

Best Practices Guide

Reduction of Greenhouse
Gas Emissions and
Land Use Planning

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TABLE OF CONTENTS

INTRODUCTION	5
1 REDUCTION OF GREENHOUSE GAS EMISSIONS AND LAND USE PLANNING	7
1.1 Greenhouse gases	7
1.2 Emission sources	9
1.3 Land use planning challenges related to urbanization models	11
2 STRATEGIES TO REDUCE GREENHOUSE GAS EMISSIONS	13
2.1 Urbanization Management	13
2.1.1 Consolidate and structure urbanization for the agglomeration	17
■ Strategies	17
■■■ Means of action	19
CASE STUDIES	
Longueuil: Consolidation of urbanization through the development of the area along boulevard Taschereau	21
Drummondville: Planning and development of commercial spaces	24
2.1.2 Consolidate and revitalize city centres and central neighbourhoods	26
■ Strategy	26
■■■ Means of action	28
CASE STUDIES	
Québec: Revival of the Saint-Roch area, the Lower Town business centre	30
Montréal: The Angus project and the redevelopment of a run-down industrial site	32
Gatineau: Residential revival on the Île de Hull	35
Trois-Rivières: Revitalization of Vieux-Trois-Rivières and surrounding downtown neighbourhoods	38
2.1.3 Increase density and diversify use in urbanized peripheral zones	39
■ Strategy	39
■■■ Means of action	42
CASE STUDIES	
Québec: Comprehensive plan for the Faubourg Laudance area and its centre, rue du Campanile	43
Gatineau: The development of a multipurpose regional centre	46

2.2	The development of transportation infrastructure	49
2.2.1	Design an integrated transportation infrastructure network in accordance with urbanization management strategies	49
■	Strategy	49
■■■	Means of action	54
CASE STUDIES		
	Châteauguay: Planning a bikeway network for the entire city	55
	Baie-Comeau: A strategic cycle path to better integrate urbanized areas	56
	Québec: The utilitarian nature of the bicycle path on chemin des Quatre-Bourgeois	56
2.3	Urban forests	57
2.3.1	Reforest open space and protect green spaces	57
■	Strategy	57
■■■	Means of action	60
CASE STUDIES		
	Québec: A master plan for the natural environment and urban forests	62
	Montréal: Green space protection on Île-des-Soeurs	64
	Victoriaville: A well established urban forestry policy	66
	Other noteworthy practices	67
BIBLIOGRAPHY		
BIBLIOGRAPHY		
GLOSSARY OF TERMS USED IN THE ACT RESPECTING LAND USE PLANNING AND DEVELOPMENT		
		70
GLOSSARY OF TERMS PERTAINING TO GREENHOUSE GASES		
		76

INTRODUCTION

Land use planning strategies can help reduce greenhouse gas emissions.

The international scientific community recognizes that the increase in greenhouse gases (GHG) is one of the leading causes of climate change, and that its consequences will be increasingly felt in the coming decades.

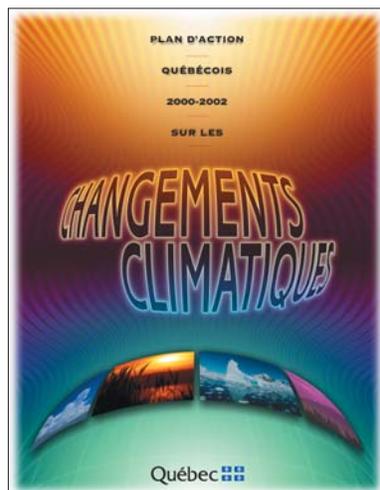
In Québec, greenhouse gas emissions stemming from human activity reached an estimated 81.9 million tonnes of CO₂ equivalent in 1991 and 83.4 million tonnes in 1996.

If nothing is done to check such emissions, they will reach 94.1 million tonnes in 2011 and 105.1 million tonnes in 2026.¹ It is against this backdrop, in keeping with the *United Nations Framework Convention on Climate Change* and in conjunction with talks stemming from the ratification of the Kyoto Protocol, that Québec has adopted an action plan to reduce greenhouse gas emissions.

This guide stems from the *Québec Action Plan on Climate Change*² and is intended for land use planning and development policies to take into account the objective of reducing greenhouse gas emissions.

It is in this perspective that the guide is aimed, first and foremost, at stakeholders in the municipal sector, whether they are elected representatives, professionals, members of urban planning or land use planning committees, or residents. It is also intended for individuals in government departments or other public or private organizations whose sphere of action can significantly impact land use development and transportation.

This guide stems from the Québec Action Plan on Climate Change



¹ Gouvernement du Québec, Comité interministériel sur les changements climatiques, *Problématique des transports et des changements climatiques au Québec — Rapport du groupe de travail sur les transports*, November 1999, page 7.

² Gouvernement du Québec, *Québec Action Plan on Climate Change 2000-2002* [online], 2000, 42 pages (<http://www.mddep.gouv.qc.ca/changements/plan-action.pdf>)

The guide is intended specifically to:

- > review the issues related to climate change and the need to reduce greenhouse gas emissions;
- > promote, in keeping with the government's land use planning orientations, strategies that help to reduce greenhouse gas emissions;
- > show how planning, regulatory and other tools provided by the *Act respecting land use planning and development* can be used to implement such strategies;
- > present case studies of Québec municipalities where land use planning strategy initiatives contribute to the reduction of greenhouse gas emissions.

In particular, it focuses on urbanization models that are likely to reduce pollutants produced by the transportation sector, the leading source of greenhouse gas emissions of human origin in Québec. In this perspective, it emphasizes urbanization management strategies that can have an impact on the choice of transportation mode, the distances travelled and the number of automobile trips in urban areas.

The guide also defines complementary development strategies pertaining to transportation infrastructure, urban forests and green spaces.

1 Reduction of Greenhouse Gas Emissions and Land Use Planning

Greenhouse gas emissions can be reduced through a form of urbanization that makes it possible to reduce automobile trips.

1.1 Greenhouse gases

The greenhouse effect is a natural phenomenon whereby the Earth's heat is trapped in the atmosphere by certain gases. Greenhouse gases thus contribute to maintaining a surface temperature on Earth favourable to life.

Industrialization and the population explosion that have occurred over the past 200 years have been accompanied by a substantial increase in the use of fossil fuels such as coal, oil and natural gas, thus leading to an equally considerable increase in greenhouse gas emissions in the atmosphere. The additional greenhouse gas emissions have in turn exacerbated the greenhouse effect, which appears to be the cause of the increase in the temperature of the Earth's surface and the lower layers of its atmosphere.

Since 1860, according to the World Meteorological Organization, nine of the 10 hottest years on a global scale occurred after 1990. Climatic warming is likely to increase during the winter and in northern regions. In Québec, by 2050 or even earlier, climatic change could lead to a temperature increase between 1°C and 6°C, in the south, and between 2°C and 9°C, in the north, depending on the seasons.³

³ Gouvernement du Québec, *Québec Action Plan on Climate Change 2000-2002* [online], 2000, page 16 (http://www.mddep.gouv.qc.ca/changements/plan_action.pdf)

CO₂ and other greenhouse gases

To mitigate the [impact of anticipated climate change](#) (see box on page 10), the international community has adopted the objective of reducing emissions of six [greenhouse gases](#) (see page 76):

- > carbon dioxide (CO₂);
- > methane (CH₄);
- > nitrous oxide (N₂O);
- > hydrofluorocarbons, sulphur hexafluoride and perfluorocarbons.

Among the six greenhouse gases mentioned, carbon dioxide is the leading greenhouse gas stemming from human activities. For this reason, the volume of greenhouse gases in the air is often expressed as tonnes of CO₂ equivalent, which serves as a reference unit for other gases.

The carbon cycle, which represents exchanges of carbon between terrestrial and oceanic ecosystems, on the one hand, and the atmosphere, on the other, is now largely affected by disturbances of human origin.

Automobiles are the leading source of greenhouse gases in Québec.



Photo : Mathieu Langlois

Industry is the second source of greenhouse gases in Québec.



Photo : Pierre Lahoud



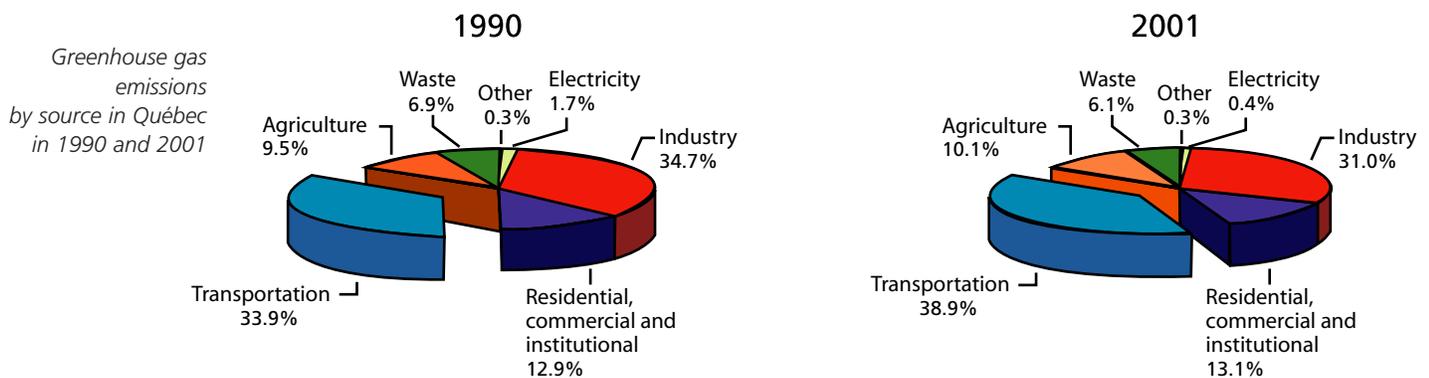
Photo : Pierre Lahoud

1.2 Emission sources

Figure 1 presents the breakdown of greenhouse gas emissions of human origin in 1990 and in 2001, in Québec. It also highlights the importance of the proportion of greenhouse gas emissions stemming from transportation, which rose between 1990 and 2001, while emissions engendered by industry and electricity declined. Emissions from each of the other sectors remained essentially stable.

The ministère des Ressources naturelles forecasts that, for the period 1996-2011, the transportation sector will also account for most of the growth in greenhouse gas emissions.⁴ It should be noted that, in addition to greenhouse gas emissions, the transportation sector also contributes to other forms of air pollution such as smog and acid rain.

CHART 1



Source: Ministère de l'Environnement du Québec, October, 2003.

The automobile, principal source of greenhouse gases

The transportation sector and, in particular, automobile trips, are likely to be targeted in order to attain greenhouse gas emission reduction objectives.

In 1996, automobiles and light trucks accounted for 76% of overall passenger-kilometres. This proportion rises to nearly 90% when certain means of transportation such as airplanes and trains are excluded.⁵ Nearly 84% of these trips occurred in urban areas while 16% were intercity trips.

Even though the Montréal and Québec agglomerations contribute significantly to the increase in greenhouse gas emissions because of the size of their population and the number of trips that take place there, it is nonetheless important to consider that medium-sized cities and smaller urban centres are also concerned by this.

⁴ Gouvernement du Québec, ministère des Ressources naturelles, *Évolution de la demande d'énergie et des émissions de gaz à effet de serre au Québec : scénario de référence 1996-2021*. Québec, 2001, pages 28-29.

⁵ Gouvernement du Québec, Comité interministériel sur les changements climatiques, *Problématique des transports et des changements climatiques au Québec – Rapport du groupe de travail sur les transports*, November 1999, page 68.

The impact of climate change on human activities

Anticipated climate change will permanently affect the environment and human activity. Some examples:

Infrastructure and buildings

Sewers may overflow more frequently in the wake of heavier precipitation. Moreover, roads are likely to be subject to more frequent freezing and thawing cycles. In some places, the erosion of river banks may worsen, thus threatening infrastructure and buildings built along these.

New design or location criteria governing such infrastructure and buildings will have to be considered, as the need arises.

Water resources

Water resources are likely to be significantly affected. A reduction of the St. Lawrence River flow is feared. Furthermore, the normal flow of certain of its tributaries could be altered by an increase in spring flooding and a reduction in summer flows.

These changes could affect water supply facilities and thus impact, domestic, industrial and agricultural uses.

Human health

Individuals who already suffer from allergies or cardiovascular and respiratory diseases may see their health deteriorate because of climatic warming. Some population groups, such as the elderly, sick individuals and children, could be especially vulnerable to higher temperatures.

Perspective for land use planning actions

Land use planning is one of the means that can be used to face these challenges at the national, regional and local levels. Actions may be developed with two different perspectives:

- > Actions to reduce greenhouse gas emissions through sustainable management of urbanization by acting directly or indirectly on the principal sources of human origin: this guide focuses on this type of action;
- > Actions to adapt to climate change focusing on prevention of and protection from natural hazards (flood plains or erosion zones), protection of banks and shores, local infrastructure planning, and so on.

1.3 Land use planning challenges related to urbanization models

Urban sprawl

Over the past 50 years, urban sprawl in the immediate vicinity of urban agglomerations has increased ever more. Moreover, urban development has occurred in an unstructured manner in rural areas. It has also appeared in existing cities and towns located near or within several dozen kilometres of urban agglomerations.

