effluent discharges and assess effluent quality in accordance with the CWS-MMWE); Action 13.3 (continue to monitor the receiving environment where wastewater treatment plants discharge and assess results to determine whether any actions, such as additional source control or treatment upgrades, are required).
Combined Sewer Systems		
C12. CSO Monitoring The District will install monitors at all 14 CSO outfall sites under its jurisdiction to determine depth and duration of combined sewer overflows and an estimate of volume.	Completed Continuing	Completed as reported in the 2010 Biennial report (For the period of 2008 to 2009, Metro Vancouver continued to monitor combined sewer overflow events at all 18 outfall sites under its jurisdiction. Refer to Appendix B – Combined Sewer Overflow Reporting in the 2010 Biennial report). Continuing in Action 8.9 (Metro Vancouver and members with combined systems will maintain monitors at combined sewer overflow sites).
C13. Operational Improvements Requires the implementation of specific projects for operational improvements at combined sewer outfall locations. In respect to the Clark Drive Outfall, the District and municipalities will implement the following projects: • Vernon Relief Drain CSO storage; • Copley / Collingwood sanitary sewer extension to 8th Avenue Interceptor • Redirection of Columbia Pump Station discharges to downstream of Yukon Gate; • City of Vancouver Thornton pump station and forcemain realignment (completed in 2000) • City of Vancouver Hastings Park lost-stream daylighting (part of combined sewer separation – Commitment C15)	Completed Continuing	Completed as reported in 2010 Biennial report (description of site-specific upgrades within Vancouver Sewerage Area, Poplar Landing combined sewer overflow storage tank, Columbia Pump Station; Source Control actions on mercury and silver) Continuing in Action 8.8 (continue to develop and implement system optimization projects in the near term to minimize combined sewer overflow sanitary sewage loading and minimize total combined sewer overflow volume spilled).

C13. Operational Improvements (cont'd) • Combined sewer separation programs (Commitment C15) In addition, the District will, in consultation with stakeholders, investigate further site-specific CSO management options at the Clark Drive Outfall location. The District will also investigate further operational improvements for the Clark Drive catchment. The District will complete feasibility studies and detailed cost-benefit analysis for the following projects that offer potential operational benefits, overflow frequency or loading reductions, or receiving environment improvements: • Glenbrook Trunk Sewer separation; • New Westminster Interceptor West Branch sewer separation; • English Bay Outfall and Alma-Discovery Outfall storage and disconnection of storm inflow to Alma-Discovery outfall; • Jervis and Chilco Pump Stations forcemain and control improvements; • Operational Improvements – Fraser River North Arm; • Operational Improvements – New Westminster Area; • Operational Improvements – Westridge Area; and • Source control initiatives targeting mercury and silver reductions. Based on environmental data, which indicates that there are measurable near-field impacts at the Clark Drive outfall into Burrard Inlet, the District will undertake further environmental assessments at Clark Drive to assess the benefits of the improvements. This work will be conducted under the supervision of the Environmental Monitoring Committee (see Commitment C2). The municipalities of Vancouver and Burnaby and the District will also undertake a review of combined sewer separation and system upgrade schedules necessary to fast-track the elimination of Clark Drive CSOs earlier than 2050. In addition to the ongoing monitoring program at the Glenbrook Outfall, the District and the City of New Westminster will undertake assessment of all other CSOs on the New Westminster waterfront for quality and environmental impact on a five-year frequency, commencing in 2001, and thereafter as part of the five-year plan review process, in order to evaluate program progress and effectiveness and determine the need for further action by New Westminster in accordance with Policy P2.		
C14. Biennial Liquid Waste Management Plan Progress Report The District will summarize the CSO monitoring results, CSO environmental monitoring and assessment results, sewerage and drainage expenditures for CSO projects, and results of CSO operational improvement investigations and implementation in a Liquid Waste Management Plan biennial progress report. The biennial reporting period will end on December 31st of every second calendar year and the report will be due by the end of March (90 days to compile). The first reporting period will end in the second whole year (not less than 24 months and not more than 36 months) following the year an LWMP is approved. An interim annual report will be submitted in March and will summarize the key achievements that occurred in the previous year.	Completed Removed Continuing	Completed as reported in 2010 Biennial report. Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in the 'Monitoring and Reporting' Section of this LWMP. Continuing in Action 8.2 (continue to estimate and report annually on the frequency, location and volume of sewage overflows from regional combined sewers, and where feasible identify and address the probable causes); Action 8.4 (continue to estimate and report annually on the frequency, location and volume of combined sewer overflows from municipal sewers, and where feasible identify and address the probable causes).

