DEDICATED FUNDING

A BEST PRACTICE BY THE NATIONAL GUIDE TO SUSTAINABLE MUNICIPAL INFRASTRUCTURE

National Guide to Sustainable Municipal Infrastructure

Guide national pour des infrastructures municipales durables

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INFRAGUIDE – INNOVATIONS AND BEST PRACTICES

Why Canada Needs InfraGuide

Canadian municipalities spend $12 to $15 billion annually on infrastructure but it never seems to be enough. Existing infrastructure is aging while demand grows for more and better roads, and improved water and sewer systems. Municipalities must provide these services to satisfy higher standards for safety, health and environmental protection as well as population growth. The solution is to change the way we plan, design and manage infrastructure. Only by doing so can municipalities meet new demands within a fiscally responsible and environmentally sustainable framework, while preserving our quality of life.

This is what the National Guide to Sustainable Municipal Infrastructure: Innovations and Best Practices (InfraGuide) seeks to accomplish.

In 2001, the federal government, through its Infrastructure Canada Program (IC) and the National Research Council (NRC), joined forces with the Federation of Canadian Municipalities (FCM) to create the National Guide to Sustainable Municipal Infrastructure (InfraGuide). InfraGuide is both a new, national network of people and a growing collection of published best practice documents for use by decision makers and technical personnel in the public and private sectors. Based on Canadian experience and research, the reports set out the best practices to support sustainable municipal infrastructure decisions and actions in six key areas: municipal roads and sidewalks, potable water, storm and wastewater, decision making and investment planning, environmental protocols and transit. The best practices are available on-line and in hard copy.

A Knowledge Network of Excellence

InfraGuide's creation is made possible through $12.5 million from Infrastructure Canada, in-kind contributions from various facets of the industry, technical resources, the collaborative effort of municipal practitioners, researchers and other experts, and a host of volunteers throughout the country. By gathering and synthesizing the best Canadian experience and knowledge, InfraGuide helps municipalities get the maximum return on every dollar they spend on infrastructure—while being mindful of the social and environmental implications of their decisions.

Volunteer technical committees and working groups—with the assistance of consultants and other stakeholders—are responsible for the research and publication of the best practices. This is a system of shared knowledge, shared responsibility and shared benefits. We urge you to become a part of the InfraGuide Network of Excellence. Whether you are a municipal plant operator, a planner or a municipal councillor, your input is critical to the quality of our work.

Please join us.
Contact InfraGuide toll-free at **1-866-330-3350** or visit our Web site at <***www.infraguide.ca***> for more information. We look forward to working with you.

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Umendra Mital, Chair	City of Surrey, British Columbia
Clarke Bellinger	CH2MHILL, Ottawa, Ontario
Ed Kovacs	City of Cambridge, Ontario
Luc Lahaie	City of Laval, Quebec
Betty Matthews-Malone	Haldimand County, Ontario
Osama Moselhi	Concordia University, Montréal, Quebec
Jean-Pierre Pierre	City of Clarence-Rockland, Ontario
Konrad Siu	City of Edmonton, Alberta
Pete Steblin	City of London, Ontario
George Trainor	City Councillor, Charlottetown, Prince Edward Island
Jeff B. Potkins	Technical Advisor, National Research Council

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Gerry Davis	City of Hamilton, Ontario
Lynne Cowe Falls	University of Calgary
John Hodgson	City of Edmonton, Alberta
Iqbal Jamal	AQL Management Consulting Inc.
Luc Lahaie	Ville De Laval, Quebec
Umendra Mital	City of Surrey, British Colombia
Mike Sheflin	(formerly) Regional Municipality of Ottawa-Carleton, Ontario

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Bill Gates	City of Halifax, Nova Scotia
Joel DeBlock	City of St. Albert, Alberta

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Governing Council:

