

The background of the cover is a scenic photograph. In the foreground, there is a large body of water with gentle ripples. In the middle ground, there is a dense line of green trees. In the background, a city skyline with several tall buildings is visible under a blue sky with some clouds. A dark mountain range is also visible in the distance.

Montréal's Green CiTTS Report  
Great Lakes and St. Lawrence Cities Initiative

# TOWARD SUSTAINABLE MUNICIPAL WATER MANAGEMENT

OCTOBER 2013



The cover page's background shows a water-themed mural painted in 2013 on the wall of a residence at the Corporation d'habitation Jeanne-Mance complex in downtown Montréal.

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Ville de Montréal

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Thanks to all Montréal employees who contributed to the production of this report.



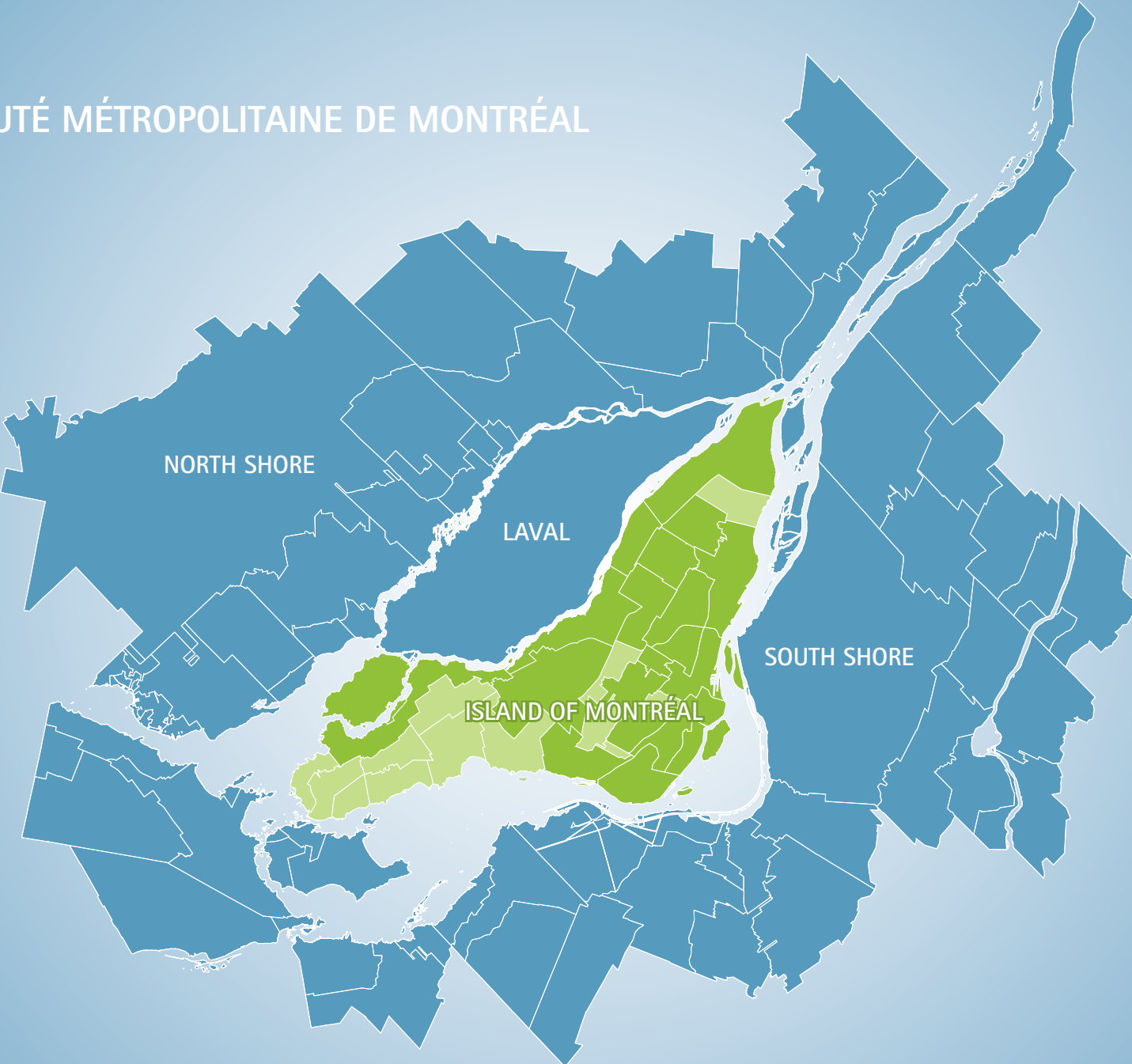
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# ABBREVIATIONS

|                     |   |        |  |
|---------------------|---|--------|--|
| GLSLCI              | The Great Lakes and St. Lawrence Cities Initiative        | MAMROT | Ministère des Affaires municipales, des Régions et de l'Occupation du territoire |
| AWWA                | American Water Works Association                          | MDDEFP | Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs |
| CBD                 | Convention on Biological Diversity                        | SS     | Suspended solids   |
| CMM                 | Communauté métropolitaine de Montréal                     | NH     | Un-ionized ammonia   |
| CBOD                | Carbonaceous biological oxygen demand                     | MDP    | <i>Montréal's Development Plan</i>   |
| COD                 | Chemical oxygen demand                                    | PMAD   | <i>Metropolitan Land Use and Development Plan</i>                                |
| CO <sub>2</sub> éq. | Carbon dioxide equivalent                                 | PIP    | Particular intervention plan   |
| SMWM                | Sustainable municipal water management                    | PPENH  | <i>Policy on the Protection and Enhancement of Natural Habitats</i>              |
| GHG                 | Greenhouse gas  | TP     | Total phosphorus   |
| ha                  | Hectare   | CC     | Cross-connections  |
| ICIs                | Industrial, commercial and institutional sectors          | QSDWC  | <i>Québec Strategy for Drinking Water Conservation</i>                           |
| ICLEI               | International Council for Local Environmental Initiatives | t      | Ton  |
| km                  | Kilometre   | CiTTS  | Green Cities Program   |
| m <sup>3</sup>      | Cubic metre   |        |  |

# COMMUNAUTÉ MÉTROPOLITAINE DE MONTRÉAL



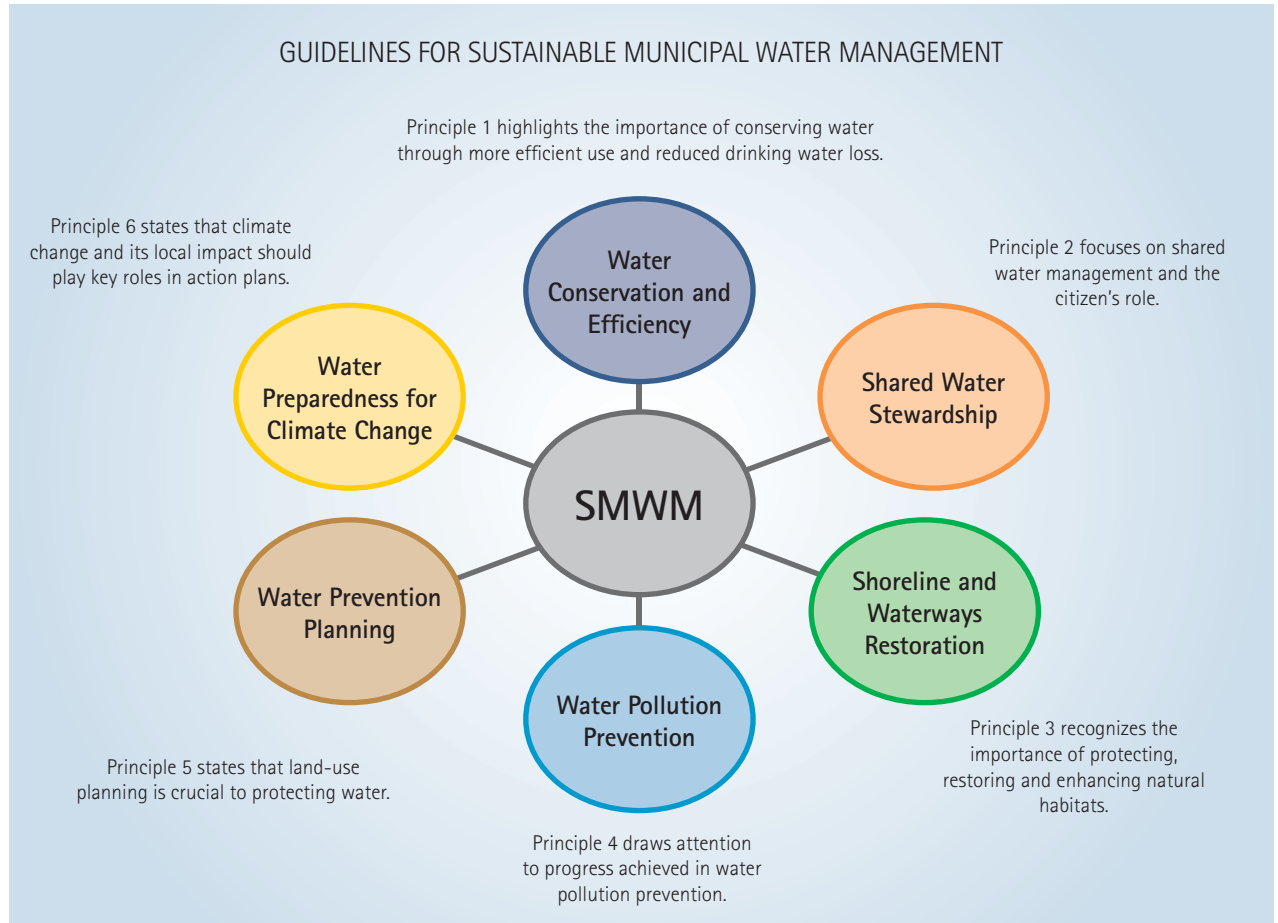
# BACKGROUND

The Great Lakes and St. Lawrence Cities Initiative (GLSLCI) is a binational coalition of mayors and other local representatives working actively with federal, state and provincial governments to promote the protection and restoration of the Great Lakes and the St. Lawrence River.

Montréal has been a GLSLCI member since 2006 and participates in several GLSLCI initiatives, including the Green CiTTS Program.<sup>1</sup> To promote its members' progress in sustainable management of municipal water (SMWM), the Green CiTTS Program's Advisory Committee recommended preparation of the guide entitled *Sustainable Municipal Water Management: Measuring Progress and Reporting Publicly*.<sup>2</sup> The guide, which promotes implementation of new municipal water management trends, was presented at the GLSLCI's June 2012 Annual Meeting in Québec City. It supports an undertaking by the Initiative's municipal members to apply sustainable management principles to the municipal water system. Sustainable management covers such sectors as water conservation, regional planning, public awareness, pollution reduction, habitat protection and restoration, along with adaptation to climate change.

1. The Green CiTTS Program highlights the Great Lakes and St. Lawrence Cities' leadership in guiding the region toward a more sustainable future, while providing cities with the support they need to move further along the path to sustainability.

