

From: **"Mochrie, Paul"** <[Paul.Mochrie@vancouver.ca](mailto:Paul.Mochrie@vancouver.ca)>

To: **"Direct to Mayor and Council - DL"**

Date: 6/17/2022 7:19:24 AM

Subject: Council Memo - Update on the Healthy Waters Plan – RTS 13902

Attachments: Council Memo - Update on the Healthy Waters Plan – RTS 13902.pdf

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Dear Mayor and Council,

Please see the attached memo from Lon LaClaire. This memo is a progress update, in response to Council direction to develop a comprehensive sewage and rainwater management plan for Vancouver. This initiative, now referred to as the "Healthy Waters Plan", will guide the long-range investments, policies, programs and partner collaboration needed to address pollution from combined sewer overflows (CSOs) and urban runoff, meeting the growth needs of the city and addressing key risks related to climate change and aging infrastructure. This memo contains information on the following:

- ☐ an assessment of the current state of sewage and rainwater management, and a preliminary baseline forecast to establish the context for the next phase of Healthy Waters Plan development;
- ☐ the proposed Strategic Framework of Guiding Principles, Goal Areas and Objectives for the Healthy Waters Plan. This Strategic Framework will be foundational for the evaluation of different sewage and rainwater management pathways to be considered in Phase 2, and will guide plan implementation activities to follow (staff are anticipating that this will be brought forward to Council for consideration in Q4 2022); and
- ☐ a range of priority actions to be pursued in parallel to achieve positive water quality outcomes (see Appendix C).

If you have any questions, please feel free to contact Lon LaClaire at 604-873-7336 or [lon.laclaire@vancouver.ca](mailto:lon.laclaire@vancouver.ca).

Best,  
Paul

**Paul Mochrie** (he/him)  
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City of Vancouver  
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The City of Vancouver acknowledges that it is situated on the unceded traditional territories of the xʷməθkʷəy̓əm (Musqueam), Skwxwú7mesh (Squamish), and səlilwətał (Tsleil-Waututh) Nations.

## MEMORANDUM

June 15, 2022

TO: Mayor and Council

CC: Paul Mochrie, City Manager  
Armin Amrolia, Deputy City Manager  
Karen Levitt, Deputy City Manager  
Katrina Leckovic, City Clerk  
Lynda Graves, Administration Services Manager, City Manager's Office  
Maria Pontikis, Chief Communications Officer, CEC  
Anita Zaenker, Chief of Staff, Mayor's Office  
Neil Monckton, Chief of Staff, Mayor's Office  
Alvin Singh, Communications Director, Mayor's Office

FROM: Lon LaClaire  
General Manager, Engineering Services

SUBJECT: Update on the Healthy Waters Plan

RTS #: 13902

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This memo is a progress update, in response to Council direction received May 26, 2020 to develop a comprehensive sewage and rainwater management plan for Vancouver. This initiative, now referred to as the "Healthy Waters Plan", will guide the long-range investments, policies, programs and partner collaboration needed to address pollution from combined sewer overflows (CSOs) and urban runoff, meeting the growth needs of the city and addressing key risks related to climate change and aging infrastructure.

This memo contains information on the following:

- an assessment of the current state of sewage and rainwater management, and a preliminary baseline forecast to establish the context for the next phase of Healthy Waters Plan development;
- the proposed Strategic Framework of Guiding Principles, Goal Areas and Objectives for the Healthy Waters Plan. This Strategic Framework will be foundational for the evaluation of different sewage and rainwater management pathways to be considered in Phase 2, and will guide plan implementation activities to follow (staff are anticipating that this will be brought forward to Council for consideration in Q4 2022); and

- a range of priority actions to be pursued in parallel to achieve positive water quality outcomes (see Appendix C).

## Background

In May 2020, Council directed staff to develop the Healthy Waters Plan, to identify long-range strategic investments, policies, programs, and partner collaboration needed to address the following key issues:

- CSOs and polluted urban runoff<sup>1</sup> impact aquatic ecosystem health and public access to water. Vancouver has a regulatory requirement to eliminate CSOs by 2050, and it is also a Council and Park Board priority to increase public access to water.
- Population growth and land-use recommendations in adopted community plans faces uncertainty when it comes to sewage and drainage system capacity. In addition, a comprehensive integrated system planning effort is required to ensure that infrastructure services can sustainably support the growth that will be contemplated in the Vancouver Plan.
- Climate change, including the increasing intensity and frequency of rainfall events, sea level rise and drought, adds further strain on sewage and rainwater management services. Further, significant and continued investment will be required between now and 2050 to renew and adapt aging infrastructure. The Healthy Waters Plan will help strategically target investments and policies to mitigate risk and maintain affordability.
- Water is a vital resource and life force for communities and ecosystems. For millennia, First Nations communities have developed around their relationships with water. Post-contact, in the past hundred years or so in Vancouver, through land development, deforestation, the burying of streams and development of modern sewer and drainage infrastructure, our relationships with water, the land and natural systems have been disrupted. The Healthy Waters Plan provides the opportunity to support Vancouver's commitment as a City of Reconciliation, as well as contribute towards meeting equity objectives.

The City of Vancouver and Metro Vancouver Regional District jointly provide sewage and drainage services, with the City providing local infrastructure servicing and Metro Vancouver managing regional conveyance and wastewater treatment. The Healthy Waters Plan should allow investments and outcomes across both systems to be optimized and will inform the pending update to the Metro Vancouver Liquid Waste Management Plan (LWMP), which will serve as a regulatory plan for the regional government and its members. A high level of collaboration is required with Metro Vancouver to align with and meet the timeline requirements of the LWMP, which must be finalized by 2023.

Today, the City's sewage and drainage infrastructure consists of 93,000 service connections from homes and businesses, 42,000 catch basins, 24 pump stations, 2,130 km of pipes and 300 green rainwater infrastructure installations, with a replacement value of approximately \$7.6 billion.

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<sup>1</sup> Urban runoff includes rainwater and other sources of water (e.g. groundwater, irrigation, car-washing etc.) entering the City's drainage system from streets and properties. Pollutants include hydrocarbons, automobile tire dust, litter, micro-plastics, heavy metals, sediments and biological matter.

## Project Work Plan and Status Update

A phased approach is being taken in the development of the Healthy Waters Plan. Partner, stakeholder and public engagement are being tailored to each phase of the plan development, with the approach factoring in the COVID-19 pandemic as appropriate. The three phases of the work plan are as follows:

- Phase 1 – Current State Assessment and Priority Action Plan (nearing completion): This report asks Council to consider the proposed Strategic Framework of Guiding Principles, Goal Areas and Objectives for the Healthy Waters Plan, which were developed through a comprehensive partner and stakeholder engagement process. Phase 1 work also includes:
  - Current State Assessment and Preliminary Baseline Forecast (Appendix B): provides a summary of the key findings of this work, which sets the context for planning work to follow.
  - Priority Actions While Planning (Appendix C): these are “no regrets” actions to achieve positive water quality outcomes that will occur in parallel with the Healthy Waters Plan development. Council’s consideration of these projects occurs separately within the capital budget approvals process.
- Phase 2 – Pathway Development: This phase of work will focus on completing a staged and comprehensive analysis of a range of alternative infrastructure and policy solutions at different scales, utilizing the strategic framework of decision criteria developed in Phase 1. A key deliverable of this phase will be the identification of preferred pathways for detailed business analysis and plan development to take place in Phase 3.

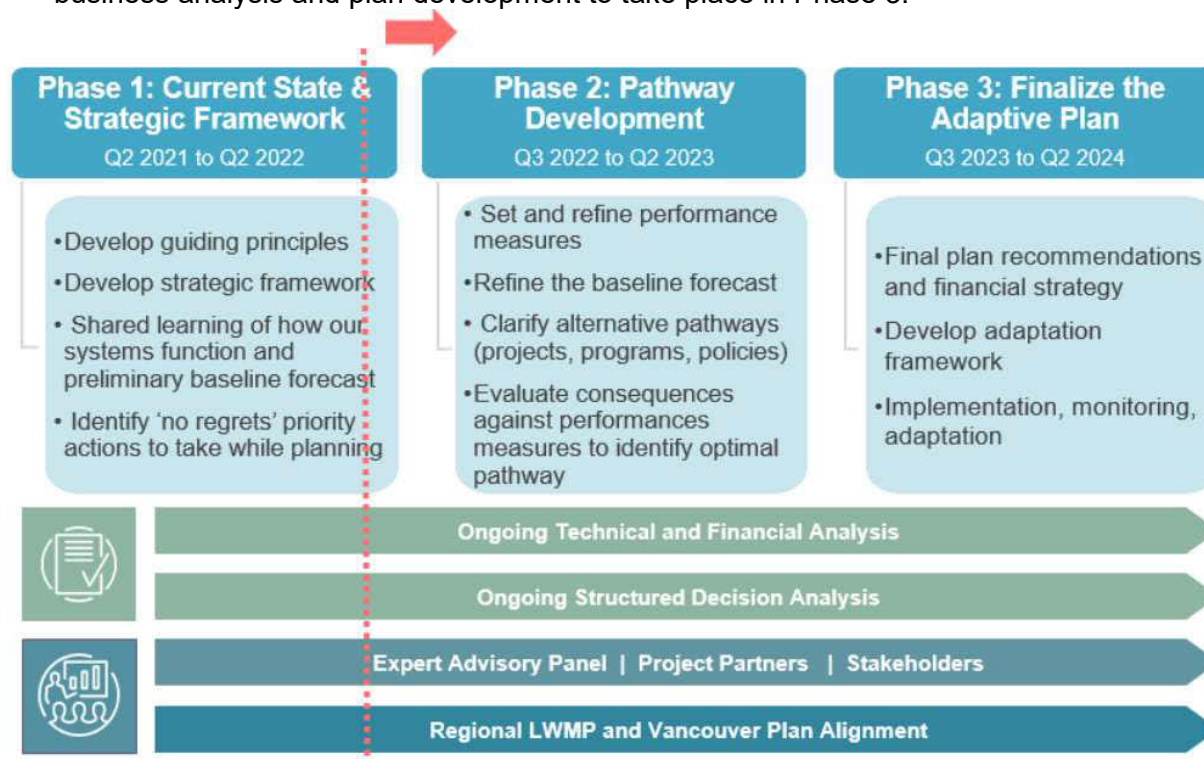


Figure 1: A PHASED APPROACH TO PLAN DEVELOPMENT

- Phase 3 – Finalize the Plan: The optimal pathway will be further refined to guide City investments into the future. This includes detailed business case analysis, financing strategies and a long-term roadmap for infrastructure investments, operational improvements, policy and regulation and frameworks to support watershed planning and the prioritization of work.