Joe Augé	Government of the Northwest Territories, Yellowknife, Northwest Territories
Mike Badham	City of Regina, Saskatchewan
Sherif Barakat	National Research Council Canada, Ottawa, Ontario
Brock Carlton	Federation of Canadian Municipalities, Ottawa, Ontario
Jim D'Orazio	Greater Toronto Sewer and Watermain Contractors Association, Toronto, Ontario
Douglas P. Floyd	Delcan Corporation, Toronto, Ontario
Derm Flynn	Town of Appleton, Newfoundland and Labrador
John Hodgson	City of Edmonton, Alberta
Joan Lougheed	City of Burlington, Ontario
Saeed Mirza	McGill University, Montréal, Quebec
Umendra Mital	City of Surrey, British Columbia
René Morency	Régie des installations olympiques
Vaughn Paul	First Nations (Alberta) Technical Services Advisory Group, Edmonton, Alberta Montréal, Quebec
Ric Robertshaw	Public Works, Region of Peel, Brampton, Ontario
Dave Rudberg	City of Vancouver, British Columbia
Van Simonson	City of Saskatoon, Saskatchewan
Basil Stewart, Mayor	City of Summerside, Prince Edward Island
Serge Theriault	Government of New Brunswick, Fredericton, New Brunswick
Tony Varriano	Infrastructure Canada, Ottawa, Ontario
Alec Waters	Alberta Infrastructure Department, Edmonton, Alberta
Wally Wells	The Wells Infrastructure Group Inc. Toronto, Ontario

Municipal Infrastructure Committee:

Al Cepas,	City of Edmonton, Alberta
Wayne Green	City of Toronto, Ontario
Haseen Khan	Government of Newfoundland and Labrador St. John's, Newfoundland and Labrador
Ed S. Kovacs	City of Cambridge, Ontario
Saeed Mirza	McGill University, Montréal, Quebec
Umendra Mital	City of Surrey, British Columbia
Carl Yates	Halifax Regional Water Commission, Nova Scotia

Relationship Infrastructure Committee:

Geoff Greenough	City of Moncton, New Brunswick
Joan Lougheed	City Councillor, Burlington, Ontario
Osama Moselhi	Concordia University, Montréal, Quebec
Anne-Marie Parent	Parent Latreille and Associates Montréal, Quebec
Konrad Siu	City of Edmonton, Alberta
Wally Wells	The Wells Infrastructure Group Inc. Toronto, Ontario

Founding Member:

Canadian Public Works Association (CPWA)

EXECUTIVE SUMMARY

Dedicated or earmarked mechanisms for funding municipal infrastructure are an option for municipalities in addressing infrastructure gaps and underfunded project backlogs to achieve sustainable and fully financed infrastructure. These funding methodologies establish a predictable stream of revenues exclusively dedicated to targeted types of infrastructure. This, in turn, allows for better co-ordination between funding and infrastructure maintenance, rehabilitation, and replacement needs, and helps ensure that funds are available when needed.

This best practice focuses on dedicated funding mechanisms for potable water, wastewater, storm water, and road infrastructure. It is intended to provide municipalities with basic information about the various mechanisms and guidance for developing their own methodologies and applications.

Funding mechanisms for each infrastructure type can be categorized into two categories:[1] potable water, wastewater, and storm water infrastructure, and road infrastructure.

POTABLE WATER, WASTEWATER, AND STORM WATER INFRASTRUCTURE

- Utility or full-cost recovery models (base utility billing, a levy on the utility bill and, *for wastewater and storm water only*, a surcharge on the water bill);
- Property tax models (dedicated tax increment or surcharge on property tax bill);
- Fee-for-service models for potable water only (user or access fees, frontage fees, and tapping fees); and
- Other models (local improvement charges, development charges and public–private partnerships).

ROAD INFRASTRUCTURE

- Usage models or road-based utility models (tolls and congestion pricing, and fuel taxes or share of fuel tax revenues);
- Property tax models (dedicated tax increment or surcharge on property taxes and dedicated general tax revenue allocations);
- Other models (local improvement charges and development charges).

[1] The names of instruments used in this document are the most commonly used names found in the literature and related information. However, it should be noted that in some municipalities instruments may have different names. For example, in Saskatchewan the cities act calls the surcharge on property tax a "special tax." In Regina, the term "utility model" is used for a financial planning and forecasting tool for the water, wastewater, and drainage utility. In some municipalities, for example in the Regional Municipality of York, the public–private partnerships are also referred to as "front-end developer contributions."

Utility or *full-cost recovery models*, and *usage models* (for roads), entail charges calculated directly on the basis of intensity of use of the infrastructure by a user, either actual use or approximated use according to some methodology. In *property tax models*, charges are calculated on the basis of property values and, only in aggregate, are directly related to the use of the infrastructure by the municipality. *Fee for service models* entail charges for related services, and *other models* represent a range of various mechanisms for raising funds, typically for specific infrastructure projects.

