City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	May 2, 2009
From:	John Irving, P.Eng. MPA Director, Engineering	**File:**	01-0157-20-LWMP1/2009- Vol 01
Re:	**Liquid Waste Management Plan**		

Staff Recommendation

That the following comments be provided as initial input to Metro Vancouver on the draft Liquid Waste Management Plan:

1. A strategy to explore alternative delivery models and approaches, such as combined district utility systems be incorporated in the plan,

2. Source reduction policies be balanced with service delivery requirements for managing ground water discharge from construction sites with a particular focus on reviewing criteria for iron, and

3. Incorporate the following revisions to the Liquid Waste Management Plan Implementation Program:

    a) that item 18.1 be revised to include municipal rights to material and energy recovery, and

    b) that clause ii under item 35.3 be removed.

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ROUTED TO:	**CONCURRENCE**		**CONCURRENCE OF GENERAL MANAGER**		
Public Works	Y ☑	N ☐			
Environmental Programs	Y ☑	N ☐			
Sustainability	Y ☑	N ☐			
REVIEWED BY TAG	YES ☑	NO ☐	**REVIEWED BY CAO**	YES ☑	NO ☐

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Staff Report

Origin

At the Metro Vancouver Board meeting of March 27, 2009, the modified draft Liquid Waste Management Plan (LWMP) (Attachment 2, dated March, 2009) was approved by the Board and Metro Vancouver (MV) staff were directed to proceed with consultation.

At the MV Regional Engineers Advisory Committee (REAC) meeting of April 3, 2009, MV staff requested that municipal staff bring forward the draft LWMP to their respective municipal Councils to seek municipal input on the Plan.

This staff report is provided to present the draft LWMP with analysis of the implications to the City of Richmond and recommended response to MV.

Findings

The first LWMP was adopted by all Greater Vancouver Sewerage and Drainage District member municipalities in 2001 and approved by the Province of B.C. under the Waste Management Act in 2002. The March, 2009 draft LWMP is an update of the 2002 LWMP and offers an opportunity to consider past progress and include actions to address new issues and opportunities. The general objective is to update the LWMP every five years.

Development of the draft LWMP has been ongoing through 2008 and 2009. Metro Vancouver held a consultation process, between March 6 and May 30, 2008, to provide opportunities to receive input from citizens, municipalities, non-governmental organizations, businesses and First Nations on its Strategy for updating the LWMP. As part of this process, Metro Vancouver held nine public meetings and nine municipal workshops across the region. Further public consultation on the draft LWMP is now being conducted.

Analysis

The key liquid waste management areas for discussion and direction are:

- Strengthening source controls
- Improving Metro Vancouver, municipal and private sewer asset management
- Adopting new storm water practices for new developments
- Recovering materials and energy and water reuse
- The timing and order of providing secondary treatment to Vancouver and North Shore Sewerage Areas (Iona Island and Lions Gate wastewater treatment plants)

The main changes to the 2002 LWMP that are being proposed in the draft LWMP are a new layout and format of the plan, and updated contents that include the removal of completed action items and the addition of new actions to align the LWMP with current Provincial, Metro Vancouver and municipal policies and procedures. MV has attempted to align the draft LWMP with the Provincial plans and positions that have been introduced since 2002 including the BC Climate Action Plan, the BC Energy Plan, Living Water Smart, A Guide to Green Choices, and the Ministry of Community Development's objectives in Integrated Resource Management.

The delivery of the LWMP action items fall into one of three categories:

1. Metro Vancouver Programs
2. Municipal Programs
3. Combination of Metro Vancouver and Municipal Programs

Treatment Plant Upgrades

The two most significant key actions in the draft LWMP are the upgrading of the Iona Island and Lions Gate wastewater treatment plants to provide secondary treatment, and the ongoing commitment to reinvest in aging infrastructure. The draft LWMP identifies the total cost for the treatment upgrades to be $1.4 billion, and costs borne by MV for treatment upgrades will be passed to all member municipalities through the sewer rates. The municipalities that directly benefit from these improvements pay 30% of the cost and the balance (70%) is then distributed amongst all municipalities. 100% of the operating costs are paid by the sewerage area.

Given the significant cost and importance of this work, regional, provincial and federal cost sharing will be sought by MV on a 1/3, 1/3, 1/3 basis. The draft LWMP identifies that completion of the upgrades would be achieved by 2020 to 2030 and that the amount and timing of funding contributions will determine the actual implementation timeline.

This is by far the most costly action item in the LWMP.

Municipal Initiatives

The draft LWMP introduces fourteen new action items that are to be delivered exclusively by municipalities. Three of these action items relate to the delivery of Integrated Storm water Management Plans (ISMP's) that may have a varying degree of applicability to Richmond, however, further study is required in this regard. Action items are summarized in the attached table (Attachment 1).

These cost estimates were calculated by Metro Vancouver staff and are only preliminary estimates. The exact amount and timing of incurring any of these costs would need to be determined through further analysis. Adoption of the draft LWMP by the Metro Vancouver Board and ultimately the Province would, through the life of the plan, commit Richmond to potential one-time costs of $1,100,000 and annual costs of approximately $225,000 for programs that are exclusively the City's responsibility.

Item 16.1 – "Develop and implement asset management plans on a 100 year replacement cycle" is fundamental to the LWMP. Richmond has been proactive in ensuring that utility infrastructure rates and reserve funding requirements are well understood through work being done in the City's Engineering Planning section and the respective computer simulation sewer utility models built to support the City's Official Community Plan. Sewer utility reserve funding levels for infrastructure replacement are currently $4M annually and the recommended target to meet this initiative and replace infrastructure prior to failure is $6.3M annually as outlined in the 2009 Utility Budgets and Rates report presented at the December 8, 2008 Council meeting.

Proposed Initial Comments

Alternative Approaches
The draft LWMP has incorporated many elements to improve the current system. Opportunities exist to explore how other delivery system models may further the advancement towards more sustainable communities. Alternative views would consider opportunities such as system delivery at multiple scales (i.e. region/district/site level), combined utility delivery (e.g. district energy and water utilities), and liquid waste management through upfront design (i.e. making liquid waste management an integral part of any project from the very beginning). Exploration and piloting of alternative system approaches should be included as a specific strategy in the draft LWMP.

Ground Water Discharges
A key challenge for Richmond in particular is managing water-based discharge from dewatering activities associated with building and development projects. Richmond's ground water has naturally occurring high levels of dissolved iron. This water has the potential to adversely impact fresh water systems and as such is not always suitable to discharge to storm water systems. Current policies and practices in the do not always allow this water to be discharged through the sanitary system. Appropriate methodologies for best management approaches should include strategies to reduce dewatering volumes, such as ground re-charge discharge to sanitary systems. This issue should be incorporated or added as a strategy/action item for review in the draft LWMP.

Energy Recovery
Item 18.1 of the draft LWMP reads as follows:

"Seek and obtain legislative changes to permit Metro Vancouver to generate revenue from the recovery of materials and energy from its wastewater system and its wastewater treatment plants".

Exclusive Metro Vancouver rights to material and energy recovery from the wastewater system would displace potential revenue generation opportunities for the City. New legislation in this area should recognise municipal rights in this area and not limit revenue generation opportunities to Metro Vancouver.

It is recommended that item 18.1 be revised to include municipal rights to material and energy recovery.

Sewer Service Area Extension
Item 35.3 of the draft LWMP reads as follows:

"In collaboration with municipalities and the senior government agencies, develop criteria for the extension of municipal sewer service outside of Metro Vancouver's Urban Development Area

i. consider risks to public health, environment and agriculture.
ii. include provisions to ensure new municipal sewer servicing does not encourage or facilitate further development or urbanization."

Further development or urbanization should be considered through the Liveable Region Strategic Plan and guided by the City's OCP and land use planning and approval processes. It is recommended that clause ii under item 35.3 be removed from the draft LWMP.

Financial Analysis

Adoption of the LWMP by the Metro Vancouver Board and ultimately the Province will result in municipalities being required to include the action items in municipal work programs. The presentation by Metro Vancouver staff to the City's General Purposes Committee on May 4th outlines financial commitments for Richmond (Lulu catchment) of up to 25% over current sewer utility rates under a co-funded scenario. The final surcharge over current rates is dependent upon whether or not Metro Vancouver receives grants for large infrastructure projects and the schedule upon which the major initiatives are completed.

Next Steps

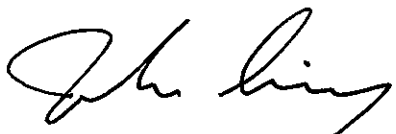
- Further consultation on draft LWMP: public, municipal and First Nations input
- Finalize LWMP for adoption by Metro Board and municipal Councils - 3rd quarter, 2009
- Submit Plan to Ministry of Environment for approval – 3rd to 4th quarter, 2009
- Implement the Plan - 2009-2010

Financial Impact

There is no direct financial impact at this time. As previously noted, adoption of the LWMP by the Metro Vancouver Board and the Province would commit the City to sewer utility rate surcharges of up to 25%.

Conclusion

Metro Vancouver is seeking comments from member municipalities on the draft LWMP. The draft LWMP includes a variety of new initiatives including $1.4B of sewer treatment plant improvements. This report summarizes the main points of the LWMP and provides recommendations for initial input from the City of Richmond to foster further innovation and enhance alignment with local interests.



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Att: 2

Draft LWMP New Municipal Cost Action Items

LWMP Action Item	Description Brief (see LWMP for full description)	Est. Cost to Metro Vancouver Member Municipalities per LWMP One time	Annual
1.2	Update bylaws to manage liquid waste at source	$ 1,500,000	
3.2	Develop inflow management plans: Consider inspection of private sewers		$ 2,000,000
4.1	Update bylaws to require min. on-site storm water management	$ 1,500,000	
4.2	Update utility design standards to enable on-site storm water management	$ 1,500,000	
15.2	Review and revise sanitary inflow and infiltration allowance	$ 200,000	
17.4	Undertake best practices audit every 3 years		$ 700,000
20.2	Identify and evaluate opportunities for heat recovery from sewers	$ 800,000	
26.2	Estimate and document GHG and air emissions associated with sewer system operation	$ 1,500,000	
32.1	Link integrated storm water management with land use planning	$ 1,500,000	
32.2	Implementation of storm water management plans	$ 1,500,000	
33.1	Integrated resource management implementation in sewerage areas – link planning initiatives	$ 3,000,000	
35.3	Develop criteria for sewer service extension outside MV Urban Development Area	$ 200,000	
Total cost to Municipalities		$ 13,200,000	$ 2,700,000
Richmond cost by % Population		**$ 1,100,000**	**$ 225,000**

Liquid Waste Management Plan

For the Greater Vancouver Sewerage & Drainage District and Member Municipalities

DRAFT – MARCH 2009

metro vancouver

www.metrovancouver.org

DRAFT

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Vision Statement

Sustainable Region Initiative

Metro Vancouver has a vision to achieve what humanity aspires to on a global basis – the highest quality of life embracing cultural vitality, economic prosperity, social justice and compassion, all nurtured in and by a beautiful and healthy natural environment.

