

Integrated Liquid Waste and Resource Management

A Liquid Waste Management Plan
for the Greater Vancouver
Sewerage & Drainage District
and Member Municipalities



**metro
vancouver**

May 2010

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The Best Place on Earth

Reference: 127948

MAY 30 2011

Lois E. Jackson, Chair
Metro Vancouver Board
Metro Vancouver
4330 Kingsway
Burnaby BC V5H 4H9

Dear Chair Jackson:

Thank you for your letter of June 25, 2010, with the attached Liquid Waste Management Plan (LWMP), the Board resolutions for adopting the plan and a summary of the Metro Vancouver's consultation process. A summary of endorsements confirming each member municipality commitments was received on December 21, 2010.

Ministry staff have reviewed your submission and accompanying documents. The technical aspects of the proposed LWMP are supported, and I am satisfied there has been adequate public review and consultation. However, the LWMP as submitted does not fully meet my requirements. Therefore, I hereby impose the following changes to the submitted LWMP titled *Integrated Liquid Waste and Resource Management: A Liquid Waste Management Plan for the Greater Vancouver Sewerage & Drainage District and Member Municipalities (ILWRMP)* dated May 2010:

1. The Ministry supports upgrading to secondary level treatment the Lions Gate wastewater treatment plant by 2020 and Iona Island wastewater treatment plant as soon as possible, but no later than 2030 and not contingent on the availability of senior government funding. The Ministry of Environment is not a funding agency. While I understand the cost of the upgrades is significant, they are necessary to meet current environmental standards. The Ministry will support Metro Vancouver pursuing senior government and alternative funding options, but cannot guarantee any provincial commitment in that regard, nor compromise the Ministry's mandate to protect the environment.
2. Member municipalities are strongly encouraged to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce potable water use.

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3. Metro Vancouver, in partnership with member municipalities, is encouraged to pursue a region-wide water conservation program targeting the industrial, commercial, institutional and agricultural sectors as part of its new Drinking Water Management Plan. Remaining municipalities in the region that have not implemented metering for these sectors are encouraged to do so.
4. Metro Vancouver must use receiving environment and effluent monitoring data from combined sewer overflow (CSO) and sanitary sewer overflow (SSO) in the regional system to interpret the overall status of CSOs and SSOs. Metro Vancouver will continue the fate and effects studies on CSOs with the Clarke Drive location and other significant sites as determined by the Environmental Management Committee. Metro Vancouver will establish similar studies representative of significant SSO locations, in particular the Cloverdale, Katsie and Lynn locations. The interpretation and assessment should demonstrate whether there has been any improvement or degradation along with any measures taken to address such discharges. Metro Vancouver will report out in the Quality Control Annual Report.
5. Metro Vancouver is encouraged to continue to build upon previous studies associated with studying endocrine-disrupting chemicals, persistent organic pollutants and other micro-contaminants found in wastewater by developing source control initiatives through education (for example, target outreach), regulation and inspection programs.
6. Metro Vancouver will continue the receiving and ambient monitoring programs specified in the approved 2002 LWMP, including, but not limited to, recreational water quality (beach monitoring); monitoring near the outfalls for all five wastewater treatment plants, including the extensive deep sea monitoring near the Iona Island plant; and CSO effluent quality and monitoring of small urban streams relating to impacts from urbanization and stormwater.
7. Member municipalities will, with MV planning and coordination, and to the satisfaction of the Regional Manager, develop a coordinated program to monitor stormwater and assess and report the implementation and effectiveness of Integrated Storm Water Management Plans (ISMP). The program will use a weight-of-evidence performance measurement approach and will report out in the Biennial Report. The Regional Manager may extend the deadline for completion of ISMP by municipalities from 2014 to 2016 if satisfied that the assessment program could result in improvement of ISMP and protect stream health.
8. Bypass conditions that occur at wastewater treatment plants will be reported out in the annual quality control report. The report on each activity will include a description of the event, cause, environmental effect and monitoring that occurred and any mitigation measures undertaken to prevent reoccurrence and remediate detrimental environment effect.

9. The ILWRMP has a goal of protecting public health and the environment. In keeping with this goal and to ensure alignment with other national, provincial and regional initiatives, Metro Vancouver and member municipalities are encouraged to:
 - a. Have local land use planning consider the direction provided by the ISMPs;
 - b. Consider how the degree, type and location of land development within a drainage can affect the long-term health of the watershed;
 - c. Consider how to protect the stream, including the riparian areas that exert an influence on the stream, from long-term cumulative impacts; and
 - d. Use scenarios and forecasting to systematically consider environmental consequences/benefits of different land use approaches prior to build-out (for example, Alternative Future type approaches).

10. Metro Vancouver will continue to consult with First Nations during the implementation of the Plan—in particular, engaging, as appropriate, with First Nations likely to be impacted by the secondary upgrades.

Pursuant to Section 24(5) of the *Environmental Management Act*, I hereby approve Metro Vancouver's LWMP titled *Integrated Liquid Waste and Resource Management: A Liquid Waste Management Plan for the Greater Vancouver Sewerage & Drainage District and Member Municipalities* dated May 2010, subject to the conditions noted above.

I commend Metro Vancouver Board and staff on their success in developing a comprehensive master plan to manage the Greater Vancouver Sewerage & Drainage District's liquid waste for years to come.

Sincerely,



Terry Lake
Minister of Environment

cc: Jim Standen, Assistant Deputy Minister, Environmental Protection Division
Jonh Braman, Regional Manager South Coast, Environmental Protection Division

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Table of Contents

Vision Statement	4
A. Sustainable Liquid Waste Management Plan	6
Governance	6
Roles and Responsibilities	6
Scope of the Plan	7
Linkages and Alignment	10
B. Goals, Strategies, Actions and Measures	13
Goal 1: Protect public health and the environment	13
Goal 2: Use liquid waste as a resource	21
Goal 3: Effective, affordable and collaborative management	23
Financial Plan	30
Performance Measures	32
<hr/>	
Figure 1 <i>Metro Vancouver Member Municipalities and Electoral Area A</i>	8
Figure 2 <i>Metro Vancouver Sewerage Areas and Existing Wastewater Treatment Plant Locations</i>	9
Figure 3 <i>Metro Vancouver Sustainability Framework</i>	12
<hr/>	
Table 1 <i>List of Members for Metro Vancouver and the Greater Vancouver Sewerage and Drainage District</i>	7
Table 2 <i>Scenarios for Annual Household Levies by Sewerage Area</i>	31

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.

In 2002, Metro Vancouver adopted The Sustainable Region Initiative (SRI) as its framework for decision making as well as the mechanism by which sustainability imperatives 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; and
- be collaborative.

These provide the foundation for the three sets of sustainability principles that guide Metro Vancouver:

- protect and enhance the natural environment (conserve and develop natural capital);
- provide for ongoing prosperity (conserve and develop economic capital); and
- build community capacity and social cohesion (conserve and develop social capital).