## **Summary of Key Findings from Phase 1**

Phase 1 work, nearing completion, has focused developing a Current State Assessment, to present the historical and current day context of sewage and rainwater management in the city. It also includes a Preliminary Baseline Forecast, to understand the future context for planning work. A summary of this work is presented in Appendix B, and key findings include:

- **Equity and Reconciliation Gaps:** The City and Metro Vancouver sewage and drainage system is designed to prioritize public health and recreational uses around west side water bodies (e.g. swimming beaches). In 2020, approximately 75% of total CSO volumes were discharged into the Inner Harbour of Burrard Inlet in East Vancouver. This has contributed to a high level of microbial and other pollutants in this area. Staff have heard concerns from partners and stakeholders that the high level of CSO discharges in the Inner Harbour of Burrard Inlet is concerning from an equity and access to water perspective. Re-opening of food fisheries in Burrard Inlet and Indian Arm have been identified as a high priority for the Tsleil-Waututh Nation. With the support of the Province of B.C. and other government organizations, the Tsleil-Waututh is leading the development of Burrard Inlet Water Quality Objectives. The Healthy Waters Plan and future sewage and rainwater management decision making will need to consider the Burrard Inlet Water Quality Objectives.
- **Vancouver's CSO Elimination Timeline:** 100% sewer separation by 2050 is not likely affordable or achievable. Achieving CSO elimination through sewer separation alone may exacerbate flood and runoff water quality risks, creating significant cascading risks that further exacerbate affordability challenges, particularly around flood-prone areas. The Healthy Waters Plan will need to evaluate to what degree green rainwater infrastructure can contribute towards CSO elimination objectives, as well as other potential grey infrastructure solutions that are complementary to sewer separation.
- **Pollution from Urban Runoff:** Urban runoff carries pollutants from roads and properties, including hydrocarbons, micro-plastics, heavy metals, biological pollution and litter. For areas of the city that still have combined sewers, much of this pollution is directed to regional wastewater treatment plants. However, continuing sewer separation without complementary interventions will result in more of this runoff pollution being directed to local waters via outfalls without treatment. The Healthy Waters Plan will need to consider how green and grey infrastructure solutions will work together to address this issue, as well as source controls to prevent contaminants from entering the system.
- **Increasing Risk of Sewer Backups and Overland Flooding Due to Climate Change:** Higher intensity and longer duration rainfall events increase the risk of sewer system backups and overland flooding. Sea level rise further increases this risk with low-lying areas becoming more difficult to drain due to overland flooding pressures compounded by high tides and storm surge events. Without investments in coastal adaptation, water storage solutions, overland flow routes, and green rainwater infrastructure, the risk of

flooding in low-lying areas will continue to increase into the future. The Healthy Waters Plan will need to address this emerging risk and provide an adaptive planning framework to respond to climate-oriented uncertainty and risk.

- **Urban Heat and Drought Due to Climate Change:** In addition to increased flooding and sewer back-up risk, climate change will increase drought, heat stress, and drinking water supply pressures in Vancouver. Areas of the city without tree cover and other natural assets will have added challenges when it comes to withstanding heat dome events<sup>2</sup>. In addition, trees are vulnerable to die-off due to prolonged dry periods. Healthy Waters Plan investment decision making will need to support conservation and fit-for-use approaches for water management, and adequately account for the full breadth of benefits that can be delivered through green rainwater infrastructure assets.
- **Meeting the Needs of a Growing Population:** Growth and density are increasingly being distributed across the City. While this delivers a wide range of benefits, it also creates technical and financial challenges to adapt existing infrastructure to meet the needs of the future. The Healthy Waters Plan will need to address the growth contemplated in the Vancouver Plan, as well as help to inform how population growth is phased in over time.
- **Increasing Affordability Challenges:** Sewage and drainage infrastructure makes up one of the most costly building blocks of modern cities. Costs are forecasted to increase significantly over the coming five years. In addition to City costs associated with asset renewal and meeting the needs of growth is the need to proceed with the Iona Island Wastewater Treatment Plant Project. This project is estimated to cost \$10 billion, including inflation and contingencies. At this time, there is insufficient information to evaluate with certainty the affordability implications for Vancouver homes and businesses. The next phase of Healthy Waters Plan develop will need to consider:
  - Investment pathways that achieve multiple objectives, with a high level of integration of grey and green rainwater infrastructure solutions;
  - balancing level-of-service objectives for flooding and other risks (such as environmental impacts, asset condition, etc.) with affordability considerations, and informing trade-offs where necessary;
  - financial strategies and development policies that incentivize improved water management on private properties to minimize the burden on public infrastructure; and
  - senior government advocacy priorities and funding needs to address affordability challenges.

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<sup>2</sup> On June 7, 2022, the BC Coroner released the report titled “Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021”. The report had four key findings, including recommendation (D) “As the Local Government Act, Community Charter and the Vancouver Charter are reviewed and “Climate Lenses” are crafted for Official Community Plans and Regional Growth Strategies, the Ministry of Environment and Climate Change Strategy will ensure that updates and revisions are consistent with the Climate Preparedness and Adaptation Strategy and require the protection and restoration of the urban tree canopy and permeable surface areas to absorb water.”.

## **Proposed Strategic Framework of Guiding Principles, Goal Areas and Objectives**

In May 2020 Council directed staff to proceed with a comprehensive plan for sewage and rainwater management. At that time, staff recommended that the plan be developed with the following preliminary goal areas, subject to revision following engagement with partners, stakeholders and the public:

- Address pollution arising from CSOs and urban runoff, strategically based on environmental risk and access to water priorities
- Minimize risks to service levels and affordability associated with aging infrastructure, population growth, seismic events, and climate change including sea level rise, increased rainfall intensity, and drought
- Enhance biodiversity and improve health and well-being through fostering natural systems
- Ensure efficient, cost effective investments and regulations that deliver value and support prosperity for current and future generations
- Support equity for all Vancouverites, and reconciliation with Indigenous communities

These preliminary goal areas set the scope for the work program to follow, and were used to initiate discussions with partner and stakeholder organizations around the Guiding Principles, Goal Areas and Objectives for the Healthy Waters Plan.

## **Engagement Approach**

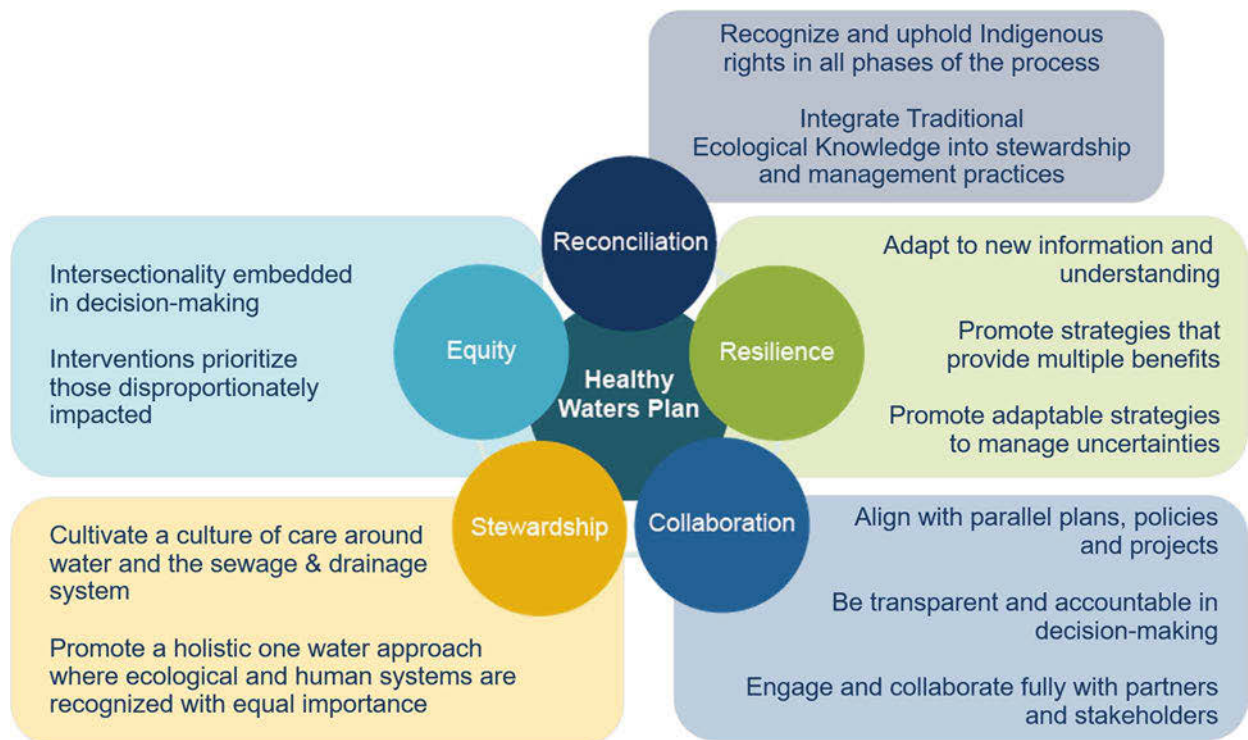
The proposed Strategic Framework of Guiding Principles, Goal Areas and Objectives were developed in collaboration with the Healthy Waters Plan Project Advisory Group. The Project Advisory Group includes representatives of Musqueam Indian Band, Tsleil-Waututh Nation, federal and provincial governments and Metro Vancouver, along with key stakeholder groups who have a vested interest in sewage and rainwater management planning. The Healthy Waters Plan Leadership Forum and the integrated City, Metro Vancouver and Host Nations Technical Working Group was also consulted. Appendix A provides information regarding the composition and roles of different engagement groups.