2. The Assessment Scorecard and the Mayors' Resolution appear on the GLSLCI's Web site at [www.glslicities.org/initiatives/greencities/smwm.cfm](http://www.glslicities.org/initiatives/greencities/smwm.cfm)



**"We the members of the Great Lakes and St. Lawrence Cities Initiative commit to upholding the principles of Sustainable Municipal Water Management. We will strive to continuously improve our performance in each of the six areas identified by the principles, recognizing that each municipality's progress may be different. We will use the Sustainable Municipal Water Management Scorecard and report publicly on progress towards achieving the SMWM principles."**

From the June 2012 Resolution

# MONTRÉAL'S REPORT

Montréal has rolled out numerous initiatives paving the way toward more sustainable management of municipal water. It has made major investments in its water supply and sewage systems over recent years to reduce drinking water consumption, upgrade the drainage system, diminish overflows and cut pollution of aquatic environments. In June 2011, Montréal also received the **Green CiTTS Award** for its Progress on Stormwater Management in Light of Climate Change.

The city participated in GLSLCI efforts leading to creation of the Water Management Scorecard and is committed to reporting on its efforts to achieve sustainable municipal water management in line with the proposed framework.

The six municipal water sustainable management principles have been subdivided into 25 milestones (chart, page 8). For each milestone, the GLSCLCI recommends one or more indicators for measuring a municipality's progress. The GLSCLCI recognizes, however, that the suggested indicators must be suited to the local context. Cities can accordingly adopt the Scorecard and apply indicators suited to their respective situations.

Montréal's Report includes:

- The chart on page 8 listing the GLSCLCI's milestones and Montréal's trends.
- A brief summary of the city's key municipal water management plans.
- A broader presentation of achievements with respect to each selected milestone. Some can be measured while others are more difficult to quantify in terms of the corresponding GLSCLCI milestone. Web links to additional information are provided.

Six of the 25 milestones were not selected for this initial exercise, primarily because data was unavailable or is still too incomplete. Some indicators were also reformulated to reflect Montréal's situation more effectively.



# ASSESSMENT SCORECARD CHART

| PRINCIPLES  | MILESTONES   | TRENDS |
|---|--|--------|
| 1. WATER CONSERVATION AND EFFICIENCY                            | 1.1: Promote Water Conservation  |        |
|   | 1.2: Install Water Meters  |        |
|   | 1.3: Set the Right Price   |        |
|   | 1.4: Minimize Water Loss   |        |
|   | 1.5: Increase Water Reuse and Recycling                                    |        |
| 2. SHARED WATER STEWARDSHIP                                     | 2.1: Raise Public Awareness  |        |
|   | 2.2: Engage the Public   |        |
| 3. SHORELINE AND WATERWAYS RESTORATION<br>SHORELINES, WATERWAYS | 3.1: Protect and Restore Shorelines/Riparian Corridors and Control Erosion |        |
|   | 3.2: Increase Public Access to Shorelines, Riverbanks and Waterfronts      |        |
|   | 3.3: Protect Habitats and Biodiversity                                     |        |
| 4. WATER POLLUTION PREVENTION                                   | 4.1: Prevent Pollutants from Entering the Sewage Collection System         |        |
|   | 4.2: Reduce Pollutants from Wastewater Treatment Plant Effluent            |        |
|   | 4.3: Reduce Stormwater Entering Waterways                                  |        |
|   | 4.4: Monitor Waterways and Sources of Pollution                            |        |
|   | 4.5: Improve Beach Quality   |        |
|   | 4.6: Reduce Sodium Chloride Entering Waterways                             |        |
| 5. WATER PROTECTION PLANNING                                    | 5.1: Adopt Council-Endorsed Commitment to Sustainable Water Management     |        |
|   | 5.2: Integrate Water Policies into Land Use Plan                           |        |
|   | 5.3: Collaborate on a Watershed-Scale                                      |        |
|   | 5.4: Adopt Green Infrastructure  |        |
|   | 5.5: Value Ecological Functions  |        |
| 6. WATER PREPAREDNESS FOR CLIMATE CHANGE                        | 6.1: Conduct a Vulnerability Assessment                                    |        |
|   | 6.2: Reducing Vulnerability—Adaptation Plan                                |        |
|   | 6.3: Adapt Emergency Response Plan to Climate Change                       |        |
|   | 6.4: Reduce Greenhouse Gas Emissions (GHG)                                 |        |

## CONTINUOUS IMPROVEMENT INDICATORS

|                                    |  |
|------------------------------------|--|
| Significant Progress               |  |
| Stability or Moderate Progress     |  |
| Decline                            |  |
| Not applicable or goal not adopted |  |

## STATED OBJECTIVE INDICATORS

|                                |  |
|--------------------------------|--|
| Milestone adopted or completed |  |
| Milestone being adopted        |  |
| Milestone not considered       |  |



# MONTRÉAL'S POLICIES



Many of Montréal's policy documents pertain to sustainable management of municipal water. Three refer directly to GLSCI principles and milestones.

## MONTRÉAL WATER STRATEGY

Montréal's Service de l'eau submitted a document to city management entitled *Enjeux, orientations et objectifs pour une nouvelle stratégie de l'eau* (Issues, Principles and Objectives for a New Water Strategy). The *Montréal Water Strategy* outlines the city's water management plans over the next decade (2011–2020) and addresses five major issues:

- Public health and safety.
- Responsible management of assets and optimization of their performance.
- Sustained funding and responsible financial management.
- Heightened environmental responsibility through sustainable water management.
- Adoption of healthy management and operating practices.

These concerns have generated a set of core objectives accompanied by an action plan of some 160 activities scheduled for implementation by 2020 to ensure effective water management in line with best practices. This new *Montréal Water Strategy* includes a financial plan aimed at mid-term self-financed water management.

## MONTRÉAL COMMUNITY SUSTAINABLE DEVELOPMENT PLAN 2010–2015

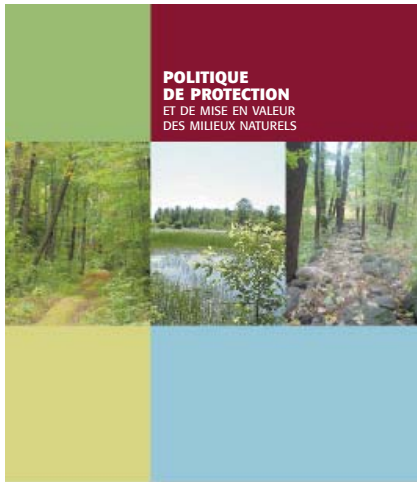
The *Montréal Community Sustainable Development Plan 2010–2015* seeks to galvanize the city, its partners and local municipal administrations around the city's principles, goals and actions. Montréal is committed to implementing all actions set out in the Plan, while its partners have agreed to deploy selected efforts for their organizations.

The Plan builds on the five principles defined in the *Montréal's First Strategic Plan for Sustainable Development, 2005–2009*. They are to:

- Improve air quality and reduce greenhouse gas emissions.
- Protect the quality of residential communities.
- Practice responsible resource management.
- Adopt best practices of sustainable development in industries, businesses and institutions.
- Enhance protection of biodiversity, natural habitats and green spaces.

These principles have given rise to nine objectives and related actions, including two objectives specific to water management:

- Reduce drinking water production by 2015, with respect to that of 2000.
- Improve the quality of stormwater entering waterways.



Montréal 

## **POLICY ON THE PROTECTION AND ENHANCEMENT OF NATURAL HABITATS**

Adopted in 2004, this Policy has three primary goals:

- Maximize biodiversity and increase the size of protected natural habitats
- Ensure the future of natural habitats in existing parks and promote the consolidation and viability of their ecosystems.
- Support better integration of ecosystems and natural landscapes within living communities.

This Policy is also designed to increase residents' access to natural areas, while preserving the ecological integrity of these unique sites within downtown Montréal. This approach aims to protect 8% of the Island of Montréal and 6% of its land area (including wetlands and interior waterways). The city is, accordingly, taking action in three kinds of sectors:

- Natural habitats in existing parks.
- Ecoterritories (areas suited to the creation of new protected areas).
- Ecologically important shoreline and aquatic environments.

The Policy promotes initiatives and partnerships. Its innovative approach seeks concerted and integrated planning and management of natural habitats with great ecological importance to ensure that future generations continue to benefit from these viable and sustainable areas.

### **LINKS**

*Montréal's Water Strategy 2011-2020 (in French)*  
[ville.montreal.qc.ca/portal/page?\\_pageid=6497,92021655&t\\_dad=portal&t\\_schema=portal](http://ville.montreal.qc.ca/portal/page?_pageid=6497,92021655&t_dad=portal&t_schema=portal)

*Montréal's Sustainable Development Plan 2010-2015*  
[ville.montreal.qc.ca/portal/page?\\_pageid=7137,72443581&t\\_dad=portal&t\\_schema=PORTAL](http://ville.montreal.qc.ca/portal/page?_pageid=7137,72443581&t_dad=portal&t_schema=PORTAL)

*Policy on the Protection and Enhancement of Natural Habitats*  
[ville.montreal.qc.ca/pls/portal/docs/page/nature\\_en\\_ville\\_en/media/documents/ppmnang060123.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/nature_en_ville_en/media/documents/ppmnang060123.pdf)

# PRINCIPLE 1

## WATER CONSERVATION AND EFFICIENCY

Each day, Montrealers receive water of excellent quality from the St. Lawrence River. The vast quantities available can meet all demands for this resource. However, aging infrastructure and excessive use have led to consumption well above the North American average. This is why the Montréal has, over the past few years, begun rehabilitating its water supply system and promoting more responsible water use.

The city participated in the GLSLCI's 2007 *Water Conservation Framework*. Montréal and 32 other municipalities consequently decided to cut drinking water production 15% compared with that of 2000. More recently, the *Montréal Water Strategy* has underscored the city's desire for efficient water management by adopting the province goal of reducing per capita consumption 20% by 2017, compared to 2001, under *Québec Strategy for Drinking Water Conservation (QSDWC)*.



Atwater Drinking Water Production Plant



# MILESTONE 1.1 PROMOTE WATER CONSERVATION

Indicator: Change in the Total Volume of Water Produced Annually

## COMMITMENT

- Reduce drinking water production 15% by 2015 compared with 2000 use under the GLSLCI's *Water Conservation Framework*.
- Under the QSDWC, reduce per-capita water consumption 20% by 2017 compared to 2001.

## HIGHLIGHTS

- Between 2001 and 2012, the Island of Montréal's annual drinking water consumption dropped 13%, from 750 million cubic metres to a bit more than 653 million cubic metres.

- Per-capita drinking water production accordingly fell from 1,120 litres to 934 litres per day. This is a significant 17% reduction, although the island's population grew 4% over that period.

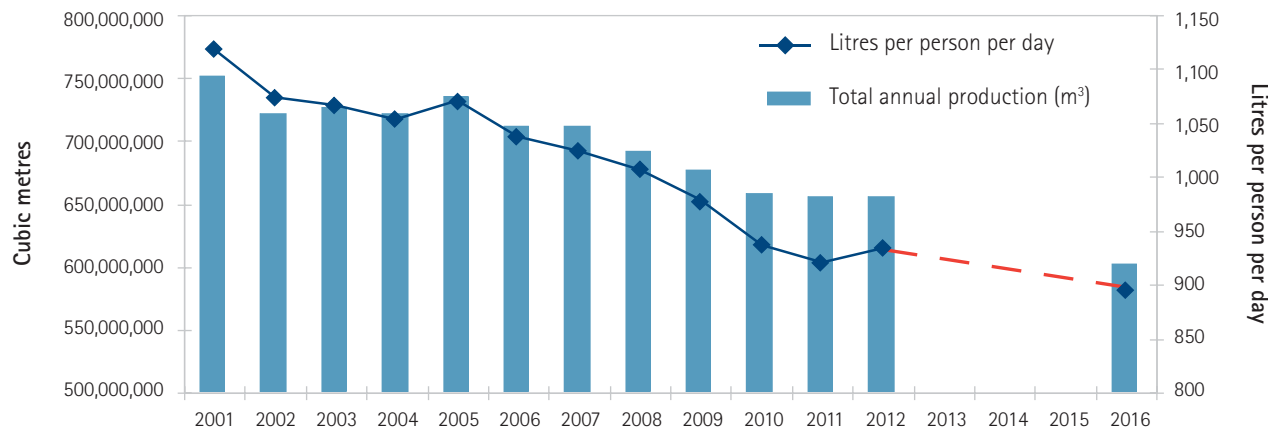
## OUTLOOK

The *Montréal Water Strategy* employs a variety of initiatives to maintain this downward trend in water production and consumption:

- Systemic detection and repair of leaks throughout the entire system.
- Paced replacement and rehabilitation of water mains to renew 1% of the system per year.