Liquid Waste

Liquid waste is the wastewater that is collected from homes, businesses, industries and institutions through vast networks of sewer pipes. Liquid waste is also the rainwater runoff and snowmelt that may be, or may become contaminated by washing and collecting pollutants from streets, lawns and gardens—most of this runoff enters creeks, rivers and the ocean untreated.

Traditionally, liquid waste has been viewed as an unusable output needing collection, treatment and disposal. However, stormwater can also be an asset in the natural environment in the form of creeks and other watercourses. Furthermore, as resources world-wide become scarcer and more expensive, liquid waste is increasingly recognized as a resource from which nutrients, energy, and 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 that all elements of liquid waste will be efficiently recovered as energy, nutrients, water or other usable material or else returned to the environment as part of the hydrological cycle in a way that protects public health and the environment.

This vision and the Sustainable Region Initiative are supported by three goals:

Goal 1: Protect public health and the environment

Public health and the environment are protected by managing sanitary sewage and stormwater at their sources, and providing wastewater collection and treatment services protective of the environment.

Goal 2: Use liquid waste as a resource

Energy will be recovered from the heat in the sewage and from biogas generated in the treatment process. Materials which have nutrient value will be recovered from wastewater treatment plants. Water will be recovered from the wastewater treatment process and stormwater.

Goal 3: Effective, affordable and collaborative management

Monitoring, maintaining and investing in liquid waste infrastructure are essential to ensuring effective system performance and preventing costlier repairs. Innovative alternative approaches to traditional treatment systems will be explored. Opportunities for positive synergies with other utilities and regional management systems will be pursued—such as integrated stormwater management plans. Sources of risk will be identified and mitigated.

A. Sustainable Liquid Waste Management Plan

Governance

The BC Ministry of Environment allows all local governments to develop and periodically update a liquid waste management plan. Liquid waste management plans are authorized and regulated through the *BC Environmental Management Act*.

This plan authorizes discharges to the environment—water, air and land—associated with the management of liquid waste in Metro Vancouver according to the criteria set out in the plan and facility specific Operational Certificates.

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 liquid waste management plan, 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 all levels of government, businesses, institutions and homeowners. This includes and is demonstrated by senior government cost sharing for major capital projects that benefit and support their mandates and regulations.

The following have key roles and responsibilities in implementing this Plan:

Federal Government:

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

Provincial Government:

- Ministry of Environment: regulates liquid waste and approves Liquid Waste Management Plans.
- Ministry of Community and Rural Development: enables infrastructure financing and provides co-funding to local governments for civic projects.
- Ministry of Health: regulates on-site wastewater treatment systems (such as septic tanks).
- Ministry of Agriculture and Lands: encourages responsible agricultural land management.

Local Government:

- Metro Vancouver and the Greater Vancouver Sewerage and Drainage District (GVS&DD): own, maintain and operate regional trunk sewers and major wastewater treatment plants, regulate industrial waste discharges, implement required regional actions in its plans, report on plan progress, and collaborate with others as appropriate.
- Municipal members of the GVS&DD: own and maintain collector sewers, implement municipal actions set out in the regional liquid waste management plan, manage stormwater systems, report on their progress on actions required in the plan, set local land use plans and community development standards.

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

Homeowners, businesses, institutions, and crown corporations: own and maintain private property sewer connections and private stormwater management systems.

METRO VANCOUVER MEMBERS		
Greater Vancouver Sewerage and Drainage District Members (GVS&DD)		Village of Anmore
City of Burnaby	City of Port Moody	
City of Coquitlam	City of Port Coquitlam	Village of Belcarra
Corporation of Delta	City of Richmond	
City of Langley	City of Surrey	Bowen Island Municipality
Township of Langley	City of Vancouver	
District of Maple Ridge	District of West Vancouver	Village of Lions Bay
City of New Westminister	City of White Rock	
City of North Vancouver	University Endowment Lands	Electoral Area A
District of North Vancouver		
District of Pitt Meadows		

Table 1 List of Members for Metro Vancouver and the Greater Vancouver Sewerage and Drainage District

Scope of the Plan

While the plan covers the geographic area of Metro Vancouver (Figure 1), the majority of its actions are specific to Metro Vancouver’s wastewater collection and treatment systems, and the users connected to these systems, including municipalities, businesses, and homeowners. In addition, the plan sets specific actions for GVS&DD members regarding their management of stormwater runoff. Major GVS&DD facilities and the system extents are shown in Figure 2. All actions in the plan are applicable to the GVS&DD and its members as listed in Table 1.

Liquid waste management from sources such as on-site treatment and septic systems, agricultural runoff, and marine pump-out facilities for pleasure craft is cross-jurisdictional. Their management is addressed in the plan by Metro Vancouver and members though collaboration with senior government agencies and stakeholders.



Figure 1 Metro Vancouver Member Municipalities and Electoral Area A

Linkages and Alignment

Aligning with National Initiatives

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

The Canada-wide Strategy sets baseline wastewater management criteria, timelines and prioritization methodologies, and formalizes processes to assess environmental risk. This plan has been developed in accordance with the Canada-wide Strategy.

Aligning with Provincial Initiatives

The goals, strategies and actions have been aligned with senior government policies and positions

Flood management and constructed habitat, Eugene Creek, Surrey.



to ensure that Metro Vancouver's and senior governments' environmental and fiscal objectives and actions are mutually supportive and successful.

Key senior government plans and initiatives supported by this plan include:

- **Integrated Resource Recovery:** Integrated Resource Recovery (IRR) was formally defined by the Province in 2008 in a report commissioned by the Ministry of Community and Rural Development titled *Resources from Waste: A Guide to Integrated Resource Recovery*. It is a concept and approach that integrates the management of water, wastewater, energy and solid waste services to recover resources and value and to help increase resiliency. IRR planning and resource recovery actions in this plan support the *BC Climate Action Plan*, the *BC Energy Plan*, and *Living Water Smart*.
- **BC Climate Action Plan:** The success in achieving the province-wide target of 33% less greenhouse gas emissions by 2020 (*Live Smart BC*) depends on the success of supporting initiatives of other provincial and local government plans. The actions set out in this plan will contribute to meeting these targets through its IRR approach and 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 electricity self-sufficiency by 2016, this plan seeks to expand the production of biogas from wastewater, and to recover heat energy from wastewater for use in district heating systems. The IRR approach to integrating liquid and solid waste management will 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:** Water Smart objectives supported by this plan include the requirements to complete and implement municipal Integrated Stormwater Management Plans, support rainwater harvesting and water reclamation actions, the development of an understanding of what makes streams healthy, watershed management planning in priority areas, and helping address the impacts of climate change and climatic variability on local water resources. This will be supported by the ongoing work of a new overarching integrated utility management advisory committee which will enhance and continue the work of the current two inter-governmental 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 commitment to IRR in this plan recognises and reinforces the links between community and effective infrastructure services. 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. This plan supports the long-term goals of improving the health of Burrard Inlet and the Fraser River estuary by upgrading wastewater treatment plants, eliminating combined sewer overflows, improving stormwater management, and ongoing environmental monitoring.