The resulting urban areas:

- > are characterized by low-density;
- > have increased distances between residential areas and workplaces, businesses and services;
- > are hardly suited to modes of transportation other than the automobile;
- > have relatively less attractive central areas: many have vacant lots and underused or abandoned buildings.

Increase in automobile trips

This type of urban development generates motor vehicle trips that lead to substantial greenhouse gas emissions and, more specifically, carbon dioxide (CO₂) emissions. Indeed, the automobile is the preferred if not the only possible choice for transportation, to the detriment of mass transit, cycling or walking.

Moreover, in urban areas, an increase in the use of the automobile is accompanied by an increase in the number of vehicle trips and in the distances traveled.

Improving accessibility between places of residence, work, consumption and other types of activities, is important, since it will lead to fewer, less polluting trips. Actions must focus on:

- > the number of trips;
- > the distances traveled;
- > the means of travel.

Table 1 illustrates the variability in greenhouse gas emissions depending on the transportation mode and distance traveled.

TABLE 1

CO₂ emissions (kg) per person, depending on the transportation mode and distance traveled

Distance	Automobile (10 L/100 km)			Commuter train	City bus	Metro	Walking or cycling
	1 person	2 people	3 people				
5 km	1.2 kg	0.6 kg	0.4 kg	0.2 kg	0.2 kg	0 kg	0 kg
10 km	2.4 kg	1.2 kg	0.8 kg	0.4 kg	0.3 kg	0 kg	0 kg
20 km	4.7 kg	2.4 kg	1.6 kg	0.8 kg	0.7 kg	0 kg	0 kg
50 km	11.8 kg	5.9 kg	4.0 kg	2.1 kg	1.7 kg	0 kg	0 kg

Source: Gouvernement du Québec, Agence de l'efficacité énergétique. Je lève le pied, je réduis les gaz, 2001.

Fewer, less polluting trips

In 1996, suburbanites in Québec and Montréal consumed twice as much energy for automobile trips as their central zone residents did.⁶ This energy consumption pattern is also found in medium-sized cities and the smaller urban centres in Québec, where needs for motor vehicle transportation tend to increase from the central area to the peripheral areas.

Land use planning measures that make it possible to reduce greenhouse gas emissions should seek to develop urban centres that broaden the opportunities for a greater number of people to make shorter, less frequent, less polluting trips.

Technological innovation and the design of new, less polluting vehicles are also noteworthy ways of reducing greenhouse gas emissions. However, technological innovation does not help in reducing traffic congestion or in alleviating other problems stemming from urban sprawl. To reduce greenhouse gas emissions, it is preferable to include both land use planning and technological innovation measures, rather than rely solely on the latter.

⁶ Id., page 70.

2 Strategies to Reduce Greenhouse Gas Emissions

Diversification of urban space is at the core of the proposed urbanization model.

Urbanization management is the main focus for the actions considered here. Two other related fields are also considered, i.e. development of transportation infrastructure, urban forests and green spaces.

For each action field, the guide defines strategies and specifies different types of means that may be relevant. The means considered include: urban planning, regulations, development funding, land assembly, and direct action such as urban redevelopment projects, green space development.

Hyperlinks allow readers to access a [glossary providing information on the terms used in the Act respecting land use planning and development](#). This information is available online in a document titled *La prise de décision en urbanisme*⁷ on the Web site of the ministère des Affaires municipales et des Régions.

2.1 Urbanization Management

The reduction of greenhouse gas emissions is a relatively recent concern, and is an addition to a series of issues that, for 20-odd years, have made the case for better management of urbanization.

These issues include: consolidation of urban areas, reduction of development costs and of infrastructure network operating costs, especially those related to passenger transportation, air pollution control, and the protection of natural areas and farmland.

Sustainable communities

Taking into account all of these issues should lead us to adopt an urbanization model more in keeping with the principles of sustainable development and what are now called sustainable communities. The following table presents the different characteristics of this urbanization model.

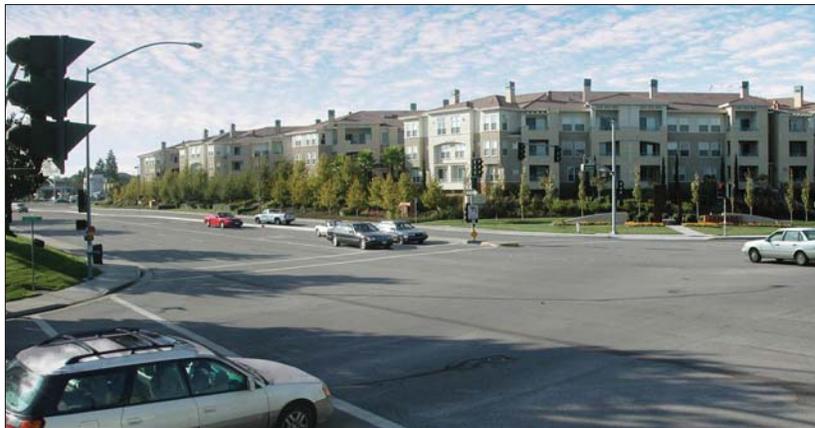
⁷ Gouvernement du Québec, ministère des Affaires municipales, du Sport et du Loisir (2004). *La prise de décision en urbanisme* (3rd edition) (http://www.mamr.gouv.qc.ca/amenagement/outils/amen_outi.htm)

A sustainable development urbanization model

	Urban sprawl model	Urban sustainable development model
Density	Low building density	Higher overall building density, which satisfies public's needs just as well
Location of urban development	Mainly in new buildings on the periphery of built areas	Largely in renovated buildings or in new buildings within urbanized areas
Mixed nature of use	Homogenous and segregated urban residential, commercial, institutional areas	Urban functions are more diversified and more extensively integrated
Transportation	Urban land use planning is geared to the automobile and is hardly conducive to walking, cycling and public transportation	Urban land use planning is more concentrated and supports an array of means of motor and non-motor transportation
Public and private areas	Emphasis is placed on the private domain, shopping takes place in malls and most recreational activities take place in private backyards	The focus is on the public domain and meeting places, shopping takes place along shopping streets, and most recreational activities occur in public parks
Planning process	There is little planning and coordination between local, regional and government stakeholders	An array of stakeholders is involved in strategic planning, which is better coordinated.

Adaptation of the table in Todd Litman, Evaluating Transportation Land Use Impacts [online]. Victoria: Victoria Transport Policy Institute, October, 2003, page 4.

A residential complex in an environment automobile dominated area.



Redevelopment of the site in compliance with a sustainable urbanization model



Photos: Urban Advantage

This urbanization model linked to sustainable communities should not be embraced dogmatically. It must be regarded as the most pragmatic response possible both to the needs of individuals and the challenges facing communities. Thus, the proposed approach seeks:

To diversify suburbs and plan their development to improve access between residences and economic and service centres and areas through means of transportation other than the automobile: it is not the intent to curb the suburbs' development at all costs;

To encourage a mix of development forms including high, medium and low density ; the intent is not to favour exclusively high-density residential areas nor to deny the demand for single-family housing;

To better integrate all urbanization economic and environmental costs while ensuring fairness: it is not the intent to increase the costs of purchasing a property.⁸

Key areas for action

To better guide urban development, the urbanization management strategies proposed here are grouped into three complementary areas for action:

1. Concentrate and structure urbanization for the entire agglomeration.
2. Consolidate and revitalize city centres and central neighbourhoods.
3. Increase density and diversify use in peripheral zones.

These strategies reflect a more comprehensive sustainable development approach.

Thus, from an economic standpoint, it is important to curb the costs related to urban sprawl that governments fund. From a social standpoint, low population growth compels us to consolidate or revitalize existing urban areas. From an environmental standpoint, measures adopted to better manage urbanization and reduce greenhouse gas emissions are also likely to solve other related problems, such as air pollution, destruction of natural environments, or the loss of biodiversity.

⁸ Based on Smart Growth BC, *The Smart Growth Toolkit: helping to create more livable communities in British Columbia*. Vancouver, 2001, pages I-5 and I-6.

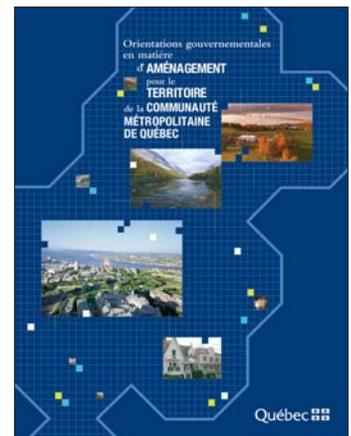
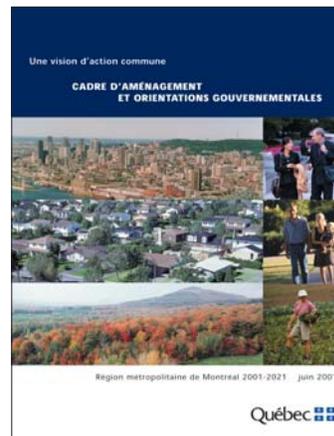
Proposed strategies and government land use planning orientations

Strategies that concern urbanization management and contribute to a reduction in greenhouse gas emissions are part of the [government land use planning orientations](#). Specifically, these orientations* focus on:

- > consolidating existing urban areas and revitalizing city centres and older areas as a priority;
- > channelling urban development in areas that can accommodate development economically and in an environmentally-friendly manner;
- > planning industrial and commercial spaces so they may benefit from public and private investments;

> harmonizing land use planning and environmental protection objectives with objectives set out for infrastructure planning and public facilities, especially transportation planning.

These strategies are also in keeping with government orientations that apply to the [Communauté métropolitaine de Montréal](#)** and the [Communauté métropolitaine de Québec](#)***. It should be noted that the government's policy directions, made public in June 2001 and in December 2002, respectively, explicitly address the question of greenhouse gas emissions and establish a link between these issues and urbanization models.



References:

- * Gouvernement du Québec, *Les orientations du gouvernement en matière d'aménagement : Pour un aménagement concerté du territoire* (http://www.mamr.gouv.qc.ca/pdf_mamm/amen/oramenag.pdf), 1994, pages 18, 40 and 45
- ** Gouvernement du Québec, *A Shared Vision for Action: Planning Framework and Government Orientations*. Montréal Metropolitan Region 2001-2021, 2001, page 91 (http://www.mamr.gouv.qc.ca/publications/amenagement/cmm_cadre_eng.pdf)
- *** Gouvernement du Québec, *Orientations gouvernementales en matière d'aménagement pour le territoire de la Communauté métropolitaine de Québec*, 2002, page 21 (http://www.mamr.gouv.qc.ca/amenagement/amen_amen_cadr.htm)

2.1.1 Consolidate and structure urbanization for the agglomeration

The establishment of a network of structured economic and service nodes may lead to significant reductions in the number of trips and distances traveled.

Strategies

A sustainable urbanization model when adopted for an entire agglomeration entails the need to control urban sprawl.

The sustainable urbanization model takes shape by the definition of urbanization perimeters, urban growth boundaries, and the identification of a network of structured economic and service nodes determined in relation to transportation infrastructure and networks. Such strategies can be considered in land use and development plans prepared by a Regional County Municipality (RCM), by a city empowered with this responsibility, or by a metropolitan community and, as the case may be, in municipal land use planning.

Urbanization Containment

The urbanization perimeter defines the boundary of the territory to be developed on the fringe of the urban area. In addition to controlling urban uses, the delineation of the urbanization perimeter allows for the planning of urban support systems and infrastructure such as water supply and wastewater systems, road networks or mass transit systems.

The curtailment of urban sprawl through the delineation of an urbanization perimeter encompassing various urban uses can help shorten trips since most residents in urban agglomerations concentrate their regular trips (residence-workplace-consumption-recreation-education and other services) within this area.

Define a network of structured economic and service nodes

The concentration of economic activities and services that either serve the residents of various neighbourhoods or the entire area defines the urban structure.

Such concentrations of businesses and services, community support systems or industrial uses form nodes, i.e. the city centre and other centres of activity spread throughout the area, or found along the main thoroughfares. The location of these economic and service centres and areas is closely linked to the location of the main transportation networks and infrastructure.

However, the economic and service nodes established over the past 30 or 40 years are often isolated and relatively distant from residential areas. Moreover, they are frequently poorly served by public transit and are hardly accessible by means other than the automobile.

Under these circumstances, it is important to consider strategies that address improving access to the economic and service nodes, in particular by public transit, as well as strategies focusing on the consolidation, increased density and diversification of these nodes, as likely to significantly reduce greenhouse gas emissions. Indeed, such planning makes it possible to generate substantial reductions in the number of trips and in the distances traveled. Furthermore, such planning fosters the use of less polluting means of transportation.

■ ■ ■ Means of action

The delineation of an [urbanization perimeter](#) is largely based on the assessment of future development trends over a period of 10 to 15 years.

It also depends on the urban structure and density of land use that is preferred. If the delineation of urbanization is a key component of land use planning, we should take for granted that it must be accompanied by the definition of orientations concerning land use, phasing of development in the urbanized area, and may require the conduct of impact studies prior to any development.

Determine priority development zones

In light of the current revision of RCM land use planning and development plans and the preparation of the metropolitan land use and development plans of the Communauté métropolitaine de Montréal and of the Communauté métropolitaine de Québec, it is relevant to note that many of the urbanization perimeters delineated during the 1980s still include large undeveloped areas.

If such perimeters are not reduced, it may be necessary to phase development within the perimeters. This planning method can foster the concentration of various functions and thus help to reduce travel.