Staff would like to acknowledge the contributions of partners and stakeholders in the development of the Strategic Framework of Guiding Principles, Goal Areas and Objectives. Their advice helps to ensure that this framework is sufficiently comprehensive, addressing core needs of the community and environment. Their participation is also necessary to achieve alignment with First Nations and other levels of government who have a role in sewage and rainwater management, stewardship and regulation.

## **Guiding Principles**

Guiding Principles are critical to all stages of the Healthy Waters Plan development. They will inform how the engagement work is conducted, how various pathway options will be defined in Phase 2, and how the plan is implemented including the prioritization of investments. Figure 2 defines the proposed Guiding Principles for the Healthy Waters Plan.





**Figure 2: PROPOSED GUIDING PRINCIPLES FOR THE HEALTHY WATERS PLAN**

## Goal Areas and Objectives

Goal Areas describe the high-level vision of what we want to achieve with the Healthy Waters Plan. Each Goal Area has an associated set of Objectives. Objectives are specific and describes what matters in achieving a Goal Area.

Goal Areas and Objectives will be considered in the evaluation of different alternative plan pathways in Phase 2. In order to be useful in this analysis, an Objective must be:

- focused on one particular area (e.g. CSO elimination);
- measurable so that we're able to quantify to what degree an alternative pathway meets the objective (e.g. # of CSO events per year); and
- directional (e.g. increase, decrease, minimize, maximize).

Table 1 presents the proposed Goal Areas and Objectives to be considered by Council later in the year. These Goal Areas and Objectives will form the basis of evaluation of different investment, policy and partnership pathways in Phase 2. Not all Objectives are of equal importance, and, based on further analysis and engagement, later phases of the Healthy Waters Plan will assign appropriate weighing to the various Objectives.

Each Objective will have corresponding Performance Measures that are used for the assessment. For example, Objective 1.1, "Work towards the elimination of pollution of waterways due to combined sewer overflows" could have a corresponding Performance Measure such as "Number of annual CSO events" or "Total annual volume of CSO discharges in litres".



**Table 1 PROPOSED GOAL AREAS AND OBJECTIVES FOR THE HEALTHY WATERS PLAN**

<b>Goal Area</b>	<b>Objectives</b>
<b>1. Healthy Waterways</b>	1.1 Work towards elimination of pollution of waterways due to combined sewer overflows 1.2 Work towards elimination of pollution of waterways due to sanitary sewer overflows 1.3 Reduce the pollution of waterways due to urban runoff 1.4 Minimize rainwater and groundwater conveyed to Metro Vancouver Wastewater Treatment Plants 1.5 Reduce improper discharges into the sewage & drainage system
<b>2. Healthy and Liveable Watersheds</b>	2.1 Increase the retention and infiltration of rainwater into the ground 2.2 Increase the amount of naturalized areas within the rainwater management system 2.3 Reduce the impact of drought on street trees and other natural assets 2.4 Increase the connectivity of naturalized areas and green rainwater infrastructure
<b>3. Adapt to Risk and Uncertainty</b>	3.1 Minimize sewer back-up risk to people, critical infrastructure and property 3.2 Minimize overland flooding risk to people, critical infrastructure, and property 3.3 Minimize flooding risk due to sea level rise, storm surges and king tides disrupting drainage services 3.4 Minimize seismic risk to sewage and drainage services 3.5 Minimize sewer and drainage system capacity risk due to growth, development and climate change
<b>4. Affordable and Strategic Service Delivery</b>	4.1 Minimize the long-term impact to taxpayers and ratepayers 4.2 Minimize costs to building development 4.3 Increase the equity of cost distribution between current and future generations 4.4 Increase the adaptability of investments to manage future uncertainties 4.5 Maximize community economic benefits of sewer & drainage investments

In some cases, the Performance Measures and associated targets will need to consider senior government regulation or the regional LWMP. For example, Objective 1.1 will need to have a Performance Target that aligns with the regional LWMP. In addition, the Burrard Inlet Water Quality Objectives, which is under development and led by the Tsleil-Waututh Nation, will need to be considered later on in the planning process when Performance Targets are set.

This proposed Strategic Framework is subject to change, based on outcomes from Phase 2 technical work and engagement.

### **Next Steps – Healthy Waters Plan Development**

As shown in Figure 1, Phase 1 work is nearing completion. Phase 2 work will begin in Q3 of this year, and will focus on developing and evaluating a range of investment, policy and programmatic pathways for sewage and rainwater management. Staff plan to report back to Council in Q4 2022, for direction on the proposed Strategic Framework of Guiding Principles, Goal Areas and Objectives.

If you have any questions about this information, please contact me directly.

A handwritten signature in blue ink, appearing to read 'Lon LaClaire', with a horizontal line extending from the end.

Lon LaClaire, M.Eng., P.Eng.  
General Manager, Engineering Services  
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## APPENDIX A: ENGAGEMENT STRUCTURE FOR THE HEALTHY WATERS PLAN

### Engagement Framework

The Engagement Framework describes who is involved in the Healthy Waters Plan planning process, and in what capacity. The Engagement Framework is guided by the City of Vancouver's core values for public participation, which are informed by the International Association for Public Participation (IAP2). The Healthy Waters Plan commits to an engagement process that: advances reconciliation, is equity-infused, is integrated and coordinated, and that is collaborative. The following table summarizes each engagement committee and level of engagement.

**TABLE A1 - ENGAGEMENT FRAMEWORK**

<b>Project Advisory Group</b> <b>IAP2 Level: <i>Involve, Collaborate</i></b>	<p><b>Who:</b> Staff from the Government of Canada, Province of BC, Metro Vancouver, Musqueam Indian Band, development community, Port of Vancouver, Vancouver Coastal Health, BC Housing, and NGOs and advocacy groups.</p> <p><b>What:</b> The Project Advisory Group represents the interests of those who will be affected by project decisions, and will significantly inform the goals, objectives and performance measure for the Healthy Waters Plan.</p>
<b>Leadership Forum</b> <b>IAP2 Level: <i>Collaborate</i></b>	<p><b>Who:</b> Senior managers and staff from Metro Vancouver, City of Vancouver, Province of BC, Government of Canada, Musqueam Indian Band, Tsleil-Waututh Nation</p> <p><b>What:</b> The Leadership Forum is a venue for higher-level discussions around regulatory matters, related financial and investment considerations, and linked decision-making pathways around the Healthy Waters Plan and the Integrated Liquid Waste Resource Management Plan</p>
<b>Technical Working Group</b> <b>IAP2 Level: <i>Involve</i></b>	<p><b>Who:</b> Technical staff from the City of Vancouver, Metro Vancouver, Musqueam Indian Band and Tsleil-Waututh Nation</p> <p><b>What:</b> The Technical Working Group meets to review technical deliverables from the Current State Assessment, and achieve shared, inter-jurisdictional learning occurs, and support collaboration across jurisdictions</p>
<b>Expert Advisory Panel</b> <b>IAP2 Level: <i>Involve, Collaborate</i></b>	<p><b>Who:</b> A multi-disciplinary group of experts with no vested interest in the outcomes of the project, from other wet-weather cities, academic expertise, Traditional Ecological Knowledge and experience of environmental justice efforts from the United States and Canada</p> <p><b>What:</b> The Expert Advisory Panel provides independent advisory support to help define and expand the envelope of what is possible within the Healthy Waters Plan. The Expert Advisory Panel helps to fill knowledge gaps and provide best practices.</p>

**Indigenous Engagement**

The project team followed the City of Vancouver Indigenous Engagement Protocol in establishing respectful and reciprocal relationships with Host Nations. The project team submitted formal referrals to the Musqueam, Squamish and Tsleil-Waututh Nations and to the Metro Vancouver Aboriginal Executive Council (MVAEC) in May 2021 and in August 2021.

Further to the referral process, the project team developed capacity-funding agreements with Musqueam Indian Band and Tsleil-Waututh Nation to support their full participation throughout the development of the Healthy Waters Plan. As of spring 2022, MVAEC has not formally responded to the City's referrals. Staff are in early conversations with the Squamish Nation regarding their potential involvement in upcoming phases of work.

## **APPENDIX B: KEY FINDINGS FROM THE CURRENT STATE ASSESSMENT AND PRELIMINARY BASELINE FORECAST**

Phase 1 work, nearing completion, has focused developing a Current State Assessment, to present the historical and current day context of sewage and rainwater management in the city. It also includes a Preliminary Baseline Forecast, to understand the future context for planning work. This is critical foundational analysis to identify key considerations for the work to follow in Phases 2 and 3.

### **1. Current State Assessment**

Phase 1 work has largely focused on assessing the current state of sewage and rainwater management, factoring in both City of Vancouver and Metro Vancouver infrastructure services. This serves to set a foundational understanding of sewage and rainwater management to guide options analysis and planning work in Phases 2 and 3.

#### **1.1 The Evolution of Sewage and Rainwater Management in Vancouver**

Following settler colonization, the first sewers were constructed in 1889, with the primary purpose to convey sanitary waste away from the new city and reduce the frequency of water-borne disease outbreaks. This system was expanded over time to serve new development. Streams were culverted and buried to allow for this widespread development, and were connected to the sewer system. This combined sewer system conveyed mixed sanitary and rainwater directly to receiving waters.

Driven by emerging concerns regarding sewage pollution in Vancouver waterways, in 1953, the “Rawn Report” recommended the construction of interceptor pipes to convey sewage from the city to a new wastewater treatment plant at Iona Island (referred to in this report as the “Iona Island WWTP”). Subsequent to the Rawn Report, the Greater Vancouver Sewage and Drainage District<sup>3</sup> (referred to in this report as “Metro Vancouver”) was established to provide regional conveyance and treatment services.

Since the 1960s, the City began the practice of installing separated sanitary and storm pipes when new neighbourhoods were developed. Beginning in the 1970s, the City began replacing existing combined pipes with separated pipes in targeted areas of the Downtown and West End to address water quality issues. Within the 2011 regional Liquid Waste Management Plan (LWMP), the City committed to separating 1% of its sewer inventory on an annual basis, with the target of eliminating Combined Sewer Overflows (CSOs) by 2050.