Releasing salmon fry, Silver Creek, Burnaby.

Linking with Metro Vancouver’s other plans

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

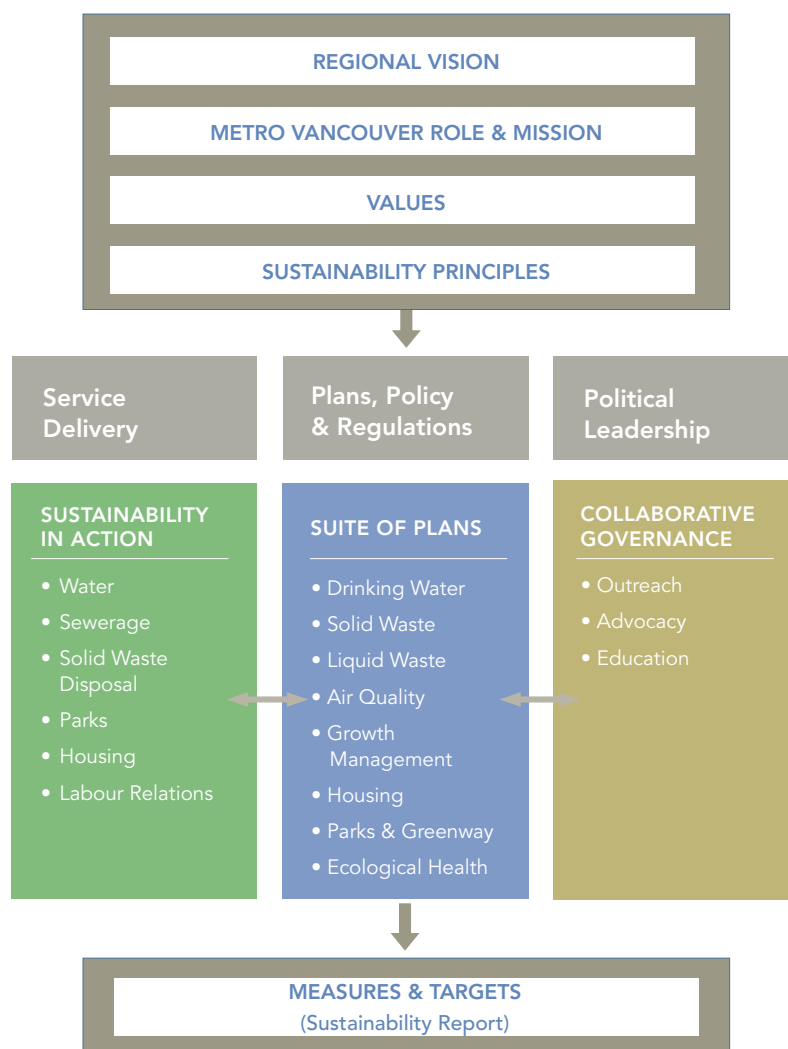
- **Drinking Water Management Plan (DWMP):**

The increased use of reclaimed wastewater for non-drinking water uses and harvesting of rainwater for landscape irrigation will help access alternatives to treated drinking water for use where 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):**

Minimizing greenhouse gas emissions generated from liquid waste management and using wastewater heat to substitute for fossil fuel based heating supports Metro Vancouver’s climate change objectives.

Figure 3 Metro Vancouver Sustainability Framework



- **Solid Waste Management Plan (SWMP):**
 Metro Vancouver will seek to produce biogas from co-managing liquid waste and organic solid wastes; technologies to make biodiesel from wastes, opportunities to derive marketable fertilizer products, recovered nutrients and compost will be explored.
- **Regional Growth Strategy (RGS):**
 The regional sewerage system will not be extended beyond the urban containment boundary except for overarching environmental or public health reasons.

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.

B. Goals, Strategies, Actions and Measures

This plan has three goals, which are addressed by nine strategies and supporting actions for Metro Vancouver and member municipalities. The supporting actions are linked and reinforce each other; their implementation requires collaboration and integration to ensure that they are not undertaken in isolation.

During implementation of the plan, there will be collaboration between Metro Vancouver, its members and other partners to ensure an informed and coordinated process.

Goal 1: Protect public health and the environment

The fundamental purpose of sewerage systems is preventing the spread of waterborne diseases and protecting the receiving environment from harm. Key management areas which support this goal are:

- **Coordination of Infrastructure Capacity and Urban Development:** The regional sanitary sewer system should be constructed to keep pace with development; the rate of urban development and redevelopment should be coordinated with the expansion of the regional sanitary sewer system.
- **Sanitary Sewer Source Control:** Three main objectives for managing liquid wastes at their source are protection of health and the environment, protection of infrastructure and worker safety, and prevention of sewer overflows. Pollution prevention programs keep out of the sewers the pollutants that cannot be effectively treated at wastewater treatment plants and those that are harmful to workers or infrastructure. This is achieved through permitting, enforcement and outreach programs. Reducing the risk of overflows is supported by actions that maintain sewer capacity, such as permitted limits on commercial discharge volumes and ongoing pipe maintenance programs to keep out excessive rainwater and groundwater.
- **Sanitary Sewer Overflows:** Sanitary sewers overflow when their capacity is exceeded, often due to large volumes of groundwater and rainwater entering the system. Preventing sanitary sewer overflows means keeping groundwater and rainwater out of sanitary sewers (referred to as inflow and infiltration management); this is done through ongoing inspection and targeted

maintenance programs. To be effective, all regional, municipal and private sanitary sewers must be properly maintained. Private sewers connect homes, business and institutions to the municipal and regional systems, and account for approximately 50% of the approximate 15,000 km of sewers in the region. While the regional and municipal sewers continue to be kept in good repair through ongoing maintenance programs, private sewers have not been part of any comprehensive strategy. Long-term overflow elimination strategies depend on the reduction of inflow and infiltration through inspection and maintenance for all sewers as part of maintenance and redevelopment cycles over the coming decades. For the interim, storage and temporary treatment of chronic sanitary sewer overflows will be used to mitigate risks to the environment.

- **Stormwater and Rainwater:** The region contains over one hundred watersheds with creeks and rivers of all sizes. These provide habitat for fish and wildlife, as well as recreation to many. Stormwater impacts the health of these watersheds and can degrade their ecosystems. Member municipalities continue to undertake and will implement integrated stormwater management plans to better protect their watersheds. Integrated Stormwater Management Plans (ISMPs) include managing rainwater at the site level, thereby minimizing stormwater runoff. To be effective, municipalities will integrate land use into their stormwater management plans, and appropriate site-level rainwater management practices into their community development policies.