- The *Network Optimization and Sectorization Project* aimed at regulating pressure more effectively and measuring flow in different sectors by 2022. This effort will increase water main service lives and reduce failures.
- Meter installation in industrial, commercial and institutional sectors (ICIs) by 2018 to produce water budgets consistent with best practices of the American Water Works Association (AWWA).
- Application of two new water consumption by-laws that have been in effect since July 2013.

**Change in Montréal's Drinking Water Production**  
(Total annual production and litres/person/day)



## LINKS

*2012 Report on Drinking Water Consumption (in French)*  
[ville.montreal.qc.ca/pls/portal/docs/page/eau\\_fr/media/documents/bilan\\_usage\\_eau\\_potable%20\\_2012.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/eau_fr/media/documents/bilan_usage_eau_potable%20_2012.pdf)

*By-Laws on Drinking Water use In Montréal*  
[ville.montreal.qc.ca/portal/page?\\_pageid=6937,113267603&t\\_dad=portal&t\\_schema=PORTAL](http://ville.montreal.qc.ca/portal/page?_pageid=6937,113267603&t_dad=portal&t_schema=PORTAL)



# MILESTONE 1.2 INSTALL WATER METERS

Indicator: Install Water Meters in ICIs

## COMMITMENT

The Island of Montréal has over 26,000 ICI buildings, but only 7,000 are equipped with water meters. Under Montréal's Water Strategy, the city has decided to launch a water meter installation program for most ICIs. This program is designed to

- Produce a water budget consistent with AWWA best practices.
- Meet QSWDC requirements.
- Distribute costs among users.
- Assess performance of infrastructure restoration and drinking water conservation programs.



3" FLO-DAR water meter

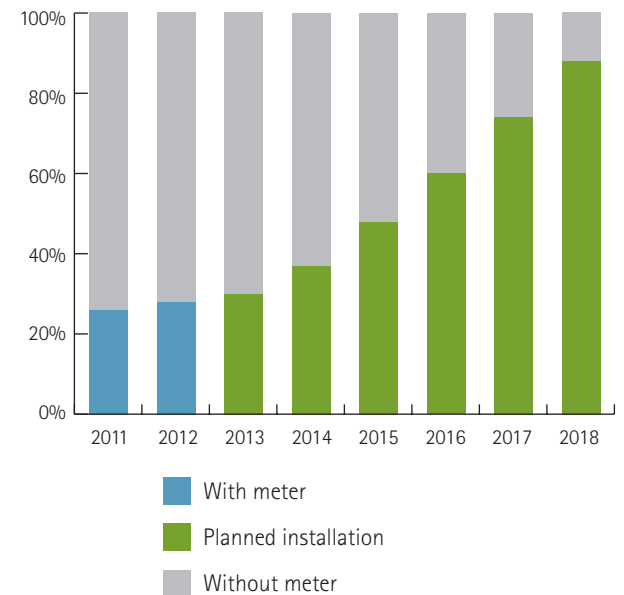
## HIGHLIGHTS

- The Water Meter Installation Program officially began in July 2012.
- From July 2012 to July 2013, 1,365 program-compliant meters were installed.
- The program is fully administered internally, boosting growth of municipal expertise in the field and ranking Montréal as a leading water meter user.

## OUTLOOK

- 16,000 meters should ultimately be installed.
- The Service de l'eau plans to install all these meters over a five-year period.
- This program will result in reduced ICI water consumption and help the city meet its goal of reducing drinking water production.
- This program will contribute to better consumption estimates and make annual water budgets more accurate.

Percentage of ICIs With and Without Meters on the Island of Montréal



## LINK

*Metering Water Consumption in Montréal (in French)*  
[ville.montreal.qc.ca/portal/page?\\_pageid=6497,113151590&t\\_dad=portal&t\\_schema=portal](http://ville.montreal.qc.ca/portal/page?_pageid=6497,113151590&t_dad=portal&t_schema=portal)

# MILESTONE 1.4 MINIMIZE WATER LOSS

Indicator: Estimated Percentage of Water Loss in Distribution System

## COMMITMENT

- Since 2011, Montréal's Service de l'eau has been submitting reports on total water consumption to the City Council. Produced according to the AWWA's international standards, these reports are used in estimating water loss in the supply system.
- The Service d'eau's goal is to achieve a 20% supply system loss rate ultimately, according to QSDWC targets.

## OUTLOOK

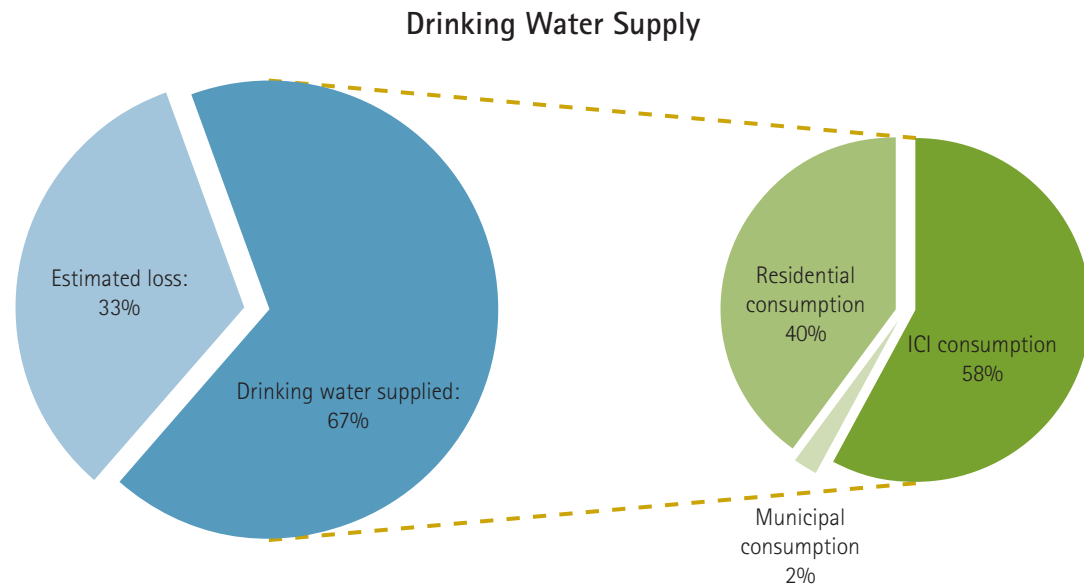
- The System Pressure Regulation and Sectorization Project and meter installation in ICIs will yield more precise data on water production and estimated loss.
- Systematic leak detection, repair of water main failures and water main renewal will gradually lower this loss rate.

## LINK

*2012 Report on Drinking Water Consumption (in French)*  
[ville.montreal.qc.ca/pls/portal/docs/page/eau\\_fr/media/documents/bilan\\_usage\\_eau\\_potable%20\\_2012.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/eau_fr/media/documents/bilan_usage_eau_potable%20_2012.pdf)

## HIGHLIGHTS

- An estimated 33% of all water distributed by the Island of Montréal's six drinking water production plants is lost.
- This is an improvement over the former estimated figure of 40% from the early 2000s. However, with only 20% of the water supply metered, this loss estimate remains very approximate.



# PRINCIPLE 2

## SHARED WATER STEWARDSHIP

Boosting public awareness is essential to a better understanding of water-related issues and municipal efforts to manage the complete water cycle responsibly. Public awareness also means increasing public involvement in water conservation, because community participation is essential to sustainable water management.



Water Awareness Day by Montréal-Nord's Eco-Quartier

## MILESTONE 2.1 RAISE PUBLIC AWARENESS

### Indicator: Activities to Raise Public Awareness

#### COMMITMENT

- Create a blue squad (La Patrouille bleue) to raise public awareness. This activity falls under the *Montréal Community Sustainable Development Plan and Montréal's Water Strategy*.



The 2012 Blue Squad

#### LINKS

##### *Blue Squad (La Patrouille bleue)*

[ville.montreal.qc.ca/portal/page?\\_pageid=6937,95025585&t\\_dad=portal&t\\_schema=PORTAL](http://ville.montreal.qc.ca/portal/page?_pageid=6937,95025585&t_dad=portal&t_schema=PORTAL)

##### *Leaflet: Water a Precious Resource (in French)*

[ville.montreal.qc.ca/pls/portal/docs/page/eau\\_fr/media/documents/depliant\\_economisez\\_eau\\_lr.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/eau_fr/media/documents/depliant_economisez_eau_lr.pdf)

#### HIGHLIGHTS

Since 2010, the Service de l'eau has partnered with the NPO Regroupement des éco-quartiers. Consisting of some 40 young people, the Squad talks with residents of the city's different districts over four weeks in the spring.

The Squad:

- Raises awareness of Montréal residents and ICIs on drinking water consumption by-laws and suggests installation of low-flow equipment to ensure responsible water use.
- Advises residents of existing regulations designed to protect buildings from sewer backups.
- Encourages property owners to manage stormwater more effectively at the source by diverting downpipe water and promoting rain barrel use.

Between 2010 and 2013, Squad members personally spoke with over 35,000 residents and hundreds of businesses about conserving drinking water. The four annual Blue Squads also gave over 100 young people work experience in the water sector and build on their communication skills.

The Service de l'eau has also conducted a variety of communication and awareness raising campaigns (such as a radio campaign supporting a new water by-law). It also developed awareness-raising tools for public events, including its Water Conservation House that offers tips on responsible domestic water use.

#### OUTLOOK

The Service de l'eau intends to continue its public awareness and communication campaigns in 2014, particularly with respect to the new By-Law Concerning the Use of Drinking Water.



Raising Public Awareness at the Water Conservation House



# PRINCIPLE 3

## SHORELINE AND WATERWAYS RESTORATION

The St. Lawrence River Basin is one of the planet's largest fresh water ecosystems, draining over 20% of world reserves. The vast range of habitats and species that it hosts also make it one of North America's richest natural heritage sites. The St. Lawrence's biodiversity has become increasingly vulnerable due to urban growth and pressures due to local and world-wide human activity. Riverbanks, coasts and shorelines are essential to the survival of ecosystems and to maintaining biodiversity along waterways.

Since 1996, the United Nations' Secretariat of the Convention on Biological Diversity (CBD) has been based in Montréal. The Secretariat encourages local authorities to get involved in the protection of biodiversity through such efforts as the International Council for Local Environmental Initiatives' (ICLEI's) Local Action for Biodiversity Project. This association is present among over 200 local governments in 43 countries.