In late 2018 and 2019, a number of Council imperatives around resilience, climate adaptation, climate emergency, watershed revival, blue green systems and accelerating action on CSOs emerged. The Vancouver Park Board (Park Board) commissioners also passed a number of resolutions urging the City to accelerate efforts to address CSOs and restore the water quality in False Creek and other waters surrounding Vancouver. In addition to the impacts to coastal biodiversity, over the years Vancouver beaches experience occasional closures when levels of E. coli bacteria exceed recommended guidelines. This is likely resulting from multiple sources of pollution, including CSOs and

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<sup>3</sup> The Greater Vancouver Sewage and Drainage District was incorporated by the Province in 1956. Its predecessor, the Vancouver and Joint Districts Sewerage and Drainage Board, had been incorporated in 1914. The GVS&DD assumed all assets and liabilities of the Vancouver and Joint Districts Sewerage and Drainage Board.

urban runoff. Further, major new waterfront parks are planned at the east basin of False Creek, increasing the need to address water quality issues in this area.

In November 2019, Council approved the Rain City Strategy, which directs Staff to accelerate the implementation of green rainwater infrastructure solutions to reduce pollution from urban runoff, adapt to climate change impacts, reduce the volumes of CSOs and ease the burden on infrastructure associated with increased rainwater volumes and urbanization. The Park Board endorsed this strategy in February 2020. The Rain City Strategy builds upon provincial regulatory obligations and nearly two decades of green rainwater infrastructure leadership, pilot and demonstration projects developed by the City, Park Board, community, industry and academia in Vancouver.

The Park Board, through its VanPlay, Parks and Recreation Services Master Plan, has continued to emphasize the importance of natural systems, flow of water connectivity, and urban biodiversity as foundations for thriving cities and ecosystems. VanPlay offers a vision for integrated water multi-functionality: access to nature, rainwater management, ecosystems, recreation etc., and relies on clean water.

Today, the City's sewage and drainage infrastructure consists of 93,000 service connections from homes and businesses, 42,000 catch basins, 24 pump stations, 2,130 km of pipes and 300 green rainwater infrastructure installations, with a replacement value of approximately \$7.6 billion.

## **1.2 Vancouver's Regulatory Obligations**

Figure C.1 provides an overview of the key environmental regulatory requirements for sewage and rainwater management. The Provincial Municipal Wastewater Regulation sets limits for CSOs and Sanitary Sewer Overflows (SSOs). These regulatory limits can only be exceeded in the event that there is an approved LWMP in place that sets the pathway for long-term regulatory compliance.

In 1990, following approval by the Province, the "Stage 1" regional LWMP was established, which was necessary to meet the requirements of the Provincial Environmental Management Act. Further updates were brought forward in 2000 and 2001, to outline commitments towards sewer separation, eliminating CSOs and upgrading the Iona Island Wastewater Treatment Plant. In 2011, the Province approved the updated LWMP, a ten-year plan which sets regulatory obligations for Vancouver around:

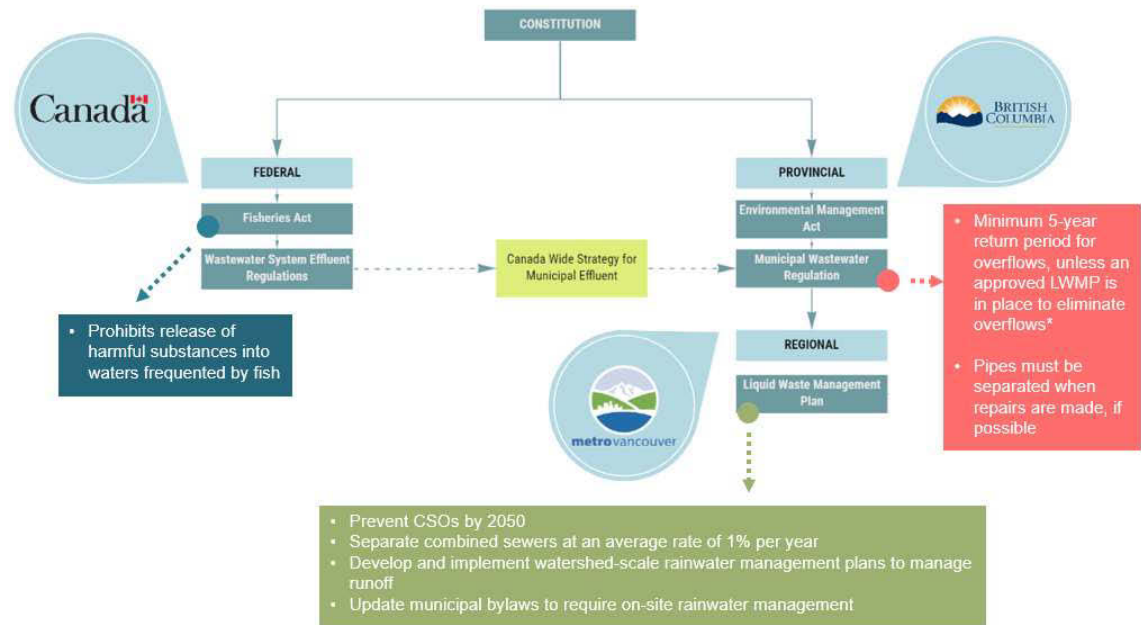
- i. eliminating CSOs by 2050;
- ii. replacing 1% of mainline sewers with separated sewers on an annual basis;
- iii. developing and implementing an Integrated Rainwater Management Plan; and
- iv. monitoring and mitigating water quality impacts from polluted urban runoff.

All municipalities in Metro Vancouver must also have Integrated Rainwater Management Plans and provide reports to the Province, through Metro Vancouver biannually, on their progress and compliance. In 2016, the City of Vancouver's Integrated Rainwater Management Plan was adopted by Council, with a focus on runoff water quality and addressing the impacts of the sewer and drainage system on local receiving waters and aquatic ecosystems. The Integrated Rainwater Management Plan established a long-term target to capture and remove runoff pollutants from 90% of the



volume of runoff from effective impervious areas for Vancouver's average annual rainfall. The Plan included a strong emphasis on green rainwater infrastructure approaches that utilize a combination of engineered and ecosystem service methods to manage rainwater volume and water quality. Further to this, in 2019 Council adopted the Rain City Strategy, which included implementation of rainwater management requirements for new development, as well as a range of actions for streets, public spaces and parks.

**FIGURE B1. KEY ENVIRONMENTAL REGULATIONS TO GUIDE THE HEALTHY WATERS PLAN**



*\*Note: An approved LWMP should target an average 1% per year reduction of CSO volume and 10% reduction in SSO volume over a 10-year period. The Provincial Municipal Wastewater Regulation is considered to serve as a guideline, and the LWMP is considered to be the primary regulation for the management of CSOs.*

Metro Vancouver has initiated the process of updating the LWMP, with the final plan due to be submitted to the Province for review by Q3 2023. Subject to approval by Metro Vancouver Boards, Vancouver City Council and the Province, the updated LWMP will establish a new regime of regulatory requirements for Metro Vancouver and its members, including the City of Vancouver.

### 1.3 The Current Status of Sewer Separation Work

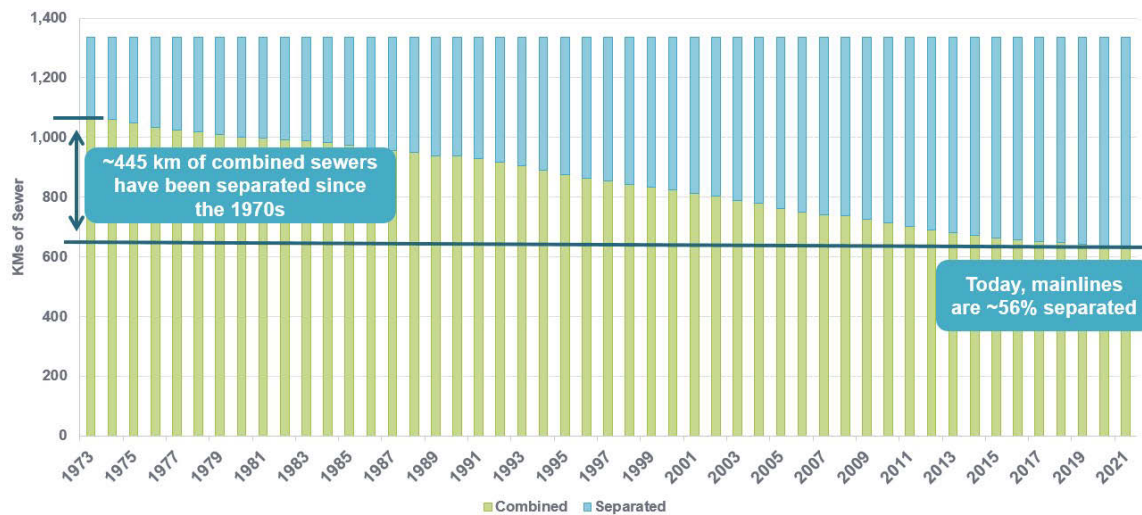
While newly developed areas of the city were built with separated sanitary and rainwater pipes beginning in the 1960s, the separation of existing combined sewers did not begin until the 1970s, taking a targeted approach to address sewage pollution in waters adjacent to Downtown. While decision making around which sewers to separate had a water quality focus early on, starting the 1990s, decision-making factors were broadened to include prioritizing the need to renew aging and failing pipe infrastructure.

Figure B2 shows how sewer separation work has progressed over the years. This work involves the separation of mainline sewer pipes in the streets, as well as the connection pipes and associated plumbing of the properties served by the system. Mainline sewer

pipes are separated through the City's asset renewal program, and a small portion through upgrades to serve growth. Property connections are separated at the time of property redevelopment or major renovations. Today, 56% of Vancouver's mainline sewers are separated, and approximately 60% of its property connections are separated. Vancouver has faced challenges in keeping up with renewing deteriorating assets at a sustainable rate, and in meeting 1% per year rate of separation target due to significant construction cost escalation as well as the need to fund other essential public services.

Figure B3 presents a map showing sewer separation status across the city. The areas shaded in dark green are considered to be fully separated, as rainwater runoff is diverted to receiving waters and does not enter Metro Vancouver's pipes.