- **Combined Sewer Overflows:** The region's first sewers were built as a network of combined sewers before wastewater was treated. They carried sanitary sewage, and water from drains and enclosed creeks to outfalls in the Fraser River, Burrard Inlet and English Bay. While new trunk sewers and wastewater treatment plants have been built, they cannot cope with the large amount of rainwater entering combined sewers during wet weather, and the combined sewer system continues to have overflows at its remaining outfalls. Reducing combined sewer overflows is ongoing and long-term; combined sewers continue to be replaced with separate sanitary and storm sewers. Ultimately, combined sewer overflows will be reduced to meet criteria for sanitary sewer overflows, and combined sewers will either be eliminated or phased to become stormwater outfalls. Interim solutions include flow containment tanks, sewer separation prioritization, and flow routing to minimize the amount of sanitary sewage in overflows.

Municipalities will develop and implement ISMPs for combined sewer areas so that the impacts from future stormwater systems are proactively mitigated. Opportunities will be sought that use some of the combined sewer system to send the first flush of stormwater to wastewater treatment plants or divert stormwater discharges from sensitive waterbodies.

- **Wastewater Treatment:** This plan's commitment to upgrade the remaining primary wastewater treatment plants to secondary treatment is consistent with the Federal-Provincial policy for secondary level treatment as the minimum Canada-wide standard. The plan calls for continued monitoring and assessment of the performance of wastewater treatment, and using the results to inform the process to improve treatment.

STRATEGY 1.1

Reduce liquid wastes at their source

This strategy seeks to enhance the effectiveness of regional wastewater treatment plants and municipal stormwater management programs by minimizing liquid wastes at their source. Actions that keep excessive rainwater and groundwater out of sanitary sewers will reduce the risk of sewer overflows, and help maintain sewer capacity and treatment effectiveness. Managing rainwater and stormwater runoff at the site level will reduce negative quality and quantity impacts.

Metro Vancouver will increase enforcement of the Sewer Use Bylaw, improve source control tools and update outreach and education programs. Metro Vancouver and municipal actions will jointly seek to reduce groundwater and rainwater entering sanitary sewers over the long-term.

Annacis Island wastewater treatment plant provides treatment for over 1,000,000 people.



This strategy will be implemented by the following actions:

METRO VANCOUVER WILL:

Source control

- 1.1.1 Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the *Canadian Environmental Protection Act*. *2012*
- 1.1.2 Develop new regulatory instruments, such as Pollution Prevention Plans to complement existing regulations. *2014*
- 1.1.3 Increase resources for permitting, and inspection to support and enforce sewer use bylaws. *2010*
- 1.1.4 Investigate the implications of the use of domestic food grinders. *2012*
- 1.1.5 Develop and implement targeted outreach plans to support liquid waste source control programs. *Ongoing*

Inflow and Infiltration and Rainwater Management

- 1.1.6 Develop a template to guide the preparation and implementation of inflow and infiltration management plans as part of broader asset management plans and to support sanitary sewer overflow reduction strategies. *2011*
- 1.1.7 Work with the real estate industry and their regulators, and the municipalities to develop and implement a process for the inspection and certification of private sewer laterals being in good condition as a required component of real estate transactions within Metro Vancouver. *2011*
- 1.1.8 Develop and implement inflow and infiltration management plans that identify reduction strategies and timelines to ensure wet weather inflow and infiltration are within targeted levels. *2012*
- 1.1.9 Work with municipalities to review historical data and adjust as necessary the average inflow and infiltration allowance for regional trunk sewers and wastewater treatment



Private sewers connect homes and businesses to the municipal-regional sewer network.

- plants, and develop associated target allowances for municipal sewer catchments associated with a 1:5 year return frequency storm event for sanitary sewers to a level that ensures environmental and economic sustainability. *2013*
- 1.1.10 Review progress in reducing inflow and infiltration every four years. *every 4 years*
- 1.1.11 Enhance enforcement of sewer use bylaw prohibition against the unauthorized discharge of rainwater and groundwater to sanitary sewers. *2010*
- 1.1.12 Work with municipalities to: *2012*
 - a) facilitate research on watershed-based stormwater management approaches;
 - b) identify improvements to stormwater bylaws to include on-site rainwater management requirements;
 - c) develop model utility design standards and options for neighbourhood design guidelines;
 - d) establish region wide baseline criteria for on-site rainfall management including variations for localized geology, rainfall and watershed conditions;

- e) establish mechanisms to ensure continued performance of on-site rainwater management systems; and
 - f) work with senior governments and industry to develop codes of practice, certification, guidelines and standards which support this plan.
- 1.1.13 Decrease liquid waste volumes through complementary initiatives in the Metro Vancouver Drinking Water Management Plan to reduce potable water consumption. *Ongoing*

MUNICIPALITIES WILL:

Source control

- 1.1.14 Review and enhance sewer use bylaws to reduce liquid waste at source, including contaminants identified by the *Canadian Environmental Protection Act*. *2012*

- 1.1.15 Continue existing programs of permitting and inspection to support and enforce sewer use bylaws. *Ongoing*
- 1.1.16 Identify and regulate pesticides and lawn care products which negatively affect rainwater runoff quality and urban stream health. *2014*
- 1.1.17 Continue outreach plans to support liquid waste source control programs. *Ongoing*

Inflow and Infiltration and Rainwater Management

- 1.1.18 Develop and implement inflow and infiltration management plans, using the Metro Vancouver template as a guide, to ensure wet weather inflow and infiltration volumes are within Metro Vancouver's allowances as measured at Metro Vancouver's flow metering stations. *Develop by 2012*
- 1.1.19 Enhance enforcement of sewer use bylaw prohibition against the unauthorized discharge of rainwater and groundwater to sanitary sewers. *2010*
- 1.1.20 Update municipal bylaws to require on-site rainwater management sufficient to meet criteria established in municipal integrated stormwater plans or baseline region-wide criteria. *2014*
- 1.1.21 Update municipal utility design standards and neighbourhood design guidelines to enable and encourage on-site rainwater management. *2014*

Separating combined sewers is a long-term program.



STRATEGY 1.2

Reduce wet weather overflows

While reducing the amount of rainwater and ground-water in sewage is vital to reducing sewer overflows over the long-term, interim overflow treatment, prioritized and targeted sewer renewal and separation, and integrated municipal-Metro Vancouver operation strategies will mitigate the risks of overflows over the short-term.

Key municipal actions are to eliminate sanitary sewer overflows and reduce the risk of spills by: improving and co-ordinating sewer rehabilitation programs to keep rainwater and groundwater out of sanitary sewers; constructing interim high rate overflow treatment facilities; and separating the remaining combined sewers in Burnaby, New Westminster and Vancouver.