C15. Combined Sewer Overflow Elimination The cities of Vancouver, Burnaby, and New Westminster will implement combined sewer separation programs that will replace aging combined sewers with separate sanitary and storm sewers and lead to the elimination of combined sewer overflows. 1. The City of Vancouver will continue with the present combined sewer system separation program at approximately 1 per cent of the system per year to target elimination of combined sewer overflows in the Vancouver Sewerage Area by 2050. 2. The City of Burnaby will implement a combined sewer separation program that proceeds on an annual basis, at a uniform rate, and that targets elimination of combined sewer overflows in the Vancouver Sewerage Area by 2050 and in the Fraser Sewerage Area by 2075. 3. The City of New Westminster is committed to implementation of Combined Sewer Overflow (CSO) reduction measures which meet or exceed 1% per year, resulting in long-term CSO elimination by means of sewer separation as well as by other means (e.g., detention storage, source controls, etc.). The city will complete the installation of storm sewers within 22 per cent of the combined sewer area by 2012. This effort will focus on the lower Columbia catchment. Opportunistic sewer separation will also occur in other areas where capacity is an issue with existing combined sewers. The entire sewer system will be video inspected by 2012 and infiltration and inflow reduction achieved through sewer rehabilitation. In addition, source control projects (such as removal of rainwater roof leaders from direct connection to the sewer system) will be implemented, and the effectiveness of these methods will be evaluated. Overall, this program will produce CSO reductions at a rate in excess of 1% per year.	Continuing	Continuing in Action 9.2 (develop intermediate targets on a five-year interval for municipal and regional separation of prioritized combined catchments); Action 9.3 (Burnaby, New Westminster, and Vancouver will continue to work with Metro Vancouver to develop and implement Sewer Separation and Combined Sewer Overflow Elimination Plans to prevent combined sewer overflows, and in the interim, support the intermediate targets developed in action 9.2; Burnaby, New Westminster, and Vancouver will separate municipal collector sewers according to the Sewer Separation Plans).
C16. Operational Improvement Investigations Municipalities will complete feasibility studies and detailed cost benefit analysis for the following projects that offer potential operational benefits, overflow frequency or loading reductions, or receiving environment improvements: • Cambie Pump station and outfall improvements (Vancouver); • 1st and Boundary pump station realignment (Vancouver and Burnaby); and • Stormwater redirection to Grandview Cut (Vancouver).	Completed Continuing	Completed as reported in 2010 Biennial report (Studies are being undertaken to look at ways to achieve early combined sewer overflow reductions cost-effectively. These studies are ongoing in conjunction with the main line sewer separation program and private property separation program). Continuing in Action 8.8 (continue to develop and implement system optimization projects in the near term to minimize combined sewer overflow sanitary sewage loading and minimize total combined sewer overflow volume spilled, while also considering effects on sanitary sewage loading from sanitary sewer overflows).
C17. Best Management Practices The Cities of Vancouver, Burnaby, and New Westminster will continue with best management practices such as catch basin cleaning that reduce loads to combined sewers at source and rain barrel, impervious area reduction, or on-site storage that reduces peak flows or volumes of stormwater runoff to sewers.	Completed Continuing	Completed to varying extents by different municipalities with combined sewer systems as reported in 2008 Biennial report, Appendix 2. Continuing in Action 10.2 (continue to develop, review and update Integrated Watershed Management Plans (IWMPs)); and Action 10.5 (expand the use of green infrastructure, blue infrastructure, and other practices to mimic natural watersheds, reduce runoff and discharge, improve water quality and increase climate resilience. Members with combined sewers will expand the use of green infrastructure to complement combined sewer separation).

C18. Biennial Liquid Waste Management Plan Progress Report Every two years municipalities with combined sewers will summarize and forward to the District for inclusion in a biennial Liquid Waste Management Plan progress report the following information: • Sewer system mapping that indicates the overall extent of combined, sanitary, and storm sewers, the extent of combined sewers replaced by separate sewers in the past two years, the location of new storm outfalls, and the extent of private property combined service connections replaced by separate service connections. • A summary of sewerage and drainage system expenditures for the past two years. The biennial reporting period will end on December 31 of every second calendar year and the report will be due by the end of March (90 days to compile). The first reporting period will end in the second whole year (not less than 24 months and not more than 36 months) following the year an LWMP is approved. An interim annual report will be submitted in March and will summarize the key achievements that occurred in the previous year.	Removed	Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' Section of this LWMP.
Separate Sanitary Sewer Systems		
C19. Infrastructure Management The District and its member municipalities will establish ongoing sanitary sewer system evaluation programs to determine the condition of the regional trunk sewerage system, the municipal sewerage system, and private property service laterals. As required, legislative and legal authority will be sought to address infiltration and inflow originating from private property service laterals. These evaluation programs will be ongoing and determine the condition of the entire sewer system over a 20-year time cycle. The District and its member municipalities will develop and apply a consistent approach to sewer system evaluation surveys. Repair and replacement programs will be established based on targets set for sanitary sewer overflow reduction and the severity of infiltration and inflow relative to the design allowance of 11,200 litres per hectare per day.	Completed Continuing	Completed to varying extents by member jurisdictions as reported in 2010 Biennial report. Completed via Metro Vancouver report "Private Sewer Lateral Programs: A Study of Approaches and Legal Authority for Metro Vancouver Municipalities." Continuing in Action 1.1 (maintain the condition and performance of the sewerage system to serve a growing population in a changing climate); Action 1.2 (provide local collector and regional trunk sanitary sewer capacity; and wastewater treatment plant hydraulic capacity for peak dry weather flow plus an inflow and infiltration allowance of 11,200 L/ha/d, to ensure hydraulic gradelines stay within safe operating levels)
C20. New Construction Objectives The District and its member municipalities will review engineering standards and guidelines for new sewer construction with the objective of ensuring a high standard for new construction to minimize future infiltration and inflow problems.	Completed Continuing	Completed as reported in the 2010 Biennial report (Master Municipal Construction Document design standards were modified to reduce inflow and infiltration). Continuing in Action 11.4 (coordinate, with members, an approach for seeking to update the Master Municipal Construction Documents such that green infrastructure guidelines become standards)
C21. Wet Weather Facilities The District will complete the conceptual designs and feasibility studies for the following wet weather facilities to reduce chronic sanitary sewer overflows: Cloverdale storage and operational improvements; and Maillardville sanitary sewer increased conveyance (growth pre-build).	Completed	Completed as reported in the 2010 Biennial report (The Cloverdale storage facility construction is complete).
C22. Flow Monitoring The District will maintain a network of flow monitors that will continually monitor sewer flows and will determine the daily average flow by specific catchments, or by municipality where the flow monitoring configuration is appropriate.	Completed	Completed as reported in the 2010 Biennial report (Metro Vancouver maintains an extensive sewer flow monitoring network for billing purposes and to assist in determining when capacity upgrades are needed. In addition, Metro Vancouver has upgraded its SCADA computer system and its data storage database).