We will achieve this vision by embracing the principles of sustainability, not least of which is an unshakeable commitment to the well-being of current and future generations and the health of our planet, in everything we do.

As we share our efforts in achieving this vision, we are confident that the inspiration and mutual learning we gain will become vital ingredients in our hopes for a sustainable common future.

Liquid Waste

Traditionally, liquid waste has been viewed as an unusable output needing collection, treatment and disposal. As resources world-wide become scarcer and more expensive, liquid waste is increasingly recognized as a resource from which materials, energy, and even water may be recovered and reused. Resource recovery can help to offset a portion of the costs associated with liquid waste management. In a fully sustainable system, there is no waste — everything is recycled, and reused.

The long-term vision for liquid waste management in Metro Vancouver is to achieve a fully sustainable system through ever increasing resource recovery.

This vision is supported by two goals:

Goal 1: Protect Public Health and the Environment

Providing basic wastewater collection and treatment services are core utility services that protect public health and the environment. By increasing resource recovery, less effluent and waste material will be discharged into the environment.

Goal 2: Manage Liquid Waste Affordably and Effectively

By recovering valuable resources such as materials, energy, and water from the liquid waste, Metro Vancouver will offset some of the costs of providing basic wastewater collection and treatment services.

A. Sustainable Liquid Waste Management Plan

The Sustainable Region Initiative

Sustainability encompasses a long term commitment to economic prosperity, community well-being and environmental integrity. It is at the core of Metro Vancouver's vision for the future and provides the foundation underpinning the development of the region's management plans.

In 2002, Metro Vancouver adopted The Sustainable Region Initiative (SRI) as its framework for decision making as well as the mechanism by which sustainability principles are moved from ideas into action. The SRI has been driven by three overarching principles which state that decision making must:

- Have regard for both local and global consequences, and long term impacts
- Recognize and reflect the interconnectedness and interdependence of systems
- Be collaborative

These provide the foundation for the three sets of sustainability principles that guide Metro Vancouver: conserve and develop natural, economic and social capital.

- Protect and enhance the natural environment (conserve and develop natural capital)
- Provide for ongoing prosperity (conserve and develop economic capital)
- Build community capacity and social cohesion (conserve and develop social capital)

Achieving a sustainable region requires ongoing reinvestment in infrastructure that is resilient and adaptable to address climate change, lessens the region's dependence on non-renewable energy supplies and minimizes impacts on the environment. A sustainable region requires innovation and new approaches to rationalize and prioritize the wide range of regional and municipal services that compete with each other for limited public funds.

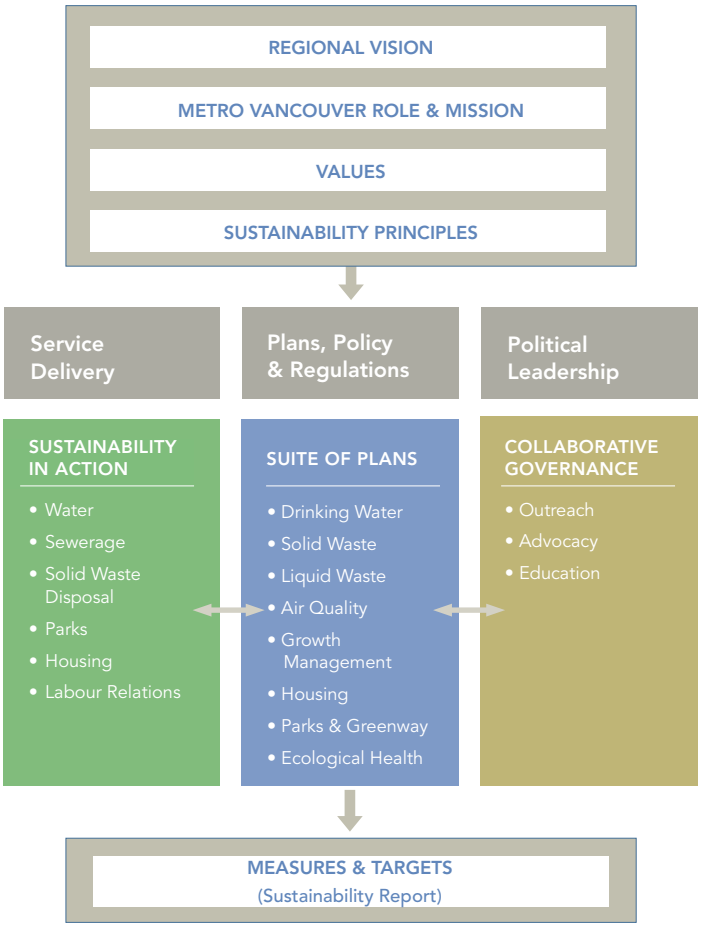
Sustainability and Liquid Waste Management

Liquid waste management is a critical part of protecting public health and maintaining a healthy environment — it is fundamental to a livable and sustainable region.

Wastewater is collected from homes, businesses, industries and institutions through a vast network of sewer pipes that transport it to a wastewater treatment plant where pollutants are removed. In addition, rainwater runoff can become contaminated by washing pollutants from streets, lawns and gardens — most of this runoff enters the receiving waterways untreated.

Ongoing new investment and reinvestment is essential to meeting new demands and maintaining the existing system. Innovation in maintenance, technology and partnerships is essential for sustainable liquid waste infrastructure.

Metro Vancouver Sustainability Framework



The 2002 Liquid Waste Management Plan (LWMP) included three key strategies to help achieve sustainability: conserve resources, maintain infrastructure and stretch capacity, and focus effort to maximize environmental benefit per dollar spent. The updated plan builds on these strategies by focussing on source reduction, materials and energy recovery, enabling innovation, ensuring appropriate asset management and building resilient infrastructure.

Integrated Resource Management

Wastes are resources—if accessed and used they can help preserve non-renewable resources, stretch the capacity of existing infrastructure, save energy, generate value, protect the environment and reduce greenhouse gas emissions—this is the potential of Integrated Resource Management (IRM). IRM was formally defined by the Province in 2008 in a report commissioned by the Ministry of Community Services titled Resources from Waste. It is a concept and process that uses a structured analysis of options that can achieve reliable water, wastewater, energy and solid waste services through a resilient design that can better accommodate future challenges required for adaptation to climate change and population growth. Options beyond the traditional approach of centralized wastewater treatment are investigated that can lead to a more distributed system incorporating revenue opportunities associated with water, energy, and materials from both the liquid and solid waste streams. It is a more sustainable way to address the region's needs, and strongly supports the development of a sustainable region. IRM is about integrated planning to explore and develop synergies and efficiencies in areas that traditionally were managed in isolation of each other.

A major challenge for Metro Vancouver and its members is adapting legacy sewerage and stormwater infrastructure from a 20th century model to a sustainable 21st century model. The IRM approach requires the successful alignment and

integration of provincial, municipal and regional plans and a willingness to embrace and refine new technologies and techniques.

IRM is applied through the strategies and actions in the LWMP by Metro Vancouver and by member municipalities. For example, Strategy 6: "Recover resources and value from liquid wastes" and Strategy 8: "Provide resilient infrastructure to address risks and long-term needs" provide the main context and actions that support IRM. Additional actions in Strategy 5: "Examine and use innovative approaches and technologies": will support IRM through collaboration, innovation audits, learning academies, and partnerships. The IRM approach is also supported through other actions such managing pollutants at their source, actions managing rainwater on-site, actions managing existing infrastructure investment, and eliminating combined sewer overflows. Most specifically, Implementation Step 33.1 will assess each sewerage area using an Integrated Resource Management business case model.

The updated LWMP has realigned its goals, strategies and actions to keep current with senior government policies and positions, as well as ensure that Metro Vancouver's and senior governments' environmental and fiscal objectives and actions are mutually supportive and successful.

Key senior government plans and policies supported by the LWMP include:

• *BC Climate Action Plan*: The Provincial government recognises that in managing greenhouse gas emissions, "doing nothing is not an option", and the "scientific evidence [for climate change] is now overwhelming, and so is the urgent need for action". The success in achieving the province-wide target of 33% less greenhouse gas emissions by 2020 (LiveSmart BC) depends on the success of supporting initiatives of other provincial and local government plans. Through the BC Climate Action Charter, Metro Vancouver and many of its municipalities have committed to becoming greenhouse gas neutral by 2012. The LWMP will contribute to meeting these targets through its actions to recover energy, water and nutrients from wastewater and stormwater.

• *The BC Energy Plan—A Vision for Clean Energy Leadership*: In support of the provincial government's vision for "clean energy leadership" and energy self-sufficiency by 2016, the LWMP builds and expands on previous Metro Vancouver initiatives by seeking to expand the production of biogas from wastewater, and seeks to recover heat energy from wastewater for use in district heating systems. Opportunities to integrate liquid and solid waste management can also support the BC Bioenergy Strategy: Growing our natural energy advantage. In partnership with municipalities and the private sector, initiatives in these areas will reduce greenhouse gas emissions, diversify the region's sources of energy, provide renewable energy and increase our energy independence.

• *Living Water Smart—British Columbia's Water Plan:* The LWMP supports provincial government positions in many areas. Local watershed planning is supported and enhanced through completion and implementation of municipal Integrated Stormwater Management Plans required by the LWMP. The provincial position to mandate purple pipes in new construction by 2010 will lead to a new network that delivers alternative water resources for non-drinking water uses—this will conserve drinking water and valuable distribution capacity. The LWMP helps to set-up alternate water supplies through its rainwater harvesting and water reclamation actions. Other Water Smart objectives supported by the LWMP include: developing an understanding of what makes streams healthy; watershed management planning in priority areas; and helping address the impacts of climate change and climatic cycles on local water resources. This is supported by the ongoing work of Metro Vancouver's two inter-governmental LWMP committees, the Environmental Monitoring Committee (EMC) and Stormwater Inter-agency Liaison Group (SILG).