This strategy will be implemented by the following actions:

METRO VANCOUVER WILL:

- 1.2.1 Prohibit the construction of new combined sewer systems other than those functioning as part of a strategy to reduce combined sewer overflows or to manage stormwater quality. *Ongoing*
- 1.2.2 Address the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE)* by working with Burnaby, New Westminster and Vancouver to develop and implement: priorities for sewer separation of catchments tributary to combined sewer outfalls; regional and municipal sequence for trunk and collector sewer separation; strategic use of existing combined sewers to manage rainwater quality runoff; and a strategy to separate combined sewer connections from private properties. *2014*
- 1.2.3 Replace combined regional trunk sewers with separated sanitary and storm sewers as determined by the plans developed in 1.2.2. *Ongoing*
- 1.2.4 Work with municipalities to develop and implement municipal-regional sanitary overflow management plans which will: prevent sanitary overflows resulting from heavy rain and snowmelt occurring less than once every five years (for a 24 hour duration event); reduce emergency overflows due to power outages; and identify locations and schedules for appropriate system capacity improvements, wet weather containment, and point treatment and discharge to receiving waters of chronic overflows, including Cloverdale Pump Station, Katzie Pump Station, Lynn Pump Station. *2013*

MUNICIPALITIES WILL:

- 1.2.5 Work with Metro Vancouver to develop and implement municipal-regional sanitary overflow management plans as set out in 1.2.4. *2013*
- 1.2.6 Burnaby, New Westminster and Vancouver will work with Metro Vancouver to give effect to 1.2.2 and, specifically, implement plans to prevent combined sewer overflows by 2050 for the Vancouver Sewerage Area and 2075 for the Fraser Sewerage Area and separate combined sewers at an average rate of 1% and 1.5% of the system per year in the Vancouver Sewerage Area and Fraser Sewerage Area respectively. *Ongoing*

STRATEGY 1.3

Reduce environmental impacts from liquid waste management to a minimum

Metro Vancouver and municipalities will maintain and operate their liquid waste infrastructure, make improvements to meet evolving regulatory requirements and reduce risks to the environment which may be identified through ongoing monitoring and assessment programs. Implementing secondary level of wastewater treatment for the Vancouver and North Shore Sewerage Areas is a significant action supporting this strategy.

Metro Vancouver and municipal actions include provision of basic sewer service levels and quantifying and managing air emissions including odours and greenhouse gases associated with operating and maintaining wastewater collection systems.

Metro Vancouver and municipal sewer systems include a large network of sewage pumping stations.



This strategy will be implemented by the following actions:

METRO VANCOUVER WILL:

System Operation and Maintenance

- 1.3.1 Develop and implement operational plans for sewerage and wastewater treatment facilities to ensure infrastructure reliability and optimal performance. *Ongoing*
- 1.3.2 Maintain trunk sanitary sewer capacity for dry weather sewage conveyance levels plus the Metro Vancouver target inflow and infiltration allowance; as necessary upgrade trunk sewer systems to maintain hydraulic gradelines and safe operating levels which have been established based on measured flow. *Ongoing*
- 1.3.3 Work with municipalities to develop and implement emergency sanitary sewer overflow plans including contingency plans to minimize impacts of unavoidable sanitary sewer overflows resulting from extreme weather, system failures or unusual events. *Ongoing*

Secondary level wastewater treatment

- 1.3.4 Operate wastewater treatment plants which have secondary level treatment (Annacis Island, Lulu Island, North West Langley wastewater treatment plants) to meet requirements specified in each facility's Operating Certificate and the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE)* National Performance Standards for wastewater effluent, including: *Ongoing*
 - (a) monthly average maximum Carbonaceous Biochemical Oxygen Demand (CBOD₅): 25 mg/L; and
 - (b) monthly average maximum Total Suspended Solids (TSS): 25 mg/L.

1.3.5 Upgrade or replace Lions Gate (North Shore Sewerage Area) and Iona Island (Vancouver Sewerage Area) wastewater treatment plants to secondary level treatment to meet *Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE)* requirements and timelines.

a) The intended site for the North Shore Sewerage Area secondary facility is the Metro Vancouver owned property located between Pemberton, Philips and McKeen Avenues, and West First Street in the District of North Vancouver. The existing outfall will be retained as part of the upgraded facility. The outfall discharges to embayed marine waters as defined in the *Environmental Management Act, Municipal Sewage Regulation*.

b) The intended site for the Vancouver Sewerage Area is the property immediately adjacent and east of the existing Iona Island plant in the City of Richmond. The existing outfall will be retained as part of the upgraded facility. The outfall discharges to open marine waters as defined in the *Environmental Management Act, Municipal Sewage Regulation*.

c) Based on the CWS-MMWE and the assessment made by the Environmental Monitoring Committee, the Lions Gate upgrade should be completed within 10-years subject to the appropriate financial arrangements being in place as indicated in the Financial Plan.

d) Based on the CWS-MMWE and the assessment made by the Environmental Monitoring Committee, the Iona Island upgrade should be completed within 20 years. In spite of this, Metro Vancouver has a strong desire to accelerate the completion of the Iona Island upgrade as soon as is

reasonably possible in a 10 to 20 year timeframe, because of the significance of this upgrade to Metro Vancouver's Sustainable Region Initiative. The Region will strive to the greatest extent possible to achieve this. Risk factors to overcome include resolution of technical and land tenure issues, construction logistics and will be subject to appropriate financial arrangements being in place as indicated in the Financial Plan. In collaboration with provincial and federal governments, Metro Vancouver will engage in resolving these obstacles to complete the Iona Island upgrade at the earliest practicable time.

e) Metro Vancouver will seek assistance from both senior levels of government in resolving First Nations rights and title issues associated with these secondary treatment plant upgrades.

1.3.6 Maintain interim maximum daily concentration limits for wastewater effluent of 130 mg/L BOD₅ at both Lions Gate and Iona Island plants and 130 mg/L TSS at Lions Gate and 100 mg/L TSS at Iona Island until such time as secondary treatment is operational, and operate the plants to meet requirements specified in each facility's Operating Certificate. *Ongoing*

Other environmental impact mitigation actions:

1.3.7 Assess environmental monitoring results (see Strategy 3.3) to determine whether any actions are required to meet Ministry of Environment/*Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE)* requirements. *Ongoing*

- 1.3.8 Continue odour control programs at wastewater treatment plants and implement odour control programs for targeted facilities in the regional sewer system and for relevant energy and material recovery processes (see Action 3.3.4). *Ongoing*
- 1.3.9 Develop and implement air emissions management programs for standby power generators and biogas production, including assessment of desirability of retrofit and accelerated asset replacement where appropriate. *2014*
- 1.3.10 Develop and implement programs to reduce greenhouse gas emissions from the regional liquid waste management systems to help achieve federal, provincial and Metro Vancouver greenhouse gas targets (see Action 3.3.4). *2015*