**FIGURE B2. PROGRESS ACHIEVED ON SEWER SEPARATION**



The areas of the city not shaded in dark blue are in transition from combined to separated, and are made up of “fully combined” and “functionally combined” areas. An area is considered fully combined if mainline sewers are combined (shown as grey lines on Figure B3) regardless of the status of the connection from private properties. An area is considered functionally combined if sections of mainline sewers have been separated (shown as orange lines on Figure B3) to serve as future storm and sanitary, but the rainwater runoff from the area cannot directly discharge to a receiving water body (except during a CSO event).

Key barriers to achieving full separation of functionally combined areas include: (1) the need to address the remaining inventory of combined connections from private properties, which are currently separated through the cycle of property redevelopment; and (2) the need to construct stormwater trunks and outfalls for some areas to create a pathway for the rainwater to the receiving body. Consequently, these areas continue to primarily discharge to the Metro Vancouver interceptors and can contribute to a higher frequency of CSOs during certain rain events. Figure B4 provides a schematic showing differences between fully combined, functionally combined and fully separated infrastructure.

FIGURE B3. CURRENT STATUS OF SEWER SEPARATION

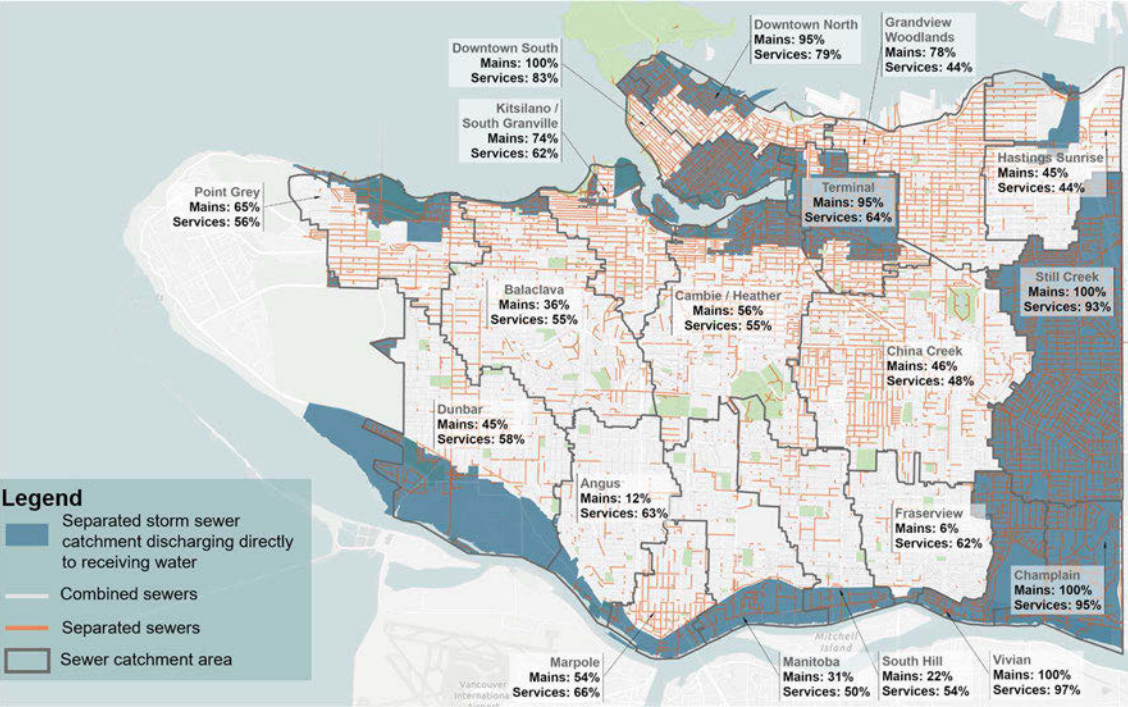
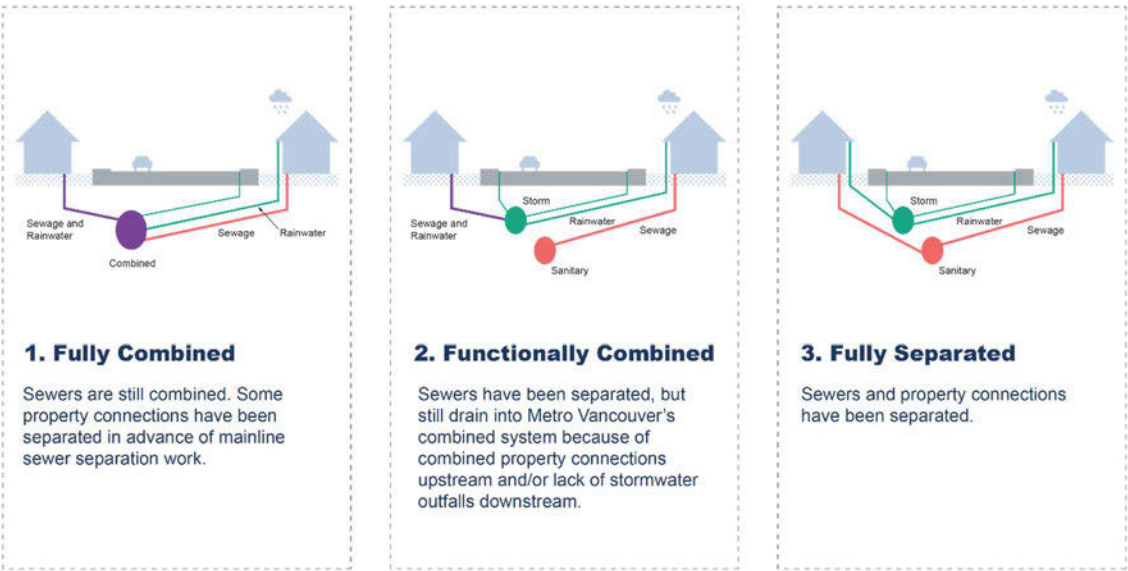


FIGURE B4. TRANSITION FROM COMBINED TO SEPARATED PIPE NETWORKS



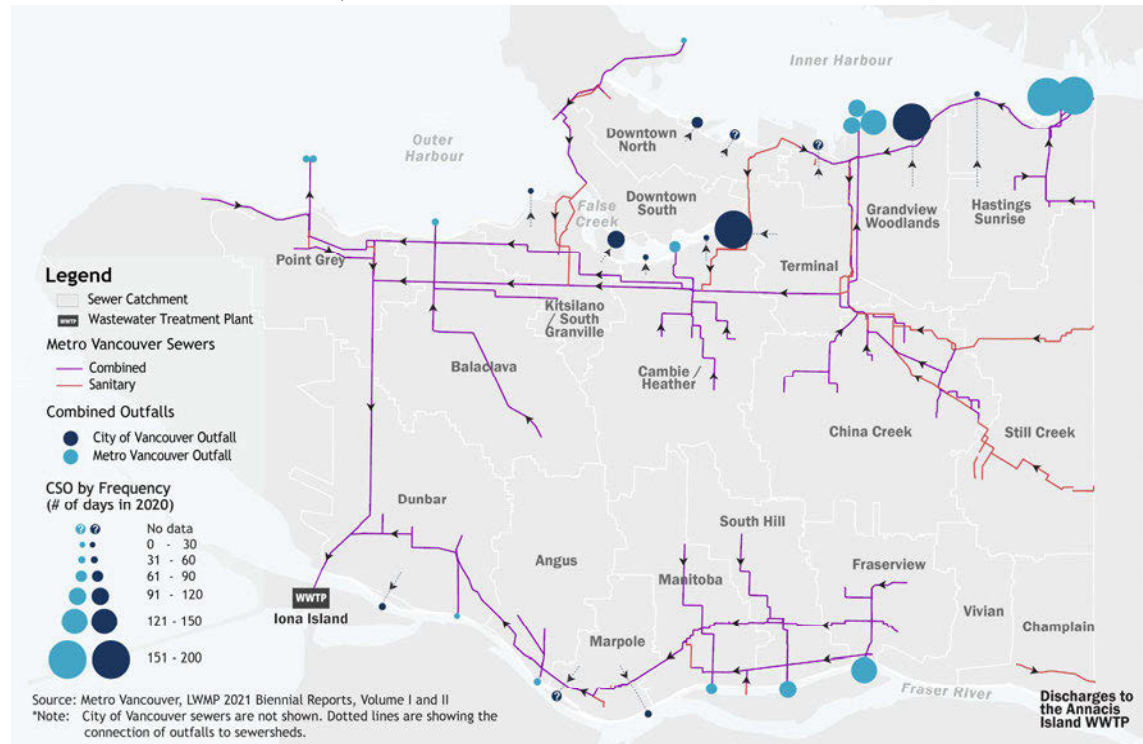
**Legend**

- Combined Pipe
- Sanitary Pipe
- Storm Pipe

## 1.4 Current Status of CSOs and Urban Runoff Pollution

In 2020, approximately 32 million cubic metres (32 billion litres) of CSOs were discharged<sup>4</sup> in the Vancouver Sewerage Area from Metro Vancouver CSO outfalls. An additional 6 million cubic metres (6 billion litres) was estimated to have been discharged from City of Vancouver outfalls in 2020. Figure B5 provides a map showing the estimated frequency of CSO events, and Figure B6 shows the estimated volumes of mixed sanitary and rainwater discharged at different CSO outfalls in 2020.

**FIGURE B5. ESTIMATED FREQUENCY OF CSO EVENTS FOR 2020<sup>5</sup>**



In 2020, approximately 75% of CSO volumes were discharged into the inner harbour of Burrard Inlet, as per Figure B7. The impact to water quality in this area, due to high volumes of CSO discharges, has been raised as a concern by partners and stakeholders in the Healthy Waters Plan engagement process.

The re-opening of food fisheries in Burrard Inlet and Indian Arm has been identified in the Burrard Inlet Action Plan as a high priority for the Tsleil-Waututh Nation and will require among other regional interventions, sewer overflows from the Vancouver Sewerage Area, to be addressed. With the support of the Province of BC and other

<sup>4</sup> The Vancouver Sewerage Area includes the joint municipal and regional system that serves Vancouver, parts of Burnaby and the University of BC Endowment Lands. CSO discharges include a mixture of rainwater, estimated at approximately 90% of CSO volume on average, and sanitary sewage, which is estimated approximately 10% of CSO volume on average. However, the proportion of the sanitary component in CSO discharges varies significantly between outfalls, with East Vancouver CSOs to the Inner Harbour discharging a higher fraction of sanitary effluent vs. west side CSOs to the Outer Harbour.