The *Act respecting land use planning and development* makes provisions for the definition within land use planning and development plans of [priority development zones](#), the determination of the use to which they are put and the approximate occupation densities that will foster more concentrated urban development.

The Act also allows for the adoption of criteria that make it possible to defer development of the remaining portion, called the reserve or expansion zone, to be urbanized subsequently. As urbanization proceeds, certain portions of the reserve or expansion zone will become priority zones.

Examples of criteria for the inclusion of portions of an area in a priority development zone

The decision to include a given area in a priority zone should be contemplated in light of criteria such as:

- > **contiguity** to the urbanized zone served by public services, especially the water supply and wastewater systems;
- > **distance** from neighbourhood services and community facilities, including schools and recreational facilities;
- > **availability** of public transportation services;
- > **amount of space** still available in priority zones, bearing in mind, for example, the number or percentage of occupied lots and vacant lots serviced by municipal services or the area capable of accommodating a specific type of use;
- > **attainment of a quota** or an approximate building density in a priority zone before an area is included in the priority zone;
- > **cost** and feasibility of linking infrastructure and facilities such as water supply and wastewater systems, the road network, and so on, to existing systems.

Planning economic nodes and areas

From an operational standpoint, these strategies have been addressed in the [land use policies](#) and [equipment and infrastructure](#) policies set out in [land use planning and development plans](#). Economic and service nodes and areas can be defined:

- > by determining the distribution of businesses and services throughout the region or the urban agglomeration and, if need be, at the district or neighbourhood levels; the businesses and services are defined in relation to specific categories of use or buildings;
- > by locating or defining criteria to locate community facilities at the regional or urban agglomeration level, and, as the case may be, at the district or neighbourhood levels;
- > by delimiting industrial areas and uses.

The location of these uses and facilities takes into consideration or makes provision for criteria considering adequate transportation services. At the same time, [land transportation planning](#) must take into consideration this spatial distribution of the facilities and uses and, if need be, must make provision for the means to enhance public transportation services and non-motorized transportation.

At the urban agglomeration level, the land use planning and development plan can also include the determination of [priority redevelopment zones](#) and specify land use and densities. The plan may focus on the urban core but can also include adjacent areas to be redeveloped, as illustrated by the redevelopment plan for the boulevard Taschereau in Longueuil (see below).

Planning programme

It goes without saying that planning at the regional or agglomeration level is complemented by the local municipality's [planning programme](#), all the more so as the boundaries of a number of municipalities now encompass most or all of the urban agglomeration. Mention should be made of the Ville de [Drummondville](#) (see page 24), which, among other things, has adopted a commercial planning and development policy as well as innovative means to encourage its implementation.

CASE STUDY ■■ Longueuil: Consolidation of urbanization through the development of the area along boulevard Taschereau

When it reviewed its land use planning and development plan, the former Champlain RCM engaged in a specific planning exercise focusing on the development of boulevard Taschereau, one of the main urban thoroughfares on the South Shore of Montréal. The plan aims explicitly at fostering the increase and diversification of urban functions, the development of infrastructure for a wide range of transportation modes, and more extensive use of public transit.

The implementation of this plan will undoubtedly enhance access, reduce the number of trips and encourage less polluting travel between places of residence and places of consumption, workplaces or places of entertainment.



Boulevard Taschereau and the economic and service nodes identified in the land use planning and development plan.



Provisions in the land use planning and development plan

The revised land use planning and development plan fosters the diversification of uses in the vicinity of this commercial thoroughfare, by an increase in residential and office functions.

This approach is intended, on the one hand, to develop an active living environment throughout the week and, on the other hand, to help attract new public transit users, while creating a mixed, enriched urban environment. The plan calls for the implementation of “integrated projects” replacing now overabundant parking lots.

Moreover, the plan also makes provision for the redevelopment of the boulevard’s public right-of-way to allow for the integration of various modes of transportation, while ensuring the safety and smooth flow of traffic and enhancing the quality of the physical environment.

In addition to the three traffic lanes in each direction, a reserved public transit lane is planned, initially for buses and, ultimately, for a light-rail train system, along with safe, comfortable facilities for pedestrians, i.e. sidewalks with landscaped strips and crossings with shelters at intersections. Cyclists would be channelled to a network of parallel streets.



Implementation measures

To ensure the implementation of this comprehensive programme, the revised land use planning and development plan has defined a number of measures to be considered in the planning programme and by-laws, and in development. Among the measures included are:

- > review of municipal by-laws governing the construction and architectural integration of buildings in order to enhance the boulevard's surroundings and improve its image (drawing buildings closer to the road, increasing the minimum number of storeys, harmonizing commercial displays and improving the functionality of parking lots);
- > development of public land to improve the interface with the private domain, which includes, in particular, the provision of landscaped strips, sidewalks and street furniture;
- > detailed complementary studies such as development and design plans for each economic and service node located along the boulevard; such studies must emphasize the diversity of urban functions and define the conditions under which such functions coexist harmoniously.

Several priority initiatives have already been carried out in conjunction with this planning exercise, such as: the addition of reserved bus lanes on the shoulders, new intersections with traffic lights and safe pedestrian crosswalks at busy intersections, along with the reconfiguration of the Taschereau-Autoroute 10 interchange.

It should also be noted that improvements have been made to several existing malls (renovation of the façades and landscaping) and new commercial buildings have been erected. Furthermore, by-laws governing site planning and architectural integration programmes (SPAIPs) and the special planning programmes (SPP) have been adopted in accordance with the development objectives.

Source : Ville de Longueuil ■

CASE STUDY ■■ Drummondville: Planning and development of commercial spaces

To reduce travelling distances and encourage the use of transportation means other than the automobile, it is important to plan for different types of business and service concentrations based on the market area:

- > concentration of basic or daily businesses and services nearer to the homes served, in the centre of districts or neighbourhoods;
- > concentration of specialized businesses and services serving a wider clientele, such as the entire urban agglomeration, in areas accessible by various modes of transportation.

Business and service nodes in the 1996 planning programme

The Ville de Drummondville carried out this planning process when it undertook its planning programme in 1996. While it recognizes the importance of the commercial centre located at the periphery of the urbanized area, the planning programme seeks to consolidate the city centre and defines in respect of other sectors of the city “urban cells” that are intended to become more autonomous with regard to the presence of neighbourhood or local businesses and services.

In the planning programme, business and service nodes are delimited in the city centre and in each of the urban cells. To foster the vitality of each node, the zoning by-law defines an array of uses for businesses and services corresponding in relation to the size of the market area. Control over uses in the zoning by-law is also intended to prevent the spreading of commercial zones beyond these nodes.

At the same time, when any external request is received to alter the boundaries of a commercial zone or the nature of the uses authorized therein, the city reassesses the balance between this zone and the market area served. Depending on the findings of the study and the zone’s commercial vitality, this may lead to a reduction in the perimeter of the zone under study or of the range of uses permitted for the benefit of zones that the city wants to strengthen.



Role of the Commercial Board (“Commissariat au commerce”)

In 1998, in conjunction with this ongoing planning exercise, the city decided to be proactive with respect to the development of business and service activities by establishing a special board.

In addition to the promotion of commercial activities and the sound management of commercial lots and buildings, the board is also responsible for the revitalization of the downtown area (“*Corporation Rues Principales Drummondville*”).

Furthermore, it participates in the development process by submitting recommendations to the urban planning advisory committee on all questions related to commercial development, in respect of initiatives related to the special planning programme and projects subject to the site planning and architectural integration programme (SPAIP) by-law which applies to the most strategic commercial sectors.

A mixed residential and commercial building.



Photo : Mathieu Langlois

Source : Ville de Drummondville ■

2.1.2 Consolidate and revitalize city centres and central neighbourhoods

Density and diversity promote fewer, less polluting trips.

Strategy

Traditional city centres and central neighbourhoods usually display a greater land use density and diversity of functions and uses. Transportation infrastructure is designed to allow for different modes of transportation.

These sectors should, *ex ante*, generate fewer and shorter “residence-workplace-consumption-recreation-education and other service” trips than peripheral areas, which are more spread out and where functions are more segregated. They also offer more opportunities for travel by public transit, on foot or by bicycle.

Moreover, the concentration of activities found in these areas usually leads to the convergence of public transit routes, which makes it possible to reduce automobile trips from the periphery. Consolidation, increased density, redevelopment or revitalization of city centres and older neighbourhoods, is a strategy that warrants consideration in order to curb greenhouse gas emissions.

Focusing on the revitalization of city centres and central neighbourhoods

This strategy can benefit from a number of opportunities. There is throughout North America a persistent trend to revitalize and repopulate [city centres](#).⁹ This trend is manifest, more specifically, by the development of new residential offerings, of commercial and entertainment facilities, and by the sustained demand for office space.

⁹ Pierre Blais (2000). *Aperçu de tendances émergentes en matière d'urbanisation dans les grandes agglomérations américaines — revue de littérature*. Québec: ministère des Affaires municipales, du Sport et du Loisir, Observatoire municipal, April, 20 pages (http://www.mamr.gouv.qc.ca/publications/obse_muni/tendances_emergentes.pdf)

Increasingly, the city centre cores are becoming living environments, with an all day use rather than a single purpose time-limited daily use. This trend reflects the desire of a growing numbers of residents to live where they can walk to work and gain ready access to cultural and entertainment facilities.

While they are less intensive areas, many central neighbourhoods located near the city centre core are also being revitalized.

Many new housing units are located in former warehouses, commercial buildings or office buildings. Aside from the opportunities that they afford to recycle existing buildings, city centres and central neighbourhoods offer many potential sites for redevelopment, such as abandoned industrial lots or obsolete buildings that can be replaced. Moreover, there are still large institutional properties that can be subjected to more intensive use.

Challenges to be met

The consolidation and revitalization of city centres and central neighbourhoods also pose a number of challenges.

Despite the diversity of functions and uses that makes many central areas attractive, the need for certain consumer goods and services gives rise to automobile trips to businesses that are often located in the periphery. The same is true of workplaces that are not always well served by public transit from central areas.

Maintaining or recreating the greatest possible diversity of functions and uses, especially businesses, services and education, is a challenge for the consolidation of central areas.

Attracting new residents to central areas where they are likely to find more services nearby, demands considerable effort to control and enhance the quality of the built environment, which is often denser and in which residents live and move about, often on foot. Special attention must be paid to the quality of housing (intimacy, amount of sunshine or the presence of private outdoor spaces), the architectural appearance of buildings, and the quality of street furniture.

Diversified city centres.



Photo: Ville de Québec

■ ■ ■ Means of action

Some land use and urban planning tools warrant consideration to implement this strategy.

Planning and regulations

Planning tools such as the [planning programme](#), the [special planning programme \(SPP\)](#) or, the [criteria included in by-laws concerning comprehensive development programmes \(CDPs\)](#), should include explicit development objectives in relation to the consolidation and revitalization strategy while taking into account specific municipal traits.

These development objectives should, among other things, address the following issues: respect for the urban fabric and scale; development of efficient pedestrian or cycling routes in light of the distribution of activity nodes and public transit routes; provision for a sufficient number of neighbourhood services or a balance between a lively site-use and residents' need for peacefulness and privacy.

Such development objectives are usually reflected in the standards included in [zoning](#), [subdivision](#) and [construction](#) by-laws.

On the other hand, in order to better take into account the diversity of the built environment in city centres and central neighbourhoods, these objectives can also be transposed as development criteria in discretionary urban by-laws which allow for the identification of requirements on a case-by-case basis such as [site planning and architectural integration programmes \(SPAIP\)](#), [conditional use by-laws](#) and [by-laws concerning specific construction, alteration or occupancy proposals for an immovable \(SCAOPI\)](#).

Measures to support revitalization

Financing tools and land assembly are highly useful to municipalities considering the complexity and cost of revitalization or redevelopment projects in city centres and central neighbourhoods. While in the short term, these measures require an investment by the municipality to support owners and developers, these prove highly profitable in the medium and long term.

The [programme to purchase buildings in the city centre](#) and [land banks for housing](#), are some of the measures which allow for the purchase of land or buildings and for improvements to be made to these by municipalities in order to make the properties more attractive to the developers who will buy them and carry out the desired revitalization project. Other measures to be considered include [financial assistance](#) measures either in the form of property tax credits or grants.

Other measures also include, in Québec: specific contributions by a developer as determined under the provisions of a [municipal works agreements by-law](#); a requirement to submit a [preliminary programme for the redevelopment of a property subsequent to a demolition](#); the requirement that the developer pay for the cost of facilities under an [SPAIP](#), a [CDP](#) or a [SCAOPI](#); the requirement that the developer pay a [contribution for parks, playgrounds and natural areas](#).

In addition to allowing municipal funding of certain projects, these measures bolster regulatory provisions aimed at facilitating the provision of housing for different types of clientele, the establishment of local businesses or services or the implementation of pedestrian and cycling facilities and infrastructure, all of which can reduce the number of trips and distances travelled and encourage the use of alternative transportation modes instead of the automobile.

Revitalization actions by municipalities

In conclusion, bearing the same objective, mention should be made that municipalities may also [act directly](#) to provide for housing and the development of public spaces and roads.

To demonstrate the feasibility of the strategies described in the preceding sections and to illustrate how these were implemented, revitalization projects in Québec (see below), [Montréal](#) (see page 32), [Gatineau](#) (see page 35), and [Trois-Rivières](#) (see page 38) are examined.