This best practice guide demonstrates that for water, wastewater, and storm water infrastructure, the mechanisms available make it possible to develop a method of generating funds for current operations, maintenance, and infrastructure extensions, as well as for infrastructure replacement and rehabilitation. Whether the infrastructure is fully funded will depend on the magnitude of fees and charges. However, municipalities interviewed during the process of developing this best practice indicated their infrastructure is in "fairly good condition," and the mechanisms they are using are effective.

For roads, the range of available mechanisms appears to be smaller, particularly for financing current operation and maintenance costs, and replacement of the existing infrastructure. The major difference between roads and the other infrastructure types is that there is no counterpart of *utility models* for roads. Tolls, congestion pricing, and share of gas taxes partially fill this gap. However, tolls may have operational limitations, and a share of fuel taxes requires negotiations with higher-level governments.

Dedicated general tax revenues allocated to roads (and possibly other municipal infrastructure types as well) is a promising mechanism, but requires well-informed and educated city councils committed to ensuring that annual allocations are sustained and adequate to support life-cycle infrastructure needs. Dedicated tax increments or surcharges on property tax or utility bills also offer an excellent opportunity to raise revenues for roads and other infrastructure. However, the number of specific charges that can be used at one time is likely limited to two or three.

Challenges in the implementation and operation of dedicated funding mechanisms include:

- managing public acceptance;
- developing and setting the appropriate rate;
- organizational and management resistance to change;
- resistance on the part of municipal council and representatives of other municipal services;
- residual funding gaps and development of strategies to address them; and
- restrictive legislative frameworks created by other levels of government.

Interviews with municipalities conducted during the process of developing this best practice guide suggested there may be “windows of opportunity” for introducing various funding mechanisms, or times when local circumstances help make the public aware of infrastructure needs and help convince the public and municipal council of the need to introduce new dedicated funding methods. Some mechanisms, such as water utility and development charges, have been used in several municipalities for years. It seems that there is a general public acceptance of the notion that water is not a free resource and water services should have a charge to the user or that development should be financed from development-related sources.

Despite the challenges, the municipalities interviewed indicated their infrastructure is in relatively good condition. The mechanisms employed are effective as well as cost efficient from the operational point of view.

1. GENERAL

1.1 INTRODUCTION

Many municipalities in Canada face increasingly underfunded infrastructure backlogs and gaps, and increasing financial pressures in infrastructure management. These difficulties have resulted from several trends over the last decade, specifically:

- ageing infrastructure facilities that create large needs for capital replacement, renewal, and rehabilitation;
- growth in municipalities putting pressure on existing services and forcing reallocation of funding to new infrastructure (or capacity increases in existing infrastructure) from rehabilitation and other municipal responsibilities, such as the police or fire department;
- environmental and public health issues, which demand new investments for higher service levels;
- delegation of responsibility for some municipal services and infrastructure formerly managed by provincial departments to municipalities without a proportionate increase in funding (or even accompanied by a general reduction in funding);
- the limited ability to raise funds from traditional sources of municipal revenues, such as property taxes, due to public and business resistance to increases in property taxes, new taxes, or tax-like instruments or restrictive legislative environment; and
- resulting competition for resources, tax revenues, and top position on the list of priorities between many infrastructure types and other municipal responsibilities.

Dedicated or earmarked funding methodologies represent an approach to filling infrastructure gaps by helping to better co-ordinate infrastructure maintenance, rehabilitation, and replacement needs with municipal revenues and ensuring that funds are available when needed. Other solutions and strategies include long-term planning of municipal needs, establishing levels of service, or life cycle management. Some of these strategies are topics of other best practices published by the National Guide to Sustainable Municipal Infrastructure (InfraGuide).

This document outlines the state of practice as it relates to dedicated funding mechanisms for potable water, wastewater, storm water and road infrastructure. It is intended to provide municipalities with basic information and guidance for developing their own applications and methodologies of dedicated infrastructure financing.

A survey of Canadian municipalities followed by detailed interviews conducted between January 2004 and March 2004, revealed that many municipalities already use a wide range of dedicated financing instruments. However, these methodologies are not yet widely used.