<sup>5</sup> Figures B5 and B6 present information based on measured flow values at combined sewer outfalls, as well as estimated values for outfalls that do not currently have flow monitoring in place. The City is actively expanding its monitoring to all of its combined sewer outfalls in the 2019-22 Capital Plan, and additional monitoring investments are being proposed for the 2023-26 Capital Plan.



government organizations, the Tsleil-Waututh is leading the update to the Burrard Inlet Water Quality Objectives, which will inform the Healthy Waters Plan and future sewage and rainwater management decision making.

FIGURE B6. ESTIMATED VOLUME OF CSO EVENTS FOR 2020

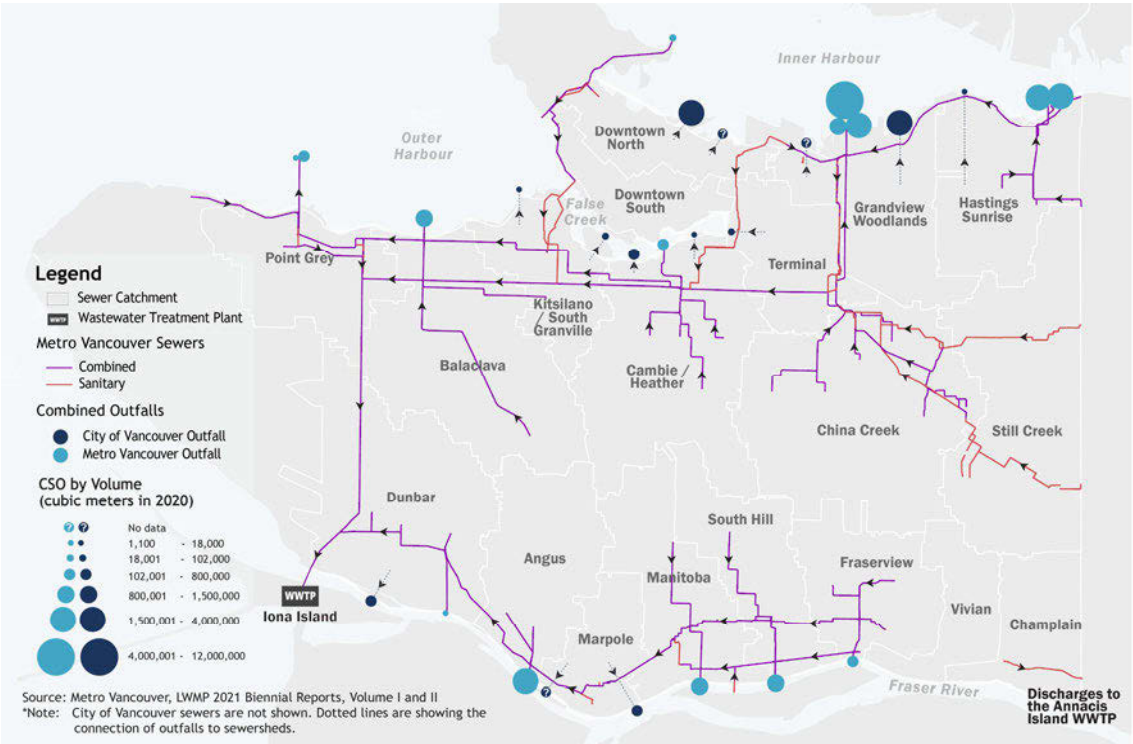
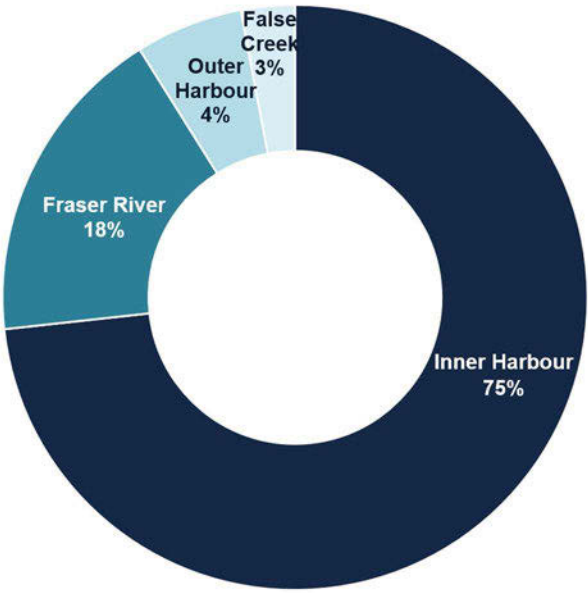


FIGURE B7. PROPORTION OF CSO VOLUMES DISCHARGED TO DIFFERENT RECEIVING WATERS (2020)



A smaller but still significant frequency and volume of CSO events also occur in English Bay, False Creek and the Fraser River. West side beach areas have much lower frequency and volume of CSO events, primarily because the system has been designed and operated over the past decades to prioritize the protection of public health in areas popular for swimming and other recreational activities.

In addition to sanitary sewage constituents, water quality in receiving environments can be adversely impacted by pollutants carried in urban runoff, such as sediment, hydrocarbons, micro-plastics, heavy metals, litter, and biological pollutants.

Stormwater outfalls currently provide minimal to no treatment of runoff pollutants prior to discharge, and as work continues to separate sanitary and storm pipes, the volume of untreated runoff entering receiving waters will increase. However, due to the combined nature of much of the system today, the base flow of combined sewage and rainwater (first flush) is often directed to the Iona Island Wastewater Treatment Plant.

The accelerated deployment of green rainwater infrastructure helps capture and treat a portion of this runoff and improve water quality. Expansion of source controls is also needed, to increase awareness and enact policies that prevent contaminants from entering the system in the first place, including public education, regulation and other actions by different levels of government.

## **1.5 The Health of Vancouver's Receiving Water Bodies**

The health of Vancouver's receiving waters has been impacted as a result of culverting and burying streams, infilling coastal areas, hardening of shorelines, losing riparian areas, altering water flow regimes, presence of invasive species, and pollution from various human activities in water bodies. Depending on the water body, aquatic health may also be affected by other sources of pollution, for example, illegal cross-connections of sewers, illegal boat discharges, animal faecal matter, and legacy contamination from historical land uses. In any given water body, different and multiple sources of pollution exist and mitigation efforts must be tailored to these conditions.

In 2020, Council directed staff to proceed with development of the Aquatic Environments Action Plan, with a focus on holistic aquatic environmental health. Whereas the scope of the Healthy Waters Plan covers the sewage and drainage system, the scope of the Aquatic Environments Plan covers the complex and interdependent drivers (sewage and drainage being one of many) that impact water quality as well as broader biodiversity objectives for Vancouver's receiving bodies.

Provincial ambient water quality objectives include guidelines for contaminant limits within the water bodies to meet the specific designated uses for the different water bodies. Updating the water quality objectives for Burrard Inlet is a key priority in the development of the Burrard Inlet Action Plan, which is being led by the Tsleil-Waututh Nation with the support of the Province of BC. This work includes updating historical 'designated water uses' terminology to 'values,' with relevance to water quality. The 'designated water uses' or water 'values' to be protected include:

- **Aquatic life and wildlife:** Water quality supports biodiversity, and viable, healthy populations of species in the long-term. Species and habitats are found



at multiple locations and represent the range of species and habitats once more broadly present.

- **Human consumption of shellfish:** Healthy, wild shellfish can be harvested safely by present and future generations.
- **Human consumption of finfish:** Healthy, wild finfish can be harvested safely by present and future generations.
- **Cultural practices and recreational uses:** Water and sediment are safe and clean for cultural, spiritual, and recreational activities including primary contact and secondary contact activities
- **Institutional or commercial uses:** Water uses meet institutional or commercial needs without negatively affecting water quality at intake sites, outflow sites or the receiving environment

The water quality objectives, considering these uses, will need to be considered in development of the Healthy Waters Plan.

## 1.6 Sewer Backups

Sewer backups are caused by a variety of factors including blocked, clogged, and damaged pipes; undersized pipes with inadequate capacity; and heavy rainfall events that exceed the design capacity of the sewers. Based on the staff's operational knowledge, the leading causes of sewer backups in Vancouver is tree root intrusion into pipes, as well as oil, fat, and grease build-up. Blockages on property service connection pipes are the most common form of backup event. However, backups can also occur for mainline sewers that have exceeded their design capacity due to flows from heavy rainfall, high tide and high groundwater levels; a risk that is increasing with aging infrastructure and climate change.

On average, the City receives about 1,100 service requests per year for sewer backups through the 311 service request line. While back-up prevention devices have been required for all new buildings since 2018, most properties are not protected from sewer backups.

## 1.7 Overland Flooding

Vancouver is exposed to overland flooding hazards from various sources, including high coastal water levels, high river and creek levels, and high rainfall intensity and volume. The severity of these hazards is increasing with climate change.

Overland flooding in Vancouver typically results from drainage system limitations during heavy rainfall events, particularly when the soil is already saturated. Operational issues can also result in overland flooding, such as catch basins being plugged by leaves and sediment during the fall. The drainage system capacity is also increasingly being limited by high coastal water levels, which are occurring more frequently due to sea level rise and storm surge events. Under extreme rainfall events, overland flow will occur primarily on the road network along similar paths to historic streams that were buried. Many cities utilize roads for managing overland flow, but in the City of Vancouver overland flow via roads is not at this time considered a part of the rainwater conveyance network due to existing system design limitations. Regardless, when the roads and underlying drainage have insufficient capacity, overland flooding can impact people, properties, and infrastructure.

Overland flooding risk from coastal and Fraser River sources has been assessed through the Coastal Flood Risk Assessment and Coastal Adaptation Plan programs, which are informing on-going planning work. Work is also underway to update overland flood assessment and related planning for the Still Creek floodplain in Vancouver. For extreme rainfall flood hazard and risk in areas with buried streams, operational knowledge and on-going overland flow modelling work have been informing utility planning. However, a comprehensive risk assessment is still required as a foundation for policy and investments for managing overland flood risk.