In terms of protection measures, Montréal became Québec's first city to adopt a *Policy on the Protection and Enhancement of Natural Habitats* (PPENH) in December 2004.



The Island of Montréal's Protected Natural Habitats

# MILESTONE 3.1 PROTECTING AND RESTORING RIVERBANKS AND SHORELINES AND CONTROLLING EROSION

Indicator: Protected area of the Island of Montréal

## COMMITMENT

Montréal is committed to protecting 8% of the entire island and 6% of its land area (including wetlands and inland waterways) under the *Policy on the Protection and Enhancement of Natural Habitats* (PPENH).

## HIGHLIGHTS

- The Island of Montréal's landmass covers 50,089 hectares. Before 2004, 3.1% or 1,569 ha of this space was protected.
- Since 2004, the PPENH resulted in the addition of over 1,336 ha of protected habitats, representing 5.75% (2,885 ha) of the island's surface area (including wetlands and interior waterways).
- By including protected areas in the major waterways surrounding the island, over 17% of this area is now protected. This objective is comparable with international standards.
- Three new large parks were created (Sources Nature Park, Third Peak of Mount Royal Nature Park and Rapides-du-Cheval-Blanc Nature Park), while several other nature parks were expanded.

## OUTLOOK

The PPENH envisions four major projects supporting biodiversity, ecological and recreational connectivity and water management:

- Defining an overall plan to create a large regional park in Montréal's West Island.
- Continuing enhancement of Eastern Montréal's natural habitats, particularly by restoring ecological networks.
- Creating a Green Belt comprising the upstream portion of the Saint-Pierre River Valley, the Saint-Jacques Cliff and the Lachine Rapids.
- Connecting Promenade Bellerive Park, the Bois-d'Anjou Nature Park and the De Montigny Creek's Greenway Ecoterritory.

## LINK

*2009-2013 Report on the Policy on the Protection and Enhancement of Natural Habitats (in French)*  
[ville.montreal.qc.ca/pls/portal/docs/page/grands\\_parcs\\_fr/media/documents/bilan%20politique\\_2009-2013.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/grands_parcs_fr/media/documents/bilan%20politique_2009-2013.pdf)



Ecoterritory of Eastern Montréal's Green Belt  
Credit: © Air Imex



Ecoterritory of the Senneville Forest  
Credit: © Air Imex

## MILESTONE 3.2 INCREASE PUBLIC ACCESS TO SHORELINES, RIVERBANKS AND WATERFRONTS

Indicator: Increased Physical or Visual Public Access

### HIGHLIGHTS

- Some municipal acquisitions have, over the years, served to expand Montréal's shoreline nature parks by providing new viewpoints and protected areas. This was the case, for example, with the 2009 creation of Rapides-du-Cheval-Blanc Nature Park. The park is to be developed and opened to the public
- In 2009, the Montréal Urban Agglomeration Council included the Government of Québec's *Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains* in its existing land-use plan. The island's boroughs and municipalities subsequently incorporated this Policy in their planning by-laws and will ensure they have been applied before issuing permits or certificates.
- Ice fishing was introduced in the winter of 2012-2013, near Montréal's Old Port.

### OUTLOOK

As part of its overall development plans, Montréal will continue evaluating opportunities for physical and visual contact in areas that are not ecologically vulnerable.

In terms of environment, the Communauté métropolitaine de Montréal's (CMM's) *Metropolitan Land Use and Development Plan* (PMAD), adopted in December 2011, provides for the protection and enhancement of its natural

and built assets (including the CMM's major waterways) and the correction of certain deficiencies. It recommends, for example, the creation of Green and Blue Belts by setting up metropolitan recreational and tourism projects corresponding to the capacities of its natural habitats, including:

- Development of a metropolitan bike path and waterway system.
- An increased number of water access points for recreational use (swimming, boat launching, docking facilities, etc.).

### LINKS

*Green and Blue Belt of Greater Montreal (in French)*  
[pmad.ca/fileadmin/user\\_upload/pmad2012/documentation/20130228\\_fascicule\\_trameVerteBleue.pdf](http://pmad.ca/fileadmin/user_upload/pmad2012/documentation/20130228_fascicule_trameVerteBleue.pdf)

*Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains*  
[www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=//Q\\_2/Q2R35\\_A.htm](http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=//Q_2/Q2R35_A.htm)

### SHORELINES FOR THE COMMUNITY

- » The Island of Montréal has 315 km of shorelines. Some sections are highly developed, others have remained in their natural states. There are 137 km of shorelines on public property.
- » Shorelines in large parks total 63 km.
- » Twelve of 25 large parks border waterways and many borough parks lie along a river.
- » The public has access to three beaches in the Bois-de-l'Île-Bizard Nature Park, the Cap-Saint-Jacques Nature Park and Notre-Dame Island
- » With support from the city, a pedestrian and cyclist ferry shuttles between Montréal's Promenade Bellerive Park and the Parc national des Îles-de-Boucherville.
- » A green beltway, with panoramic stretches, provides excellent lookouts and vistas over stunning riverscapes. Such unique experiences give everyone a chance to enjoy the beauty of living on an island, while building on personal values and interests.
- » These shorelines give Montréal a competitive edge for its natural island-based attractions by offering a range of aquatic, discovery and educational activities pertaining to the environment, recreation, the outdoors, culture, sports and history.



## MILESTONE 3.3 PROTECT BIODIVERSITY AND HABITATS

### Indicator: Actions Supporting Biodiversity

#### COMMITMENT

In 2011, Montréal decided to develop a strategy and action plan for fostering biodiversity.

#### HIGHLIGHTS

- Under ICLEI's Local Action for Biodiversity Project<sup>3</sup>, Montréal released a report on biodiversity in May 2013. This outlined the current situation, along with achievements to date. It also recommended various approaches for preparing a biodiversity strategy and action plan.
- In 2013, the city's Direction des grands parcs et du verdissement, Secretariat of the Convention on Biological Diversity and ICLEI hosted an urban biodiversity conference (*Urban Biodiversity, a Value to Appreciate*) in Montréal. It was attended by over 150 participants and speakers from some 20 cities, 10 outside Canada.
- The city is providing technical support in developing a conservation plan for the map turtle in the Lac des Deux Montagnes area. The map turtle inhabits the St. Lawrence River and is a species of "special concern" under federal statutes and a "vulnerable species" under provincial regulations.

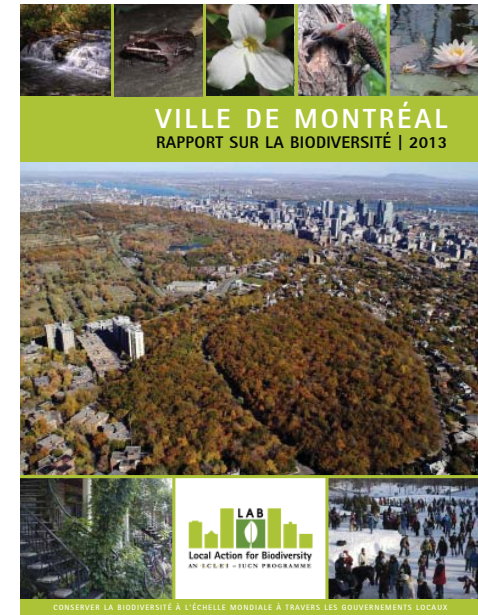
#### OUTLOOK

- Promote greater local and international recognition of the need to protect biodiversity.
- Take advantage of opportunities for protecting and acquiring land of ecological value through gifts, servitudes, purchases, etc.
- Take advantage of opportunities for partnerships to protect aquatic and land-based habitats.
- Pursue the war on invasive species.
- Continue activities to promote environmental education in the large parks, particularly among children.

3. ICLEI: The International Council for Local Environmental Initiatives is an international umbrella association for hundreds of cities and municipal associations.

#### LINK

*Biodiversity Report (in French)*  
[ville.montreal.qc.ca/pls/portal/docs/page/grands\\_parcs\\_fr/media/documents/rapportbiodiversite2013lecturecran.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/grands_parcs_fr/media/documents/rapportbiodiversite2013lecturecran.pdf)



Montréal



Map Turtle and its Shell



# PRINCIPLE 4

## WATER POLLUTION PREVENTION

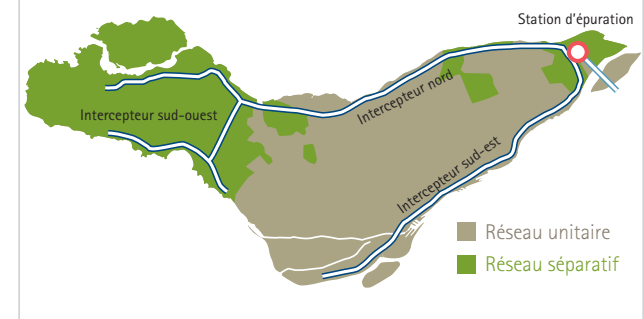
Water Pollution prevention means treating the island's wastewater through three primary strategies:

- Controlling the discharge of pollutants into the municipal sewer system and waterways at the source by enforcing by-laws and sewer-use fees for large discharges, as well as by prohibiting objectionable discharges.
- Aquatic habitat quality monitoring programs, including cross-connection detection and correction.
- Wastewater interception, collection and treatment at the municipal physical/chemical wastewater treatment plant that will soon also provide ozonation treatment.



Jean-R. Marcotte Wastewater Treatment Plant

### Le réseau d'égout



# MILESTONE 4.1 PREVENT POLLUTANTS FROM ENTERING THE SEWAGE COLLECTION SYSTEM

## 4.1.1 DISCHARGE BY-LAWS

Indicator: Activities by the Direction de l'environnement's Response Teams

### COMMITMENT

Montréal enforces CMM *By-Law 2008-47 on Wastewater Disposal* (CMM) (sewer hook-up, wastewater pre-treatment, periodic characterization, discharge prohibitions and standards for discharge into the sewer system and waterways and requires notification of accidental spills). The city also enforces *By-Law RCG 08-041* (permits for wastewater discharge and sewer-use fees for major discharge sources (flows, SS, COD, phosphorus, dose of alum, sludge from septic tanks and chemical toilets). The Direction de l'environnement studies industrial plans, approves treatment and prevention projects, responds to resident complaints, inspects establishments and tests their effluents.

### OUTLOOK

Efforts to date have cut the discharge of heavy metals, oil, grease and suspended solids generated by key targeted firms from 85% to 95%. Once new discharge standards came into effect in 2012, institutional compliance audits and data studies demonstrated changes in discharge levels by industrial sector, while identifying standards posing challenges to compliance and technical needs. Priorities and effective compliance strategies were adjusted accordingly, with necessary regulatory changes made where required.

### HIGHLIGHTS

| INDUSTRIAL WASTEWATER DISCHARGE CONTROLS   | 2012          | 2011           | 2010          | 2009          | 2008          |
|--|---------------|----------------|---------------|---------------|---------------|
| Number of new discharge permits issued   | 13            | 18             | 15            | 7             | 15            |
| Number of new treatment or prevention project approvals  | 111           | 82             | 93            | 119           | 80            |
| Treatment and prevention project investments (millions of \$)  | \$4.5 million | \$11.5 million | \$8.9 million | \$1.4 million | \$1.6 million |
| Number of complaints processed (waterway and discharge quality)  | 242           | 142            | 121           | 149           | 115           |
| Number of industrial wastewater samples taken to check compliance with discharge standards<br>+ Samples for cross-connection detection | 830<br>+235   | 600<br>+183    | 680<br>+121   | > 600<br>+373 | 603<br>+151   |
| Number of standardized results of tests for different pollutants   | 34,000        | 27,000         | 21,000        | > 25,000      | > 15,000      |
| Number of regulatory violation notices requiring remedial action   | 196           | 188            | 349           | 176           | 197           |
| Number of charges filed in Municipal Court   | 1             | 17             | 12            | 9             | 9             |
| Number of violators convicted*   | 8             | 0              | 1             | 5             | 4             |
| Total fines*   | \$107,500     | \$0            | \$20,000      | \$78,500      | \$60,000      |

\* A given year's convictions and fines include certain violations committed in prior years and resolved the current year, while excluding some violations committed the current year but unresolved that year.