• *A Guide to Green Choices—Ideas and Practical Advice for Land Use Decisions in BC Communities:* Expressed in this guide is the need for "sustainable infrastructure" and "integrating communities with nature". The long-term sustainable management of existing infrastructure investments as well as future infrastructure require integrated innovative solutions. The LWMP contains actions that support the reduction of sewage volumes and system risks through improved asset management and an adaptive management approach. Municipal integrated Stormwater Management Plans link the

health of urban streams to the land use decisions and will seek to protect the health of urban streams by better managing rainwater where it falls.

• *Burrard Inlet Environmental Management Plan and Fraser River Estuary Management Plan:* These are joint plans involving federal and provincial agencies, Metro Vancouver, municipalities and crown corporations. The LWMP supports the long-term goals of improving the health of Burrard Inlet and the Fraser River estuary by upgrading its wastewater treatment programs, elimination of combined sewer overflows, improved stormwater management, and ongoing environmental monitoring.

Linking with Metro Vancouver's Other Plans

There is an interdependence between the goals, strategies and actions in the LWMP and those in other regional plans—specifically the Regional Growth Strategy, the Solid Waste Management Plan, the Air Quality Management Plan, and the Drinking Water Management Plan. The LWMP supports a sustainable region by applying an IRM approach that aligns and integrates the goals, strategies and actions of other Metro Vancouver and municipal plans and initiatives, as identified in the Sustainability Framework.

Some examples illustrating the integrated links between regional plans include:

• *Drinking Water Management Plan (DWMP):* The LWMP recognizes the value of treated wastewater and rainwater. It enables the increased use of reclaimed wastewater for non-drinking water uses and will promote the harvesting of rainwater for landscape irrigation. Together, these plans help access new resources as alternatives to treated drinking water for when high quality drinking water is not needed. These plans support provincial government targets for BC to become 33% more efficient in its water uses.

• *Air Quality Management Plan (AQMP):* Strategy 3: "Minimize impacts from liquid waste on the environment—water, land and air" commits Metro Vancouver and member municipalities to minimizing the greenhouse gas emissions generated in providing their liquid waste programs. In addition, Strategy 6: "Recover resources and value from liquid waste" recognises that wastewater contains large amounts of low-grade heat that can be collected, concentrated and used as an alternative to fossil fuel in space heating and domestic hot water. About 25% of the region's air emissions result from fossil fuels use in space heating and providing domestic hot water. Actions under Strategy 6 will not only lead to a healthier environment through the reduction of air and greenhouse gas emissions, but also access a valuable renewable energy resource.

• *Solid Waste Management Plan (SWMP):* Food wastes can be processed to produce biogas—which is a renewable fuel. A similar process is used at wastewater treatment plants to treat wastewater solids. Under Strategy 6: "Recover resources and value from liquid wastes", and as part an IRM approach, Metro Vancouver will seek to produce biogas from co-managing liquid waste and organic solid wastes. In addition, technologies to make biodiesel from wastes will be considered for implementation. Through the LWMP's commitment to innovation and collaboration, opportunities to derive marketable fertilizer products, recovered nutrients and compost can be explored.

• *Regional Growth Strategy (RGS):* The regional sewerage system is a critical component of Metro Vancouver's urban development. The BC Local Government Act requires that all bylaws adopted and services undertaken by a regional district be consistent with the RGS. The RGS establishes the extent of Metro Vancouver's future urban development which improves certainty in investing and managing regional and municipal liquid waste infrastructure. Integration of municipal community planning and the LWMP also occurs within municipal commitments to Integrated Stormwater Management Plans by recognizing the link land use decisions have on the health of our urban streams.

The Sustainability Framework also provides a mechanism to collaborate with other organizations in areas of overlapping responsibilities such as transportation, economic development, culture, social responsibility, and environmental stewardship.

Liquid Waste Management in Metro Vancouver

Governance

Liquid waste management plans are authorized and regulated through the provincial Environmental Management Act. Municipalities and regional districts are allowed to tailor their plan to their area's unique economic, social, and environmental conditions. Plans authorize the discharge of suitably treated effluent from specified wastewater treatment plants according to the criteria set out in each plant's Operational Certificate.

The BC Ministry of Environment allows all local governments to develop and periodically update a liquid waste management plan. Once each updated plan is approved, it becomes part of local liquid waste regulation through the BC Environmental Management Act. In the absence of an approved LWMP, the provincial Municipal Sewage Regulation governs.

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 co-ordination between the following groups:

First Nations: have constitutional rights which must be taken into account in the planning process

Federal Government:

- Environment Canada: regulates pollutants and enforces key provisions of the Fisheries Act
- Fisheries and Oceans Canada: mandated to protect fish populations in receiving waters and urban streams

Provincial Government:

- Ministry of Environment: regulates liquid waste and approves Liquid Waste Management Plans
- Ministry of Community Development: enables infrastructure financing and provides co-funding
- Ministry of Health: regulates on-site systems (i.e. septic tanks)
- Ministry of Agriculture and Food: responsible for agricultural land management

Local Government:

- Municipal members of the GVS&DD: implement municipal actions in LWMP, mandated to manage stormwater and municipal sewage, required to report on their LWMP progress
- Metro Vancouver (GVS&DD): implement required regional actions in LWMP, collaborative role for some actions, required to report on its LWMP progress

Homeowners, businesses, institutions, and crown corporations: own and maintain private property sewer connections

Scope of the Plan

The LWMP is applicable to the geographic area of Metro Vancouver (see Figure 1). All strategies and actions in the LWMP are applicable to all members of the Greater Vancouver Sewerage and Drainage District (GVS&DD) as listed in Table 1.

The GVS&DD Sewerage Areas and major facilities are shown in Figure 2. The three villages (Belcarra, Anmore, and Lions Bay), Bowen Island Municipality, and portions of Electoral Area A are within the Metro Vancouver geographic area but are not GVS&DD members and did not participate formally in the development of the LWMP. As such, the applicability of the LWMP to these jurisdictions is limited to those parts of the plan addressing non-point source pollution issues such as pleasure craft sewage and on-site disposal systems. Electoral Area A includes the University Endowment Lands which is a member of the GVS&DD, and University of British Columbia which is not a member of the GVS&DD but does fall within the GVS&DD Vancouver Sewerage Area.

The LWMP includes actions for core service areas that the GVS&DD and member municipalities are required to provide (i.e., wastewater collection and treatment, stormwater management for municipalities, environmental monitoring). In addition, the LWMP includes collaborative actions to address cross-jurisdictional issues (i.e. septic tanks, agricultural rainwater runoff, and marine pump-out facilities for pleasure craft).

METRO VANCOUVER MEMBER MUNICIPALITIES

Greater Vancouver Sewerage and Drainage District Members (GVS&DD)

City of Burnaby	City of Port Moody
City of Coquitlam	City of Port Coquitlam
Corporation of Delta	City of Richmond
City of Langley	City of Surrey
Township of Langley	City of Vancouver
District of Maple Ridge	District of West Vancouver
City of New Westminster	City of White Rock
City of North Vancouver	University Endowment Lands portion of Electoral Area A
District of North Vancouver	
District of Pitt Meadows	