C23. Biennial Liquid Waste Management Plan Progress Report Every two years, municipalities will summarize and forward to the District for inclusion in a biennial Liquid Waste Management Plan progress report, the following information: • Sewer system mapping that indicates the overall extent of the current cycle of the sanitary sewer system evaluation program and the condition of sewerage infrastructure. • The extent of new sewer construction and sewer repair and replacement work over the past two years. • A summary of the results of all flow monitoring work undertaken as part of the sewer system evaluation program. • The location and frequency of sanitary sewer overflows occurring from the municipal collection system. • A summary of sewerage system expenditures for sewer system evaluation work, and repair and replacement work. The biennial reporting period will end on December 31st of every second calendar year and the report will be due by the end of March (90 days to compile). The first reporting period will end in the second whole year (not less than 24 months and not more than 36 months) following the year an LWMP is approved. An interim annual report will be submitted in March and will summarize the key achievements that occurred in the previous year.	Completed Removed Continuing	Completed as reported in the 2010 Biennial report by different member jurisdictions. Removed. Biennial reporting will be replaced by a short LWMP Annual Report, dashboards, and progress meetings. Refer to reporting commitments described in 'Monitoring and Reporting' Section of this LWMP. Continuing in Action 6.1 (members will complete inflow and infiltration management plans); Action 6.2 (members will use the inflow and infiltration dashboard to track progress in reducing inflow and infiltration); Action 7.3 (Metro Vancouver and members will report annually on the number and location of sanitary sewer overflows, and, where feasible, the estimated volumes and probable causes).
Source Control and Demand Management		
C24. Reduction of Copper The District will recommend that the Greater Vancouver Water District (GVWD) consider the benefit of copper reduction in wastewater effluent and biosolids and meet the current implementation schedule for construction of facilities for pH adjustment of drinking water.	Completed	Completed as reported in the 2010 Biennial report (adjustments to pH are completed at Seymour and Coquitlam drinking water sources to reduce copper in potable water which also reduces copper in wastewater and biosolids).
C25. Sewer Use Bylaw Review The District will update the *Regional Sewer Use Bylaw* to reflect the most recent scientific and technical knowledge about the impact of substances discharged to sewer on human health and safety, performance of collection and treatment systems, and the receiving environment.	Completed Continuing	Completed as reported in the 2010 Biennial report (new Codes of Practice for Dry Cleaners and Photographic Imaging Operations). Continuing in Actions 3.3 (pursue reductions in industrial wastewater flow and loading, starting with updating fees in bylaws to create financial incentives that motivate industries to minimize their wastewater discharges); Action 4.1 (update Metro Vancouver's bylaws for industrial and commercial dischargers).
C26. Development of Peak Discharge Limits and Fees for Industry The District will develop, in co-operation with identified stakeholders, a system of limits and fees to be implemented across the District. Maximum daily loadings (limits) will be assigned to industrial operations that are discharging more than an established percentage of the annual loadings received by the wastewater treatment plant servicing the particular industry. Limits will be accompanied by a system of fees that will include additional charges for the difference between the average and maximum daily loadings and charges based on marginal costs for treating the loadings exceeding the assigned (authorized) maximum daily loadings.	Completed	Completed as reported in the 2010 Biennial report (new limits and fees for industrial dischargers in sewer use bylaw).
C27. Criteria for New Industrial Demand for More than 3% of Capacity The District will develop criteria to be used in development of a business case if a single industrial user proposes to exceed more than 3% of the system capacity.	Completed	Completed as reported in the 2008 Biennial report (new sustainability-based business case framework with new set of metrics).