# MILESTONE 4.1 PREVENT POLLUTANTS FROM ENTERING THE SEWAGE COLLECTION SYSTEM

## 4.1.2 SEWER-USE FEES

Indicator: Annual Rates and Change in Amounts Collected

### COMMITMENT

Under this program, businesses making large discharges into the public sewer system (100,000 m<sup>3</sup>/day or more) pay sewer-use fees, to prevent the public and other businesses from having to shoulder such costs. These rates are based on effluent quantity, mass loading of suspended solids (SS), chemical oxygen demand (COD), total phosphorus (TP) and an additional dose of alum to treat discharges.

### HIGHLIGHTS

| INDUSTRIAL WASTEWATER DISCHARGE SEWER-USE FEES  | 2012        | 2011          | 2010          | 2009          | 2008           |
|---|-------------|---------------|---------------|---------------|----------------|
| Number of institutions paying sewer-use fees  | 50          | 51            | 52            | 61            | 69             |
| Revenues generated by sewer-use fees for industries generating over 100,000 m <sup>3</sup> per year | \$4 million | \$3.8 million | \$4.2 million | \$4.4 million | \$6.24 million |

### LINKS

*Municipal Wastewater By-Laws and Permits (in French)*  
[ville.montreal.qc.ca/reglementseauxusees](http://ville.montreal.qc.ca/reglementseauxusees)

*Article 19 of Montréal City Council By-Law RCG 12-047 Concerning Sewer-Use Fees (in French)*  
[ville.montreal.qc.ca/sel/sypre-consultation/afficherpdf?idDoc=24494&typeDoc=1](http://ville.montreal.qc.ca/sel/sypre-consultation/afficherpdf?idDoc=24494&typeDoc=1)

# MILESTONE 4.1 PREVENT POLLUTANTS FROM ENTERING THE SEWAGE COLLECTION SYSTEM

## 4.1.3 CROSS-CONNECTION DETECTION PROGRAM

Indicator: Progress in Cross-Connection Detection Studies

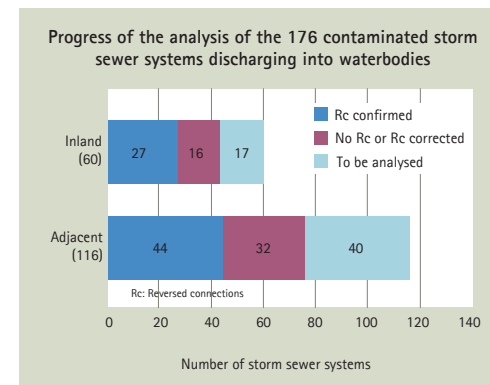
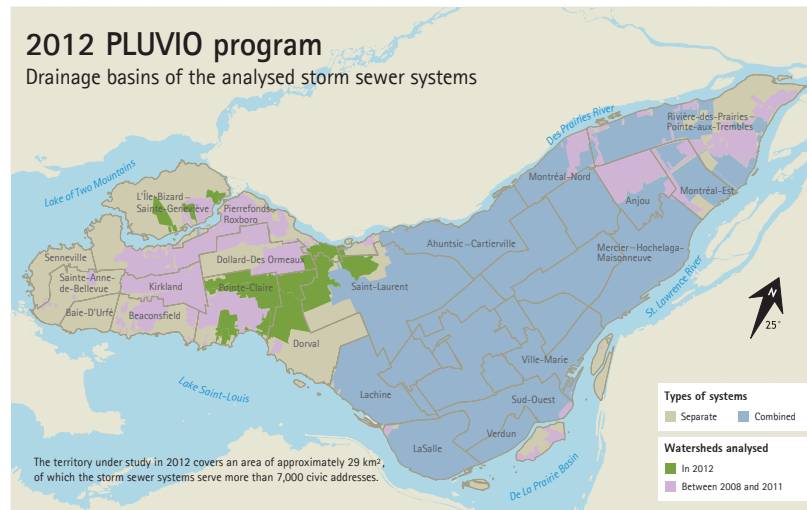
### COMMITMENT

The city has set up cross-connection detection program to pinpoint sources of domestic sewage in the storm sewer system and make necessary repairs.

### HIGHLIGHTS

The presence of cross-connections has, to date, been confirmed on 119 storm sewer systems (including 33 in 2012) of a total 176 systems to be checked (among 550 existing systems on the Island of Montréal).

This program helps Montréal's boroughs and municipalities to fix cross-connections.



### LINK

Water Monitoring Network—RSMA (in French)  
[ville.montreal.qc.ca/rsma](http://ville.montreal.qc.ca/rsma)

### HEALTHY STORM SEWER SYSTEMS ON THE HORIZON... MORE AND MORE ACHIEVEMENTS!

Over the past five years, many reversed connections (Rc) have been rectified in boroughs and cities such as Beaconsfield, L'Île-Bizard-Sainte-Geneviève, Montréal-Nord, Pierrefonds-Roxboro, Pointe-Claire, Rivière-des-Prairies-Pointe-aux-Trembles, Ville-Marie and Verdun; in Nuns' Island only, some 50 Rc were corrected. The City of Kirkland has distinguished itself in this respect. During the past three years, this city's taxpayers have allowed Rc screening of their properties to take place and nearly 95% of the Rc discovered have been remedied to date. Residential owners whose homes were affected by Rc have benefited from a subsidy by the municipality to help them defray the costs of the corrective measures required.

The Yellow Fish Road program, organized by Trout Unlimited Canada, is an environmental initiative that is firmly entrenched in Kirkland. Each spring, community groups criss-cross the streets of the city to paint symbolic small yellow fishes near storm sewers. This activity is intended to raise awareness among the population that the discharge of untreated



wastewaters in our waterbodies threatens our health and environment. For further information, please consult their Web site at [yellowfishroad.org](http://yellowfishroad.org). RSMA would take this opportunity to congratulate the citizens and authorities of Kirkland for their initiatives.



# MILESTONE 4.2 REDUCE POLLUTANTS FROM WASTEWATER TREATMENT PLANT EFFLUENT

Indicators: Jean-R. Marcotte Wastewater Plant Results Compared with MAMROT Performance Goals and Disinfection Project

## COMMITMENTS

One goal of Montréal's Water Strategy is to improve the quality of wastewater discharged from the treatment plant into the St. Lawrence River as follows:

- Annually meeting performance goals of the Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT) for the SS and TP control parameters.
- Disinfect treated wastewater with ozone, under the *Montréal Water Strategy*.

## HIGHLIGHTS

### MAMROT PERFORMANCE CRITERIA

MAMROT gave the treatment plant the following scores in 2012:

- Compliance with discharge requirements: 100% (this score has been awarded every year since the monitoring system came into effect).
- Compliance of reports submitted to MAMROT: 100%.

The treatment plant's effluent contains average annual concentrations of 18 mg/L of suspended matter and 0.42 mgP/L of total phosphorus.

### WASTEWATER TREATMENT PLANT RESULTS COMPARED WITH MAMROT'S SUSPENDED SOLIDS (SS) CRITERIA

| CRITERIA                                    | MAMROT REQUIREMENTS | 2012 STATION<br>mg/L or % or kg/d |
|---|---------------------|-----------------------------------|
| Northern and southern tributaries           |                     | 104.3 mg/L                        |
| Effluent                                    | <= 20 mg/L          | 18 mg/L                           |
| Average annual removal rate                 | >= 75%              | >= 82.8%                          |
| Minimum average weekly removal rate minimal | >= 65%              | >= 72.3%                          |
| Maximum average weekly concentration        | < 30 mg/L           | 23.5 mg/L                         |
| Maximum weekly effluent load                | < 107,800 kg/d      | 61,061 kg/d                       |
| Annual effluent load                        | < 77,000 kg/d       | 40,160 kg/d                       |

Additional information is available in the annual reports of the wastewater treatment plant.

### WASTEWATER TREATMENT PLANT RESULTS COMPARED WITH MAMROT'S TOTAL PHOSPHORUS (TP) CRITERIA

| CRITERIA                                    | MAMROT REQUIREMENTS | 2012 STATION<br>mgP/L or % or kgP/d |
|---|---------------------|-------------------------------------|
| Northern and southern tributaries           |                     | 1,60 mgP/L                          |
| Effluent                                    | <= 0.50 mg/L        | 0.42 mgP/L                          |
| Average annual removal rate                 | >= 70%              | 73.6%                               |
| Minimum average weekly removal rate minimal | >= 60%*             | 62.8%                               |
| Maximum average weekly concentration        | < 0.75 mg/L         | 0.56 mgP/L                          |
| Maximum weekly effluent load                | < 2,240 kg/d        | 1,370 kgP/d                         |
| Annual effluent load                        | < 1,680 kg/d        | 947 kgP/d                           |

\* Phosphorus levels are considered "outside targets" if mgP/L and % removal figures do not simultaneously meet tolerated levels.

## MILESTONE 4.2 REDUCE POLLUTANTS FROM WASTEWATER TREATMENT PLANT EFFLUENT

Indicators: Jean-R. Marcotte Wastewater Plant Results Compared with MAMROT Performance Goals and Disinfection Project



### LINK

*Annual Report—Jean-R. Marcotte Wastewater Treatment Plant (in French)*

[ville.montreal.qc.ca/portal/page?\\_pageid=6497,54611645&t\\_dad=portal&t\\_schema=PORTAL](http://ville.montreal.qc.ca/portal/page?_pageid=6497,54611645&t_dad=portal&t_schema=PORTAL)

### WASTEWATER DISINFECTION PROJECT

Disinfection of wastewater at the treatment plant reduces the risk posed by pathogens during summer recreational and tourism activities downstream of the Island of Montréal. It also serves to protect St. Lawrence River flora and fauna.

Following numerous studies, thousands of tests and pilot trials, the city concluded that ozonation, using the powerful oxidant ozone, is the best method for disinfecting wastewater. The city accordingly decided to deploy this technology. The project receives financial backing from the federal and provincial governments.

### OUTLOOK

The ozonation unit is scheduled to come on line in 2016. It will only operate during the year's six warmer months.

The treatment plant is now subject to Canadian government's new *Wastewater Systems Effluent Regulations*, which have been gradually implemented since June 29, 2012. Under the Regulations, treated effluent must meet limits for carbonaceous biochemical oxygen demand (CBOD), suspended matter (SS), un-ionized ammonia (NH<sub>3</sub>) and toxicity (acute toxicity to rainbow trout). Noncompliant effluent and planned diversions can be rejected pursuant to an authorization issued by the authorities, under certain circumstances and for a variable period depending on overflows observed and the receiving waterways. Efforts and discussions in this area are underway to adopt an equivalent agreement in the new provincial regulations.