CASE STUDY ■■ Québec: Revival of the Saint-Roch area, the Lower Town business centre

In the late 1990s, following several decades of decline, the Saint-Roch area experienced a veritable rebirth. The revitalization includes the development and consolidation of residential, commercial, service, administrative, cultural and entertainment functions. The sector has become a living environment in which trips can be reduced. Moreover, because it is central, all of the new activities that have been established there are readily accessible by means of public transportation. The sector is also readily accessible by bicycle or on foot from other central districts in the city.

Municipal public projects

In concrete terms, the revitalization of the area began with a series of municipal public projects such as the development of the Jardin Saint-Roch, the rehabilitation of rue Saint-Joseph, the establishment of city administrative offices in heritage industrial buildings, the naturalization of the banks of the rivière Saint-Charles, and the development of the coteau Sainte-Genève.

Many buildings have been erected or recycled as dwellings, educational or research institutions, administrative offices, entertainment centres and artists' workshops. Between 1991 and 2001, over 100 buildings were restored, 800 new housing units were added, and nearly 4,000 jobs were created or relocated in the district.



Saint-Roch area: a variety of functions and uses in the downtown core area.



Photo : Ville de Québec

A vast array of measures

The area's redevelopment reflects a trend in North America to revitalize and repopulate city centres. Governments usually support such redevelopment. In Saint-Roch, the scope and speed of the revitalization is largely attributable to governments and, in particular, the Ville de Québec. The Québec case is also noteworthy because the city chose to favour local initiatives, maintain residents and implement measures to support precarious or underprivileged clientele. To this end, the city relied on a vast array of measures. Specifically, it:

- > purchased buildings and funded the restoration of buildings which it co-owned;
- > set up a home ownership and renovation programme aimed at artists' workshops in order to consolidate these facilities which were threatened by rising building values;
- > offered financial assistance and other assistance for priority real estate initiatives involving projects faced with special constraints such as high building recycling and upgrading costs;
- > put in place a policy to support businesspeople and implemented a commercial building façade renovation programme on rue Saint-Joseph;

> adopted a public consultation policy and reviewed the urban planning by-laws to support and guide the district's redevelopment. This review included, among other things:

- an increase in density obtained by imposing a minimum number of storeys;
- new standards governing soundproofing and ventilation as well as the prohibition for restaurants and bars to play music outdoors to ensure the harmonious integration of projects into the surrounding area;
- an adjustment of building occupancy standards to allow for more lively street-level activities and for a mix of residential and commercial uses;
- provision for the use of the "plans de construction" technique, similar to the specific construction, alteration or occupancy proposals for an immovable as provided for under the *Act respecting land use planning and development*, to manage the insertion of new buildings into densely built environments;
- restrictions of the area occupied and the distance between certain uses, in order to foster a sound distribution of functions: for example, bars and activities related to entertainment must be separated by a minimum distance, which varies by zone.

Source: Ville de Québec ■

CASE STUDY ■■ Montréal: The Angus project and the redevelopment of a run-down industrial site

The Angus project, now underway in the Rosemont district in Montréal, is located on the former site of the Canadian Pacific Angus Shops. It encompasses a diversified array of urban functions, i.e. medium-density residential buildings, including townhouses, condominiums and rental duplexes and triplexes, a food store set up in a former industrial building, a number of other neighbourhood businesses and the Technopôle Angus, an industrial park managed by a community-based organization, the Société de développement Angus.



The project is well integrated into the surrounding urban fabric and is contributing to the diversity, a common trait of central neighbourhoods where improved access leads to reduced and less polluting trips between places of residence, work and consumption. In particular, it offers new industrial locations in an area that is not solely accessible by automobile which is the case in the suburbs.

In 1995, project planning by Canadian Pacific, owner of the property, and the Ville de Montréal, produced a development programme similar to a comprehensive development programme (CDP), which defines the allowable uses and densities.

In addition to this programme, a development agreement was signed governing all questions relating to implementation. Consideration was given to the concerns of residents of the neighbouring Rosemont-Petite-Patrie district, which led, in particular, to the designation of an industrial zone to be included in the redevelopment. Redevelopment began in 1998 with decontamination of the site funded by the government's Revi-sol programme.

Urban design principles

The project adheres to the urban design objectives and principles included in the development programme, such as:

- > a grid of perpendicular streets that extends neighbouring streets, which facilitates travel and contributes to the project's integration into the neighbourhood;
- > a series of small squares surrounded by residential buildings;
- > the preservation of heritage, such as the walls of old buildings and machine-made parts, that are reminders of the area's industrial past.

The grid of perpendicular streets extends neighbouring streets, thus facilitating travel



A group of townhouses seen from one of the squares.



Photo : Mathieu Langlois

Source : Ville de Montréal ■

The Île de Hull includes the traditional downtown area of the former Ville de Hull, now part of Ville de Gatineau. Beginning in the 1970s, many real estate projects were developed in the downtown area, in particular office buildings. Today, nearly 25,000 jobs, mostly in the public sector, are located in this area.

Specific action programme

The revitalization of the Île de Hull, initiated in the 1990s, focused at the outset on the consolidation of the downtown commercial areas. In 2000, the city broadened its revitalization perspective by adopting a specific programme centred on residential development.

This initiative, aimed, in particular, at increasing density, should help to reduce automobile trips, since a greater numbers of residents will benefit from this central location in the urban agglomeration. This greater density is also likely to draw closer together places of residence and the already numerous workplaces in the area.

A demolition monitoring committee was set up to study redevelopment proposals, and ensure that new projects are sound. This measure is seen as facilitating the administration of the specific action programme bearing in mind that the Île de Hull has been particularly hard-hit by the major urban renovation initiatives of the past 40 years.



Varied means

It is against this backdrop that the specific action programme included different stages and means.

First, priority redevelopment zones were delineated. The specific action programme favours fairly dense housing in priority zones located near large green spaces and office buildings. In redevelopment zones located in the centre of the island, the programme gives priority to residential renovation aimed at the development of housing better suited for families.

The three main programmes for implementation are administered in keeping with the objectives specific to each area. These programmes include: two programs offered by the Société d'habitation du Québec, the Programme de rénovation des vieux quartiers (PRVQ), until 2001, and the Programme Rénovation Québec, since 2002, and a municipal property tax credit programme.

Urban planning by-laws have been reviewed to increase residential density and land use and thus promote the conversion of typical properties (built on 10-m-wide by 30-m-long lots, created by subdivision dating from the industrial era).

The city plans to redevelop boulevard Maisonneuve and boulevard Saint-Laurent, adjacent to the areas undergoing revitalization. This extensive \$11.6 million project is being carried out in partnership with the National Capital Commission and is receiving funding from the Canada-Québec Infrastructure Works Programme 2000. The conversion of the two boulevards into urban parkways offering an environment better suited to pedestrians (landscaped medians, greening, wider sidewalks, and so on) will foster the area's redevelopment and the construction of new real estate complexes. Work on the first segment of the project was slated to begin in June 2004.



While they are recent, since 2000 nearly 200 dwellings have undergone some form of revitalization, whether through renovation or construction, as well as changes in home ownership, and that area has seen the renovation of commercial façades, and the recycling of buildings.

An example of integration that is contributing to greater density in the Île de Hull.



Photo: Mathieu Langlois

New housing on rue Champlain, another example of increased density.



Photo: Ville de Gatineau

Units neighbouring the Île de Hull, located near the urban agglomeration's employment centres, benefit from facilities such as a railway right-of-way converted into an intercity cycling path.



Photo: Mathieu Langlois

Source: Ville de Gatineau ■

CASE STUDY ■■ Trois-Rivières: Revitalization of Vieux-Trois-Rivières and surrounding downtown neighbourhoods

The revitalization of downtown Trois-Rivières was undertaken in the 1980s, among other things through the development of a public square near the port, the administration of a façade renovation programme on rue des Forges and in its immediate vicinity, and the establishment downtown of two major employers, Hydro-Québec and the federal government.

As in the previous case study concerning Gatineau, the Ville de Trois-Rivières is now seeking to increase the number of residents in its central neighbourhoods, which should contribute to a reduction in the number of automobile trips since these areas offer an array of local services and will benefit from being centrally located in the urban agglomeration.

Incentives for revitalization

To attain these objectives, the city has broadened the area benefiting from revitalization measures in order to encompass neighbourhoods adjoining downtown.

These measures, which stem partly from the Programme Rénovation Québec offered by the Société d'habitation du Québec, include, amongst others, financial incentives in the form of tax credits and grants, which apply, in particular, to new buildings or to the conversion of non-residential buildings into residential buildings. They also include homeownership grants. Moreover, the city has purchased lots both downtown and in the surrounding neighbourhoods in order, through land assembly to facilitate their redevelopment.

In addition, the city has reviewed its urban planning by-laws in order to better take into account the specific traits of its built environment and the dynamic of the real estate market. In particular, it has prohibited the demolition of dilapidated buildings, despite a loss of value that can exceed 50%. It has also prohibited the subdivision of residential units in order to preserve or recreate extensive dwellings and thus ensure a varied housing supply.

The ripple effect from these series of measures is apparent in the new vitality on rue des Forges and the number of new buildings and recycling projects that have been carried out in the central areas. Since 1996, over 100 housing units have been built there and nearly 900 units have been renovated.



Two new twinned buildings with 16 housing units, at the corner of Royale and Bureau.



Photo : Ville de Trois-Rivières

Source: Ville de Trois-Rivières ■

2.1.3 Increase density and diversify use in urbanized peripheral zones

In peripheral zones, more optimal land use can be attained through comprehensive projects or small, specific projects that gradually increase building density.

■ Strategy

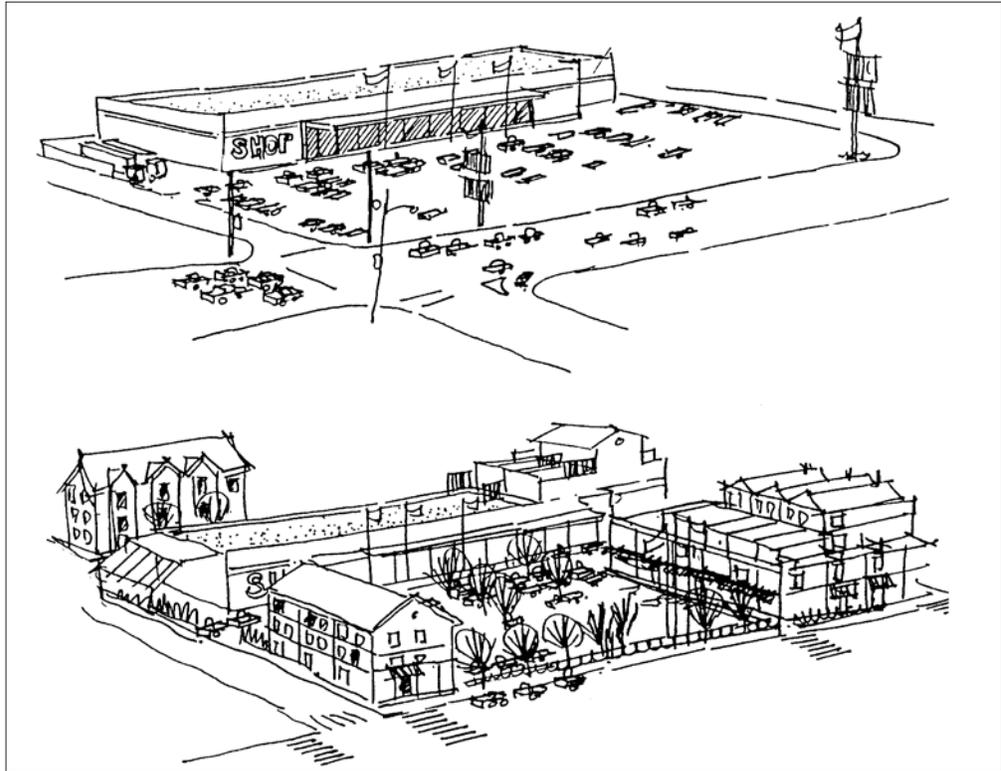
As we mentioned earlier, over the past 50 years urbanization at the fringe of urban agglomerations has led to low density development and to a growing segregation of residential, commercial, industrial and other functions. This form of urbanization has generated longer, more numerous trips, most of them by automobile.

Today, new models to increase density and diversify functions and uses warrant consideration.

Redevelopment: prioritize comprehensive projects

The redevelopment of large areas through comprehensive projects that replace obsolete uses or buildings can be perceived as an opportunity to increase density and broaden diversity. Let us consider, in particular, the recent development of big box retail stores and major regional malls that have led to the decline or even the closing of older malls along key thoroughfares on the periphery of urban agglomerations, thus creating commercial wastelands.

*Increased density
and greater diversity on a
mall site.*



Source: American Planning Association

This development dynamic leads to decay and dilapidation similar to that observed earlier in downtown and central areas. Although it is problematical, this situation can also offer an opportunity for redevelopment, especially through mixed projects that encompass residential, commercial, service, local or district uses.

The land to be redeveloped often has the advantage of being accessible by public transit. Moreover, redevelopment can be designed in light of pedestrian needs, in particular in the manner of older more traditional neighbourhoods. Several major projects of this type have been carried out in recent years in North America.