C28. Reduction of Demand for Treatment Capacity The District will investigate initiatives that have the potential to reduce the per capita demand for treatment from the 1998 levels. Demand management for all sewer user sectors (residential, industrial, and commercial/institutional) will be examined and considered through business case development.	Completed Continuing	Completed as reported in the 2010 biennial report (via actions reported in C25 and C26). Continuing in Strategy 3 (Reduce flows and loadings into the system) and Strategy 5 (Reduce excess rainwater entering into private lateral sewers).
C29. Education Program The District will develop and implement an educational program for the residential, commercial, and institutional use targeting specific practices that have pollution prevention or demand management benefits. An education program on the use of food grinders will be developed.	Completed Continuing	Completed as reported in 2008 and 2010 biennial reports (surfactant reduction program, Smartsteps and Buildsmart programs, industry resource document). Continuing in Action 3.1 (pursue reductions in residential wastewater flow and loading through improving education and awareness, starting with discouraging disposal of food waste down drains); Action 4.2 (continue to motivate residents and businesses to prevent pollution at the source by properly managing what they send down drains and toilets).
C30. Sewer Use Charges for Commercial and Institutional Sector The District will assist member municipalities in reviewing sewer charges for the commercial and institutional sector, given that user pay charges are instrumental in cutting demand for service.	Completed	Completed as reported in 2008 biennial report (in 2005, a methodology for estimating both Metro Vancouver and municipal costs of conveying and treating commercial and institutional discharges was developed for municipalities to use).
C31. Evaluation of Current Industrial Pricing Strategy The District will evaluate the efficiency of the current BOD/TSS Industrial Pricing Strategy in reducing demand for treatment capacity.	Completed	Completed as reported in 2008 biennial report (*Evaluation of the Effectiveness of the Industrial BOD/TSS Pricing Strategy for Reducing Demand from Industry in the GVRD,* Compass Resource Management Ltd, March 15, 2004).
C32. Recognition for Water Conservation The District, in conjunction with the Greater Vancouver Water District (GVWD), will evaluate implementation of a recognition program that acknowledges reductions in water usage and wastewater generation. The District will consider loading-based permit limits, in addition to the existing concentration-based permit limits, for operations that can demonstrate consistent reductions of more than 10% in their water consumption (expressed as volume of water per unit of production).	Removed Continuing	Removed. This specific action may be outdated and may not be effective in making significant reduction in water consumption. Continuing in Strategy 3 (Reduce flows and loadings into the system).
C33. Notification to Environment Canada If, through environmental monitoring and assessment, a substance is identified as a potential concern in the aquatic environment but is not listed in the Canadian Environmental Protection Act, the District will notify Environment Canada and request that they commence a substance review in accordance with current process for such reviews.	Completed Continuing	Completed as reported in the 2010 biennial report (notified Environment Canada that flame retardants containing PBDE should be banned). Continuing in Action 4.1 (prioritize contaminants for source control using the Canadian Council of Ministers of Environment (CCME) Canada-wide Strategy for Management of Municipal Wastewater Effluent (CWS-MMWE) Environmental Risk Management Framework. Metro Vancouver will take further source control actions such as educating target sectors to reduce discharges, advocating for increased provincial and federal regulations on the manufacturing and use of products with contaminants, and updating Metro Vancouver's bylaws for industrial and commercial dischargers).

Residuals Management		
C34. Iona Island Treatment Plant Biosolids At the Iona Island Wastewater Treatment Plant site, the District commits, as a minimum, to recycling or disposing of ongoing biosolids production once the land area and lagoons are full.	Completed Continuing	Biosolids produced at the Iona Island Wastewater Treatment Plant are now dewatered and beneficially used in land application. Continuing in Action 15.1 (grow the land application program).
C35. Biosolids Growing Medium The District commits to produce and distribute biosolids growing medium which meet standards set out in the Organic Matter Recycling Regulation Draft 2.0, dated July 1999. As currently drafted this regulation would allow distribution of Class A biosolids growing medium with no limit on quantity and without the need to obtain permits or approvals from the Ministry of Environment, Lands and Parks. Prior to the proposed regulation being passed the District will work with the Ministry of Environment, Lands and Parks to include the requirements for the distribution of biosolids in the operating certificates for the District's facilities.	Continuing	Continuing in Action 15.1 (grow the land application program). All biosolids used in land application (including Biosolids Growing Medium and Class A Compost from biosolids) meets or surpasses the requirements of the Organic Matter Recycling Regulation.
Stormwater Management		
C36. Interagency Liaison Group Stormwater management planning will build on the improved information on stormwater problems and solutions developed during the Liquid Waste Management Plan process. To facilitate the ongoing exchange of information on stormwater issues, and implementation of the Liquid Waste Management Plan, municipalities and the District will participate in an interagency liaison group similar to the existing Stormwater Management Task Group. The group will provide advice to the District about stormwater issues.	Continuing	Continuing in Action 12.1 (coordinate a revision of the interagency group's terms of reference, possibly to operate as a sub-committee under the Regional Engineer's Advisory Committee (REAC)).
C37. Stakeholder Participation The community, senior and local government agencies, and other stakeholders will be invited to participate in the integrated planning process intended to proactively address issues on a long-term basis.	Continuing	Continuing in Action 12.4 (host a forum at regular intervals to report progress on IWMPs and LWMP rainwater actions, and to foster collaboration and knowledge sharing among members, First Nations, and interested parties).
C38. Policies and Bylaws Municipalities, in consultation with the District where appropriate, and the Stormwater Interagency Liaison Group, commit to adopting or updating, policies or bylaws related to improving stormwater management for at least two stormwater issues over the five year period of the stormwater plan. Issues to be considered may include, source control, flood protection, sediment and erosion control, soil conservation and topsoil removal, impervious area, and protection of riparian areas.	Completed Continuing	Completed to varying extents by different municipalities as reported in 2010 biennial report, Appendix 2. Continuing in Action 11.2 (update rainwater policies, programs, and bylaws in a harmonized manner).
C39. Rate of Watershed-scale Stormwater Planning Work Municipalities commit to undertake (or review) integrated stormwater management planning at a watershed scale for urban watersheds (less than 80% of watershed area is in the Green Zone as defined in the 1996 Livable Region Strategic Plan). Watershed-scale planning will be ongoing and evolving and proceed such that plans for all watersheds will be completed within the first twelve years following approval of the LWMP. Each watershed plan will be reviewed at least once every twelve years. The Stormwater Interagency Liaison Group will develop a terms of reference template for integrated stormwater management planning to facilitate the implementation of watershed-scale stormwater management plans in the municipalities. The District will participate in watershed-scale stormwater management plans as appropriate and where watersheds include two or more municipalities, a coordinated approach will be undertaken by appropriate municipalities.	Completed Continuing	Completed to varying extents by different municipalities as reported in 2010 biennial report. Continuing in Action 10.1 (use the Stormwater Monitoring and Adaptive Management Framework (AMF) to monitor watershed health).