## MILESTONE 4.3 REDUCE STORMWATER ENTERING WATERWAYS

### Indicator: Reduced Overflows

#### COMMITMENT

- Meet MAMROT performance targets.
- Develop stormwater management systems upstream of sewers to diminish wastewater volume and overflows from heavy rainfalls, while promoting the return of clean water to natural habitats.

#### HIGHLIGHTS

Montréal's system now includes 15 major water retention structures and over 100 smaller facilities. During exceptionally heavy rains, the combined sewer system reaches its maximum capacity quickly and 162 overflow structures carry wastewater overflows to the waterways

- The treatment plant received the following MAMROT score in 2012:
  - » Compliance with discharge requirements: 100%.
  - » Implementation of monitoring program: 100%.

All overflow structures:

- » Compliance with discharge requirements: 91%
- » Implementation of monitoring program: 98%

Interception rate: 98.9% "dry weather" flow is intercepted and treated at the treatment plant.

- Hydraulic studies of the island's drainage basins are being produced for a master drainage plan designed to boost sewer system service levels and meet discharge requirements of the Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs (MDDEFP).
- The city requires stormwater retention measures for private land. For the past four years, the areas concerned have a retention capacity of 40,000 m<sup>3</sup> and a retention value of \$40 million.
- On a smaller scale, residents can also help reduce the volume of runoff from their property. Since 2010, the city has promoted installation of rain barrels and the diversion of downpipe flows to permeable surfaces, in conjunction with environmental organizations.



#### OUTLOOK

- The city, in partnership with the higher levels of government, plans to build five new retention ponds by 2016. They will have a total storage capacity of 160,000 m<sup>3</sup> and help relieve the system, while reducing overflow frequency.
- The Service de l'eau has begun reviewing regulations concerning rainwater retention on private lots to incorporate performance criteria for green infrastructure.

#### LINKS

*Annual Report—Jean-R. Marcotte Wastewater Treatment Plant (in French)*

[ville.montreal.qc.ca/portal/page?\\_pageid=6497,54611645&\\_dad=portal&\\_schema=PORTAL](http://ville.montreal.qc.ca/portal/page?_pageid=6497,54611645&_dad=portal&_schema=PORTAL)

*Private Lot Retention Permits and Approvals (in French)*

[ville.montreal.qc.ca/portal/page?\\_pageid=6497,81367601&\\_dad=portal&\\_schema=portal](http://ville.montreal.qc.ca/portal/page?_pageid=6497,81367601&_dad=portal&_schema=portal)

*2011-2012 Report on Rain Barrel Distribution (in French)*

[ville.montreal.qc.ca/pls/portal/docs/page/eau\\_fr/media/documents/bilan\\_prog\\_barils\\_eau\\_de\\_pluie\\_2012-2013.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/eau_fr/media/documents/bilan_prog_barils_eau_de_pluie_2012-2013.pdf)

# MILESTONE 4.4 MONITOR WATERWAYS AND SOURCES OF POLLUTION

Indicator: Water Quality Parameters

## COMMITMENT

The Montréal Direction de l'environnement's Water Monitoring Network (RSMA) has sampled the city's waterways every summer over the past 20 years. These efforts include periodic visits to various key points in and around the island. Checks on waterway quality improvement serve in assessing if objectives are being met for restoring multiple potential uses of our waterways, while protecting habitat qualities of other species, along with biodiversity.

During its targeted communication efforts, the RSMA shares findings requiring remedial action with the appropriate forums. RSMA observations and analytical results are then used to draft a report on the overall quality of Montréal's waterways. This work highlights problem areas for which improvement is required and helps to step up ongoing clean-up activities.

## LINK

*Water Monitoring Network—RSMA (in French)*  
[ville.montreal.qc.ca/rsma](http://ville.montreal.qc.ca/rsma)

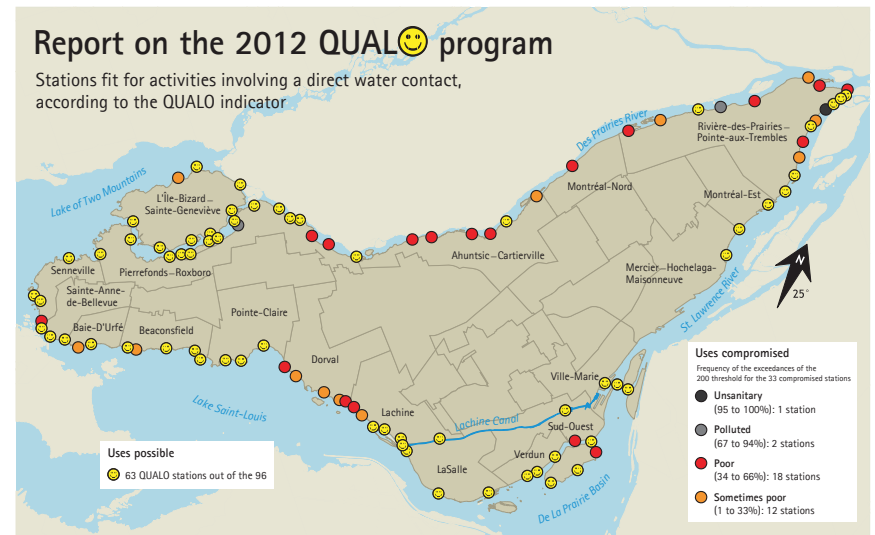
## HIGHLIGHTS

### QUALO PROGRAM—SHORE WATER QUALITY

According to 2012 findings, the Shore Action Program is approaching its goal of restoring multiple aquatic activities. If there has been no rainfall for the prior 60 hours, results show that 94% of the stations have contamination levels lower than the standard for direct contact water activities, such as swimming.

The program was conducted over 20 weeks (May 21 to October 3) at 96 sampling stations on Rivière des Prairies, Lac Saint-Louis, the La Prairie Basin, the St. Lawrence River and Île Bizard

- Criterion 200: 63 of 96 stations (66%) are suited for direct water contact activities compared with 56% in 2011 (78% of 1,917 samples tested met Criterion 200).
- Criterion 1000: The number of samples exceeding the Criterion 1000 threshold has remained flat at about 7%.



The water quality indicator is based on MDDEFB bacteriological criteria:

- » Criterion 200 (fecal coliform per 100 mL of water): for direct water contact activities (swimming, windsurfing, waterskiing, white water sports, scuba diving and jet skiing).
- » Criterion 1000 (fecal coliform per 100 mL of water): for indirect water contact activities (recreational boating, canoeing and sport fishing).



# MILESTONE 4.4 MONITOR WATERWAYS AND SOURCES OF POLLUTION

## Indicator: Water Quality Parameters

### COURDO PROGRAM—WATER QUALITY IN SURROUNDING WATERWAYS

Waterway quality around the Island of Montréal has risen sharply since the 1970s, following installation of treatment equipment.

#### Best Water Quality in Rivière des Prairies

- Criterion 200: In 2012, 28% of fecal coliform counts exceeded Criterion 200 (61% in 2002).
- Criterion 1000: In 2012, Criterion 1000 was exceeded 5 times in 245 samples (2%, compared with 12% in 2002).

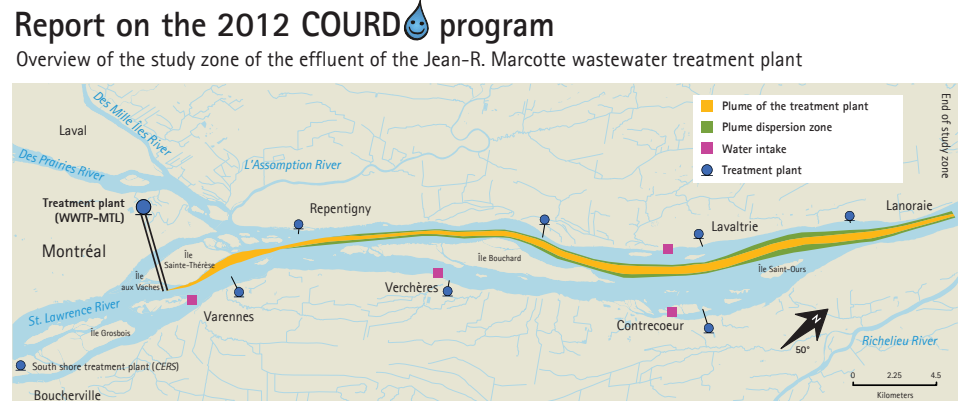
### Increased Knowledge of Impact Area Downstream of the Wastewater Treatment Plant

Coliform counts were conducted downstream of the wastewater treatment plant in 2012. The program comprised 57 stations. All data showed that the facility's impact area was limited to the river's centre, along the north side of the Verchères Islands. The river's north shore is unaffected, as the water that flows past it has different characteristics.

### OUTLOOK

Key challenges in coming years are:

- Monitoring and improving the Island of Montréal's water quality (affected by contamination from storm sewers that empty into it), to restore more activities in our waterways.
- Monitoring and improving waterway quality (influenced by such factors as increased surface mineralization).
- Better knowledge of the sector's water quality would be highly useful in setting the next treatment priorities, in an effort to improve the river and start up a disinfection unit at the Jean-R. Marcotte Wastewater Treatment Plant



# PRINCIPLE 5

## WATER PROTECTION PLANNING

Development choices reflect the social, economic and environmental concerns of a city and its inhabitants. Long neglected, sustainable water management is now playing a growing role in land-use planning. Water-related goals help guide decisions of municipal departments in formulating by-laws, zoning regulations, incentives, etc. Such goals also encourage public and private stakeholders to factor drinking water consumption, stormwater runoff management and aquatic habitat protection into development planning.



Development concept for Éco-Campus Hubert-Reeves, incorporating a vast conservation sector in Saint-Laurent  
Credit: © Technoparc Montréal, [www.technoparc.com](http://www.technoparc.com)

## MILESTONE 5.1 ADOPT COUNCIL-ENDORSED COMMITMENT TO SUSTAINABLE WATER MANAGEMENT

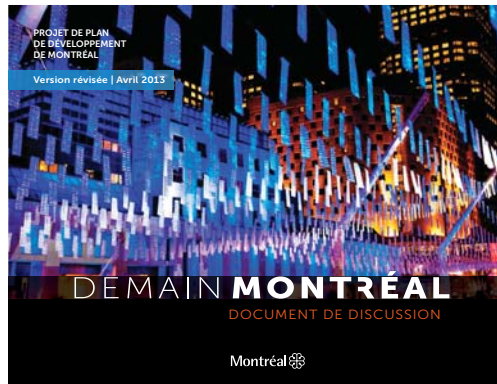


### COMMITMENT FULFILLED

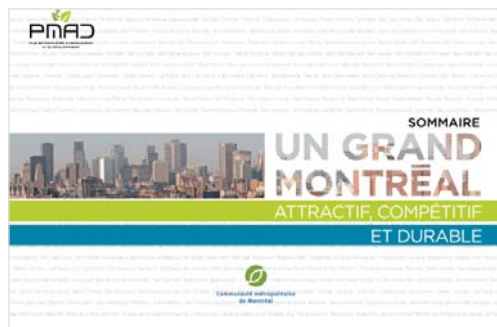
Adoption in 2010 by city authorities of the *Montréal Community Sustainable Development Plan 2010-2015* and of the *Montréal Water Strategy* in 2011 illustrates Montréal's commitment to include sustainable water management in its management practices.