Village of Anmore

Village of Belcarra

Bowen Island Municipality

Village of Lions Bay

Portion of Electoral Area A excluding University Endowment Lands

Table 1

REPLACE WITH HIGH RESOLUTION MAP

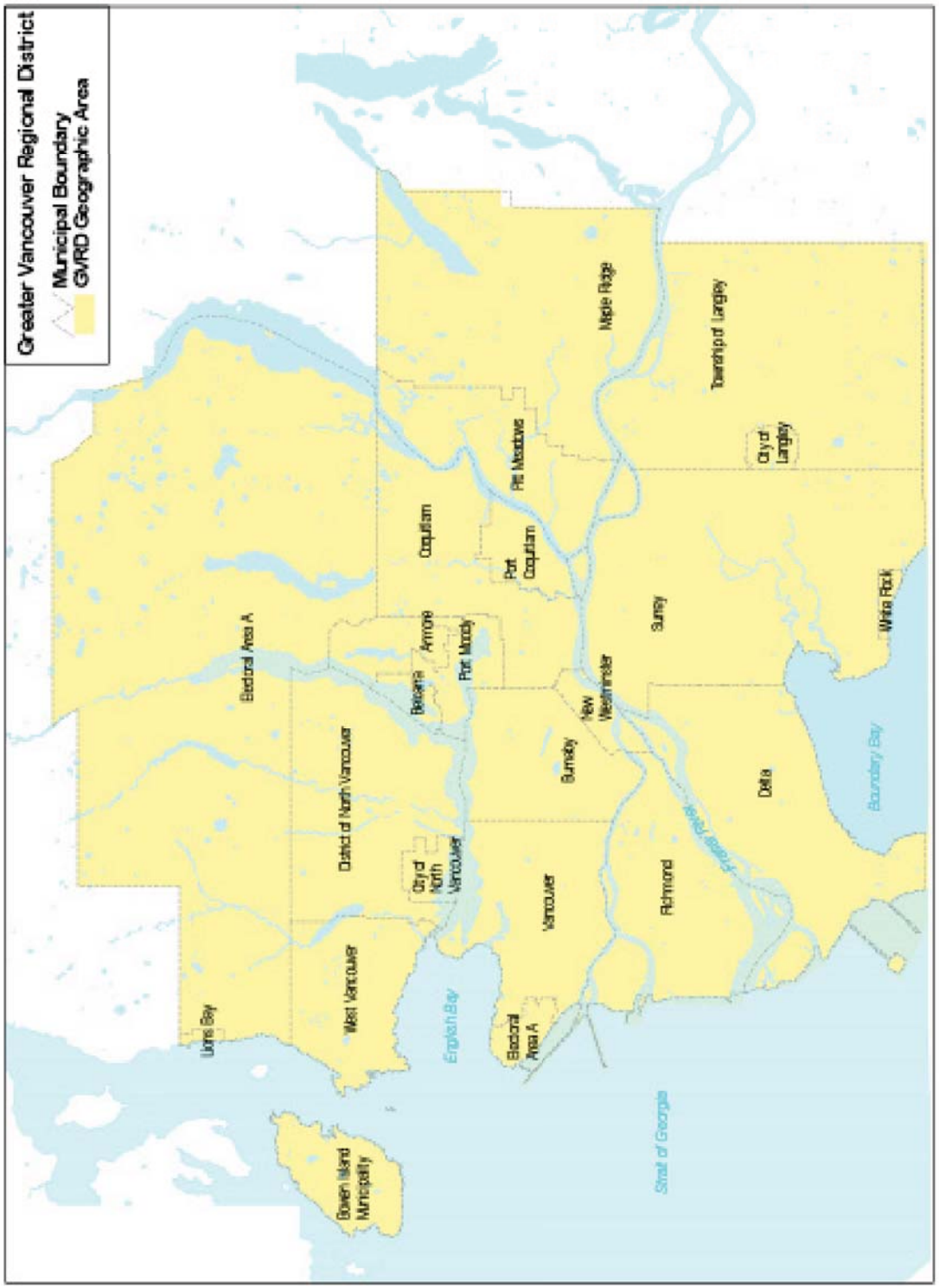


FIGURE 1 METRO VANCOUVER MEMBER MUNICIPALITIES AND ELECTORAL AREA A

REPLACE WITH HIGH RESOLUTION MAP

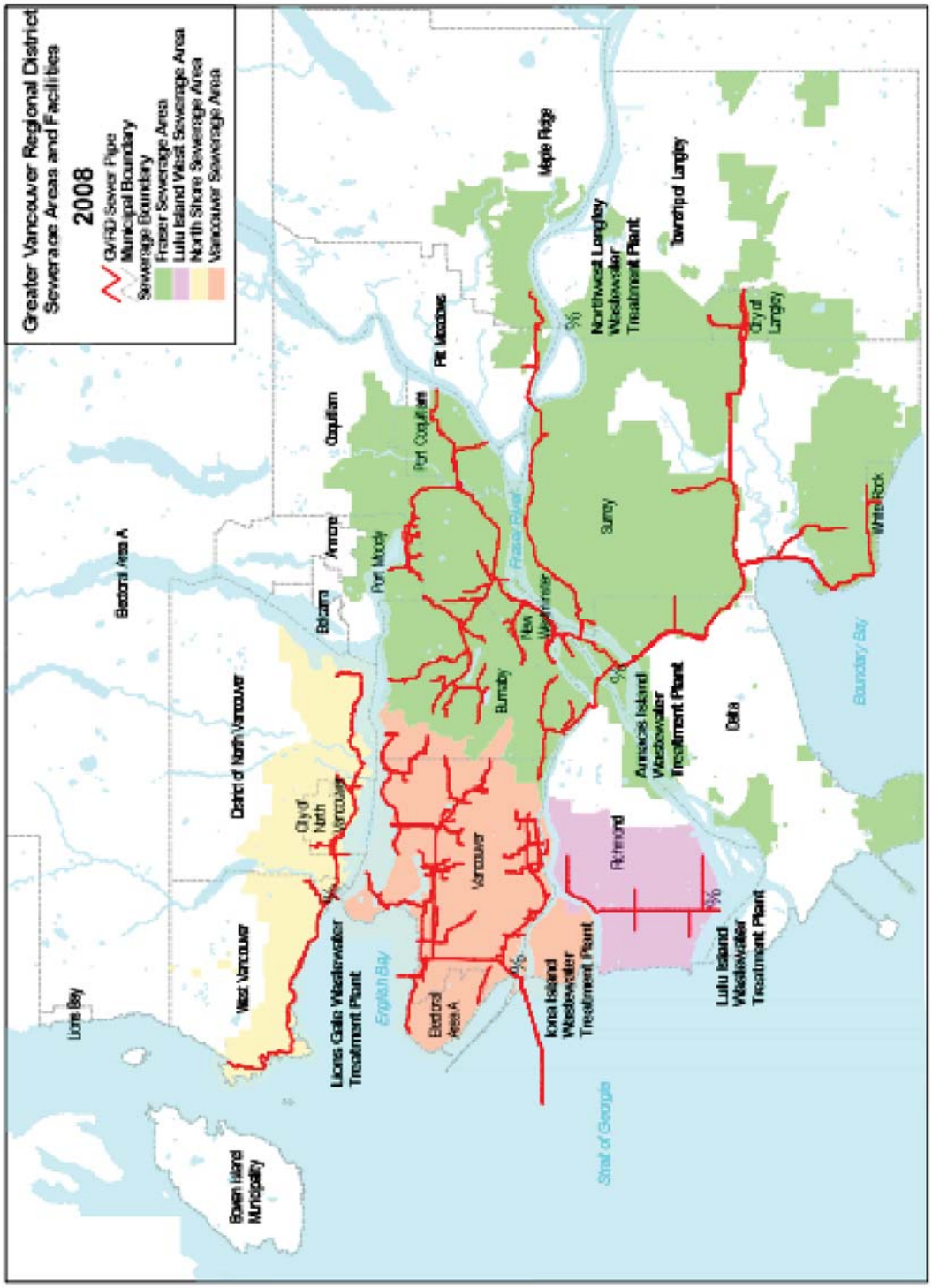


FIGURE 2 METRO VANCOUVER SEWERAGE AREAS AND EXISTING WASTEWATER TREATMENT PLANT LOCATIONS

B. Goals, Strategies, Actions and Measures

The Liquid Waste Management Plan has two goals, which are supported by eight strategies and multiple actions for Metro Vancouver and member municipalities. During implementation of the plan, there will be sufficient collaboration and coordination between Metro Vancouver, member municipalities and other partners to ensure an informed and consensus-based process.

Goal 1: Protect public health and the environment

The primary purpose of sewerage systems is preventing the spread of waterborne diseases and protecting the receiving environment from harmful liquid wastes. Principal objectives of rainwater management are preventing localized flooding from rainwater runoff and protecting urban streams from polluted runoff and damaging storm flows. Providing basic wastewater collection, treatment and receiving environment monitoring are core utility services that protect public health and the environment.

Strategy 1: Minimize liquid wastes at their source

This strategy enhances regional wastewater treatment and municipal stormwater management. By minimizing liquid wastes at their source, pollutants that cannot be efficiently removed at treatment plants or would impair sewerage system performance are reduced. This strategy also includes reducing stormwater by managing rainwater runoff at the site level which reduces negative quality and quantity impacts.

Key Metro Vancouver actions are directed at improved enforcement of the Sewer Use Bylaw and updating outreach and education programs, while municipal actions focus on managing stormwater at its source — the site level.

This strategy has the following actions:

Action 1: Improve regulations, codes, economic incentives and enforcement to better manage liquid wastes at source

Action 2: Support and improve liquid waste source management with targeted outreach programs

Action 3: Prevent rainwater and groundwater from entering sanitary sewer systems

Action 4: Minimize stormwater impacts by managing rainwater runoff at the site-level

Action 5: Decrease liquid waste volumes by reducing indoor water use

Strategy 2: Reduce wet weather overflows

Reducing the amount of rainwater and groundwater in sewage is vital to ensuring that existing sewerage system capacity is maintained and that wastewater overflows are minimized. Inspection, maintenance and replacement of sewer systems are essential activities to ensuring cost effective operation and preventing overflows.

Key municipal actions are to eliminate sewer overflows and reduce the risk of spills: by improving sewer inspection and rehabilitation programs to keep rainwater and groundwater out of sanitary sewers; and by separating the remaining combined sewers in Burnaby, New Westminster and Vancouver.

This strategy has the following actions:

Action 6: Eliminate sanitary sewage in combined sewer overflows

Action 7: Minimize occurrence of sanitary sewer overflows

Strategy 3: Minimize impacts from liquid waste management on the environment — water, land and air

The success of this strategy requires Metro Vancouver and municipalities to maintain and operate their liquid waste infrastructure and make improvements in response to identified risks to the environment.

Key Metro Vancouver actions are to provide secondary level treatment for all Metro Vancouver sewerage areas (upgrading North Shore and Vancouver wastewater treatment from primary to secondary).

This strategy has the following actions:

Action 8: Operate and maintain sewerage and drainage systems, and wastewater treatment plants

Action 9: Provide secondary level wastewater treatment as the minimum level for all Sewerage Areas

Action 10: Improve liquid waste management programs in response to environmental monitoring results

Action 11: Increase the number of marinas with pump-out facilities for pleasure craft

Action 12: Develop and implement an odour and air emission management strategy

Action 13: Minimize greenhouse gas emissions from liquid waste management

Goal 2: Manage liquid wastes affordably and effectively

To achieve sustainable liquid waste management, programs and services must be affordable and effective, now and in the future. Innovation, resource and value recovery, and resilient infrastructure and risk management are key strategies to fulfilling this goal.

Strategy 4: Manage assets and optimize existing liquid waste operations

Affordable liquid waste management requires ongoing assessment of the system performance and its integrity. It is more cost effective in the long-term to properly maintain the current investment in sewerage and drainage assets than to neglect it and face significantly higher repair and replacement costs in the future.

This strategy has the following actions:

Action 14: Assess the performance and condition of sewerage and drainage systems

Action 15: Improve effectiveness of wet weather flow management strategies

Action 16: Manage liquid waste assets so that expensive repair and rehabilitation is not deferred to future generations

Strategy 5: Examine and use innovative approaches and technologies

Innovation seeks improvement through local research and development and by adapting successes from elsewhere. It is essential to addressing new pollutants of concern, improving wastewater treatment, and sustainable stormwater management. Innovation is also important to reducing the long-term financial burdens of maintaining and rehabilitating the approximate 15,000 kilometres of regional, municipal and private sewers in Metro Vancouver.

Metro Vancouver and municipalities will explore and apply innovation to liquid waste collection, treatment, infrastructure management and environmental monitoring in order to improve liquid waste program effectiveness and value.

This strategy has the following action:

Action 17: Identify innovations that may: 1) improve the efficiency and effectiveness of wastewater and stormwater management services, and 2) provide secondary benefits to the environment and society

Strategy 6: Recover resources and value from liquid wastes

Liquid wastes and stormwater are sources of nutrients and green energy and can be an alternative source of water. Opportunities exist to reduce, reuse, recycle, and recover value from all materials — including liquid waste. This strategy is to access and recover new uses and value from liquid waste.