MUNICIPALITIES WILL:

System Operation and Maintenance

- 1.3.11 Develop and implement operational plans for municipal sewerage facilities to ensure infrastructure reliability and optimal performance. *Ongoing*
- 1.3.12 Work with Metro Vancouver to develop and implement emergency sanitary sewer overflow plans including contingency plans to minimize impacts of unavoidable sanitary sewer overflows resulting from extreme weather, system failures or unusual events. *Ongoing*

Other environmental impact mitigation actions:

- 1.3.13 Work with private marina operators, Ministry of Environment and Environment Canada to develop and implement regulations to ensure all new marinas and marinas where planned renovations exceed 50% of the assessed existing improvements value have pleasure craft pump-out facilities. *Ongoing*
- 1.3.14 Require all pleasure craft pump-out facilities to connect to a municipal sanitary sewerage system or a provincially permitted on-site treatment and disposal system or have established enforceable protocols for transporting liquid waste for disposal at a permitted liquid waste management facility. *Ongoing*
- 1.3.15 Continue existing municipal odour control programs and implement new programs for targeted municipal sewer facilities (see Action 3.3.4). *Ongoing*
- 1.3.16 Develop and implement air emissions management programs for standby power generators at municipal sewer pump stations. *2016*
- 1.3.17 Develop and implement programs to reduce greenhouse gas emissions from municipal liquid waste management systems to help achieve federal, provincial and municipal greenhouse gas targets (see Action 3.1.5). *Ongoing*

REQUEST THE MINISTRY OF ENVIRONMENT:

- 1.3.18 Include Metro Vancouver and municipalities in the Ministry's processes to review and establish official water uses and official water quality objectives for specific water bodies within Metro Vancouver. *Ongoing*

Goal 2: Use liquid waste as a resource

The goal of using liquid waste as a resource marks two important advances in thinking about liquid waste in the context of Metro Vancouver's sustainability framework.

The first is the recognition that the traditional and still vitally important functions of liquid waste management to protect public health and the environment will ultimately be achieved most beneficially by converting liquid waste into usable resources. Liquid waste is a source of green energy and nutrients and, in addition to stormwater, it can provide alternative sources of water. Strategies are included in this plan to address these opportunities.

The second, which follows logically from the first, is the recognition that the opportunities for cost-effective resource recovery from liquid waste are magnified when explored in the context of integrated resource recovery from the whole range of urban management systems. This is essentially the implementation of the second 'overarching imperative' of the SRI framework: "Recognize and reflect the interconnectedness and interdependence of systems...".

A major challenge for Metro Vancouver and its members will be to adapt the legacy sewerage and stormwater infrastructure of the 20th century to a more sustainable, integrated 21st century system focussed on integrated resource recovery. This will involve embracing new technologies and reshaping communities and their infrastructure so that the resources and energy recovered can be used efficiently and effectively: integrating a new kind of liquid waste infrastructure with building design, community and nature. This involves managing liquid wastes as a resource, minimizing discharges, minimizing financial risks, and maximizing the quality of discharges.



Biogas produced from wastewater supplies heat and power to the Iona Island wastewater treatment plant.

STRATEGY 2.1

Pursue liquid waste resource recovery in an integrated resource recovery context

Metro Vancouver will continue with its Biosolids Management Plan Framework programs until new options and supporting business cases have been developed and implemented under this Strategy.

METRO VANCOUVER WILL:

- 2.1.1 Assess each sewerage area using an integrated resource recovery business case model that: *2012*
- (a) evaluates opportunities to expand the recovery of energy, nutrients and water from the liquid waste system, specifically:
- energy from biogas at wastewater treatment plants including investigating new sludge and wastewater treatment technologies and the co-digestion of other organic wastes such as organics in municipal solid waste, oils and greases;
 - heat energy from new pump stations, sewer replacement and rehabilitation and major wastewater treatment plant projects;
 - biodiesel from trucked liquid waste, waste grease and sewer grease;
 - energy from biosolids and sludge;
 - nutrients, such as phosphorous from liquid waste and biosolids; and
 - alternatives to potable water for non-drinking purposes, such as rainwater harvesting, greywater reuse and reclaimed treated wastewater;
- (b) identifies linkages between liquid waste resource recovery opportunities and other systems (solid waste, drinking water, land use/buildings, parks, air quality, energy); and
- (c) develops and evaluates business cases for integrated resource recovery/use opportunities.
- 2.1.2 Implement appropriate business cases based on the results of 2.1.1. *Ongoing*
- 2.1.3 Work with municipalities to adapt plans and infrastructure for long term needs based on the results of 2.1.1. *Ongoing*

MUNICIPALITIES WILL:

- 2.1.4 Work with Metro Vancouver to give effect to 2.1.1, 2.1.2 and 2.1.3. *Ongoing*

Goal 3: Effective, affordable and collaborative management

To be sustainable, liquid waste management requires programs and services that are affordable and effective, now and in the future. Innovation, monitoring and assessment, maintenance and reinvestment, resilient liquid waste systems and risk management are important activities which help achieve this goal.

Managing assets and optimizing their operation requires ongoing inspection, condition assessments and performance modelling. This is supported by an extensive data collection network for sewer flows, rainfall and stream flows that provides information essential to assessing and planning performance of wastewater and drainage systems. Environmental monitoring and assessment programs inform Metro Vancouver and the Ministry of Environment on the effectiveness of the region's liquid waste management programs and whether changes may be needed.

Collaboration and program alignment among Metro Vancouver and its members help prioritize maintenance and reinvestment in wastewater collection and treatment systems. Stormwater management is made more effective by better integration of stormwater management and land use planning and a commitment by GVS&DD members to implement their integrated stormwater management plans. Collaboration extends beyond Metro Vancouver and its members, and includes senior levels of government, academia and business—this fosters innovation. This plan promotes collaborative forums and dialogue through the development of a learning academy for liquid waste, partnerships in research, and advisory committees.



The new Columbia Street Pump Station helps reduce combined sewer overflows.

STRATEGY 3.1

Manage assets and optimize existing sanitary sewerage operations

Long-term affordable sanitary sewerage management requires ongoing assessment of the system performance and its integrity. Proper maintenance of existing sewerage assets will, in the long term, forestall the need for significantly higher repair and replacement costs in the future.

METRO VANCOUVER WILL:

- 3.1.1 Assess the performance and condition of regional sewerage systems by: *Ongoing*
- (a) inspecting regional sanitary sewers on a twenty year cycle; and
 - (b) maintaining current maps of sewerage inspection, condition, and repairs.