## MILESTONE 5.2 INTEGRATE WATER POLICIES INTO LAND USE PLAN

The city's Draft *Montréal Development Plan* (MDP) is intended to pilot Montréal's development over the next decade. In line with the CMM's Metropolitan Land Use and Development Plan (PMAD), Montréal will revise its urban planning documents over the next two years.



[ville.montreal.qc.ca/demainmontreal](http://ville.montreal.qc.ca/demainmontreal)



[www.pmad.ca](http://www.pmad.ca)

### DRAFT MONTRÉAL DEVELOPMENT PLAN

- The MDP provides a strategic outlook on development over the next two decades. It is based on key elements of Montréal's plans and policies adopted by City Council over the past few years.
- The draft MDP was discussed at information sessions and public hearings in 2012 and 2013.
- The draft MDP highlights the environmental challenges the city must meet. These include "providing integrated water management by continuing to rehabilitate the sewer and drinking water systems, reducing drinking water production and collecting storm runoff at the source. This effort is designed to control the quantity and quality of water discharged in receiving environments more effectively."
- The MDP will also serve as a foundation for producing the *Land Use and Development Plan* and the city's subsequent *Urban Plan*.

### THE METROPOLITAN LAND USE AND DEVELOPMENT PLAN, THE LAND USE AND DEVELOPMENT PLAN AND THE URBAN PLAN

- The CMM's PMAD came into effect in March 2012.
- Under the PMAD, the Montréal Urban Agglomeration must revise its *Land Use and Development Plan* and adopt it in 2014, pursuant to *An Act Respecting Land Use Planning and Development* of the Québec Government.
- The city's revised *Urban Plan* should follow in 2015.
- Protection of Greater Montréal's shorelines and waterways is a key focus of the PMAD.
- The CMM has also recommended that municipalities include climate change adaptations in their planning practices, including boosting surface water retention capacity through greening measures.



## MILESTONE 5.4 ADOPT GREEN INFRASTRUCTURE

### Indicator: Green Infrastructure Projects

#### COMMITMENT

Under the *Montréal Community Sustainable Development Plan 2010–2015*, the city agreed to include green infrastructure in its development plans. In 2013, the Service de l'eau presented decision makers with an integrated stormwater management strategy aimed at reducing the expected impact of increasingly heavy rainfalls and their resulting costs. Green infrastructure is one of the initiatives proposed for promoting storm water management upstream of the sewage system.



Creation of a green lane on rue Laval in Plateau Mont-Royal  
Credit: © Soverdi

#### HIGHLIGHTS

- Over 30 green infrastructure projects have been created or are underway on public land (curb extension, rain gardens, bioretention ponds, green roofs, permeable pavement, etc.). These improvements generally reduce the heat island effect and promote stormwater retention/infiltration.
- Several boroughs have launched green lane initiatives in residential areas.
- The city also contributed to the creation and dissemination of the Bureau de normalisation du Québec's *Standard 3019-190* on parking lot development. This standard provides a guide to designers seeking to reduce the heat island effect and integrate on-site storm water management more effectively.

#### MOUNT ROYAL PARK

Creation of retention ponds plays a role in landscaping projects for the city's large parks, where feasible. A series of projects in the 1990s at Mount Royal Park helped retain water in the park and connect runoff with specifically designed outlets, delaying the arrival of peak flows in key sectors. Collecting runoff in retention ponds built into stairway repairs at Mount Royal Park's Peel entrance is a good example of the city's win-win approach to projects pairing environmental solutions with user needs. More recently, the city took advantage of the major Beaver Lake Basin restoration to apply best management practices by partially refilling the lake with runoff, rather than water from the public supply.



## MILESTONE 5.4 ADOPT GREEN INFRASTRUCTURES

### Indicator: Green Infrastructure Projects

#### OUTLOOK

- Proliferation of green infrastructure requires assessment of its functional and financial performance by category (actual cost and retention/infiltration cost per cubic metre).
- Experience from these projects helps build on expertise that will permit the creation of green infrastructure projects tailored to local needs.
- The Service de l'eau is working on a draft by-law concerning stormwater retention on private lots. Performance criteria are also be considered based on local circumstances (hydrology, topography, soil types, etc.), when designing green infrastructure.
- The Service de l'eau is also studying the feasibility of diverting stormwater from roofs to green spaces and developing infrastructure that can withstand flooding from heavy rainfalls.
- The draft *2012-2021 Canopy Action Plan* is designed to increase Montréal's tree cover from 20% to 25%, with 300,000 trees to be planted over a 10-year period. This effort will help improve air quality, reduce smog, reduce the heat island effect and diminish runoff.



Dry retention basin at the train station between Saint-Léonard and Montréal-Nord



Bioretention basis at the Habitations Jeanne-Mance parking lot in Ville-Marie

#### LINKS

*Discovering Green Lanes (in French)*

[www.soverdi.org/ruelles-vertes](http://www.soverdi.org/ruelles-vertes)

*Canopy Action Plan 2012-2021 (in French)*

[ville.montreal.qc.ca/pls/portal/docs/page/grands\\_parcs\\_fr/media/documents/pac\\_juin\\_2012\\_final.pdf](http://ville.montreal.qc.ca/pls/portal/docs/page/grands_parcs_fr/media/documents/pac_juin_2012_final.pdf)

# PRINCIPLE 6

## WATER PREPAREDNESS FOR CLIMATE CHANGE

The three key elements involved in preparing for climate change are: (1) identifying potential risks, sectors and populations affected, (2) identifying and implementing reduction or adaptation measures and (3) developing/ deploying responses. Cities play key roles in contending with climate change through their responsibilities for urban planning, infrastructure, transportation systems, economic development, the environment, etc.



Sewer system overflow following intense rainfall in Montréal on May 19, 2012  
Credit: © Métro newspaper, [www.journalmetro.com](http://www.journalmetro.com)



# MILESTONE 6.1 CONDUCT A VULNERABILITY ASSESSMENT

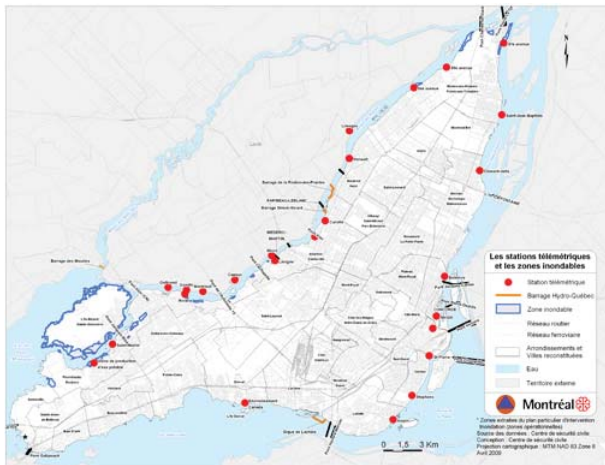
## Indicator: Vulnerability Assessment

### COMMITMENT

- Produce a vulnerability assessment before drafting an adaptation plan.

### HIGHLIGHTS

Higher waterway levels may cause different degrees of flooding on some parts of the island. Montréal's Centre de sécurité civile has identified sectors most likely to flood.



In 2011, a comprehensive study on adapting urban sewer systems to climate change was published. This project was headed by the city in conjunction with the OURANOS Consortium and the Institut national de recherche scientifique (INRS).



The study quantified the impact of potential rainfalls in a future climate (over a 50-year period) based on simulations with a section of Montréal's drainage system. The study established the need:

- To include stormwater management (primarily by returning runoff to the natural environment) in other planning measures.
- To step up surface and underground stormwater retention requirements, as part of the construction permit issuance process.
- To conduct a topographic analysis to ensure uses are compatible with network load risks or alter surface profiles to direct runoff toward green spaces.
- To continue developing drainage basin master plans and models.
- To promote projects reducing the percentage of impermeable surfaces.

### OUTLOOK

En 2013, the Direction de l'environnement conducted a Climate Change Vulnerability Assessment for the Island of Montréal. It included:

- Formulation of a methodology and selection of indicators for assessing vulnerability (primarily with respect to the heat island effect and stormwater runoff).
- Conducting a Vulnerability Assessment for different population groups on the island (age, location, sewer types, etc.).
- Production of vulnerability status maps, identifying areas at risk for selected parameter (such as flooding).

### LINKS

*Centre de Sécurité Civile—Rising Water (in French)*  
[ville.montreal.qc.ca/portal/page?\\_pageid=7637,82391659&\\_dad=portal&\\_schema=PORTAL](http://ville.montreal.qc.ca/portal/page?_pageid=7637,82391659&_dad=portal&_schema=PORTAL)

*Comprehensive Study on Urban Drainage and Adaptation (in French)*  
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# MILESTONE 6.2 REDUCING VULNERABILITY – CLIMATE CHANGE IMPACT ADAPTATION PLAN

Indicators: Climate Change Adaptation Plan Formulated by Municipal Bodies and Progress Implementing Adaptive Measures

## COMMITMENT

Montréal's Direction de l'environnement has decided to produce a climate change adaptation plan for the urban agglomeration in 2014. This plan will address the prior vulnerability assessment and encompass a variety of measures to be implemented over a two-decade period.

## HIGHLIGHTS

Some prevention measures have already been deployed to reduce risks associated with an expected increase in heavy rainfall.

Since 2011, *By-Law 11-010 Concerning the Protection of Buildings Against Sewer Backups* requires installation of plumbing equipment to prevent backups for new and renovated buildings, as well as those plagued by a history of such problems. The city also provides the services of inspector to determine measures best suited to a given building.



## OUTLOOK

The Service de l'eau has produced an integrated stormwater management strategy to reduce the impact and cost of runoff due to climate change. It is focusing on a range of measures, by selecting those best suited to specific needs and situations. This strategy will be proposed as part of the *Adaptation Plan*.

### EXAMPLES ON PRIVATE LOTS

- Protection of buildings against backups.
- Diversion of runoff from downpipes to permeable surfaces.
- Retention for impermeable surface (roof, parking, etc.).

### EXAMPLES ON PUBLIC PROPERTY

- Green infrastructure.
- Sewer upgrades.
- Retention ponds.
- Zoning according to topography.
- Flood-resistant areas, street retention, etc.



Table adapted from a presentation to Montréal's Executive Committee in July 2013

## LINKS

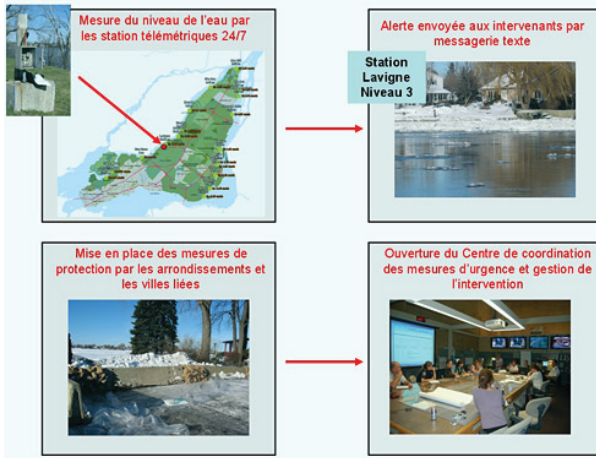
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*Sewer Backups (Separate system)*  
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# MILESTONE 6.3 ADAPT EMERGENCY RESPONSE PLAN TO CLIMATE CHANGE

## Measurement and Alert System



## PIP—Flood Waters Mobilization Levels, Indicators and Actions

| Stations télémétriques | OSCAM   | Actions  |
|------------------------|---|--|
|                        | <b>Veille saisonnière</b><br>(décembre et janvier)<br>(mars et avril) | • Surveiller les conditions météorologiques susceptibles d'entraîner la formation de frazil en hiver et les crues au printemps   |
| Niveau 1               | <b>Normal</b><br>Moins de 3 critères sont atteints                    | • Procéder à une surveillance plus intense   |
|                        | <b>Veille</b><br>Au moins 3 critères sont atteints                    | • Amorcer des opérations de surveillance et de vérification telles que l'inventaire du matériel d'intervention, la révision des procédures et l'intensification de la surveillance.  |
| Niveau 2               | <b>Alerte</b><br>Au moins 3 critères sont atteints                    | • Préparer les équipements d'intervention :<br>- sacs de sable,<br>- barricades,<br>- pompes submersibles.   |
| Niveau 3               | <b>Intervention</b><br>Au moins 4 critères sont atteints              | • Procéder à l'installation d'équipements d'intervention et amorcer la mise en œuvre de l'organisation des mesures d'urgence d'arrondissement relatives à la crue des eaux<br>• Ouverture du CCMU et des centres d'opération d'urgence (COU) dans les arrondissements et villes liées. |

## HIGHLIGHTS

Civil security officials are equipped with planning and response tools to predict and contend with various emergencies that might occur on the island, including extreme heat waves and flooding.