## **2. Looking Ahead – Preliminary Baseline Forecast**

A Preliminary Baseline Forecast has been developed to better understand our future planning context considering asset management needs, water quality and complying with regulations for CSO elimination, uncertainties related to climate change and population growth, and financial considerations.

### **2.1 Forecasting Investment Requirements for Asset Renewal and Pollution Control**

The 2011 LWMP commits the City to separating 1% of its sewers on an annual basis, as well as eliminating CSOs by 2050. The 1% separation rate was determined based on a generalized assumption that pipe assets have an average lifecycle of 100 years and therefore require an average 1% per year renewal rate, and as such, system separation can take place concurrently as part of system renewal. In recent years the City has fallen short of achieving the 1% renewal rate due to significant cost escalation associated with sewer construction, as well as needing to deliver on other City service objectives, while mitigating affordability impacts. Starting in 2018, the introduction of the Utilities Development Cost Levy (UDCL) has enabled the City to dedicate funds for major neighbourhood scale growth-triggered system upgrades. This levy enables the City to expand its ability to address the sewer and drainage system demands, and to have “growth pay for growth”.

In order to provide an approximate overview of upcoming costs to achieve full system separation, a hypothetical scenario was created to assess the financial implications associated with achieving 100% sewer separation by 2050. This scenario considers how much of the sewer system is separated today, but does not consider the amount of separation progress that may be achieved through the growth program to serve new development. It also does not consider that extent to which complementary tools like green rainwater infrastructure may contribute to CSO mitigation. Key scenario assumptions to achieve 100% system separation by 2050 that inform Figure B8 include:

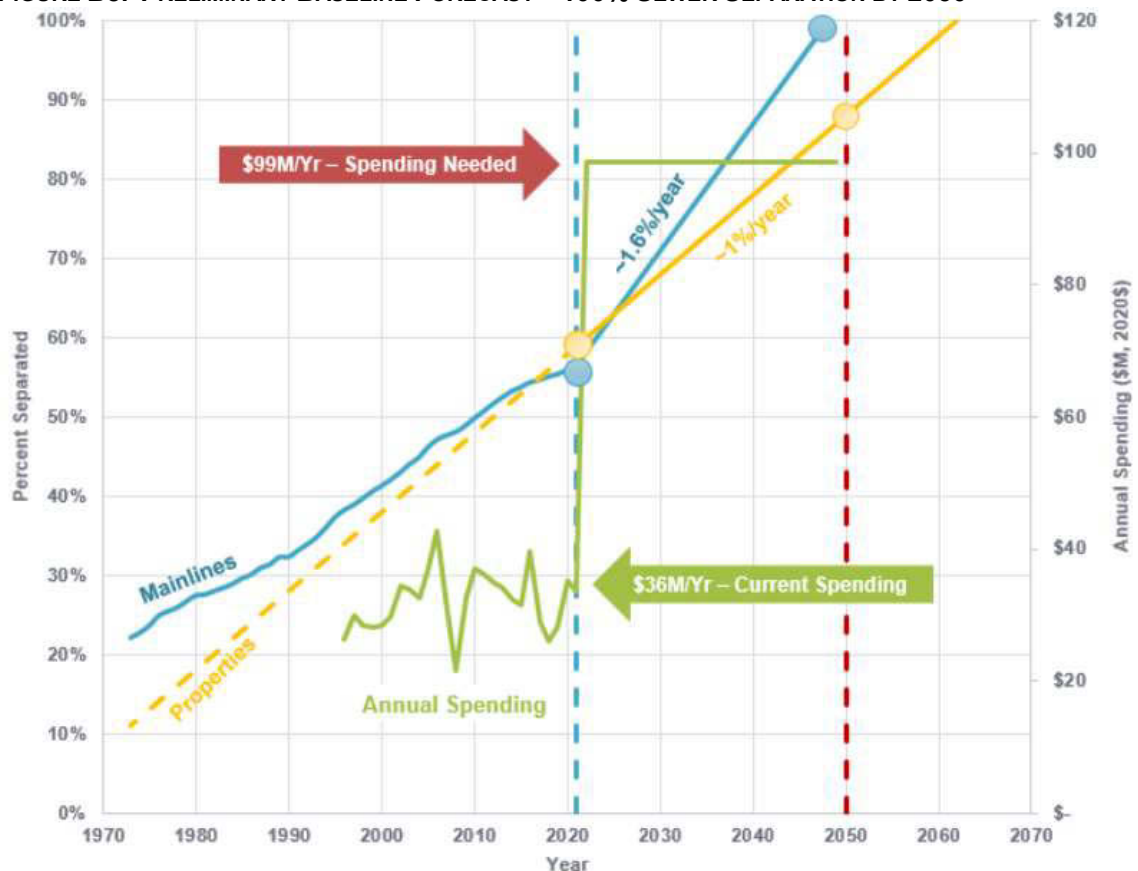
- An average renewal and separation rate of 1.6% of the system per year, between 2022 and 2050. A 1.6% rate considers previous years where the 1% target was not achieved
- Private property plumbing and connection pipes are separated at the time of redevelopment (analysis assumes 1% of inventory separated per year)

Key conclusions from Preliminary Baseline Forecast:

- To achieve 100% sewer separation by 2050, annual spending would need to be increased by 175% above 2019-2022 Capital Plan Sewer Renewal program (increasing from \$36M per year to \$99M per year)

- Based on redevelopment alone, a portion of combined private connections from existing properties will not be separated by 2050 (our analysis forecasts property connection separation is unlikely to be achieved until after 2060). Therefore, additional City spending and/or regulatory measures would need to be advanced to complete separation of private side combined connections.
- Concurrently, concentrating investment on sewer separation alone will increase urban runoff, and therefore amplify water quality and flood risks notably in low lying areas (unless mitigating policies and substantial additional investments are implemented concurrently to address flood risks and runoff water quality).
- This scenario may also result in some mainline sewer assets being renewed well ahead of their end of life, reducing the value achieved from infrastructure investments made in past years.

**FIGURE B8. PRELIMINARY BASELINE FORECAST – 100% SEWER SEPARATION BY 2050**



In conclusion, this baseline forecast indicates that 100% sewer separation by 2050 is not likely affordable nor achievable, and that sewer separation alone will likely exacerbate flood and runoff water quality risks, creating significant cascading risks that further exacerbate affordability challenges, particularly around flood-prone areas of the city.

In 2019, the Rain City Strategy was adopted, setting the target for green rainwater infrastructure to manage 40% of impervious areas by 2050. Implementation of green rainwater infrastructure to date has focused on removing contaminants from urban

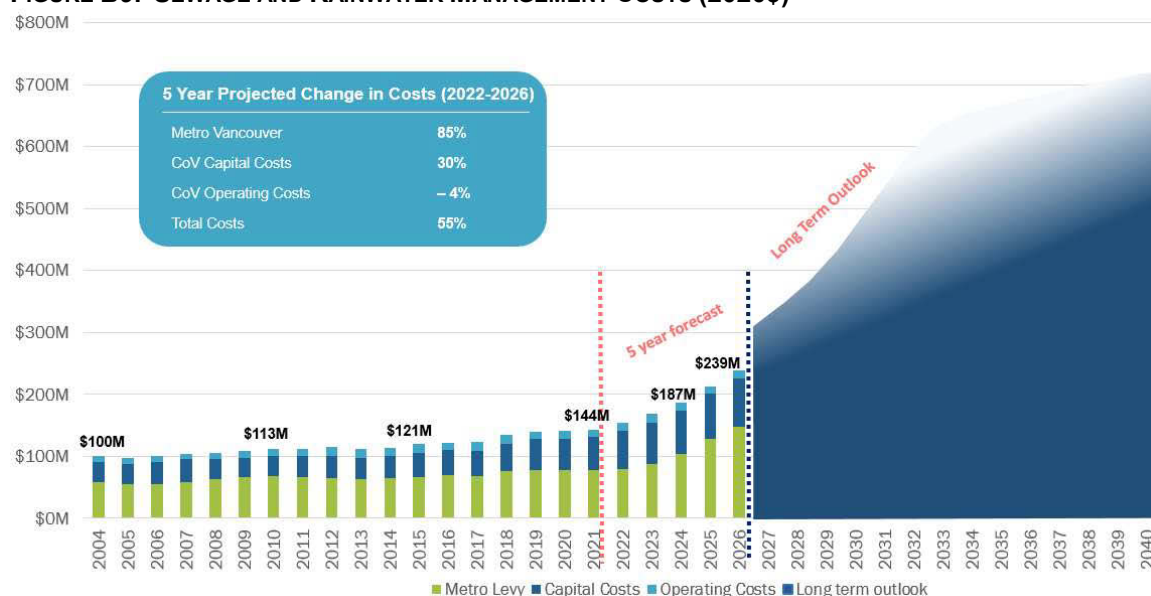
runoff, preserving pipe capacity and a range of social and ecological co-benefits. Further analysis is required within the Healthy Waters Planning process to define the role of green rainwater infrastructure for CSO elimination and for the Liquid Waste Management Plan update.

## 2.2 Rising Costs

Figure B9 shows how the City's sewage and rainwater management costs have changed over the years, normalized to 2020 dollars. It also includes a five-year forecast, which incorporates Metro Vancouver's most recent five-year forecast for its costs to be recovered from the Vancouver Sewerage Area, as well as the City's forecast costs, based on the current capital plan and operating spend trajectory.

A key driver for Metro Vancouver's forecast cost increase is the upgrade of the Iona Island WWTP to secondary or tertiary treatment. To comply with federal regulations, Metro Vancouver must upgrade the facility to significantly reduce pollutant loading from the Vancouver Sewerage Area (VSA) into the Salish Sea. This project is currently estimated to cost approximately \$10 billion, factoring in future inflation and contingencies. While Metro Vancouver has a regulatory requirement to complete the project before 2030, the earliest viable time that the project could be completed is 2034.