Metro Vancouver actions will target further water, energy and nutrient recovery from the liquid waste system. Municipal actions will examine the recovery of uses and value from rainwater and the renewable heat energy in sewer systems.

This strategy has the following actions:

Action 18: Seek legislation to enable revenue generation from the recovery of energy and materials from liquid waste

Action 19: Optimize the processing of wastewater treatment solids to maximize resource recovery

Action 20: Recover energy from liquid waste and biosolids

Action 21: Recover nutrients for fertilizer from liquid waste

Action 22: Promote the collection and use of rainwater for irrigation and other non-potable water uses

Action 23: Use reclaimed wastewater as an alternative to potable water where opportunities permit

Action 24: Explore options for beneficial uses of wastewater treatment grit and screenings

Strategy 7: Monitor the performance of the liquid waste system and impacts on the receiving environment

Monitoring and collection of data fall into two general categories: operation of infrastructure and assessment of the potential for impacts from discharges. Performance monitoring is essential to system optimization, and in guiding infrastructure planning and adaptive management.

This strategy has the following actions:

Action 25: Update the list of indicators to be used in assessing the environmental effects of liquid waste management

Action 26: Monitor the quantity and characteristics of liquid waste point discharges to the environment

Action 27: Monitor the ambient environment conditions of relevant water bodies in the region

Action 28: Monitor and assess the effects of liquid waste management on the receiving environment

Action 29: Collect data to assess effectiveness and plan liquid waste operations

Strategy 8: Provide resilient infrastructure to address risks and long-term needs

Key to resiliency is providing adaptable infrastructure to increase opportunities and flexibility for its future uses. Success of this strategy requires integration of liquid waste management with other plans and objectives both within and between Metro Vancouver and its members.

Key Metro Vancouver and municipal actions will include providing resilient and adaptable infrastructure to maximize options for its future use; and include collaboration on finding common solutions and strategies for sewer system management.

This strategy has the following actions:

Action 30: Develop scenarios and identify trends to assess risks to sewerage and drainage systems and their performance

Action 31: Develop integrated stormwater management plans at the watershed scale to manage rainwater runoff

Action 32: Implement integrated stormwater management plans at the watershed scale to manage rainwater runoff

Action 33: Adapt and integrate infrastructure to address risks and long-term needs

Action 34: Assess density trends in on-site sewage treatment and disposal facilities

Action 35: Co-ordinate liquid waste infrastructure and services with the Regional Growth Strategy and its objectives

Financial Plan

Providing secondary level wastewater treatment for the North Shore and Vancouver Sewerage Areas requires significant funding which has yet to be identified. Given the significant cost and importance of this work regionally, provincially, and federally, cost sharing on a 1/3:1/3:1/3 basis will be sought by Metro Vancouver and municipalities from both senior levels of government. In addition, Metro Vancouver will work with its member municipalities to ensure that the cumulative cost implications of this plan are mitigated through appropriate financial strategies such as rate smoothing. The amount and timing of provincial and federal cost sharing contributions to these secondary treatment programs will determine the timelines given the region's limited capacity to complete this work.

As a result, there are three potential timelines to achieving region-wide secondary level wastewater treatment:

1. Sufficient provincial and federal co-funding is provided for the construction and related costs, including accommodation of First Nations, to enable the provision of secondary treatment for both the North Shore and Vancouver Sewerage Areas by 2020;
2. Insufficient provincial and federal co-funding enables the provision of secondary treatment for only the North Shore Sewerage Area by 2020, with the Vancouver Sewerage Area by 2030; and
3. Insufficient provincial and federal co-funding enables the provision of secondary treatment for only the Vancouver Sewerage Area by 2020, with the North Shore Sewerage Area by 2030.

Performance Measures

Performance measures document progress in achieving the goals of the LWMP, and are useful for the adaptive management process.

Goal 1: Protect Public Health and the Environment

- minimize exceedances of parameters specified in the operating certificates for wastewater treatment plants
- minimize number of sanitary sewer overflows
- minimize sanitary sewage volumes in combined sewer overflows
- minimize wet weather peaking factors at key monitoring points
- minimize beach closure days

Goal 2: Manage Liquid Waste Affordably and Effectively

- maximize amount of energy and materials recovered from liquid waste system
- maximize number of integrated stormwater management plans completed
- maximize metres of sewer pipe inspected and renewed annually

Adaptive Management

The Liquid Waste Management Plan will be periodically reviewed and updated to adapt to the changing needs of the region. Metro Vancouver and its members will continue to provide a progress report to the province every two years. In addition, Metro Vancouver and its members will undertake a comprehensive review and update of the plan on a ten year cycle.

When assessing options to expand or modify utility services, Metro Vancouver and municipalities will capitalize on integrated resource management approaches that maximize ecological, social and economic benefits.

A key aspect of adaptive management is to monitor progress towards goals, any challenges, and options to overcome those challenges. To that end, the existing LWMP technical committees provide a valuable forum for the transfer of information and opportunities for collaboration to facilitate the implementation of the Liquid Waste Management Plan. The Terms of References for the two formal technical committees (i.e. the Stormwater Interagency Liaison Group (SILG) and Environmental Monitoring Committee (EMC)) were included in the previous LWMP and will be updated as appropriate. The LWMP technical committees provide input and guidance to Metro Vancouver and member municipalities as requested.

In addition to the formal technical committees, there are informal technical committees that facilitate implementation and adaptive management of the liquid waste management plan including: Fraser Sewerage Area Technical Committee (including the Lulu Island Sewerage Area), North Shore Sewerage Area Technical Committee, Vancouver Sewerage Area Technical Committee, and the REAC Liquid Waste Subcommittee.

The Burrard Inlet Environmental Action Program (BIEAP) and the Fraser River Estuary Management Program (FREMP), together forming the BIEAP-FREMP Management Committee, will continue to act as a senior level forum for much of the policy matters and assessment of the scientific work upon which the LMWP is based.

C. Liquid Waste Management Plan Implementation

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
Strategy 1: Minimize liquid wastes at their source					
1 Improve regulations, codes, economic incentives and enforcement to better manage liquid wastes at source	1.1 Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the Canadian Environmental Protection Act: i. develop Codes of Practices to reduce contaminant discharges and priority contaminants from commercial and institutional sectors, including: hospitals and laboratories, heating & cooling system discharges, U-Brew & U-Vint, automotive repair services, carpet cleaners, and printers ii. develop new regulatory instruments, such as Pollution Prevention Plans, to complement existing regulations iii. revise non-domestic fee structure to improve cost recovery according to the polluter-pay/user pay principle, including: a) Permit Application and Amendment Fees b) Permit Administration (Compliance Promotion) Fees c) Industrial Discharge Fees (for conveyance, treatment and disposal costs)	C30. C31. C25. C26.	Metro Vancouver	2012	$100,000/y
	1.2 Review and update stormwater and sewer use bylaws to manage liquid wastes at source, including contaminants identified by the Canadian Environmental Protection Act	P14. P15.	Municipalities	2012	$1,500,000
	1.3 Develop a region-wide strategy that identifies and targets the management of pesticides and lawn care products impacting rainwater runoff quality and urban stream health	P16. P17. C13b	Metro Vancouver	2014	Included in Metro Vancouver programs
	1.4 Seek from the Province legislative changes to allow enhanced compliance promotion and enforcement, including: i. enabling the use of administrative penalties and ticketing for less serious infractions ii. increasing the maximum fine available through the courts		Metro Vancouver & Province	2011	$25,000
	1.5 Provide resources for Metro Vancouver-municipal permitting, inspection, and outreach program co-ordination to support and enforce sewer use bylaws i. Metro Vancouver sewer–use bylaws and supporting outreach programs		Metro Vancouver & Vancouver	Ongoing	$500,000/y (including additional four staff for compliance promotion)
	ii. municipal bylaws and supporting outreach programs		Municipalities	ongoing	Existing programs
2 Support and improve liquid waste source management with targeted outreach programs	2.1 Develop and implement targeted outreach plans for identified priorities to support and improve liquid waste source management programs i. consider opportunities for collaboration on relevant initiatives with municipalities, senior government agencies, and non-governmental organizations ii. consider opportunities that complement outreach programs which support other regional plans	C29.	Metro Vancouver	Ongoing	$200,000/y

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
3 Prevent rainwater and groundwater from entering sanitary sewer systems	3.1 Develop a template to guide the preparation of inflow and infiltration management plans as part of broader asset management plans (detailed in Action 16.2) and sanitary sewer overflow reduction strategies i. identify and evaluate options and opportunities that promote the reduction of groundwater and rainwater inflow and infiltration into municipal sanitary sewers, including inflow and infiltration originating from service laterals (private and public sections of sewer connections) ii. consult with municipalities on template development	C19	Metro Vancouver	2010	$200,000
	iii. identify needed changes to legislation and legal authority to enable options and strategies		Metro Vancouver	2012	$200,000
	3.2 As a component to municipal asset management plans (detailed in Action 16.2) and as a strategy to reduce sanitary sewer overflows, develop and implement inflow and infiltration management plans so that wet weather inflow and infiltration are less than Metro Vancouver's inflow and infiltration allowance as measured at Metro Vancouver's flow metering stations (defined in Action 15.2) i. use the Metro Vancouver template to guide the development of inflow and infiltration management plans ii. inflow and infiltration management plans will consider inspection of private sewers connected to municipal sewers: a) as part of the municipal process in evaluating and issuing renovation and building permits for serviced properties b) at the time of property transfer, and/or c) targeted inspection	P8 C19	Municipalities	2014	$2,000,000/y
	iii. require the repair or replacement of private sewers: a) that have cross-connections between storm sewers and sanitary sewers b) identified as being in poor condition		Municipalities	Ongoing	private property owners
	3.3 As a component to regional asset management plans and as a strategy to reduce sanitary sewer overflows, develop and implement inflow and infiltration management plans so that wet weather inflow and infiltration does not exceed Metro Vancouver's inflow and infiltration target (defined in Action 15.2)		Metro Vancouver	2012	$1,000,000/y
	3.4 Update and enforce sewer use bylaws to prohibit the construction of rainwater and groundwater connections to sanitary sewers, i. permit exceptions specifically authorized by the Ministry of Environment	P20	Municipalities	2010	included in Action 1.2
			Metro Vancouver	2010	$50,000/y for ½ an enforcement officer