However, this type of redevelopment project must meet the challenge of changing development models and approaches in this type of area, given the established tendency to develop single-purpose, dispersed projects designed to be served by the automobile. It appears that residents or users can benefit from the greater proximity or integration of functions, more intensive use of open space, in particular huge parking lots, and broader access by means of various modes of transportation.

TABLE 3

Building types and net residential densities

Type of building	Net density (dwellings/hectare)
Isolated single-family dwelling on a big lot	5 to 10
Isolated single-family dwelling on a conventional lot (500 m ² to 700 m ²)	10 to 20
Single-family semi-detached or duplex dwelling	20 to 40
Single-family townhouse	30 to 60
Triplex	Roughly 100
Multi-family dwelling, maximum of four storeys	80 to 200
Big multi-family dwellings	100 to 400

From: Raphaël FISCHLER. 2002. Forme urbaine, développement métropolitain et mobilité des personnes, rapport soumis à la Commission de consultation sur l'amélioration de la mobilité entre Montréal et la Rive-Sud, 29 mai, p. 43.

A new concept for large urban agglomerations

In large urban agglomerations with extensive public transportation networks, comprehensive projects may be proposed for the development or redevelopment of areas located near a train or bus station or a main service point in a mass transit system. Such projects engender greater residential density and include new transportation infrastructure that emphasizes pedestrian access, in keeping with the American concept of transit-oriented development (TOD).

Incremental densification

Typical bungalow suburbs can also undergo a gradual increase in density. This can be achieved through the insertion of residential buildings with more than one dwelling unit on vacant lots available throughout the urban fabric (infill). The addition of a dwelling unit to existing single-family residences, whether or not such dwellings are intended for cohabitation by several generations of the same family, is also another way of increasing density.

The [Faubourg Laudance district in Québec](#) (see page 43) and the [multipurpose centre in Gatineau](#) (see page 46) illustrate the possibility of planning vast complexes in the suburbs that are denser, more diversified and designed for different modes of transportation.

■■■■ Means of action

Land use and urban planning tools described in the case studies on consolidation and revitalization of city centres and central neighbourhoods, with the necessary adaptation to the conditions prevailing in peripheral areas, can also serve to implement strategies to increase residential density and diversity.

Planning objectives

In the case of comprehensive projects, the [planning programme](#), an [SPP](#) or [development criteria in a by-law concerning the CDP](#) adopted by a local municipality should include development objectives focusing more on new development models rather than on the existing built environment.

These development models translate, in particular, into more intensive land use, provision of sidewalks, cycle paths and pedestrian promenades, creation of public squares, and construction of buildings that are street and pedestrian friendly.

Revitalization initiatives

These new development models require a review of urban planning by-law provisions, but may also require, in some instances, that revitalization initiatives similar to those put in place for central areas, be carried out. These initiatives may lead to special planning, and include [municipal actions, funding and land assembly](#).

Incremental densification objectives also require that adjustments be made to regulatory provisions that for now emphasize integration into the built environment. Specific measures in a [by-law concerning the SPAIP](#) or at least, amendments to building setback standards in [zoning by-laws](#) should be considered, especially with regard to side yards and the location of parking spaces.¹⁰

CASE STUDY ■■ Québec: Comprehensive plan for the Faubourg Laudance area and its centre, rue du Campanile

One of the initial objectives of the development of this new area in the former Ville de Sainte-Foy, now part of the new Ville de Québec, was to offer services and provide employment in the area in order to minimize automobile trips.

The comprehensive plan which was almost entirely implemented in the 1980s, made provision for a lively neighbourhood centre on rue du Campanile including buildings with businesses on the ground floor and dwelling units on upper storeys and a higher density than is usually found in the suburbs.

¹⁰ Carole Després, Andrée Fortin and Geneviève Vachon, *La banlieue revisitée*. Québec City: Éditions Nota bene, 2002, page 282.



To carry out the project in accordance with the basic concept, the municipality played an active role by:

- > assisting in property exchange between different owners to allow for land assembly and acquiring certain properties for public purposes;
- > ensuring a logical development sequence through strict control over the extension of streets and public services, as agreed in the memorandum of understanding covering such municipal public works;
- > establishing linear parks to link neighbourhood units to the centre of the area, using land contributed by the developers for use as parks;
- > lowering parking standards with respect to the number of spaces required; and
- > rigorously controlling architecture.

The Faubourg Laudance includes a wide array of residences, ranging from single-family dwellings to condominiums in multi-family buildings, not to mention semi-detached dwellings and townhouses. The average population density in the area is in the order of 65 inhabitants per hectare.

Today, this area is relatively autonomous, with an elementary school, a secondary school, neighbourhood businesses and services, e.g. a grocery store, a pharmacy, a credit union, a medical clinic; less-common services, e.g. clothing stores and a bookstore, along with offices, community services and several restaurants and coffee shops. Moreover, a large employment hub, the head office of the ministère du Revenu du Québec, is several minutes' walk from rue du Campanile.

Several public transportation routes linking the area to the economic hub on boulevard Laurier and downtown Québec serve the Faubourg Laudance. This level of service is warranted by the employment hub and the residential density of the area and its vicinity.



Rue du Campanile, with businesses on the ground floor and dwellings on the upper storeys.



Photo : Mathieu Langlois

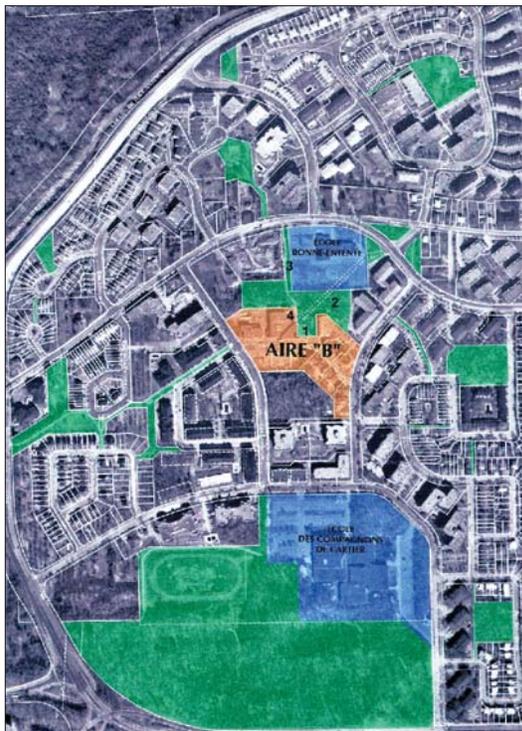
Pedestrian links converge on rue du Campanile.



Photo : Mathieu Langlois

Rue du Campanile, in the middle of the plan (Area B), around which the types of residential buildings are changing gradually from high to lower density.

The construction of linear parks reduces the time required to go directly to the centre of the area from each neighbourhood unit.



Orthophoto plan : Ville de Québec

Source : Ville de Québec ■

CASE STUDY ■■ Gatineau: The development of a multipurpose regional centre

The former Ville de Gatineau had planned a long time ago for the development of a city centre for the territory that resulted from the amalgamation of several municipalities in 1975. While the new Ville de Gatineau, established in 2002, now encompasses the municipalities of the former Communauté urbaine de l'Outaouais, the development of a multipurpose centre is still relevant to this urban agglomeration.

The development of this urban centre, which has an area of roughly 1 km², satisfies the objective of increasing the density of strategic spaces located along the main transportation routes in this sector of the urban agglomeration.

Consolidation at several levels

This multipurpose centre project is in keeping at several levels with the consolidation of urbanization.

At the regional level, it has been designed in conjunction with the Rapibus project, the rapid transit system planned by the Société de transport de l'Outaouais, which will provide a rapid link between regional economic centres and downtown Ottawa. Local public transportation routes connect to the Rapibus corridor.

In relation to the immediate vicinity, the centre has been planned, to take into account the presence of offices, a commercial mall, big box retail and a hospital within a 2 km radius. Shorter trips to these service areas can be expected for a greater number of residents.

The multipurpose centre itself has been planned to include residential projects and key regional institutions, office space and businesses. Density, building and occupation standards, with businesses on the ground floor and offices or dwellings on upper storeys, draw inspiration from conventional downtown areas.



Urban design and road network

The urban design for the area provides for a diversified land use, including medium-density residential complexes (single-family townhouses, multiplex dwellings or two or three-storey multi-family dwellings) and high-density complexes (three to six-storey multi-family dwellings). Higher-density residential complexes are planned close to public transit routes.

The area has a fairly perpendicular street grid and a series of public spaces made up of squares linked by pedestrian promenades and a civic square in the centre of the area. Land use and the road network are planned in relation to public transit service points.

Implementation tools

A diversified set of implementation tools has been adopted.

It should first be noted that the 2000 reviewed land use planning and development plan of the former Communauté urbaine de l'Outaouais set out the principles and criteria for the design of the multipurpose centre in relation to the urban agglomeration. This plan called specifically, for the construction of office buildings with floor areas exceeding 1,000 m² and malls with floor areas of over 10,000 m², in the multipurpose centre.

Moreover, it should be noted that the 1999 urban planning by-laws of the former Ville de Gatineau provided that certain land uses would be exclusively located or located in priority in this centre, e.g. municipal or regional level administrative, community, educational or cultural facilities. We should add that in the past 10 years or so, major facilities such as the National Archives Preservation Centre, the Maison de la Culture de Gatineau, the Collège de l'Outaouais, and the Local Community Service Centre de Gatineau, have been located in the centre. Planning also called for a large share of new business, service and offices to be located in this centre, as well as for the development of medium- and high-density housing.



To ensure that the squares delineated in the development plan were built, agreements between the city and the developers provided for the reimbursement of an amount equivalent to 50% of the infrastructure costs borne by the developers. This reimbursement compensates developers for the reduced profitability resulting from the fact that these squares allow real-estate development to occur only on one side of the road, water or wastewater infrastructure.

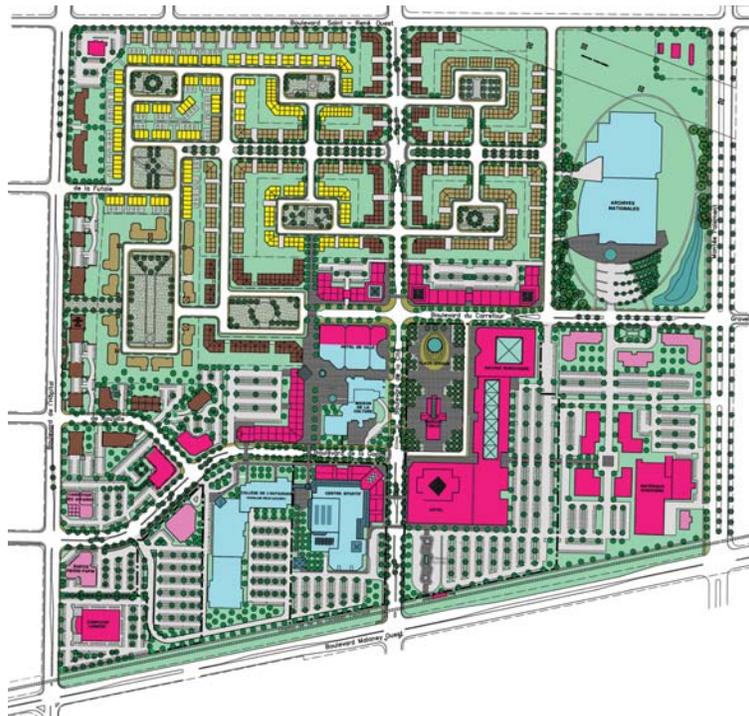
To enhance the quality of urban spaces, the city has made provision for distinctive urban furniture, wide sidewalks and the planting of mature trees along the main roads in the area.

One facet of the neo-traditional development of the Gatineau multipurpose centre: a mixed-used building.



Photo: Mathieu Langlois

The neo-traditional development plan of the multipurpose centre (excerpt from the planning programme of the former Ville de Gatineau).



Source: Ville de Gatineau ■

2.2 The development of a transportation infrastructure

In addition to facilitating public transit use, an integrated transportation infrastructure development can lead to increased walking and cycling for utilitarian purposes.

2.2.1 Design an integrated transportation infrastructure network in accordance with urbanization management strategies

Strategy

To meet this objective, the main road network should be designed for multipurpose use. This can include reserved bus or car-pool lanes, sidewalks or safe, functional, attractive bikeways. The recent redevelopment of a number of urban boulevards meets these concerns.

In particular, it is a good idea to enhance access by means of public transportation, walking or cycling to several industrial, institutional, business and service sectors that are often accessible solely by automobile from residential neighbourhoods.

Boulevard René-Lévesque in Québec: the integrated development of a reserved lane for transit buses and taxis, a wide sidewalk separated from road traffic and a cycle path marked out by bollards.



Photo : Pierre Blais

Rue University in the Quartier international de Montréal: development that gives priority to pedestrians.



Photo: Jonathan Picard (QIM)

Local street networks

Let us now examine initiatives focusing on existing or planned local street networks, pedestrian promenades and bikeways.

The local street networks pattern of suburban residential areas where single-family dwellings prevail, developed over the past 30 years, differs from the conventional square grid pattern: it is more hierarchical (e.g. one local street connects to another local street, which connects to a feeder road, which in turn connects to an arterial road), and the road layout is often more winding and personalized.

Specifically, this configuration aims to enhance peacefulness and safety on local roads, which handle much less through traffic, and to introduce greater variety in the routes leading to residences. However, it lengthens these routes, which does not encourage walking, which is further discouraged by the lack of sidewalks.