Pleasure Craft Sewage		
C40. Pump-Out Facility Inventory The District will complete an inventory of all available pump-out facilities in the region.	Completed	Completed as reported in 2006 biennial report (inventory of pump-out facilities in the region was completed).
C41. New Marinas and Major Renovations Municipalities will modify or adopt bylaws that require all new marinas, or marinas undergoing renovations that exceed 50 per cent of their assessed value, to install pump-out facilities for access by pleasure craft. As appropriate, these facilities should be connected to the municipal sewer system or designed for handling by trucked liquid waste.	Completed Continuing	Completed to varying extents by different municipalities as reported in the 2008 and 2010 biennial reports. Continuing in Action 20.3 (work with private marina operators, the Province and the federal government to develop and implement regulations to ensure all new marinas and marinas where planned renovations exceed 50 per cent of the assessed existing improvement value have pleasure craft pump-out facilities).
C42. Existing Marinas The District, in consultation with municipalities, marina operators, boaters, and senior government agencies, will undertake a feasibility study to determine how existing marinas can accommodate pump-out facilities, the cost to install such facilities, and how they would be financed, maintained, and operated.	Completed Continuing	Completed as reported in 2006 biennial report (feasibility study for pump-out facilities at existing marinas). Continuing in Action 20.4 (require all pleasure craft pump-out facilities to connect to a municipal sanitary sewerage system or a provincially permitted on-site treatment and disposal system or have established enforceable protocols for transporting liquid waste for disposal at a permitted liquid waste management facility)
On-site Sewage Disposal Systems		
C43. On-site Disposal Mapping The District and its member municipalities will complete an inventory map of areas containing on-site disposal systems on a watershed basis. The District and its member municipalities will also prepare mapping indicating projected on-site system densities to 2021.	Completed	Completed as reported in 2010 Biennial report (A map of the on-site disposal systems has been completed. The mapping is shown in Appendix 1).
C44. Performance to be Considered by Ministry of Health The Ministry of Health will be requested to consider the performance of existing systems, known pollution issues, and projected on-site system densities in the watershed when approving new systems.	Removed	Removed because onsite sewage disposal systems are regulated provincially.
C45. Performance to be Considered by Ministry of Environment, Lands and Parks. The Ministry of Environment, Lands and Parks will be requested to consider the performance of existing systems and the projected density of on-site systems when assessing nitrate contamination levels in groundwater aquifers.	Completed	Completed as reported in the September 2008 Biennial report (case studies of the impacts of on-site sewage systems on ground and surface waters were completed and were to be sent to the Province).
C46. Environmental Monitoring and Assessment The District will undertake environmental monitoring and assessments in the region's waterways to identify and determine if on-site disposal systems are contributing to waterway degradation.	Completed	Completed as reported in the September 2008 Biennial report (case study completed that developed mapping and monitoring methods and provided preliminary direction for determining limits to on-site system densities).

Agricultural Runoff		
C47. Compilation of Agricultural Watershed Water Quality Data The District will compile the monitoring information and findings from past scientific studies to determine the current base-line data associated with water quality in agricultural watersheds and in receiving waterways.	Completed Continuing	Completed as reported in Metro Vancouver 2008 Biennial report (completed in 2004, in 2005, Environment Canada collated information into a single electronic database this commitment in *Acquisition and Collation of Nutrients Data from Agricultural Areas of the Fraser Valley).* Continuing in Action 10.3 (ensure IWMPs integrate rainwater and groundwater management, consider agricultural land rainwater runoff, and reflect the provisions of the Province's *Watershed Security Strategy* once it is launched).
C48. Environmental Monitoring and Assessment The District will include waterways in agricultural areas and the associated receiving waterways in its comprehensive water quality monitoring and environmental assessment program. This work will be coordinated with the Nutrient Management Action Plan for the Lower Fraser Valley under the Fraser Basin Council.	Completed Continuing	Completed as reported in Metro Vancouver 2008 Biennial report (completed in 2004, in 2005, Environment Canada collated information into a single electronic database this commitment in *Acquisition and Collation of Nutrients Data from Agricultural Areas of the Fraser Valley).* Continuing in Action 10.3 (ensure IWMPs integrate rainwater and groundwater management, consider agricultural land rainwater runoff, and reflect the provisions of the Province's *Watershed Security Strategy* once it is launched).
C49. Identification of Water Uses and Water Quality Objectives Through their integrated stormwater management programs, municipalities will identify water uses and water quality objectives for waterways, or confirm the applicability of existing uses and objectives.	Continuing	Continuing in Action 20.2 (continue to participate, and members may participate, in provincial processes to review and establish water uses and water quality objectives for specific water bodies within Metro Vancouver).
Note: POLICIES (Ps) in the 2002 LWMP were not classified as actions. Hence, they were not reported in the biennial reports and do not have a status to include in this table. Appendix F lists the policies separately for reference.		

Appendix F – List of Policies from 2002 LWMP

The 2002 LWMP had Policies which were included in the plan, but were not reported in the Biennial or Interim reports. These Policies are included below for reference and new actions that align with specific policies have been noted as such under the action.

Receiving Environment

P1. Designated Water Uses will be Protected.

The District and member municipalities will manage wastewater and stormwater to protect receiving water uses which have been designated by the Ministry of Environment, Lands and Parks (MELP).

P2. Upgraded Service Levels will be Determined Based on Environmental Need, with Consideration to Cost and Benefit, Regional Priorities, and all Applicable Legislation.

Commitments included in this plan address infrastructure management needs and confirmed public health and environmental issues. Upgraded service levels will be provided in the future where an environmental need has been forecasted or demonstrated, with consideration to cost and benefit, regional priorities, and all applicable legislation. The following process and "triggering" mechanisms (Figure 3) will be used to determine environmental need.