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
4 Minimize stormwater impacts by managing rainwater runoff at the site-level	4.1 Update municipal bylaws to require a minimum level of on-site rainfall management to meet watershed specific criteria established in municipal integrated stormwater management plans, or to meet baseline region-wide criteria (detailed in Action 4.3ii) in the absence of runoff criteria in integrated stormwater management plans (detailed in Action 31.1)	C17 C38 NEW	Municipalities	2012	$1,500,000
	4.2 Update municipal utility design standards and neighbourhood design guidelines to enable on-site rainwater runoff management i. use the current version of Metro Vancouver's "Stormwater Source Controls Design Guideline" as a guide ii. use relevant models and analytical tools such as those promoted by the Green Infrastructure Partnership and Water Balance Model for Canada	C17 NEW	Municipalities	2012	$1,500,000
	4.3 Through consultation with municipalities and Stormwater Inter-agency Liaison Group, facilitate site-level rainwater management i. identify options for municipal stormwater bylaws and integration of on-site rainwater runoff management requirement within municipal administrations a) include model utility design standards and options for neighbourhood design guidelines for municipalities ii. establish baseline region-wide levels of on-site rainfall runoff management that consider variations in localized geology, rainfall and watershed health iii. identify options to regulate and ensure continued performance of site-level rainwater management systems, including those located on private property a) work with professional, trade associations and agencies to develop supporting codes of practice, certification, guidelines and standards	NEW	Metro Vancouver	ongoing	$200,000/y
5 Decrease liquid waste volumes by reducing indoor water use	5.1 Promote the reduction of indoor potable water consumption to reduce wastewater volumes i. support complementary initiatives in the Metro Vancouver Drinking Water Management Plan such as indoor potable water conservation strategies ii. develop and promote targeted outreach programs to reduce indoor potable water use iii. in consultation with the municipalities, develop guidelines and options to: a) update local building codes and bylaws to promote indoor potable water use reduction and enable guidelines and options b) seek changes to plumbing codes to enable guidelines and options	P19 MC6a MC6b C32	Metro Vancouver		Included in DWMP

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
Strategy 2: Reduce wet weather overflows					
6 Eliminate sanitary sewage in combined sewer overflows	6.1 Prohibit the construction of new combined sewer systems—new storm and sanitary sewers may function as combined sewers as part of the joint municipal-regional strategies to reduce combined sewer overflows	P6	Metro Vancouver and municipalities	ongoing	Included in existing Metro Vancouver and municipal programs
	6.2 Develop and implement sewer separation plans that minimize the occurrence of combined sewer overflows to a frequency no greater than once every 5 years for a 24h duration event for the Vancouver Sewerage Area by 2050 and for the Fraser Sewerage Area by 2075 i. consider the implications of climate change and climate oscillations	C13 C15 NEW	Burnaby, New Westminster and Vancouver	ongoing	Included in existing sewer separation programs
	6.3 Develop joint municipal-regional strategies to eliminate the overflow of sanitary sewage from combined sewer systems for the Vancouver Sewerage Area and Fraser Sewerage Area that: i. evaluate and prioritize options for catchments tributary to each combined sewer outfall (municipal and regional) with respect to sewer separation, wet weather flow storage and diversion ii. identify compatible regional and municipal sequence and timelines for trunk and collector sewer separation iii. consider options to target and manage rainwater runoff quality through strategic use of existing combined sewers iv. identify a strategy to separate combined sewer connections from private properties	C13 NEW P6 C15	Metro Vancouver, Burnaby, New Westminster and Vancouver	2012	$600,000
	6.4 As part of the implementation of joint regional-municipal strategies, replace combined sewers with separated sanitary and storm sewers as determined by municipal sewer separation plans:	C15	Metro Vancouver, Burnaby, New Westminster and Vancouver	Ongoing	Included in existing sewer separation programs
	i. in the Vancouver Sewerage Area, continue to separate the municipal combined sewer system at an average of 1 percent of the system per year to reduce combined sewer overflows		Vancouver and Burnaby	Ongoing	Included in existing sewer separation programs
	ii. in the Fraser Sewerage Area, implement the municipal combined sewer separation plan at an average annual rate of 1½ percent to reduce combined sewer overflows		Burnaby and New Westminster	Ongoing	Included in existing sewer separation programs

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
7 Minimize occurrence of sanitary sewer overflows	7.1 As part of asset management plans (detailed in Action 16.2), jointly develop municipal-regional sanitary sewer overflow management plans that: i. identify options to prevent sanitary sewer overflows caused by heavy rain and snowmelt events from occurring a) at a frequency no greater than once every 5 years for a 24h duration event b) consider implications of climate change and climate oscillations ii. consider inflow and infiltration management plans (detailed in Action 3.2) iii. identify options for system capacity improvements, wet weather containment, point treatment options, and timelines iv. are specific to regional Sewerage Areas or their sub-areas v. assign priority to locations experiencing high growth and chronic sanitary sewer overflows that may pose health or environmental risks	P11. MC4b	Metro Vancouver and municipalities	2012	$1,500,000
	7.2 Jointly implement sanitary sewer overflow management plans (as noted in 7.1)	NEW	Metro Vancouver and municipalities	2019	$60,000,000

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
Strategy 3: Minimize impacts from liquid waste management on the environment—water, land and air					
8 Operate and maintain sewerage and drainage systems, and wastewater treatment plants	8.1 Implement asset management plans for sewerage and wastewater treatment systems (detailed in Action 16.2) to help maintain infrastructure reliability and performance	P3. P4. P9. P22	Metro Vancouver and municipalities	Ongoing	Included in Metro Vancouver and municipal programs
	8.2 Provide basic service capacity for all trunk sanitary sewers by providing dry weather sewage conveyance plus allowance for the Metro Vancouver average inflow and infiltration allowance (detailed in Action 15.2) i. upgrade and maintain systems to provide established hydraulic gradelines and safe-operating levels	P9	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	8.3 In consultation with municipalities and Environmental Monitoring Committee, develop and implement emergency sanitary sewer overflow plans that: i. identify and maintain a system of emergency overflow locations ii. develop plans jointly for each sewerage area, or sub-areas iii. include emergency spill contingency plans to minimize the consequence of unavoidable sanitary sewer overflows caused by extreme wet weather, system failures, and unusual events	P13.	Metro Vancouver and municipalities	Ongoing	Included in Metro Vancouver programs
9 Provide secondary level wastewater treatment as the minimum level for all Sewerage Areas	9.1 Provide a minimum of secondary level wastewater treatment for:	C8. MC5a	Metro Vancouver		
	i. the North Shore Sewerage Area by constructing a new wastewater treatment plant on the Metro Vancouver owned property located between Pemberton, Philips and McKeen Avenues, and West First Street in North Vancouver a) decommission the Lions Gate wastewater treatment plant once the new plant is operating			See Page 16 for timelines	$400,000,000
	ii. the Vancouver Sewerage Area				$1,000,000,000
10 Improve liquid waste management programs in response to environmental monitoring results	10.1 Environmental monitoring will be used to assess discharge compliance with regulations, standards, and official water quality designations, with monitoring results being used to determine remedial actions i. remedial actions will be identified in consultation with Environment Canada and the Ministry of Environment	P1 P2 P5 C11 MC5b	Metro Vancouver and Municipalities	Ongoing	Included in Metro Vancouver and municipal programs

Goal 1: Protect public health and the environment

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (additional cost & resources to current level)
11 Increase the number of marinas with pump-out facilities for pleasure craft	11.1 Ensure that all new and renovated (where renovations exceed 50% of the assessed existing improvements value) marinas have pump-out facilities for access by pleasure craft by: i. collaborating with private marina operators, Ministry of Environment, and Environment Canada, develop regulations and incentives to ensure all marinas have pleasure craft pump-out facilities ii. advise Ministry of Environment of barriers iii. installing pump-out facilities for pleasure craft at all municipal marinas	C41. C42.	Municipalities	2012	Included in municipal programs
	11.2 Require all pleasure craft pump-out facilities to: i. connect to the municipal sanitary sewage system, ii. connect to a provincially permitted on-site treatment and disposal system, or iii. have established protocols for handling liquid waste by truck or barge for disposal at a permitted liquid waste management facility		Municipalities	2012	Included in municipal programs
12 Develop and implement an odour and air emission management strategy	12.1 Continue with odour control programs at wastewater treatment plants, and develop and implement odour control programs for targeted facilities in the regional sewer system and for relevant energy and material recovery processes	NEW	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	12.2 Continue with existing municipal odour control programs and develop and implement new odour control programs for targeted municipal sewer facilities	NEW	Municipalities	Ongoing	Included in municipal programs
	12.3 Identify, develop and implement programs to manage air emissions from standby power generators, and biogas production and use at: i. Metro Vancouver's sewer pump stations and wastewater treatment plants	NEW	Metro Vancouver	2014	Included in Metro Vancouver programs
	ii. municipal sewer pump stations	NEW	Municipalities	2014	Included in municipal programs
13 Minimize greenhouse gas emissions from liquid waste management	13.1 Evaluate and implement actions that reduce greenhouse gas emissions from liquid waste management to help achieve:	NEW		2020	Small cost for operations vehicles
	i. federal, provincial and municipal greenhouse gas emission targets		Municipalities		
	ii. federal, provincial and Metro Vancouver greenhouse gas emission targets		Metro Vancouver		