- 3.1.2 Create incentives to reduce inflow and infiltration by adjusting Tier I sewerage cost allocation formulae within each sewerage area from an average dry weather flow basis (25th percentile) to average wet weather flow (75th percentile) with appropriate adjustments for combined sewerage areas. Tier II cost allocation would remain unchanged. *2010*

- 3.1.3 In consultation with municipalities, review Metro Vancouver's safe-operating head for regional sewers. *2011*

- 3.1.4 Develop and implement asset management plans targeting a 100 year replacement or rehabilitation cycle for regional sewerage infrastructure. *2013 for plans*

- 3.1.5 Update and implement asset management plans for wastewater treatment plants which address risks, including climate change and seismic events, and maintain performance in wet weather. *2013*

MUNICIPALITIES WILL:

- 3.1.6 Assess the performance and condition of municipal sewerage systems by: *Ongoing*

- (a) inspecting municipal sanitary sewers on a twenty year cycle;
- (b) maintaining current maps of sewerage inspection, condition and repairs; and
- (c) using the Metro Vancouver "Sewer Condition Reporting Template Standard Report, November 2002" as a guide to ensure a consistent approach to sewer system evaluation and reporting.

- 3.1.7 Work with Metro Vancouver to give effect to 3.1.2, 3.1.3 and 3.1.4. *Ongoing*

- 3.1.8 Develop and implement asset management plans targeting a 100 year replacement or rehabilitation cycle for municipal sewerage infrastructure and provide copies of such plans to Metro Vancouver. *2014 for plans*

Installing Metro Vancouver trunk sewers, South Surrey.



STRATEGY 3.2

Use innovative approaches and technologies

This plan seeks improvement through innovation, using local research and development and adapting successes from elsewhere, to address pollutants of emerging concern, improve wastewater treatment, implement more sustainable stormwater management practices and reduce long-term financial burdens.

METRO VANCOUVER WILL:

- 3.2.1 With financial support from provincial and federal governments and the University of British Columbia, develop the Annacis Island Sustainability Academy to support innovative research and demonstration projects in liquid waste management. *Facility by 2011*
- 3.2.2 Collaborate with local and senior governments, academic institutions and industry in research on wastewater treatment technology and stormwater management and associated demonstration projects, training and development of educational toolkits. *Ongoing*
- 3.2.3 Undertake an annual internal audit of best practices of one regional liquid waste management sub program and environmental management system to identify opportunities for innovation and improvements. *Annually*

MUNICIPALITIES WILL:

- 3.2.4 Undertake a tri-annual internal audit of best practices of one municipal liquid waste management sub-program in each municipality to identify opportunities for innovation and improvements. *Triennially*



Rainwater infiltration treats stormwater and rebalances groundwater and creek flows.

STRATEGY 3.3

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

Monitoring will inform the operation of infrastructure, the understanding of the potential for impacts from discharges and infrastructure planning.

METRO VANCOUVER WILL:

- 3.3.1 Continue to monitor the ambient environment conditions of relevant water bodies in the region in conformance with the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE)* requirements, and work with the Ministry of Environment in developing Environmental Quality Objectives. *Ongoing*

- 3.3.2 Continue to monitor the quantity and characteristics of Metro Vancouver's liquid waste point discharges to the environment in conformance with the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent (CWS-MMWE)* requirements to meet Environmental Discharge Objectives. *Ongoing*
- 3.3.3 Continue to operate its regional data collection network for sewers, rainfall and streams and use that data to assess the effectiveness of actions taken under this plan. *Ongoing*
- 3.3.4 In collaboration with municipalities, estimate and document the greenhouse gas emissions and odours associated with the operation of the municipal and regional liquid waste management systems (see Actions 1.3.8, 1.3.10, 1.3.15, and 1.3.17). *2012*
- 3.3.5 Estimate and report on the frequency, location and volume of sewage overflows from regional combined and sanitary sewers, and where feasible identify and address the probable causes. *Ongoing*
- MUNICIPALITIES WILL:**
- 3.3.6 In collaboration with Metro Vancouver, estimate and document the greenhouse gas emissions and odours associated with the operation of the municipal and regional liquid waste management systems. *2014*
- 3.3.7 Estimate and report on the frequency, location and volume of sewage overflows from municipal combined and sanitary sewers, and where feasible identify and address the probable causes. *Ongoing*
- 3.3.8 Maintain and, if necessary, expand the existing municipal sewer flow and sewer level monitoring network. *Ongoing*

Monitoring at the Iona Island wastewater treatment plant laboratory.



STRATEGY 3.4

Provide resilient infrastructure to address risks and long-term needs

Metro Vancouver and municipalities will identify risks which threaten the continued integrity of liquid waste management operations and infrastructure and create more resilient and adaptable systems which address these risks to contribute to the overall goal of a resilient region.

The actions in the strategy require integration and collaboration. This is essential to developing and interpreting scenarios as well as developing management plans such as integrated stormwater management plans. Climate change, Fraser River freshet, demographic change and aging infrastructure are examples of uncertainties and factors which continue to be assessed and assimilated into scenarios that assist Metro Vancouver and municipalities in identifying options that increase long-term resiliency and manage risks.

METRO VANCOUVER WILL:

- 3.4.1 Design and adapt infrastructure and operations to address identified risks and long-term needs, including risks associated with climate change. *Ongoing*
- 3.4.2 In collaboration with municipalities and the Integrated Partnership for Regional Emergency Management (IPREM), develop emergency management strategies and response plans for municipal and regional wastewater collection and treatment systems, including identifying and maintaining a system of emergency wastewater overflow locations. *2015*
- 3.4.3 Ensure liquid waste infrastructure and services are provided in accordance with the Regional Growth Strategy and coordinated with municipal Official Community Plans. *Ongoing*

MUNICIPALITIES WILL:

- 3.4.4 In collaboration with Metro Vancouver and the Integrated Partnership for Regional Emergency Management (IPREM), develop emergency management strategies and response plans for municipal and regional wastewater collection and treatment systems. *2015*
- 3.4.5 Adapt infrastructure and operations to address risks and long-term needs. *Ongoing*
- 3.4.6 Ensure liquid waste infrastructure and services are provided in accordance with the Regional Growth Strategy and coordinated with municipal Official Community Plans. *Ongoing*
- 3.4.7 Develop and implement integrated stormwater management plans at the watershed scale that integrate with land use to manage rainwater runoff. *Plans by 2014*

STRATEGY 3.5

Use collaborative management to address evolving needs

A key feature of the plan is collaborative management— collaboration in monitoring progress, identifying challenges, and finding solutions to overcome challenges. Through collaboration, Metro Vancouver and its members will continue to adapt and evolve their liquid waste management operations and infrastructure and create more resilient and adaptable systems.