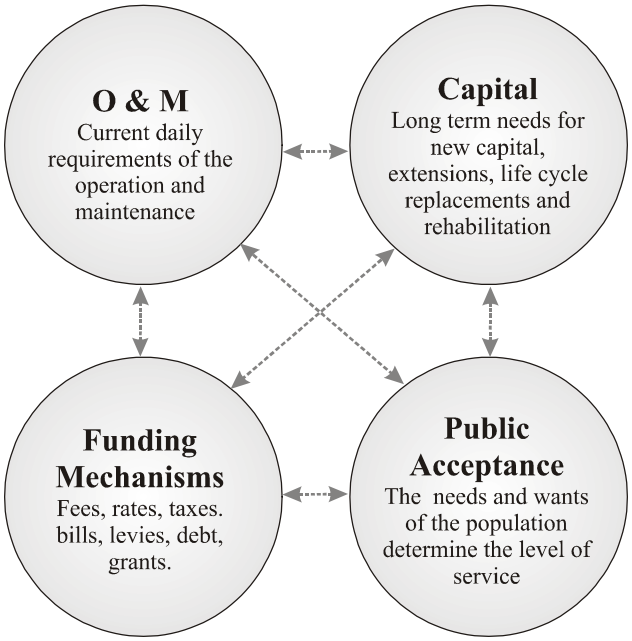
1.2 SCOPE

This best practice provides municipal decision makers with an overview of mechanisms available and successfully used in other municipalities. More detailed investigation and analysis will be required to determine the actual charges or rates corresponding to the individual mechanisms or details of their operation and administration.

The inherent intention of municipalities is to manage their infrastructure such that over the long-term each utility, or type of infrastructure, is a stable and sustainable system. The creative tension enters when ideas such as public good, user-pay, growth-pays-for-growth, minimum level of service, debt limits, reserve targets, etc, affect the management of the system.

Challenges to management involve continually balancing operational and capital needs with available funding and public demands.

Figure 1–1: Municipal Infrastructure: A Dynamic Relationship



If demand and level of service did not vary and if costs were flat over time, then the long range planning of the system would be straightforward. Unfortunately, this is not the case.

The cost of the system varies according to growth and life cycle needs; this results in irregular cash-flow requirements.

In addition to these irregular cash flows, restrictions are frequently placed on the funding mechanisms of rates, fees, debt, reserves, etc. The challenge is to find the right mix of funding mechanisms that result in a stable system, over the long run, which also meets with public acceptance.

1.3 METHODOLOGY

The development of this best practice consisted of the following steps or components:

- a review of related published literature (published documents on municipal finance issues to identify mechanisms of dedicated infrastructure funding used across Canada and internationally);
- additional background research (extensive research to find more information on how the various mechanisms are being used and identify other potential mechanisms);
- a survey on the use of various dedicated funding mechanisms by Canadian municipalities (intended as a screening survey to identify progressive municipalities in the area of practical use of dedicated funding approaches)[2];
- detailed interviews with the most progressive municipalities to find out more details regarding the development and routine operations of various mechanisms; and
- a stakeholder peer review by Working Group members and others.

1.4 GLOSSARY

Life-cycle asset cost — Cost of an asset over its entire life, including construction and installation cost, operation and maintenance, major capital repairs, and eventual replacement with a new infrastructure asset.

Rehabilitation — Upgrading the condition and performance of an asset to levels comparable with newer infrastructure to extend its service life.

Replacement — Replacing an asset that has reached the end of it service life with a new infrastructure asset.

Sustainable Infrastructure — Means that today's decisions on the provision of municipal infrastructure must protect and enhance the quality of life for the near future using measures of economic, environmental and social factors.

[2] The screening survey was distributed to 50 municipalities across Canada. Completed surveys were obtained from 19 municipalities; 12 municipalities were then interviewed in detail with regards to their funding approaches.

2. RATIONALE

2.1 BACKGROUND

Funding mechanisms generally dedicated to a specific infrastructure type or infrastructure project represent an important option through which municipalities can achieve transparent and predictable revenue streams to support financing of specific infrastructure needs. Such funding is, by definition, separated from the general tax revenue and thus helps reduce competition for resources among various municipal services. This, in turn, allows for optimizing infrastructure maintenance and improved long-term infrastructure condition by making the schedule of works contingent on the infrastructure needs rather than current policy priorities.