Ageing infrastructure in several suburban areas that were developed with such a local road network will progressively require extensive repairs, which could afford an opportunity to enhance conditions for pedestrians. Without going as far as changing the road network pattern, it might be advisable to consider providing sidewalks, street lighting better adapted to pedestrians, or other means of facilitating pedestrian trips to local services or public transit stops.

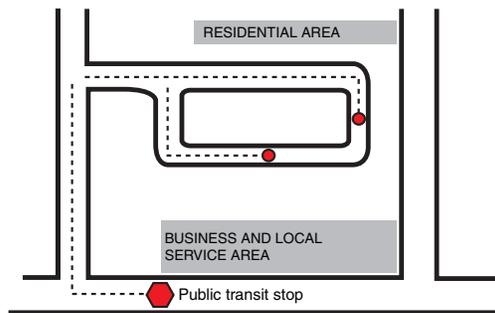
Shortening of pedestrian promenades

As the figures below illustrate, it is possible to shorten pedestrian promenades to local service centres or public transit stops either within the local road network or by means of pedestrian pathways. The comprehensive plan for the [Faubourg Laudance in Québec](#) (see page 45) examined earlier is a good example of a pedestrian network developed throughout an area.

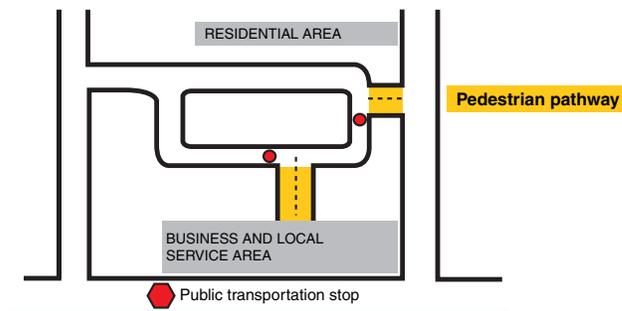
FIGURE 2

Shortening pedestrian promenades

Local road network that is not optimally suited to pedestrian trips



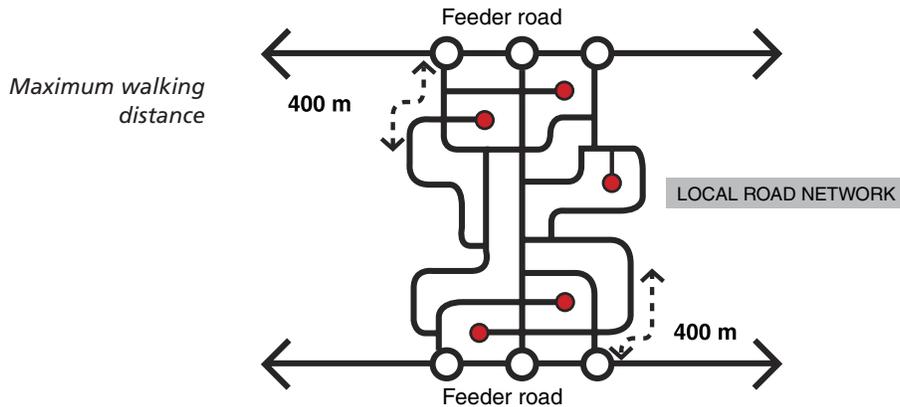
Local road network that is more optimally suited to pedestrian trips



Adapted from Government of Ontario, Ministry of Municipal Affairs and Ministry of Transportation, *Transit-Supportive Land Use Planning Guidelines*, April 1992, page 54.

Moreover, it may be advisable to estimate walking distances between the new residences and local service centres planned and bus stops, to ensure that these do not exceed, ideally, 400 m. Beyond this distance, residents are likely to use the automobile to get around.

FIGURE 3



Source: Government of Ontario, Ministry of Municipal Affairs and Ministry of Transportation, *Transit-Supportive Land Use Planning Guide*, April 1992, page 59.

A grid-type local road network of fairly perpendicular streets, as found in older urban areas, facilitates travel and is more fluid than a network comprising numerous detours and dead ends. Furthermore, such a configuration allows for a more optimal real estate development, with a subdivision pattern that is more flexible and can include a greater variety of housing types. The comprehensive plans for the [Angus project](#) (see page 34) and the [Gatineau multipurpose centre](#) (see page 48) discussed earlier illustrate this approach.

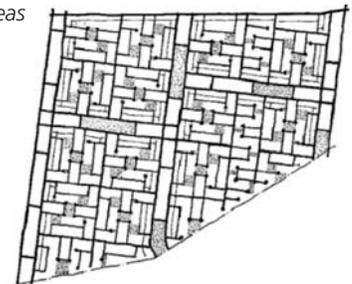
FIGURE 4

Type of street network

Street network comprising curves and dead ends



Grid-type network of perpendicular streets, as found in older urban areas



Source: Canada Mortgage and Housing Corporation (CMHC), *Residential Street Pattern Design (Socio-economic Series 75)*, 2002. All rights reserved. Reproduced with the consent of the CMHC. The reproduction or use of this material for purposes other than those authorized is strictly prohibited (<https://www03.cmhc-schl.gc.ca/b2c/b2c/init.do?language=en&shop=Z01EN&realID=0000000034&productID=0000000034000000018>).

Integrated bikeway network

To help reduce greenhouse gas emissions, the development of an integrated bikeway network must consider not only trips for sports and recreation but also utilitarian trips. An integrated bikeway network can include designated road ways, which are often combined with pedestrian pathways, and shared traffic lanes. A well designed bicycle network must seek to enhance access to economic and service centres and be safe and efficient by limiting conflicts with automobile traffic.

Some electrical power line rights-of-way, abandoned railway rights-of-way, or bank and shoreline corridors offer worthwhile opportunities for the development of such a network. Specific facilities and measures to encourage cycling, i.e. proper signage, appropriate lighting, safe parking lots, locker rooms and showers in the workplace, and so on, can be encouraged and implemented, as the case may be, by public bodies and the private sector.

Planning and development of bikeways in [Châteauguay](#) (see page 55), [Québec](#) (see page 56) and [Baie-Comeau](#) (see page 56) briefly discussed below illustrate certain approaches.

Urban bicycle lane.



Urban bicycle path.



■ ■ ■ Means of action

Planning tools

Transportation infrastructure planning must be thoroughly developed in the municipal [planning programme](#). To this end, it is important that the programme adhere to the principle of integrated transportation infrastructure development, which, while ensuring adequate service throughout the area, is also aimed at reducing greenhouse gas emissions.

Based on this principle, planning must first include a diagnosis that reveals, in particular, shortcomings that need to be remedied to foster travel by means other than the automobile. The diagnosis leads to the definition of policies and standards governing the development of future infrastructure in the areas to be urbanized and infrastructure improvement projects in urbanized zones. It can also determine the layout of certain infrastructures or define, if appropriate, criteria to be considered in a by-law concerning [CDPs](#).

Regulatory tools

The planning programme objectives should lead to a review of the [subdivision by-law](#) standards relating to the road network layout and development. To facilitate its initiatives in regards to the integrated transportation network, the municipality will ultimately have to consider an array of tools to ensure participation by developers in the development of the proposed network.

These tools include: the [municipal agreements works by-law](#); the requirements that may be imposed on developers concerning the implementation and funding of facilities or infrastructure as provided for under the by-law concerning [CDPs](#); or a [contribution in respect of parks, playgrounds and natural areas](#) which may be used for pedestrian or bicycle pathways.

In the spring of 2002, the Ville de Châteauguay adopted a master plan governing the bikeway network that it intends to develop in the coming years. The plan defines the development principles and phases in the network's development. It addresses the needs stemming from the growing use of bicycles both for recreational and utilitarian purposes. Réseau cyclable Châteauguay, an organization extensively involved in the promotion of cycling, worked closely with the city on this project.

The anticipated network includes two main routes that cross the city from north to south within an electric power line right-of-way and along the rivière Châteauguay. It also includes secondary routes designed to serve different areas and the main employment and service centres, including the industrial park.

For each section of the network, the master plan describes the preferred type of bicycle lane to be implemented (bicycle lanes or paths, paved shoulders or designated lanes), the work to be carried out and the technical standards that apply.

A cost estimate has been established for each phase of the network's development, thus allowing the city to include the projects planned in its three-year capital expenditure programme.

Source: Ville de Gatineau ■

CASE STUDY ■■ Baie-Comeau: A strategic cycle path to better integrate urbanized areas

During the 1980s, the Ville de Baie-Comeau initiated the development of a bicycle path roughly 6 km long running along highway 138, in order to improve cycling access between the Mingan area, in the west, and the Marquette area, in the east. The path improved the diversity of access modes to the city's major regional activity centres, such as the main malls, institutional centres and industries located in these areas.

In 1998, the path underwent major redevelopment in order to better combine business with pleasure. Work carried out to install municipal services allowed the city to relocate sections of the path, further from highway 138, and take advantage of a more compact foundation. The relocation also means that users enjoy a more attractive wooded environment.

Source: Ville de Baie-Comeau ■

CASE STUDY ■■ Québec: The utilitarian nature of the bicycle path on chemin des Quatre-Bourgeois

The bicycle path on chemin des Quatre-Bourgeois, an urban boulevard in Québec, was planned specifically to foster utilitarian cycling.

The bicycle path runs along several medium- and high-density residential areas and gives users access to key activity centres, including Université Laval. The entire bikeway network defined in the former Ville de Sainte-Foy cycling master plan will be connected to this structuring axis. This will result in a more efficient access to regional employment and service centres in this area of the new Ville de Québec.



*The bicycle path
on chemin des
Quatre-Bourgeois.*



The bicycle path on chemin des Quatre-Bourgeois is over 5 km in length. It has been developed in light of the specific characteristics of this urban environment, i.e. limited space, numerous car ramps, busy intersections, road overpasses, and bus shelters. It was necessary to narrow the traffic lane in order to implement the cycling path, which is also designed to safely accommodate rollerbladers.

Source: Ville de Québec ■

2.3 Urban forests

The reforestation of open spaces and enhanced protection for existing green spaces make it possible to capture some CO₂ emissions.

2.3.1 Reforest open space and protect green spaces

In recent decades, urbanization has led to the loss of numerous hectares of green space in urban centres. In support of the strategy to consolidate urbanization in order to limit the production of greenhouse gas emissions, the greening of cities offers several advantages, both in terms of carbon regulation and the enhancement of the urban living environment.

■ Strategy

The positive contribution made by trees

Through photosynthesis, trees capture carbon by fixing CO₂ and removing it from the air. In addition to capturing CO₂, trees contribute in three ways to the enhancement of the urban living environment.

- > From an environmental standpoint, trees:
 - cool the ambient air in the summer;
 - trap dust;
 - absorb noise;
 - reduce wind velocity;
 - reduce soil erosion;
 - intercept rainwater;
 - enhance the biodiversity of fauna and flora by providing shelter and food for wildlife.
- > From a social standpoint, trees:
 - provide a visual screen and enhance privacy;
 - enhance the quality of the landscape;
 - contribute to a community's peacefulness and, consequently, to the general well-being.
- > From an economic standpoint, trees:
 - reduce the cost of heating and air-conditioning;
 - increase the assessed or market value of properties.

Urban forests: street trees.



Photo : Pierre Blais

Urban forests: park trees.



Photo : Pierre Blais



Photo : Pierre Lahoud

A view of Montréal's urban forest.

Some statistics

- > In urban environments, a 30-year-old tree on average stores 9.4 kg of carbon per year. It thus takes 130 trees to store the 4,500 kg that an automobile produces while travelling 20,000 km per year.*
- > A sound layout of trees and shrubs around a house can reduce winter heating costs by up to 15% and summer air-conditioning costs by up to 50%. The same is true of properly arranged windbreaks, which can reduce from 10% to 25% the consumption of home heating fuel in the winter.**
- > Several studies show that the presence of trees on developed and undeveloped lots increases the value of the properties. Most of the studies put the increase in value at between 7% and 15%.***

Sources: * *Société de l'arbre du Québec*, Des arbres pour vivre en santé : guide pour la réalisation de projets de plantation, 1998, page 5.

** *Société internationale d'arboriculture — Québec inc.*, Guide d'évaluation des végétaux d'ornement, 1995, page 4.

*** *Id.*, pages 9-10.

Christian Faubert and Jean Canonne, "La valeur de l'arbre urbain" in *L'actualité immobilière*, Vol. XVII, No. 2 (summer), 1993, pages 40-41.

Urban reforestation

Greening strategies for urban areas focus both on the reforestation of open spaces and enhanced protection for existing green spaces. From the standpoint of reforestation, municipalities can define planting policies, programmes or projects considering all public and private spaces that offer an appropriate environment for tree growth.

The targeted spaces can be small or large:

- > residential lots in old and new areas;
- > street and boulevard rights-of-way, in the median and along the street line;
- > green spaces such as parks or shorelines;
- > institutional, commercial and industrial zones, especially parking lots, turfed plant beds, and the areas surrounding buildings;
- > abandoned or unstructured areas in urban and peri-urban environments that are underutilized, such as brownfields, farm woodlots or former extraction sites.

To improve the survival rate of trees, it is important to follow the principle of the right tree in the right place given the numerous constraints to tree planting in an urban environment. If possible, an attempt should also be made to link green spaces to foster greater biodiversity while avoiding the isolation of trees, which increases their vulnerability.