Environmental monitoring conducted by the District and member municipalities will determine if, and where, wastewater or stormwater discharges are contributing to exceedances of water quality objectives. The Environmental Monitoring Committee (see Commitment C2 – Establishment of an Environmental Monitoring Committee) will assess the monitoring results and, where warranted, "trigger" an environmental risk assessment of the particular discharge(s). The assessment may involve more comprehensive receiving environment and laboratory analysis, modelling, and forecasting, to determine the degree of environmental risk. Options for managing the defined risks will be developed by the District and member municipalities and assessed according to cost and environmental benefit criteria. The Environmental Monitoring Committee will be responsible for guiding the assessment processes for both risk and the environmental benefits of options. When a "trigger" is identified the Environmental Monitoring Committee will suggest the time-line to complete the risk and options assessment processes.

When risks, options, costs and benefits have been adequately assessed the District Board, with consideration of costs and Greater Vancouver Regional District benefits, regional priorities, and all applicable legislation, will select the appropriate response and actions. In their consideration the Board will consult with the Ministry of Environment, Lands and Parks and Environment Canada.

Environmental monitoring will be conducted following implementation of any option to determine the need for additional risk mitigation measures.

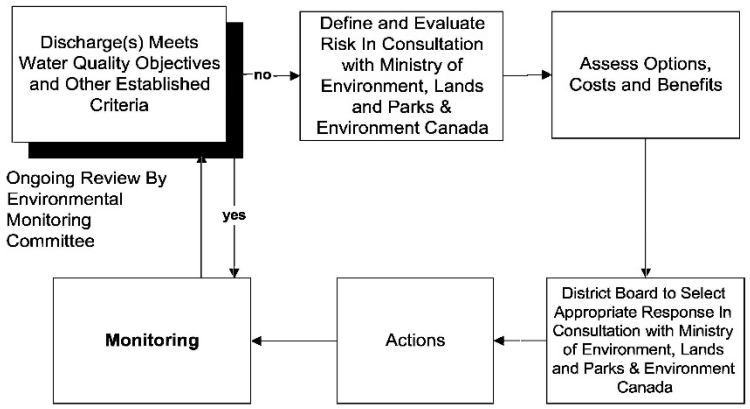


Figure 3 – Upgrading "trigger" mechanism

Treatment Plants

P3. Treatment Plant Operations and Maintenance

The District will operate and maintain the regional treatment plants to minimize risks to public health and the environment.

P4. Base Levels of Treatment at District Plants

The District will size plant process components on the basis of established historical flows and loads and projected future changes in accordance with good engineering practice and treatment plant design standards that are periodically approved by the District Board. Plant performance will be measured against authorised levels for flow, concentrations, and loads established in the operating certificates. Maximum daily (flow proportioned 24-hour composite sample) concentration levels are:

	BOD (mg/l)	TSS (mg/l)
Iona Island	130	100
Lions Gate	130	130
Annacis Island	45	45
Lulu Island	45	45
Northwest Langley	45	45

If these maximum daily concentration levels are exceeded on an operational basis then:

- the District will investigate the cause and an incident report to determine the significance and probable cause will be prepared.

- the District will evaluate the significance against its treatment plant design guideline to determine if plant expansion, upgrading, or additional source control initiatives are justified. The determination of environmental significance will be undertaken in consultation with the Environmental Monitoring Committee.

Annual effluent loads will not exceed the following maximum annual loading levels:

	BOD (t/year)	TSS (t/year)
Iona Island	72,600	55,850
Lions Gate	5,770	5,770
Annacis Island	no limit	no limit
Lulu Island	no limit	no limit
Northwest Langley	no limit	no limit

At the Annacis Island, Lulu Island, and Northwest Langley Wastewater Treatment Plants the District will provide secondary treatment for flows up to two times measured dry weather sanitary flow. Wet weather management plans to manage infiltration and inflow and stormwater will be developed for flows in excess of secondary treatment capacity.

At the Lions Gate Treatment Plant the District will provide primary treatment for flows up to two times measured dry weather sanitary flow. Wet weather management plans to manage infiltration and inflow and stormwater will be developed for flows in excess of primary treatment capacity.

For the Iona Island Treatment Plant the District will provide primary treatment for flows up to a maximum of 17 cubic metres per second. This plant capacity will be reviewed every 5 years based on flow determinations arising out of progress in the combined sewer separation programs.

P5. Upgrading from Base Levels of Treatment

The District will upgrade the level of treatment, or initiate source control measures, if the base level of treatment is not adequate to protect the aquatic environment as defined by Policy P2 and determined by the receiving water environmental objectives and performance measures.

Combined Sewer Systems

P6. Combined Sewer Overflows

No new combined sewers will be constructed in the GVRD geographic area. Existing combined sewers will be replaced by separate sanitary and storm sewers through infrastructure replacement and sewer capacity upgrading programs. Private combined sewer service connections will be replaced with separate sanitary and storm sewer

connections when a property is redeveloped or when substantive building or site renovations are undertaken.

The policy of the District is to eliminate all combined sewer overflows from its facilities. Priority will be given to reducing or eliminating those combined sewer overflows identified by the Environmental Monitoring Committee as having significant environmental impact.

P7. Combined Sewer Overflow Monitoring

Combined sewer overflow volumes will be monitored and trended at all outfalls under the District's jurisdiction to measure the effect and progress of combined sewer replacement programs. Environmental monitoring and assessment will determine risks and the need for any additional interim measures at combined sewer outfalls.