In addition, there have been growing pressures from higher-order governments to practise asset management techniques and changes in the legislative framework increasing municipal accountability for local infrastructure. For example in Ontario, the *Sustainable Water and Sewage Systems Act* 2002, increases both accountability for providing safe drinking water to residents and municipal responsibility for maintaining and replacing water and sewage infrastructure.. A 2002 report, *Accounting for Infrastructure in the Public Sector*, by the Canadian Institute of Chartered Accountants urges municipalities to establish an accounting system for local municipal infrastructure or develop a framework for financing its operation, maintenance, and replacement to improve the decision-making process and increase its transparency. Internationally, there have been similar trends.[3]

Other benefits of dedicated funding mechanisms include:

- improvement of full cost accounting and consideration of full costs in infrastructure planning;
- equitability or better allocation of costs to those who benefit from using the municipal infrastructure and municipal services;
- improved transparency of municipal financing to the public; and
- improved awareness of municipal infrastructure needs and costs by the public as well as municipal council members.

This best practice outlines a number of instruments and mechanisms that can be developed and implemented by municipalities to establish revenue streams dedicated exclusively to certain municipal infrastructure types and projects.

[3] In the United States, the Governmental Accounting Standards Board published GASB34 in 1999 and expected asset management systems in place for fiscal years ending after June 2002.
In 1992, Australia implemented the Australian Accounting Standard known as AAS 27 *Financial Reporting by Local Governments* (expanded later into AAS 29 and AAS 31), which outlined the framework for an accounting system and financial reporting by government agencies.

Four types of municipal infrastructure are discussed: water, wastewater, storm water, and roads.

For each infrastructure type, this best practice profiles methodologies currently in use in Canada, the United States, and internationally, and gives example applications. An overall assessment of costs, implementation issues, and challenges follows.

3. MECHANISMS FOR FINANCING POTABLE WATER INFRASTRUCTURE

3.1 Available Mechanisms

A wide range of mechanisms could be used to establish a stream of revenues dedicated exclusively to potable water infrastructure and water supply costs. With respect to the basis of charge calculation, they can be categorized into:

- utility or full-cost recovery models (charges calculated directly on the basis of water consumption by a user, either actual use or approximated according to some methodology);
- property tax models (charges calculated on the basis of property values and only in its aggregate directly related to the use of the infrastructure, i.e., water consumption by the municipality);
- fee-for-service models (charges for related services);
- other models (a range of mechanisms for raising funds, typically for specific projects).

1.1.1. UTILITY OR FULL COST RECOVERY MODELS

Base Utility Billing Model

A base utility billing model entails the introduction of a charge and direct billing of water users for water consumption and services. The water bill typically contains a charge directly depending on the amount of water used and a fixed cost charge that does not depend on the amount of water consumption. Some municipalities charge a flat annual rate for water. In this form, the flat rate is, in essence, a user fee. However, unlike property taxes, utility charges are not included in the property taxes and are billed separately from property taxes.

Ideally, the total water bill covers all costs of water delivery, including current operation and maintenance of existing water infrastructure, overhead, administration, and bill collection as well as future capital replacement costs. From the perspective of the environment the total water bill also covers source protection and demand management programs. The entire system is thus managed on a cost-recovery and self-financing basis, and the collected fee revenues are dedicated exclusively to water services. Finally, issues related to fire protection may also be implicated in details of the water bill.

Utility models are primarily intended for financing current operations and life-cycle renewal costs of the existing infrastructure, rather than for funding the construction of new infrastructure or infrastructure extensions. These models could potentially be implemented in both large and small municipalities.

Utility models have a demand management aspect built within them. When users pay for water and the total fee depends on the amount of water used, they have an incentive to economize this resource. This, in turn, can reduce longer-term infrastructure needs and the necessary funding requirements while supporting responsible environmental stewardship.

Levy on Utility Bills

A levy added to the regular utility bill is assessed as a fixed flat amount for all customers or as a percentage of the bill amount. Some municipalities use this mechanism to raise funds for financing rehabilitation, improvements, or expansion of the existing infrastructure serving the area where the customer resides. The levies are collected with the regular utility bill where they appear as a separate item. The levy may have a sunset clause and be cancelled when the project for which funding was collected is completed.