From the standpoint of the protection of the urban forest, municipal policies can protect woodlands of interest from urban development. They can also control deforestation.

■ ■ ■ Means of action

Planning tools

As for development and urban planning tools, following the example of the other action areas, it is advisable to include guidelines respecting reforestation and the protection of green spaces in the municipality's [planning programme](#) and, as warranted, in the RCM's [land use planning and development plan](#) or in the [development criteria in a municipal by-law concerning CDPs](#).

These guidelines should be linked to a more operational policy governing urban forestry and green spaces, which can include an inventory, an assessment and an annual or multi-year action plan that specifies the action spheres, the objectives to be attained, and evaluation and follow-up measures.

Regulatory tools

[Urban planning by-laws](#) may include zoning provisions to regulate the felling of trees or the obligation to plant trees when buildings are erected.

A [by-law concerning SPAIPs](#) can also include criteria to ensure the harmonious integration of development projects into the natural environment and reduce the anticipated environmental impact. Such criteria can focus on components such as vegetation screens or wooded buffer zones, landscaping of sites after buildings are erected, or preservation of certain trees depending on their location, health, diameter, and so on.

The urban forest can also benefit from measures defined by the RCM in a [by-law on the planting and felling of trees](#).

Aside from these regulatory controls, the municipality can acquire land for the purpose of establishing parks, green spaces or the preservation and planting of greenery. Such land purchases and plantings can be funded by means of the [contribution in respect of parks, playgrounds and natural areas](#), which can be paid when an application is submitted for a subdivision or building permit.

Urban forestry committee

The implementation of a policy governing urban forestry and the preservation of green spaces can benefit considerably from the contribution made by various community stakeholders. The establishment of a committee that includes residents can guide and support the municipality's initiatives by highlighting public concerns and, incidentally, by providing expertise.

An urban forestry and conservation committee can be tasked with elaborating a policy and an action plan, evaluating development projects, and heightening public awareness. Moreover, it can also be advantageous to work with community organizations dedicated to the conservation or planting of trees.

Brief descriptions of the experience of [Québec](#) (see page 62), [Montréal](#) (see page 64), [Victoriaville](#) (see page 66), [Saint-Georges](#) (see page 67), [Sainte-Adèle](#) (see page 68) and [Rouyn-Noranda](#) (see page 68) illustrate how this type of approach is implemented.

CASE STUDY ■■ Québec: A master plan for the natural environment and urban forests

The Ville de Québec has, over the past 20 years, assumed leadership in the realm of urban forests by adopting two five-year plans in this respect and by innovating in a number of ways in the field. By 2006, the city will have adopted a master plan to protect and develop its natural environment and urban forests.

The urban forest in the Montcalm area in Québec.



Photo : Ville de Québec

Since the initiation of the plan's implementation, various community stakeholders such as non-profit organizations, NGOs and government departments, have worked closely together in order to take advantage of each one's expertise. The master plan will, in particular, pursue four objectives.

1. Inventory natural environments of great value located in the city, describe each of the selected entities and define its potential. In the Ville de Québec, the types of natural environments include:
 - > urban forests: all trees planted individually or preserved in the urban environment, i.e. street, park and other trees;
 - > urban woods: an ecosystem in which trees predominate and all strata of vegetation are represented, often located on former farmland or sites unsuited to development because of rocky cliffs, the proximity of waterways, and so on;
 - > forest estates: a vast area that supports a wide array of forest stands, often located on the periphery of the city;
 - > water bodies, riparian areas, lake shores, and natural environments, which provide important wildlife and plant habitats.



2. Define protection measures and establish strategies adapted to each type of environment, including:
 - > reviewing by-laws governing the felling of trees and forest harvesting;
 - > defining criteria that promote the preservation of existing trees when development projects are carried out;
 - > increasing the number and area of protected natural environments;
 - > examining the possibility of establishing a protected area zoning to ensure better protection of environments of great value.
3. Complete a computerized inventory of urban forests throughout the city's territory.
4. Evaluate and adapt as needed the tree planting programmes now in effect:
 - > planting on the remaining portions of rights-of-way in front of residences;
 - > cost-sharing of tree planting on residential or commercial lots, in industrial parks and on school grounds;
 - > establishing parks and green spaces, including projects such as the naturalization of the banks of the Rivière Saint-Charles and the reforestation of abandoned or derelict municipal lots;
 - > redeveloping streets, such as the transformation of big boulevards and narrowing of roads to increase the areas for planting;
 - > planting when parking lots are eliminated in front of properties;
 - > reforestation of hardly developed or undeveloped asphalted lots and open spaces along streets, with the collaboration of interested residents, in densely built central areas.

The urban forest along the Rivière Saint-Charles in the Ville de Québec.



Photo: Ville de Québec

Source: Ville de Québec ■

In order to preserve the initial garden city concept and the outstanding natural environment of Île-des-Soeurs, the former Ville de Verdun, now amalgamated into the new Ville de Montréal, was an advocate of regulatory measures and partnerships aimed at ensuring the preservation of the natural environment.

Moreover, from the very beginning, the urban design aimed at encouraging non vehicular trips by providing a network of parkways that cross through the development zones, in order to make pedestrian walking trips quicker and safer.

Protection of the Domaine Saint-Paul woodland

Within this context, mention should be made of the commitment of the borough and residents to preserve the Domaine Saint-Paul woodland, a 30-hectare natural site located in the centre of the Île-des-Soeurs district.

Starting in the late 1980s, the Ville de Verdun gradually acquired over 80% (24 ha) of the woodland. Moreover, the Comité pour la protection du patrimoine naturel de l'Île-des-Soeurs purchased two additional hectares, which it gave to the former Ville de Verdun, thus making it possible to protect nearly 87% of the original woodland.

Moreover, in order to link the Domaine Saint-Paul to the Lachine rapids migratory bird sanctuary, the borough established a green corridor linking the woodland to the St. Lawrence River. This corridor, located on the site of the future ecological golf course, has been created by transplanting trees from the unprotected forest. The corridor fosters the mobility of wildlife and thus supports biodiversity on the site.

Over the years, the former Ville de Verdun has also acquired more than 22 000 m² of river banks, doubling the width of public banks in order to once again ensure the biomass preservation.



A set of specific measures

In its urban planning by-laws, the borough of Verdun applies specific provisions in the residential zones adjacent to the Domaine Saint-Paul in order to foster reforestation, the protection of trees and the natural environment. These provisions, which apply to lots adjacent to the woodland, stipulate, among other things, the obligation to:

- > plant one tree for every 25 m² in the backyard;
- > preserve trees with a diameter of over 10 cm;
- > all trees with a diameter over 10 cm for which an authorization to fell was granted must be replaced;
- > replace trees that were injured during construction;
- > plant an impenetrable hedge or install a gateless fence to prevent access to the woodland.

Verdun's planning programme, which was reviewed in 2000 and approved by biologists and the ministère de l'Environnement du Québec, consolidates the current situation by making provision for other measures centred on reforestation and the development of the urban forest throughout the built environment.

Moreover, the borough of Verdun has set up the Comité de gestion et de suivi des habitats naturels de Verdun, with a status that is similar to that of an urban planning advisory committee, except that its mandate is to analyse and propose any initiative deemed relevant focusing on the natural environment and to submit its recommendations to the borough council.

With respect to the contribution demanded of developers for the purpose of establishing parks, play spaces and green spaces, it should be noted that the city frequently accepts land in lieu of a financial contribution. In this way, it impresses upon promoters the interest of integrating public green spaces into their projects.

One key achievement of the borough of Verdun is to have convinced developers that a private riverbank only generates added value for shoreline residences while a public riverbank generates added value for all properties in the project, whether or not they are on the shore.

Source: Ville de Montréal ■

CASE STUDY ■■ Victoriaville: A well established urban forestry policy

In 1993, the Ville de Victoriaville established an urban forestry advisory committee with a view to defining and administering a city-wide urban forestry policy. The committee is made up of seven members who are either elected representatives, public servants or residents, including experts in horticulture. The Service de la gestion du territoire oversees regulatory questions pertaining to forestry and the Service de l'environnement manages operations.

The committee formulates opinions on all questions related to urban forestry. It studies, among other things, development projects in respect of which regulatory provisions governing the protection or planting of trees must be administered. Under its mandate, it also develops urban forestry projects. One of its first projects was to conduct a detailed inventory of the trees on municipal property.

It has also adopted annual action plans that describe reforestation, maintenance and awareness initiatives. Up until now, these action plans have set for the city a planting objective of 200 trees per year on municipal property, i.e. in parks, along boulevards and on the median, as well as on private property.

Source: Ville de Victoriaville ■

Saint-Georges de Beauce

Inaugurated in 2001, the arboretum of the Ville de Saint-Georges de Beauce is a significant contribution to the embellishment and greening of the urban environment. In 1996, with the support of its residents, the city acquired a parcel of uncultivated land to build a leisure park inspired by the Domaine Maizerets in the Ville de Québec.

Roughly 200 trees from seven botanical families have been planted in the arboretum, which has an area of 16,470 m². The community has made a considerable financial commitment to this project; residents and a number of entrepreneurs have made donations totalling nearly \$160,000.

The Saint-Georges de Beauce arboretum: a new green space in the heart of the city centre.



Photo : Karine Bonneville

Source: Ville de Saint-Georges de Beauce ■■



Sainte-Adèle

Several stakeholders in Sainte-Adèle are helping to protect green spaces and to plant trees. Mention should first be made of the Société de protection foncière de Sainte-Adèle, a non-profit organization dedicated to the preservation of the natural environment, which has acquired through purchase or donation several forests and wetlands.

The Ville de Saint-Adèle has contributed directly to the preservation of natural areas, in particular by donating several of its properties to the Société de protection foncière de Sainte-Adèle, and by acquiring certain sites to prevent building in sensitive areas located in the Lac Sainte-Adèle watershed.

Furthermore, another organization, Action Environnement Sainte-Adèle, has already planted several thousand trees and shrubs along the shores and elsewhere in the municipality.

Source: Municipalité de Sainte Adèle ■

Rouyn-Noranda

The Ville de Rouyn-Noranda has increased the area covered by woodlands in conjunction with the rebuilding of streets and alleys. The programme, which was first developed to reduce the cost of maintaining and rebuilding several streets that were overly wide for traffic and parking, made it possible to reduce by 20 m the road right-of-way to a width of 10 m to 15 m, depending on the type of street.

Sidewalks, benches and medians on nearly 15 streets have increased the space available for planting, for pedestrians, and for landscaping. Since 1995, the number of trees in the city has increased from 4,000 to 5,000, mainly along streets.

Source: Municipalité de Rouyn-Noranda ■

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GLOSSARY OF TERMS USED IN THE ACT RESPECTING LAND USE PLANNING AND DEVELOPMENT

ACT RESPECTING LAND USE PLANNING AND DEVELOPMENT (RSQ, C. A-19.1)

The *Act respecting land use planning and development* establishes the legal framework for the preparation and administration of rules governing land use planning and development in Québec.

GOVERNMENT LAND USE PLANNING ORIENTATIONS

One feature of the *Act respecting land use planning and development* is the nature of the government's involvement in the overall planning process. The government adopts land use planning policy statements that regional authorities must consider when they prepare planning documents. Moreover, the government, its ministers and mandataries are bound by the objectives set out in the land use planning and development plans in force.

The government analyses the proposed reviewed plans submitted in light of its policy statements. The Minister of Municipal Affairs and Regions is responsible for the Act's administration, ensuring compliance with government land use planning policy statements, and authorizing the coming into force of the planning documents submitted. It is incumbent upon the Minister to ensure the coordination of sector-based opinions and to present concerted opinions stemming from an analysis of departmental opinions expressed in light of the government's position.

PLANNING TOOLS

Planning tools make it possible to engage in land use planning in a municipality, a regional county municipality (RCM) or a metropolitan community.

At the supramunicipal and regional level, the **land use planning and development plan** includes the following components: a strategic vision; the general aims of the land use and development policy; the urbanization perimeters and priority development zones; a land transportation plan; infrastructure and equipment planning; intermunicipal development proposals and areas of interest; the **action plan in respect of the land use planning and development plan**; and the **territorial development plan**.

At the municipal level, the planning tools provided by the *Act respecting land use planning and development* include the **planning programme** and the **special planning programme**.

Below are brief descriptions of these tools and their components.

- **Land use planning and development plan (s. 5 to 7)**

The land use planning and development plan is the planning document that establishes guidelines governing the physical organization of a regional county municipality (RCM) or a metropolitan community. The plan coordinates choices and decisions that affect all of the municipalities concerned, the government and its departments and mandataries. Above all, the plan is a document of intent formulated and designed to highlight a regional perspective of economic, social and environmental development.

- **Strategic vision (s. 5,9°)**

A land use planning and development plan must set out a strategic vision of cultural, economic, environmental and social development to support coherent action by the the regional county municipality or the metropolitan community.

- **Urbanization perimeters, priority development zones and priority redevelopment zones (s. 5,3° and 6,1°)**

The RCM or the metropolitan community must in its land use planning and development plan delimit urbanization perimeters, including already urbanized areas and those in which it intends to allow new urban growth. It may also determine the zones that will be developed or redeveloped first within an urbanization perimeter.

- **General policies of land use (s. 5,2°)**

It is compulsory to adopt general aims for the land use policy that indicate what the RCM, the metropolitan community or the municipality intends for the different areas to be used.