**FIGURE B9. SEWAGE AND RAINWATER MANAGEMENT COSTS (2020\$)<sup>6</sup>**



It is anticipated that this project will require significant Vancouver Sewerage Area sewer levy increases that will continue beyond the five year horizon shown in Figure B9. At this

<sup>6</sup> The forecasted cost increases from 2022 to 2026 are based on Metro Vancouver's 5-year forecast (presented as part of the Metro Vancouver 2022-26 Financial Plan in October 2021), as well as the forecast presented to Council in the 2022 Sewer Rate Report.. For 2027 to 2040, the forecast has a high level of uncertainty around how the Iona Island WWTP project will be funded. Key assumptions regarding the Iona WWTP that are factored into the 2027-2040 forecast include: (1) total project cost of \$9.9 billion, with Vancouver's share being 65% of the total and no senior government funding allocation; (2) operating cost of \$100 million per year, beginning in 2035 when secondary and tertiary treatment plant operations are anticipated to commence; (3) project fully debt-funded at current market debt rates; and (4) project substantially complete by 2034, with ongoing capital works at the site completing by 2040.

time, the cost implications for the City of Vancouver and its sewer utility customers are not known. Other regional liquid waste infrastructure upgrades will also have uncertain cost implications for Vancouver.



## APPENDIX C: PRIORITY ACTION PLAN

This appendix provides a summary of early priority actions within the sewage and rainwater management system to improve water quality. These actions have in some cases been initiated already, and will be proceeding in parallel with the Healthy Waters Plan's Phase 2 development. Council's approval of these projects occurs outside of this report and within the budgeting process.

Table C1 provides a summary of projects targeted to specific water bodies. These actions focus on water bodies with known pollution, where it is anticipated that positive outcomes are viable in the short to medium term. In addition, these projects are not anticipated to require extensive planning processes or large-scale capital investments to achieve positive results. Targeted water bodies include Still Creek, Musqueam Creek, Vivian Creek and False Creek.

**TABLE C1. ACTIONS TARGETED TO SPECIFIC WATER BODIES**

Category	Actions
<b>Still Creek</b> A salmon-bearing creek with deep community interest and known biological pollutants.	<ol style="list-style-type: none"> <li><b>1. Proceed with the Still Creek Rehabilitation and Enhancement Study:</b> this study will guide future work in the Still Creek watershed to improve the health of the waterway including physical instream habitat, riparian habitat and water quality while benefiting ecological, social, and cultural values.</li> <li><b>2. Implement Distributed investments in Green Rainwater Infrastructure:</b> This work will improve management of rainwater runoff, reducing contaminant loading from City of Vancouver streets as well as managing flow rates.</li> <li><b>3. Cross-Connection and Pollutant Source Investigations:</b> Over recent years, cross connection investigations have identified a number of locations where sanitary connections from private properties enter storm drainage pipes that flow into Still Creek. The catchment area is large, and more work is required to identify other potential cross connections in the area.</li> <li><b>4. Ongoing Water Sampling</b> to confirm water quality outcomes</li> </ol>
<b>Musqueam Creek</b> A salmon-bearing, creek of cultural significance to the Musqueam Indian Band, with potential biological pollutants.	<ol style="list-style-type: none"> <li><b>1. Proactively engage and support Musqueam Creek Working Group:</b> This group was established to investigate potential sources of pollution in the Creek. It includes representatives of the Musqueam Indian Band, Metro Vancouver and the City of Vancouver.</li> <li><b>2. Investigative Work</b> to identify any potential pollutant sources.</li> <li><b>3. Targeted Elimination of Pollutant Sources:</b> remediate any sources of pollution identified.</li> <li><b>4. Ongoing Water Sampling:</b> to confirm water quality outcomes</li> </ol>



<b>Vivian Creek</b> <b>Biological pollutants</b> arising from potential cross-connections	<ol style="list-style-type: none"> <li>1. <b>Investigative Work:</b> to identify any potential pollutant sources</li> <li>2. <b>Targeted Elimination of Pollutant Sources:</b> remediate any sources of pollution identified.</li> <li>3. <b>Ongoing Water Sampling:</b> to confirm water quality outcomes</li> </ol>
<b>False Creek</b> A heavily used waterway for recreation, with poor circulation and elevated <b>biological pollutants</b>	<ol style="list-style-type: none"> <li>1. <b>Ongoing Investigations:</b> to identify potential pollution sources from the sewer and drainage system</li> <li>2. <b>Targeted Elimination of Pollutant Sources:</b> remediate sources of pollution identified.</li> <li>3. <b>Review of System Operations:</b> review of operating parameters for weirs, pump stations etc. to understand if the operation can be modified to reduce overflow events</li> <li>4. <b>Targeted Sanitation and Street Sweeping:</b> continue resource deployment of sanitation and street sweeping in areas with separated storm sewers that drain into False Creek</li> <li>5. <b>Modeling Study:</b> Environmental Services has secured a consultant to undertake modeling to simulate transport of contaminants in False Creek to gain better understanding of potential sources of pollution contributing to elevated microbial levels</li> <li>6. <b>Complete Sewer Separation:</b> in the Charleston sewer catchment area (see "Investments Targeted to Accelerated Water Quality Outcomes" in Table D2</li> <li>7. <b>Water Quality Monitoring:</b> ongoing water sampling program to track changes to water quality over time</li> <li>8. <b>Other Actions:</b> being taken by City and other parties out of scope for Healthy Waters Plan (e.g., sea bins which collect trash)</li> </ol>

Table C2 provides a summary of other priority actions while planning, including:

- **Capital Investments Towards Accelerated Water Quality Outcomes:** The 2023-26 draft Capital Plan proposes a number of initiatives that target reductions in CSOs and urban runoff pollution that aim for accelerated water quality outcomes, as well as collaboration with Metro Vancouver on key trunk sewer projects.
- **Improved Planning and Decision Making:** This includes improved data management and modelling tools and development of a comprehensive watershed planning framework to address pollution and other management objectives
- **Public Communications and Outreach:** This includes expanding monitoring to all of Vancouver's CSO outfalls, implementing a public notification system, and developing a communications and engagement plan to improve public awareness and action around reducing pollution and other sewage and rainwater management objectives.



- **Demonstration Projects:** includes a range of projects that manage rainwater, targeting CSO and urban runoff pollution reduction and a range of environmental and social co-benefits. These projects will be closely monitored, and outcomes will inform planning decisions for other parts of the city.

**TABLE C2. OTHER PRIORITY ACTIONS WHILE PLANNING**

<b>Category</b>	<b>Actions</b>
<b>Investments in accelerated water quality outcomes</b>	<ol style="list-style-type: none"> <li>1. New priorities proposed in the draft 2023-26 Capital Plan: <ul style="list-style-type: none"> <li>○ Address CSOs and urban runoff pollution through targeted CSO reduction investments (Crowe St, Charleson Catchment, Renfrew Creek and SW Marine)</li> <li>○ Increased resources for cross connection and pollutant source investigations</li> </ul> </li> <li>2. Support Metro Vancouver on Manitoba Trunk Separation/Upgrade and Willow Storm Trunk projects</li> <li>3. Implement distributed green rainwater infrastructure projects.</li> </ol>
<b>Improved planning and decision-making</b>	<ol style="list-style-type: none"> <li>1. Develop city-wide modeling strategy and continue with expansion of modeling tool.</li> <li>2. Expand monitoring to all 20 of the City's combined sewer outfalls.</li> <li>3. Procure data management platform.</li> <li>4. Evaluate potential tools to achieve separation of combined property connection pipes as part of sewer separation projects.</li> <li>5. Complete Green Rainwater Infrastructure Pathways study, to inform improved rainwater management practices and requirements for new development.</li> <li>6. Develop the City's first Groundwater Management Strategy, with the objectives of protecting and making wise use of this limited resource, while identifying options for reducing groundwater infiltration into the City's sewage and drainage system and preserving system capacity.</li> <li>7. Develop a watershed planning framework, to achieve consistent and holistic watershed planning that address pollution control and other water management objectives.</li> </ol>
<b>Public communications and outreach</b>	<ol style="list-style-type: none"> <li>1. Implement public notification system for the City's CSO outfalls</li> <li>2. In collaboration with the Vancouver Park Board and Vancouver Coastal Health, implement water quality awareness signage at Vancouver beaches and key False Creek locations and outfalls.</li> <li>3. Develop public communications plan to improve public awareness around reducing pollution and achieving improved rainwater management on private properties.</li> </ol>
<b>Priority and/or demonstration projects to contribute to reduced CSOs and urban</b>	<ol style="list-style-type: none"> <li>1. Hastings Creek/Renfrew Creek urban creek renewal project, which will manage rainwater from 100 hectares of the city and renew an urban creek.</li> </ol>

<p><b>runoff pollution while providing a range of environmental and social benefits</b></p> <p><b>(As shown in Figure C1, on next page)</b></p>	<ol style="list-style-type: none"> <li>2. Alberta Street and Columbia Park Blue Green System, which will preserve system capacity in the Oakridge Town Centre area and create enhanced public spaces.</li> <li>3. Tatlow Creek Sewer Separation and Daylighting, which will separate local area sewers reducing CSOs and removing pollutants from urban runoff, as well as a range of co-benefits.</li> <li>4. Broadway Complete Street, which will include green rainwater infrastructure and 119 large canopy street trees in the blocks around new Millennium Line stations.</li> <li>5. St. George Rainway, which will include a series of green rainwater infrastructure practices, located in the same location as a historic creek and has been initiated by the local neighbourhood.</li> <li>6. Green Rainwater Infrastructure Laneway near Harriet St. and 30<sup>th</sup> will utilize an infiltration trench system and potentially create a template for other laneways in the city.</li> <li>7. A trial of a porous asphalt parking shoulder on East 52<sup>nd</sup> Ave. between Vivian St. and Wales St. will be used to reduce the impervious area of the street while addressing a problem drainage area of the road.</li> <li>8. Catch basin pilot project s testing the effectiveness of different catch basin designs at preventing litter and debris from entering the storm sewer system.</li> <li>9. Explore the implementation of a “Downspout Disconnection” pilot project, to incentivize the detention and retention of rainwater from roof-tops on private property, and reduce the amount of rainwater entering the sewage and drainage system. Portland and Toronto are recent examples.</li> </ol>
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FIGURE C1. MAP OF PRIORITY ACTIONS