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
Strategy 4: Manage assets and optimize existing liquid waste operations					
14 Assess the performance and condition of sewerage and drainage systems	14.1 Inspect all regional and municipal sanitary sewers on a twenty year cycle: i. maintain up-to-date mapping of sewerage system inspection, condition and repairs using a consistent approach to sewer system evaluation and reporting ii. use the Metro Vancouver "Sewer Condition Reporting Template Standard, Report, November 2002" as a guide	C19	Metro Vancouver	Ongoing	$150,000/y
			Municipalities	Ongoing	$200,000/y
15 Improve effectiveness of wet weather flow management strategies	15.1 Identify and explore initiatives and strategies that promote the maintenance of sewer capacity and system integrity, including financial mechanisms specific to reducing inflow and infiltration into municipal sanitary sewer systems	NEW	Metro Vancouver	2014	$200,000
	15.2 Metro Vancouver and municipalities will jointly 1) review, and revise if appropriate, Metro Vancouver's average inflow and infiltration allowance of 11,200 litres per hectare per day for regional trunk sewers and wastewater treatment plants and 2) identify associated target inflow and infiltration allowances for municipal sewer catchments: i. associated with a 1:5 year return frequency storm event for sanitary sewers ii. assess how climate change and precipitation trends affect these allowances iii. assess the implications of variations in regional geology and topography iv. assess whether different allowances for different sewerage areas are warranted v. assess the effectiveness of inflow and infiltration management plans (detailed in Action 3.2) with respect to achieving the regional inflow and infiltration allowance as measured in the regional system	NEW	Metro Vancouver and municipalities	2014	$200,000

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
16 Manage liquid waste assets so that expensive repair and rehabilitation is not deferred to future generations	16.1 In consultation with the municipalities, review Metro Vancouver's safe-operating head for regional sewers	NEW	Metro Vancouver	2011	$100,000
	16.2 Develop and implement asset management plans targeting a 100 year replacement cycle for regional and municipal sewerage infrastructure that: i. consider liquid waste planning scenarios to assess sewerage and drainage system needs and requirements for performance and capacity ii. consider risks, such as climate change, sea level change and seismic iii. address inflow and infiltration management (detailed in Action 3.2) iv. design allowance for wet weather flow capacity in regional trunk sanitary sewers is based upon the Metro Vancouver average inflow and infiltration allowance (detailed in Action 15.2) v. identify sewer upgrades and maintenance needs so that the hydraulic gradelines do not exceed established safe-operating levels vi. document safe-operating head profiles for all regional trunk sewers vii. periodically review and revise profiles viii. consider infrastructure condition inspection findings (detailed in Action 14.1) ix. address long-term repair, rehabilitation and replacement of sewerage system components through component asset management inventories and planning	P8 NEW	Metro Vancouver	2016	$200,000/y
			Municipalities	2016	to be determined by the asset management plan (note: 1% regionally is $60 million / year)
	16.3 Provide copies of municipal asset management plans for sewerage infrastructure to Metro Vancouver (Action 16.2)	NEW	Municipalities	Ongoing	Included in municipal programs
	16.4 Update and implement asset management plans for wastewater treatment plants that: i. use liquid waste planning scenarios to assess sewerage and drainage system needs and requirements for performance capacities and to address risks ii. consider vulnerability to climate and sea level change, and seismic events iii. maintain optimum wastewater treatment performance in wet weather iv. design allowance for wet weather flow capacity in regional wastewater treatment plants serving the Fraser, North Shore and Lulu Island Sewerage Areas is based upon the Metro Vancouver average inflow and infiltration allowance (detailed in Action 15.2) v. plan and guide the long-term repair, rehabilitation, replacement and upgrade of wastewater treatment plant components through asset management inventories and planning	C9 NEW	Metro Vancouver	2016	Included in Metro Vancouver and municipal programs

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
Strategy 5: Examine and use innovative approaches and technologies					
17 Identify innovations that may: 1) improve the efficiency and effectiveness of wastewater and stormwater management services, and 2) provide secondary benefits to the environment and society	17.1 Collaborate with local and senior governments, academic institutions and industry on stormwater management research; wastewater treatment technology research; demonstration projects on green infrastructure; asset rehabilitation and renewal technologies and techniques; and training program and toolkit development for municipal sewerage and drainage asset management planning	NEW	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	i. copy neighbouring municipalities and regional district's with minutes of the Stormwater Inter-agency Liaison Group meetings	MR2	Metro Vancouver	Ongoing	Included in Metro Vancouver and municipal programs
	17.2 Develop one or more academies for wastewater and rainwater-runoff management research and innovation in collaboration with others i. provide space for an academy at Annacis Island wastewater treatment plant	NEW	Metro Vancouver	2014	$100,000/y
	ii. develop funding mechanisms to support innovative research and demonstration projects	NEW	Metro Vancouver	2012	Included in Metro Vancouver programs
	17.3 Undertake an internal audit of best practices for a different Metro Vancouver liquid waste management sub-program every year to identify opportunities for innovation to improve its efficiency and effectiveness	NEW	Metro Vancouver	Ongoing annual	$150,000/y
	17.4 Undertake an internal audit of best practices for a different municipal liquid waste management sub-program every three years to identify opportunities for innovation to improve its efficiency and effectiveness	NEW	Municipalities	Ongoing triennial	$700,000/y

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
Strategy 6: Recover resources and value from liquid wastes					
18 Seek legislation to enable revenue generation from the recovery of energy and materials from liquid waste	18.1 Seek and obtain legislative changes to permit Metro Vancouver to generate revenue from the recovery of materials and energy from its wastewater system and its wastewater treatment plants	NEW	Metro Vancouver	2010	$10,000
19 Optimize the processing of wastewater treatment solids to maximize resource recovery	19.1 Develop strategies to optimize the beneficial uses of biosolids, sludge and residuals to guide the long-term wastewater treatment asset management plans and operations i. identify strategies for preferred energy options	NEW	Metro Vancouver	2014	Included in Metro Vancouver programs
20 Recover energy from liquid waste and biosolids	20.1 Identify and evaluate opportunities to expand the recovery of energy from biogas at wastewater treatment plants: i. investigate new sludge digestion and wastewater treatment technologies, and the co-digestion of other organic wastes such as municipal organic solid wastes, oils and grease ii. identify opportunities and benefits for biogas to displace fossil fuels and reduce greenhouse gas emissions iii. explore partnerships to produce and use biogas	NEW	Metro Vancouver	2014	Included in Metro Vancouver programs
	20.2 Access heat energy from wastewater treatment plant effluent and sewers for use in space heating and water heating				
	i. evaluate options to recover heat energy at all new pump station, sewer replacement and major wastewater treatment plant projects	NEW	Metro Vancouver	2014	$600,000
	ii. identify opportunities and benefits for heat recovery options to displace fossil fuel and electric heat sources and to reduce greenhouse gas emissions iii. explore partnerships to implement heat recovery opportunities	NEW	Municipalities	2016	$800,000
	20.3 Examine options to produce biodiesel from trucked liquid waste, waste grease and sewer grease i. explore partnerships for biodiesel opportunities	NEW	Metro Vancouver	2012	$200,000
	20.4 Develop options to recover energy from biosolids and/or sludge i. identify technological requirements for wastewater treatment plant components ii. identify the potential value and uses of the energy, including greenhouse gas reduction and offset value iii. explore options and opportunities for partnership and collaboration	NEW	Metro Vancouver	2014	$600,000

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
21 Recover nutrients for fertilizer from liquid waste	21.1 Identify and assess wastewater treatment technologies and processes that recover nutrients from liquid waste for use as fertilizer i. focus recovery of strategic nutrients such as phosphorus ii. assess technology feasibility for each wastewater treatment plant iii. develop business cases for feasible technologies	NEW	Metro Vancouver	2014	$600,000
	21.2 Develop business plans and partnerships to implement nutrient recovery options that have favourable business cases and address the strategic needs of the region	NEW	Metro Vancouver	2014	$200,000/program
	21.3 Biosolids produced for land application will be a minimum Class B as defined by regulation	C35. P21.	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
22 Promote the collection and use of rainwater for irrigation and other non-potable water uses	22.1 Through the Stormwater Inter-agency Liaison Group, identify and evaluate opportunities for the collection and use of rainwater as an alternative to using potable water	NEW	Municipalities	Ongoing	Included in DWMP
23 Use reclaimed wastewater as an alternative to potable water where opportunities permit	23.1 Explore market potential for reclaimed water around the Annacis Island, Iona Island and North Shore wastewater treatment plants	MC6b	Metro Vancouver	2014	$200,000
24 Explore options for beneficial uses of wastewater treatment grit and screenings	24.1 Explore beneficial uses of grit and screenings from wastewater treatment and of residuals from sewage system maintenance i. develop business cases to determine favourable options ii. dispose of materials that have no beneficial uses at an authorized facility	NEW	Metro Vancouver	2014	$200,000

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
Strategy 7: Monitor the performance of the liquid waste system and impacts on the receiving environment					
25 Update the list of indicators to be used in assessing the environmental effects of liquid waste management	25.1 Working with the Ministry of Environment and Environment Canada, identify and list the indicators to be used in assessing the environmental effects of liquid waste management on: i. receiving waters from wastewater treatment, combined sewer overflows, sanitary sewer overflows and rainwater runoff ii. air from wastewater treatment plant, material and energy recovery operations and operations and maintenance equipment emissions iii. land and soil from sanitary sewer overflows iv. watershed and stream health from rainwater runoff, sanitary sewer overflows and on-site disposal systems	C3.	Metro Vancouver	2010 and every 5 years after-wards	Included in Metro Vancouver programs
	25.2 Allow Metro Vancouver and municipalities to actively participate in the process to review and establish official water uses and official water quality objectives for specific major waterbodies within Metro Vancouver i. the Ministry will advise the Metro Vancouver and member municipalities when a water use or water quality objective initiative has started. ii. the Ministry will develop the scope of work for their review in consultation with the Environmental Monitoring Committee, and will work with the Environmental Monitoring Committee. iii. the Ministry will document, report on the costs and benefits of designated water uses, proposed changes to designated water uses, and associated water quality objectives. iv. cost implications to the Metro Vancouver and member municipalities will be included in the report v. Metro Vancouver Board and municipal councils will have the opportunity to review and comment on the proposed changes before new designations are finalized.	C1.	Ministry of Environment	Ongoing	Included in Metro Vancouver and municipal programs