- **Equipment and infrastructure planning (s. 5,8°)**

The land use planning and development plan must indicate the nature and location of major existing or planned new infrastructure and equipment.

The inclusion of an infrastructure and equipment section in the land use planning and development plan makes it possible to ensure the maintenance, enhancement and establishment of equipment and public or private public services in urbanized areas. Such planning promotes the use and accessibility of such services and favours their optimal location.

- **Plan of the organization of land transport (s. 5,7°)**

The inclusion of a land transport section in the land use planning and development plan allows the regional county municipalities (RCMs) or metropolitan communities to conduct integrated planning of ground, air and maritime transport equipment and infrastructure. Such planning also makes it possible establish links with other sections of the plan that affect or are affected by transport and to foster cooperation among various actors.

- **Action plan in respect of the land use planning and development plan (s. 7)**

The action plan is a document to implement the land use planning and development plan centred on initiatives pertaining to land use planning and development in an RCM.

- **Territorial development plan (s. 79.20)**

The territorial development plan makes it possible to pinpoint and structure the community, economic, social and cultural development measures adopted in respect of an RCM.

- **Planning programme (s.83 and 84)**

The planning programme is the planning document that sets out guidelines for a municipality's spatial and physical organization and establishes the municipality's general development vision for its territory.

- **Special planning programme (s. 85 and 85.1)**

The special planning programme is a component of the planning programme which focuses more specifically on the planning of certain areas that demand special attention from the municipal council, e.g. the development of a new residential or industrial sector or of the city centre.

URBAN PLANNING BY-LAWS

Urban planning by-laws make it possible to establish rules, standards and evaluation criteria governing construction and the use of buildings and land in a territory. They are the key tools for the implementation of the choices and decisions concerning the community's future development that appear in the planning program and the land use planning and development plan. They guide most land use planning and development operations. Urban planning by-laws are directly enforceable against residents.

Below are brief descriptions of some of these by-laws.

- **Zoning bylaw (s. 113)**

The zoning by-law divides the municipal territory into zones, sectors of zones or parts to control land and building use and regulate the construction and appearance of structures.

- **Subdivision by-law (s. 115)**

Through its subdivision by-law, a municipality may define standards and conditions governing the parceling and identification of lots.

- **Construction by-law(s. 118)**

The construction by-law establishes construction quality standards and ensures the adequate solidity, resistance, sanitation, safety and insulation of a structure. It allows a municipality to legislate in respect of buildings but solely in order to adopt higher standards than those of the *Québec Building Code or standards for buildings or components not covered by this code.*

- **Comprehensive development programme (s. 145.9 to 145.14)**

The comprehensive development programme by-law makes it possible to require detailed planning in respect of certain areas before any amendment is made to the zoning by-law. This more flexible approach to project assessment based on criteria rather than standards fosters the search for innovative solutions in an open exchange between the municipality and the developers.

- **Site planning and architectural integration programmes (s.145.15 to 145.20)**
 The site planning and architectural integration programmes (SPAIP) by-law may identify certain areas or categories of projects subject to a qualitative assessment when an application for a permit or a certificate is submitted. This enables the municipality to ensure the quality of site planning and architectural integration, while taking into account the specific nature of each situation.
- **Conditional uses (s. 145.31 to 145.35)**
 As its name indicates, the conditional use by-law is intended to allow, under certain conditions, the establishment or exercise of a use in a zone determined by the zoning by-law.
- **Quotas on similar or identical uses (s.113, 4.1°)**
 The setting of quotas is aimed at stipulating by zone the maximum number of sites destined for identical or similar uses, including in a given building or site, the minimum distance that must separate such sites or the maximum floor or lot area that may be destined for such uses.
- **Specific construction, alteration or occupancy proposals for an immovable (s. 145.36 to 145.40)**
 The by-law concerning specific construction, alteration or occupancy proposals for an immovable is aimed at allowing, under certain conditions, a project to be carried out despite its departing from any of the municipality's urban planning by-laws.
- **Preliminary programme concerning the reuse of land freed up by demolition**
 The by-law governing demolition may stipulate that the property owner must submit for approval to the demolition committee a preliminary programme concerning the reuse of land freed up by demolition prior to an examination of his application for a permit. The by-law may also stipulate that, if the programme is approved, the property owner must submit to the municipality, prior to the issuing of his permit, a financial guarantee in respect of the execution of the programme in an amount not exceeding the value recorded on the assessment role of the building to be demolished.
- **Felling and planting of trees (s. 79.1 to 79.19)**
 A municipality or an RCM may govern or restrict the planting or felling of trees to ensure the protection of forest cover and foster the sustainable development of private forests.
- **Minor exemptions to urban planning by-laws (s. 145.1 to 145.8)**
 The by-law concerning minor exemptions to urban planning by-laws allows for the granting to an individual of an exemption in respect of the application of certain provisions in the zoning by-law and the subdivision by-law and for the stipulation of any condition, according to the municipality's jurisdiction, with a view to mitigating the exemption's impact.
- **Interim control measures (s. 65 to 72 and 111 to 112.8)**
 Interim control allows an RCM, a metropolitan community or a municipality, as the case may be, to prohibit, restrict or govern the realization of new subdivision or construction projects or new uses of land when a land use planning and development plan or a planning program is prepared, modified or reviewed.

LAND USE PLANNING FUNDING AND DIRECT MUNICIPAL ACTION

Funding and land-use control tools make it possible to establish funds and land banks or financial reserves in respect of impending investments. Through such tools, developers may be asked to participate in certain municipal works. Moreover, through these tools, groups of individuals or individuals can be encouraged to participate financially in order to support certain initiatives in a municipality.

Municipalities may also directly support the construction, maintenance or administration of equipment, infrastructure or public services or may encourage property owners to build, renovate and develop their properties or buildings.

Below are brief descriptions of some of these tools.

- **Municipal works agreements (s. 145.21 to 145.30)**

The by-law concerning municipal works agreements allows municipalities to conclude agreements with real estate developers regarding their participation in the costs and implementation of the municipal works required to carry out development projects.

- **Contribution in respect of parks, playgrounds and natural areas (s. 117.1 to 117.16)**

The contribution in respect of parks allows a municipality to impose on the property owner, as a condition for issuing a construction or subdivision permit, a levy, i.e. either the property owner transfers free of charge to the municipality a property or he pays a sum equivalent to the value of the property to be transferred, suitable for the establishment or expansion of a park or playground or for the preservation of a natural area.

- **Land banks and powers to acquire an immovable**

A municipality may, pursuant to its powers to acquire and dispose of immovables and land, facilitate the development of public and, in some instances, private projects.

The three types of powers of acquisition and disposal, whose conditions vary, are:

- the acquisition programme in respect of immovables in the city centre and acquisitions not stipulated by the programme;
- acquisitions in respect of social and health services;
- acquisitions in respect of land banks or housing banks.

A local municipality may possess immovables for the purpose of a land bank. It may also possess immovables for the purpose of housing. The municipality may lease such an immovable, convert it and install public services there, demolish, transport or restore a construction erected there, or erect a construction there. Notwithstanding any irreconcilable provision and pursuant to these powers, the municipality may also dispose at no cost for the benefit of certain establishments of an immovable obtained from the government, one of its ministers or agencies, a regional county municipality, the municipal housing office, or another non-profit organization.

· **Financial assistance**

A municipality may, pursuant to its powers, grant direct financial assistance to individuals and organizations with a view to fostering private initiatives or assisting the needy.

For example, a municipality may:

- offer tax incentives in respect of the construction, renovation or transformation of buildings and the development of land in conjunction with a revitalization programme;
- establish a public housing development fund in order to support social housing development projects;
- set up or help set up certain non-profit organizations, give them grants or offer them guarantees and assign to them on its behalf the management of certain activities.

NOTE: The Act respecting land use planning and development (RSQ, C. 1-19.1) is available online, in English, on the Publications du Québec Web site at <http://www.publicationsduquebec.gouv.qc.ca/accueil.en.html>, in the section on publications.

GLOSSARY OF TERMS PERTAINING TO GREENHOUSE GASES

Gases governed by the Kyoto Protocol

Carbon dioxide:

Carbon dioxide (CO₂) is an odourless, colourless, non-toxic gas normally found in the atmosphere. The combustion of fossil fuels is the main anthropogenic source of CO₂.

Methane:

Methane (CH₄) is a colourless, odourless gas that results from the fermentation of bacteria in the absence of oxygen. It is the main component of natural gas. It is produced by the decomposition of organic matter such as waste and animal digestion.

Nitrous oxide:

Nitrous oxide (N₂O) is a colourless gas that is produced by the combustion of fossil fuels and biomass, and by the use of fertilizers.

Hydrofluorocarbons:

Hydrofluorocarbons are a family of chemical compounds containing atoms of hydrogen, fluorine and carbon. The chemical gases in this family, including hydrofluorocarbons, sulphur hexafluoride and perfluorocarbons, are used for their refrigerating properties, as propellants in aerosols, and as solvents.

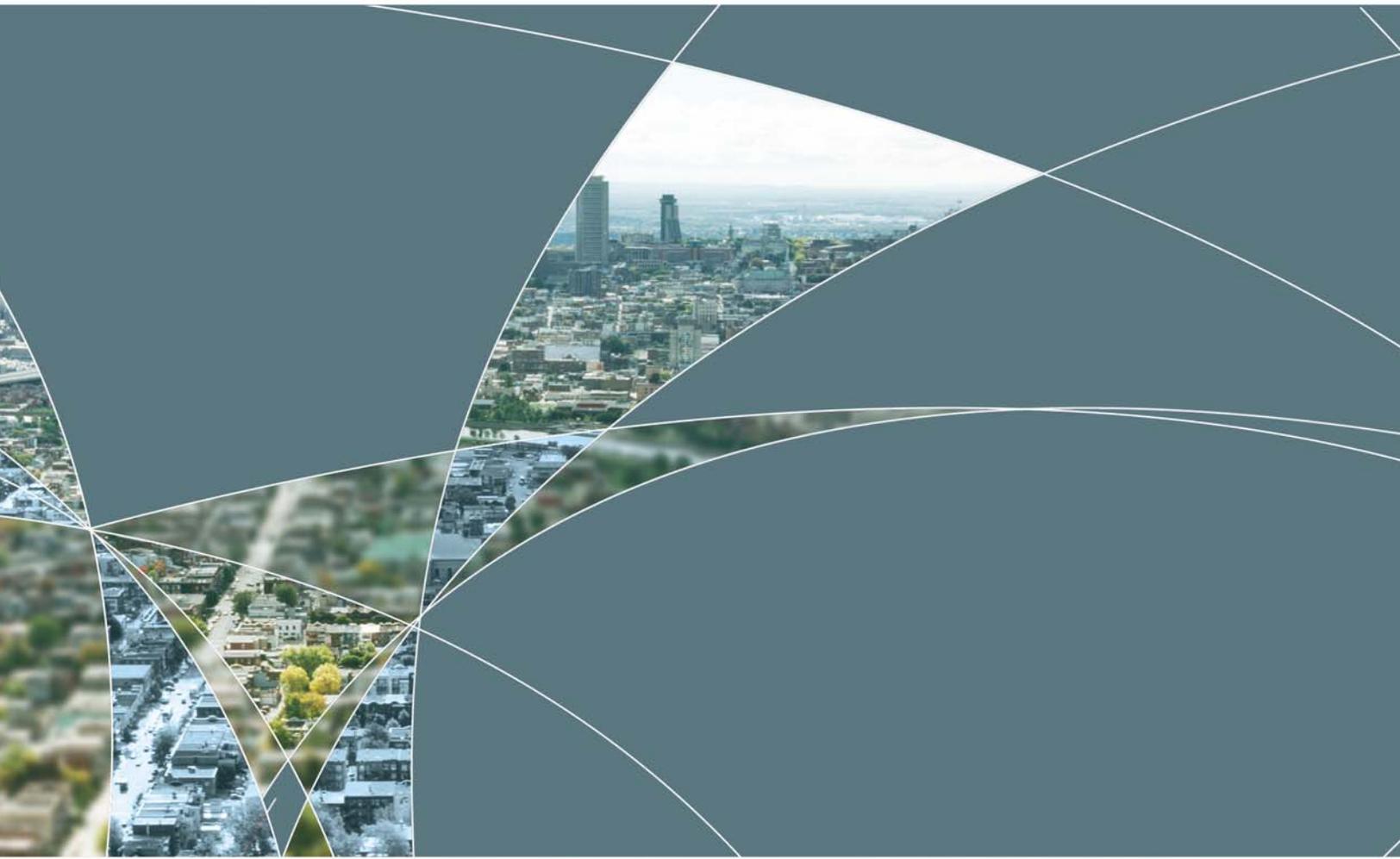
Other definitions

Carbon sink:

Carbon sink is the absorption of CO₂ and its long-term containment. Forests and oceans are carbon sinks.

Smog:

Smog is a yellowish fog stemming from a mixture of airborne pollutants made up, above all, of fine particles and ozone, more precisely tropospheric or ground-level ozone (O₃). It results from complex photochemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOCs), pollutants stemming primarily from motor vehicles, industrial processes and heating. A smog episode can last from several hours to one week. Its intensity depends on certain meteorological conditions such as sunshine, temperature and wind, the time of day, the season and the distance from the sources of pollutants.



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