These response plans are based on assessments of potential risks, including methods for detecting emergencies and transmitting warnings or alerts, along with deployment of response plans tailored to these situations and to the most vulnerable populations. Incidentally, it has recently become possible to receive emergency alerts on cell telephones.

## PARTICULAR INTERVENTION PLAN (PIP)—FLOOD WATERS

This Plan serves to predict and plan actions under city or borough authority during floods to protect inhabitants, their property and the environment. Criteria have been defined for enlistment levels.

Since January 2008, 18 telemetric stations have been monitoring water levels on Rivière des Prairies and the St. Lawrence River. Mobilization levels are determined by thresholds at telemetric station located at key spots. Levels 1, 2 and 3 correspond to river levels. Levels are not the same for all stations. They are thresholds at which flood prevention and preparation measures must be deployed.

## FOR PUBLIC THOROUGHFARES

One borough has produced an initial response guide for emergency efforts to reduce the risk to public safety in the event of local street flooding from heavy rains.

The response guide covers:

- Weather alerts.
- Planning of human and material resources.
- Identification and locations of response zones.
- Dispatching resources to secure flooded areas.
- Communications among municipal responders and officials.
- Follow-ups on efforts to improve future responses.



# MILESTONE 6.4 REDUCE GREENHOUSE GAS EMISSIONS

Indicator: Change in GHG Emissions Due to Wastewater Treatment and Drinking Water Production

## COMMITMENT

The city was committed to reducing its corporate greenhouse gas (GHG) emissions 20% from 2002 to 2012. Having met this target, the city announced in September 2013 a new 30% reduction for 2020, with respect to 2002 levels.

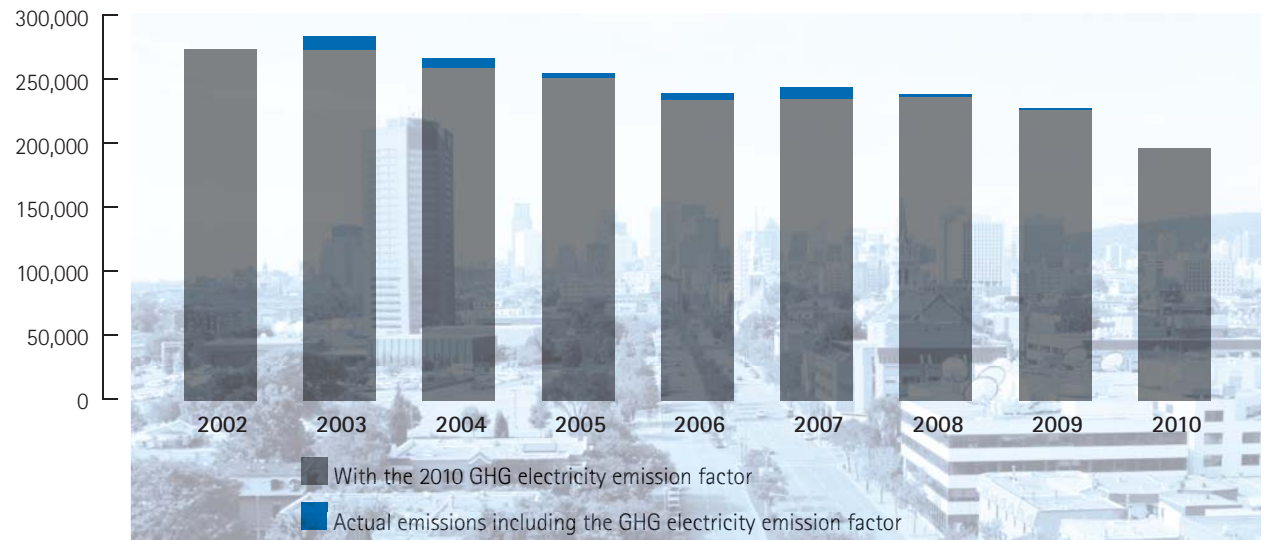
## HIGHLIGHTS

In 2013, the Direction de l'environnement produced two new GHG inventories for the Island of Montréal, the 2010 corporate emissions (municipal activities) and the 2009 collective emissions produced by the whole island (population + ICIs).

## CORPORATE GHG EMISSIONS

Corporate GHG for the island totalled 222,000 t CO<sub>2</sub> eq. in 2010, plus GHG emissions from sub-contracting activities that had never been counted before this inventory. The city met and beat its 20% reduction target from 2002, with emissions down 28% in 2010, two years before the deadline.

2002-2010 CORPORATE GHG EMISSIONS ON THE ISLAND OF MONTRÉAL, EXCLUDING SUB-CONTRACTED ACTIVITIES (T CO<sub>2</sub> EQ.)



COMPARISON OF 2010 GHG EMISSIONS FROM MONTRÉAL URBAN AGGLOMERATION DEPARTMENTS WITH THOSE OF 2002 (EXCLUDING SUB-CONTRACTED ACTIVITIES)

|  | Change (t CO <sub>2</sub> eq.) | Change (%)   | % total reduction |
|--|--------------------------------|--------------|-------------------|
| Building energy consumption                          | -9,913                         | -17.5        | 12.8              |
| Internal vehicle fuel consumption                    | -4,338                         | -8.3         | 5.6               |
| Wastewater treatment                                 | -38,729                        | -34.1        | 50.0              |
| Drinking water production                            | -86                            | -7.7         | 0.1               |
| Refrigerant leaks (HFCs from buildings and vehicles) | +123                           | +6.4         | n/a               |
| CESM biogas emissions                                | -24,455                        | -52.8        | 31.5              |
| Street and traffic lights                            | -69                            | -18.5        | 0.1               |
| <b>TOTAL</b>   | <b>-77,533</b>                 | <b>-28.5</b> | <b>100</b>        |

Note: The HFC estimate is approximate, as noted in Appendix B.6.

## LINK

Montréal—Climate Change (in French)  
[ville.montreal.qc.ca/portal/page?\\_pageid=7237,75083582&t\\_dad=portal&t\\_schema=portal](http://ville.montreal.qc.ca/portal/page?_pageid=7237,75083582&t_dad=portal&t_schema=portal)

## MILESTONE 6.4 REDUCE GREENHOUSE GAS EMISSIONS

Indicator: Change in GHG Emissions Due to Wastewater Treatment and Drinking Water Production

### DRINKING WATER

GHG emissions due to drinking water production and supply only represent 0.5% of total 2010 corporate emissions (1,040 t CO<sub>2</sub> eq.). The sector's GHG dropped 7.7% in 2010 with respect to 2002 primarily because less natural gas was used to heat buildings.

### WASTEWATER

Corporate GHG emissions due to wastewater treatment represented 34% of all corporate emissions in 2010.

Most (74%) were caused by sludge incineration. The rest were largely due to combustion of natural gas, primarily used for incinerating sludge and, to a lesser extent, for heating building due peak winter demand when incinerator heat recovery systems are not up to the task alone.

Light fuel oil, used for emergency generators and occasionally as sludge incineration fuel, caused less than 0.5% of 2010 emissions. While electric consumption for this activity is high (19% of all electricity consumed for the Island of Montréal's corporate activities), related GHG emissions are minimal, due to Quebec's low GHG electricity emission factor.

GHG emissions for wastewater treatment declined 34.1% over the 2002-2010. This decline was primarily due to the reduction of emissions caused by sludge incineration, which in turn is due to a 20% reduction of the processes emission factor in 2009, as detailed in the corporate inventory. There was also a 16% drop in the quantity of incinerated sludge. Furthermore, changes to incinerator burners in 2005 significantly diminished the amount of natural gas need for post-combustion of gas.

### OUTLOOK

GHG emission reduction efforts encompass many major challenges that will require the population as a whole to adopt new lifestyles and ways of doing things.

Only a combined effort by citizens, municipalities, governments, organizations and businesses can meet these targets.

2002-2010 GHG EMISSIONS RESULTING FROM DRINKING WATER PRODUCTION AND SUPPLY (t eq. CO<sub>2</sub>)

|      | Electricity | Natural Gas | Fuel Oil (Generator) | Total |
|------|-------------|-------------|----------------------|-------|
| 2002 | 624         | 491         | 12                   | 1,126 |
| 2003 | 595         | 575         | 83                   | 1,253 |
| 2004 | 632         | 508         | 68                   | 1,207 |
| 2005 | 667         | 595         | 68                   | 1,329 |
| 2006 | 599         | 566         | 64                   | 1,229 |
| 2007 | 643         | 518         | 64                   | 1,224 |
| 2008 | 635         | 518         | 64                   | 1,216 |
| 2009 | 626         | 353         | 64                   | 1,042 |
| 2010 | 611         | 365         | 64                   | 1,040 |

2002 TO 2010 GHG EMISSIONS DUE TO WASTEWATER TREATMENT

|   | 2002           | 2003           | 2004           | 2005           | 2006           | 2007          | 2008          | 2009          | 2010          |
|---|----------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|
| Quantity of sludge reclaimed (in t for dry sludge)        | 102,258        | 100,297        | 97,015         | 96,884         | 96,293         | 92,721        | 95,306        | 86,903        | 85,999        |
| Procédé d'incinération des boues (t eq. CO <sub>2</sub> ) | 82,549         | 80,966         | 78,316         | 78,211         | 77,733         | 74,850        | 76,937        | 70,153        | 55,561        |
| Natural gas (t CO <sub>2</sub> eq.)                       | 27,294         | 23,352         | 25,376         | 23,267         | 21,929         | 21,748        | 21,808        | 20,024        | 18,617        |
| Light fuel oil (t CO <sub>2</sub> eq.)                    | 3,405          | 6,925          | 3,140          | 2,040          | 1,232          | 1,866         | 827           | 481           | 328           |
| Electricity (t CO <sub>2</sub> eq.)                       | 374            | 377            | 371            | 411            | 418            | 399           | 414           | 390           | 387           |
| <b>TOTAL</b>  | <b>113,621</b> | <b>111,620</b> | <b>107,203</b> | <b>103,929</b> | <b>101,312</b> | <b>98,863</b> | <b>99,987</b> | <b>91,049</b> | <b>74,892</b> |



# WEB REFERENCES

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