Goal 2: Manage liquid wastes affordably and effectively

Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
26 Monitor the quantity and characteristics of liquid waste point discharges to the environment	26.1 Monitor and report wastewater treatment plant influent and effluent quality and quantity, periodically conduct detailed wastewater treatment plant effluent characterizations	C4. C12 C11	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	26.2 In consultation with municipalities, estimate and document: i. greenhouse gas and air emissions associated with a) providing and maintaining regional sewer systems, wastewater treatment and their operation	NEW	Metro Vancouver	2010	$200,000
	b) providing and maintaining municipal sewer systems and their operation		Municipalities	2010	$1,500,000
	ii. odour associated with a) providing and maintaining regional sewer systems and wastewater treatment		Metro Vancouver	2012	Included in Metro Vancouver programs
	b) providing and maintaining municipal sewer systems and their operation		Municipalities	2014	Included in municipal programs
	26.3 Estimate and report the amount of sewage in overflows from:				
	i. regional combined sewer systems a) periodically conduct detailed effluent characterization of contaminants at selected outfalls	C13 MC7 C4 P7 C12 P10	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	ii. municipal combined sewer systems		Municipalities	Ongoing	Included in municipal programs
	iii. regional sanitary sewer systems a) identify probable causes of overflows		Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	iv. municipal sanitary sewer systems a) identify probable causes of overflows		Municipalities	Ongoing	Included in municipal programs
27 Monitor the ambient environment conditions of relevant water bodies in the region	27.1 Maintain a program to assess ambient water quality in the region i. primary water bodies to be monitored include the Fraser River, Southern Strait of Georgia, Burrard Inlet, and Boundary Bay ii. determine changes in water quality as the region and municipalities improve wastewater and stormwater management iii. assess the cumulative impacts of point source and non-point source discharges, including stormwater runoff, agricultural and industry discharges iv. develop program partnerships with other levels of government as appropriate	C4	Metro Vancouver	Ongoing	Included in Metro Vancouver programs

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Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
28 Monitor and assess the effects of liquid waste management on the receiving environment	28.1 In consultation with the Environmental Monitoring Committee, monitor and assess the receiving environment using the updated list of indicators (detailed in Action 25.1) for assessing the environmental effects of liquid waste management on air, land and water by:	C4	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	i. continuing to monitor bacteriological water quality of recreational beach areas within Burrard Inlet, Sturgeon Banks, Roberts Bank, and Boundary Bay a) share monitoring data with Ministry of Environment and Ministry of Health		Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	b) if monitoring indicates bacteriological water quality that is a health or environmental concern, consider undertaking additional studies to identify point and non-point contaminant sources				
	ii. undertaking periodic environmental assessments at selected regional and municipal combined sewer outfalls to assess rate of improvement as sewer separation progresses iii. continue to conduct toxicity identification and evaluation (TIE) studies in the event of unsuccessful toxicity tests, and at any additional times determined by Metro Vancouver to support environmental protection actions of this Liquid Waste Management Plan	P7 C13	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	28.2 Continue to investigate the potential risks posed from wastewater contaminants by: i. focussing investigations on contaminants of emerging concern including: a) endocrine disrupting chemicals, b) persistent organic pollutants c) other micro-contaminants ii. consulting with the Environmental Monitoring Committee iii. collaborating with senior agencies, universities and others on these investigations	C11.	Metro Vancouver	Ongoing	$200,000/y
	28.3 Notify Environment Canada of substances not listed by the Canadian Environmental Protection Act if identified through monitoring to may be potentially impacting the receiving environment	C33	Metro Vancouver	Ongoing	Included in Metro Vancouver programs
	28.4 Monitor and assess impacts to watersheds and/or receiving water bodies from stormwater discharges	NEW			
	i. as part of the development and implementation of municipal integrated stormwater management plans (detailed in Actions 31 and 32)		Municipalities	Ongoing	Included in municipal programs
	ii. periodically characterize impacts to regionally significant or representative watersheds and/or receiving water bodies from stormwater discharges		Metro Vancouver	Ongoing	Included in Metro Vancouver programs

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Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
29 Collect data to assess effectiveness and plan liquid waste operations	29.1 Review and, as required, update standards and protocols for data collection, processing, quality assurance, publication and access for sewer flow and sewer level meters, rain gauges and stream gauges i. identify requirements to address data quality needs while logging extreme wet weather events ii. consider implications of climate change and climate variability	NEW	Metro Vancouver	2011	Included in Metro Vancouver programs
	29.2 Maintain the existing regional network for sewer flow and sewer level monitoring, precipitation and stream gauges i. optimize the regional monitor network to address data collection for sewerage area cost allocation, system modelling and analyses, and operational needs ii. optimize the number of monitor stations required for the management of regional drainage areas, and wet weather management planning and analyses	C7 C22	Metro Vancouver	ongoing	Included in Metro Vancouver programs
	29.3 Maintain, and expand if necessary, the existing municipal sewer flow and sewer level monitoring network	NEW	Municipalities	ongoing	Included in municipal programs

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Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
Strategy 8: Provide resilient infrastructure to address risks and long-term needs					
30 Develop scenarios and identify trends to assess risks to sewerage and drainage systems and their performance	30.1 Develop liquid waste planning scenarios to guide design and planning of sewerage, drainage and regional wastewater treatment systems that consider: i. population density and land use changes outlined by First Nations, Metro Vancouver Growth Management Strategy and Metro Vancouver Growth Management Scenario ii. best understanding of climate change impact and sea level rise scenarios iii. the age and likely life cycle of sewerage infrastructure iv. implications of wet weather inflow and infiltration management plans v. implications of combined sewer overflow and sanitary sewer overflow management plans vi. best estimates for trends and scenarios in energy and material costs vii. wastewater treatment plant influent and effluent monitoring data viii. findings from monitoring the receiving environment ix. trends and developments in forthcoming and new regulations	NEW	Metro Vancouver, and municipalities	Ongoing 5 year cycle	Included in Metro Vancouver and municipal programs
	30.2 Develop emergency management strategies for municipal and regional wastewater collection and treatment systems i. identify strategies to manage risks to public health, worker safety and the environment ii. consider scenarios in response to earthquake, extreme weather, power interruption, and loss of service for critical components	NEW	Metro Vancouver, and municipalities	2016	Included in Metro Vancouver and municipal programs
31 Develop integrated stormwater management plans at the watershed scale to manage rainwater runoff	31.1 Develop Integrated Stormwater Management Plans for all watersheds, tributary sub-watersheds or drainage areas which are less than 80% GreenZone-Agricultural designation: i. use the template for "Integrated Stormwater Management Plans at the Watershed Scale" as a guide ii. for watersheds that are combined sewer or closed-channel, undertake simplified integrated stormwater management plans as outlined in the template iii. identify watershed specific appropriate targets for on-site rainwater runoff management for each watershed iv. maintain a prioritized list for the likely sequencing and expected timeline of implementation actions for each integrated watershed management plan v. develop plans jointly when watersheds cross municipal boundaries	NEW P25 P30 C39. C37. C49 C38.	Municipalities	2014	Included in municipal programs

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Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
32 Implement integrated stormwater management plans at the watershed scale to manage rainwater runoff	32.1 Develop procedure and processes to link integrated stormwater management plan implementation with land use plans and official community planning processes i. use land redevelopment and permit processes to implement site-level rainwater source controls that improve long-term watershed health (detailed in Action 4)	NEW	Municipalities	2014	$1,500,000
	32.2 Facilitate the implementation of integrated stormwater management plans by: i. reviewing and updating municipal bylaws and policies related to neighbourhood design, the regulation of impervious surfaces and preservation of natural drainage and riparian corridors ii. explore the linkages and benefits of land use plans that reduce traffic and associated pollution in stormwater	NEW C38	Municipalities	2014	$1,500,000
	32.3 Implement municipal Integrated Stormwater Management Plans as appropriate for all watersheds i. consider priorities within and between different Integrated Stormwater Management Plans (detailed in Action 31.1)			Ongoing	Implementation costs vary by watershed, typically from $millions to tens of millions, with timelines from years to decades

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Action	Implementation Steps	Prev Num	Task By	Timeline	Implications (cost & resources)
33 Adapt and integrate infrastructure to address risks and long-term needs	33.1 Assess each sewerage area using an Integrated Resource Management business case model that: i. identifies opportunities and undertakes feasibility assessments to recover resources: ii. identifies integrated solutions for Metro Vancouver's plans, such as the Solid Waste Management Plan, Drinking Water Management Plan, Air Quality Management Plan and Parks Plan iii. supports Strategy 6: Recovery resources and value from liquid wastes iv. adapts existing infrastructure to meet long-term needs	NEW	Mero Vancouver	2012	$4,000,000
	33.2 Implement feasible opportunities that recover resources or add resiliency	NEW		ongoing	to be determined in studies
	33.3 Review and update municipal standards for new storm and sanitary sewers to manage risks i. consult with municipalities on sanitary sewer system standards ii. consult with the Stormwater Interagency Liaison Group and Environmental Monitoring Committee on stormwater and on-site rainwater management standards iii. include green infrastructure options by collaborating with others iv. use resources such as the Green Infrastructure Partnership (Ministry of Environment, Master Municipal Construction Documents, BC Water and Wastewater Association and West Coast Environmental Law)	C20.	Municipalities	2014	$3,000,000
34 Assess density trends in on-site sewage treatment and disposal facilities	34.1 Update and maintain an inventory of on-site sewage treatment and disposal facilities, linking data to the municipal GIS system 34.2 Develop projections of density of on-site sewage treatment and disposal system to 2031 for relevant watersheds and aquifers. 34.3 Share the information with the Ministry of Environment	C43	Municipalities	2010	Included in municipal programs

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35 Co-ordinate liquid waste infrastructure and services with the Regional Growth Strategy and its objectives	35.1 Maintain long-term growth forecasts and monitor population change to ensure consistency and predictability between municipal plans, Metro Vancouver's Growth Strategy and liquid waste infrastructure needs i. identify and inform Metro Vancouver of any changes to municipal land use or development plans that may significantly impact regional sewer or treatment performance	NEW	Municipalities	Ongoing	Included in municipal programs
	35.2 Limit the provision of new regional and municipal wastewater collection treatment services to within Metro Vancouver's Urban Development Area as defined in the Growth Management Strategy unless criteria for the extension of municipal sewer service outside of Metro Vancouver's Urban Development Area are met (detailed in Action 35.3)	NEW	Metro Vancouver and municipalities	Ongoing	Included in Metro Vancouver and municipal programs
	35.3 In collaboration with municipalities and the senior government agencies, develop criteria for the extension of municipal sewer service outside of Metro Vancouver's Urban Development Area i. consider risks to public health, environment and agriculture ii. include provisions to ensure new municipal sewer servicing does not encourage or facilitate further development or urbanization	NEW	Metro Vancouver and municipalities	2012	$200,000

DRAFT – MARCH 2009