Separate Sanitary Sewer Systems

P8. Infrastructure Management

The District and its member municipalities will establish sewer system infrastructure management programs that will maintain the regional trunks and interceptors, the municipal collection system, and the private service laterals in a state of good repair. The objective will be to ensure the sustainability of the collection system so that expensive repair and rehabilitation is not deferred to future generations and that the average daily infiltration and inflow will not exceed 11,200 litres per hectare per day as a result of a storm with less than a five year return period.

P9. Basic Sanitary Sewer Service Capacity

The District will establish a basic level of service capacity for all District sanitary sewers that provides for the conveyance of measured dry weather flows plus a wet weather allowance for infiltration and inflow of 11,200 litres per hectare per day, such that the hydraulic grade lines do not exceed established safe operating levels.

P10. Sanitary Sewer Overflow Documentation And Targets

The District will document all sanitary sewer overflows from the collection system under its jurisdictions and determine the cause of overflow. The District and its member municipalities will establish targets for sanitary sewer overflow reduction as part of their sewer system infrastructure management programs to target reduction and long term elimination of wet weather sanitary sewer overflows caused by storms of less than a five year return period. Areas experiencing high growth and chronic sanitary sewer overflows with associated health or environmental risks will receive the highest priority for elimination of sanitary sewer overflows.

P11. Sanitary Sewer and Combined Sewer Interaction

In parts of the collection system where both sanitary and combined sewer overflows are occurring due to the interaction of these sewer systems, and operational improvements are being considered to minimize overflows, the objective will be to minimize the total volume of sanitary sewage (contained in combined and sanitary sewer overflows as a component together with stormwater) that is discharging to the receiving waterways.

P12. Consideration of Consequence

When addressing sanitary sewer overflow issues, the District and its member municipalities will prioritize efforts and consider emergency spill locations to mitigate the consequence of overflows in the following priority:

1. Discharges that compromise public health;
2. Discharges that compromise public and private property damage; and
3. Discharges that have confirmed near-field environmental impacts.

P13. Emergency Overflow Locations For Unavoidable Sanitary Sewer Overflows

The District and its member municipalities will maintain a system of emergency overflow locations and prepare emergency spill contingency plans to minimize the consequence of unavoidable sanitary sewer overflows caused by extreme wet weather, system failures, and unusual events.

Source Control and Demand Management

P14. Control of Toxic Substances Discharged to Sewer

The District's Source Control Program will be consistent with the Canadian Environmental Protection Act (CEPA) control options for toxic substances. This will be in addition to the list of prohibited and restricted substances included in the Regional Sewer Use Bylaw.

P15. Promotion of Pollution Prevention

Control of the quality and quantity of discharges to sewer by applying the principles of pollution prevention will be emphasized and promoted in all sewer permits, codes of practices, waste management practices and education programs that are issued, developed and implemented by the District.

P16. Best Available Technology

Where pollution prevention fails to eliminate contaminants from discharges, the District will recommend Best Available Technology, which is proven and economically feasible, to be applied to remove contaminants of concern prior to discharge to sewer.

P17. Control of Peak Daily Demand from Industry

The District will control the peak daily demand from industry through a system of flow and load limits and fees.

P18. Usage of Capacity by the Users of the Sewer System

Any trend or projected demand that would affect the historical proportions of usage of system capacity (conveyance and treatment) will be brought to the attention of the District Board and its impact considered. The policy of business casing any new industrial demand for more than 3% of the system capacity will be continued.

P19. Promotion of Water Conservation

The District will encourage water conservation initiatives by recognizing reductions in water usage and wastewater generation.

P20. Elimination of Stormwater Discharges into Sanitary Sewers

The District will not permit new stormwater sources to be connected to its sanitary sewer system and will continue its current policy of eliminating stormwater discharges currently authorized by Authorizations and Permits. Any exception to this policy will be evaluated and considered in consultation with the affected discharger, host municipality, and representatives of the senior level of governments in charge of environmental protection.

The District, in addition to not issuing new authorizations for discharges of stormwater into sanitary sewers, will continue the program of eliminating all stormwater contributions allowed under the existing industrial permits. Each industrial operation will be required to develop and implement a plan for removal of the stormwater components from their sanitary sewer discharge.

Residuals Management

P21. Cost Effectiveness and Recycling

The District will manage its residuals in a cost-effective, environmentally sound, and reliable manner.

The District will manage its biosolids based on the principle of recycling, but will continue to evaluate cost-effective, non-recycling options.

P22. Grit and Screenings Disposal

Grit and screenings will continue to be sent to disposal facilities (landfill or incineration), both within the GVRD solid waste system and, when necessary, to other facilities within B.C. or outside of the province.

P23. Recycling Program Cost Allocation

It is intended that the District's Biosolids Recycling Program will continue to be funded annually as a regional program. Direct costs (those directly attributable to recycling projects) will be allocated to the four sewerage areas at the end of each year based on the tonnes of biosolids recycled for each sewerage area in that year. Indirect costs will be allocated to the four sewerage areas at the end of each year based on the tonnes of biosolids produced by each sewerage area during that year.

Stormwater Management

P24. Five Year Time-Frame

The stormwater management policies and commitments will apply to all District municipalities, and as appropriate the District, for a period of five years after approval of the Liquid Waste Management Plan, at which time they will be reviewed and updated.

P25. Integrated Planning Approach

The member municipalities, in consultation with the District where appropriate, will undertake a proactive integrated planning approach to municipal stormwater management, in areas serviced by separated stormwater systems, thereby improving the efficiencies and effectiveness of regulatory approvals. This integrated planning approach will integrate watershed, catchment, master drainage plans, and stormwater plans into relevant municipal planning processes such as Official Community or Neighbourhood Concept plans, Recreation and Parks Master plans, Strategic Transportation plans, etc., in order to address the impacts of stormwater management on relevant community values. These values include recreation, agriculture, fisheries, greenways, heritage, archaeology, safety, transportation, economics, property values, flood protection, affordability, the environment, and related issues.