METRO VANCOUVER WILL:

- 3.5.1 Establish a new overarching committee, the Integrated Utility Management Advisory Committee (IUMAC), to advise Metro Vancouver on plan implementation, particularly from the perspectives of integrated planning and resource recovery across utility systems. *2010*

- 3.5.2 Continue to receive advice from the Environmental Monitoring Committee (EMC) and Stormwater Interagency Liaison Group (SILG) as subcommittees under IUMAC.
Ongoing
- 3.5.3 Use the Burrard Inlet Environmental Action Program and the Fraser River Estuary Management Program Management Committee (BIEAP-FREMP) as the senior level forum for discussion of policy and assessment of the scientific work related to the plan, and for resolving toxicity concerns and any disputes among its members related to implementing the plan. *Ongoing*
- 3.5.4 Biennially produce a progress report on plan implementation for distribution to the Ministry of the Environment that:
By July 1st biennially
- (a) summarizes progress from the previous two years on plan implementation, for all Metro Vancouver actions, including the status of performance measures.
- (b) includes summaries and budget estimates for proposed LWMP implementation programs for the subsequent two calendar years.
- 3.5.5 Hold a public accountability session based on the biennial reports (Actions 3.5.4 and 3.5.8) by making the report available through Metro Vancouver’s website and by holding a special meeting of the Metro Vancouver Waste Management Committee to receive public comments and input on the report. *Biennially*
- 3.5.6 Report directly to the Ministry of Environment annual progress on integrated stormwater management plan implementation and all occurrences of sanitary sewer overflows.
By March 1st annually
- 3.5.7 In collaboration with members and the Ministry of Environment, undertake a comprehensive review and update of the plan on an eight year cycle. *Every eight years*

MUNICIPALITIES WILL:

- 3.5.8 Biennially produce a progress report on plan implementation for distribution to the Ministry of the Environment that:
By July 1st biennially
- (a) summarizes progress from the previous two years on plan implementation for all municipal actions, including the status of performance measures.
 - (b) includes summaries and budget estimates for proposed LWMP implementation programs for the subsequent two calendar years.
- 3.5.9 Report through Metro Vancouver to the Ministry of Environment annual progress on integrated stormwater management plan implementation and all occurrences of sanitary sewer overflows.
By March 1st annually
- 3.5.10 Work with Metro Vancouver to give effect to 3.5.2, 3.5.5, and 3.5.7. *Ongoing*



Trees improve habitat and reduce stormwater impacts, Still Creek, Vancouver.

Financial Plan

Metro Vancouver and its members recover most of the costs to build, operate and maintain their liquid waste infrastructure from users. These are not adequate, however, to wholly finance major capital projects such as upgrading primary wastewater treatment plants to secondary treatment, and therefore, historically senior levels of governments have worked in partnership with local governments and provided significant cost sharing for major capital projects. Given that these projects are driven in part by federal and provincial legislation and regulations targeting environmental protection, Metro Vancouver will seek and requires financial support, from both the Federal and Provincial governments, consistent with the responsibilities identified in the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent*. Metro Vancouver is committed to complete works necessary to meet national and provincial objectives and regulations. Metro Vancouver will fund its proportionate share of the infrastructure.

While various pricing mechanisms can more equitably allocate the costs among the users of municipal and Metro Vancouver's liquid waste management services, they do not offer new revenue sources. Similarly, different financing and operating models may be able to make annual financing appear less burdensome, but they also do not offer new revenue sources. Through the IRR process, opportunities to access resources from the liquid waste system to create new revenues may be possible, but these are uncertain and cannot be relied upon to address the capital funding needs of this plan.

The cost of the upgrades for the Iona Island and North Shore plants is estimated in the order of \$1.4 billion. The current regional average household levy for Metro Vancouver services varies from \$160 to \$180 depending on the sewerage area—municipal

sewerage and drainage services are additional. Without senior government cost sharing, Metro Vancouver average household levies are estimated to increase by over 600% over the next two decades for North Shore and Vancouver Sewerage Area homeowners. The importance of senior government cost sharing in maintaining affordability at the household level is shown by the Table 2 scenarios.

While Metro Vancouver and its members will work with senior government, businesses and its communities to identify cost-effective solutions, significant and equitable federal and provincial cost sharing to ease the homeowners' burden is needed and expected by Metro Vancouver and its members.

This plan includes a commitment to upgrading both the Lions Gate and Iona Island primary treatment plants to secondary level treatment. Given the significant cost and that the work is designed to fulfill environmental policy goals shared by all three levels of government, this plan assumes provincial and federal financial commitments will be forthcoming.

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.

Table 2 Scenarios for Annual Household Levies by Sewerage Area

2a) Sequencing Lions Gate and Iona Island within 10 years
(includes inflation and **2/3** senior government cost sharing)

Sewerage Area	2010	2015	2020	2025	2030
Fraser	\$156	\$171	\$242	\$291	\$323
Lulu Island	\$157	\$172	\$248	\$298	\$331
North Shore	\$181	\$292	\$417	\$504	\$565
Vancouver	\$159	\$266	\$364	\$440	\$492

2b) Sequencing Lions Gate and Iona Island within 10 years
(includes inflation and **1/3** senior government cost sharing)

Sewerage Area	2010	2015	2020	2025	2030
Fraser	\$156	\$186	\$282	\$355	\$415
Lulu Island	\$157	\$188	\$283	\$357	\$418
North Shore	\$181	\$317	\$639	\$810	\$953
Vancouver	\$159	\$290	\$545	\$690	\$812

2c) Sequencing Lions Gate and Iona Island within 10 years
(includes inflation but **no** senior government cost sharing)

Sewerage Area	2010	2015	2020	2025	2030
Fraser	\$156	\$205	\$335	\$427	\$506
Lulu Island	\$157	\$206	\$332	\$423	\$502
North Shore	\$181	\$348	\$911	\$1,168	\$1,391
Vancouver	\$159	\$317	\$769	\$985	\$1,172

The above three tables all assume that long term debt is amortized over 15 years.

Performance Measures

Performance measures document progress in achieving the goals of the LWMP, and are useful for the adaptive management process. Performance measures will be further developed by the Integrated Utility Management Advisory Committee, and will be used in reporting on the Liquid Waste Management Plan implementation progress.

Goal 1: Protect public health and the environment

- compliance with parameters specified in the operating certificates for wastewater treatment plants
- discharges that do not meet provincial water quality guidelines
- number of sanitary sewer overflows—frequency, location and volume
- sanitary sewage volumes in combined sewer overflows
- beach closure days and locations
- watershed and stream health indicators as set out in the integrated stormwater management plan template

Goal 2: Use liquid waste as a resource

- quantities and types of energy and materials recovered from the liquid waste system

Goal 3: Effective, affordable and collaborative management

- wet weather peaking factors at key regional monitoring points
- average [24 hour] flows at regional flow monitoring stations and at wastewater treatment plants
- metres of sewer pipe inspected and renewed annually
- annual operations, maintenance and capital expenditures for liquid waste management
- number and area [hectares] of integrated stormwater management plans completed



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