Stormwater management planning would strive to be consistent with the stormwater management guiding principles as referenced in Table 13-1 of the Liquid Waste Management Plan Discussion Document. One of the guiding principles is to strive to plan at a watershed scale even in non-urban (greater than 80% of watershed area is Green Zone as defined in the 1996 Livable Region Strategic Plan) watersheds where municipalities may have limited infrastructure.

Non-Point Source Pollution Management

Pleasure Craft Sewage

P26. Designation of No-Discharge Zones

Where investigations have shown that discharges from pleasure craft is leading to waterway degradation or high bacterial levels, the District will request the province to nominate the waterway, or portion thereof, for designation as a no-discharge zone under the federal Pleasure Craft Sewage Prevention Regulation.

On-Site Sewage Disposal Systems

P27. Sewer Extensions and the Green Zone

Prior to extending sewers into the Green Zone, as defined by The Livable Region Strategic Plan, the District will request municipalities to examine local servicing and alternate advanced treatment systems.

P28. On-site systems and disposal to waterways

The following guidelines should apply regarding discharges from on-site disposal systems to adjacent waterways. Where there is a conflict between these guidelines and Provincial regulations, the regulations will apply:

- Property owners with BC Hydro service and road access should investigate all land based options including approved innovative technologies and demonstrate that such land based options are non-viable solutions prior to any consideration of sewage effluent discharge into an adjacent water body.
- Property owners in "isolated" locations without road access, should investigate conventional land-based options and demonstrate that such land-based options are non-viable solutions prior to any consideration of effective innovative technology or sewage effluent discharge into an adjacent water body.
- The minimum acceptable level of treatment for properties in "isolated" locations having neither BC Hydro service or road access, should be a properly designed septic tank that provides treatment of domestic sewage prior to effluent discharge required to be in accordance with standards stipulated in the new Waste Management Act Municipal Sewage Regulation.
- There should be no discharge of untreated domestic sewage to the marine/aquatic environment under any circumstances.
- Property owners discharging to the marine/aquatic environment should obtain discharge permits from the appropriate jurisdiction.
- Property owners discharging or proposing to discharge effluent into an adjacent water body should obtain a "water body" easement for the placement and maintenance of a discharge outfall pipe, from the appropriate jurisdiction.
- Where the authority having jurisdiction for sewage discharge or sewage disposal is other than the local government, and where the bylaws or policies of the local government stipulate standards or requirements higher than those of the authority having jurisdiction, then the authority having jurisdiction should make best efforts to issue approvals which comply with requirements of the local government.

P29. Assurance Plans

No innovative treatment systems will be installed in the GVRD unless an assurance plan is in place for the proper operation, maintenance, and performance of the facility. The assurance plan will be developed in accordance with guidelines being prepared under the Ministry of Environment, Lands and Parks Municipal Sewage Regulation.

Agricultural Runoff

P30. Stormwater Consideration by Municipalities

Municipalities will consider stormwater runoff from agricultural lands when undertaking integrated stormwater management planning for their municipality.

Finance

P31. Funding Future Projects

In its 10-year financial plan the District will include future projects for upgraded service levels that have been determined to be needed in accordance with Policy P2.

In accordance with Policy P2, upgraded service levels will be provided in the future where an environmental need has been forecasted or demonstrated, with consideration to cost and benefit and regional priorities. Figure 4 shows the probable range in future annual District expenditure. The upper range represents annual expenditures if additional secondary treatment plant upgrading projects are required at Lions Gate and Iona, in accordance with demonstrated need, and they are constructed over a 10-year period commencing after 2005. The lower range represents annual District expenditures assuming no secondary treatment upgrading projects are required at Lions Gate and Iona and that the water quality objectives and other established criteria continue to be met.

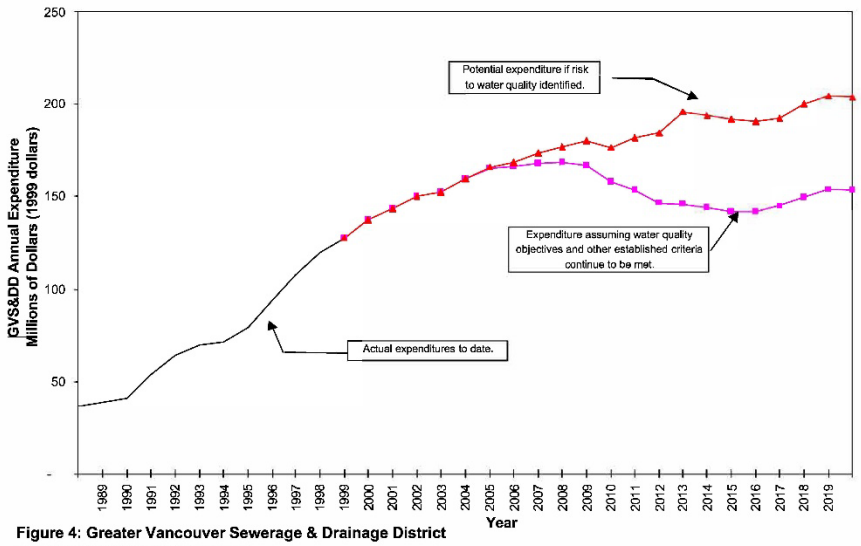


Figure 4: Greater Vancouver Sewerage & Drainage District Liquid Waste Management Plan Potential GVS&DD Expenditure Envelope