3.1.2 PROPERTY TAX MODELS

Dedicated Tax Increment or Surcharge on Property Tax Bill

This involves a tax levy on property tax bills intended specifically to cover the costs of managing and operating water infrastructure, or the costs of certain infrastructure projects. The levy may be the same for all residents or vary according to some factors, such as type of property. Another possibility is a levy designated for the purpose of fire protection. The levy is collected with regular property taxes and appears as a separate line item on the property tax bill.

If the levy is intended to recover the operating costs of water services, it is set at a rate that would generate sufficient revenues to cover all costs of water delivery, including current operation and maintenance costs of all water infrastructure and future capital replacement costs. Therefore, this type of levy on a property tax bill is similar in its nature to a flat utility charge that does not depend on actual water consumption.

If the levy is intended for a specific infrastructure project, it may be introduced by a voter referendum and have a “sunset clause” whereby the levy is abolished when the project is completed.

3.1.3 FEE-FOR-SERVICE MODELS

Other identified mechanisms that could be potentially used in financing municipal potable water infrastructure include fees for specific services provided by the municipality in connection with the use of the infrastructure. They may have different specific names in the various municipalities but are generally called:

- user or access fees (e.g., a fee for connection or reconnection to the municipal service system, service and repair of the meter);
- frontage fees (a charge for services generating costs that can be assessed on the basis of property frontage or lot size); or

- tapping fees (a specific charge for the installation of a water meter and connection to the municipal water services).

The above mechanisms are typically one-time and lump-sum fees in relation to a specific service to a specific customer. Therefore, they are most suitable for financing the incidental costs of services and repairs to customers.

3.1.4 OTHER MODELS

Local Improvement Charges

With this mechanism, the municipality collects funding or its share of the costs from benefiting property owners for the costs of local infrastructure improvement projects, such as the extension and replacement of water mains or new services to a previously unserviced area. Specific improvement projects may be proposed by the municipality or by the local residents. The details of this mechanism are generally outlined in provincial legislation, and municipal bylaws typically lay out the operational details. Local improvement charges often involve a vote or petition by the residents on the project in question. If the project has the support of the majority of residents, all residents of the area are required to pay for the improvement. The individual charges are often assessed on the basis of property frontage or lot size. The charges can be collected with the property tax bill or through a special assessment notice but, typically, are collected over a period of years with the property tax.

By its design, this mechanism is best suited for small extension, renewal, and rehabilitation projects in residential areas.

Development Charges

These fees are required from new private developers to cover the incremental capital costs of providing the infrastructure to serve the new development. The authority to introduce development charges is generally provided by provincial legislation, and the operational details and schedule of charges are often outlined in a municipal bylaw. The fees are usually collected in one lump sum at the beginning of a project. The amount of charges typically varies by dwelling type and sometimes by location within the municipality reflecting different actual costs of establishing and providing the service. Sometimes, the rates are set at different levels for various locations within the municipality to provide incentives for certain development patterns consistent with land use development policy objectives.

By definition, development charges finance primarily the capital costs of new infrastructure or infrastructure extensions. They do not cover future operation and maintenance costs or future capital replacement requirements of the infrastructure constructed with the funds. The bylaw regulations may specifically restrict the use of funds for such purposes. Moreover, development charges cannot be used to increase the level of service; they are typically based on the historical average level of service.

Public–Private Partnerships

Public–private partnerships involve sharing the construction costs and proprietary benefits and opportunities of municipal infrastructure facilities between the municipality and a private partner. Such arrangements may be used to speed up the development of a certain area.

The benefit of a public-private partnership to a municipality generally lies in the operational savings and cost sharing arrangements which can be induced as a result of the partnership.

For example, the cities of Moncton, New Brunswick and Hamilton, Ontario have both undertaken successful public-private partnerships in the area of water. The city of Hamilton retains a public-private partnership for their water and wastewater treatment facilities.[4] The city of Moncton maintains a public-private partnership in their water treatment facilities for potable water and lists many savings attributed to the partnership on their website.[5]

In a variation of this mechanism, the private partner provides some funding for the public facility and, in exchange, the partner is guaranteed future access to the excess capacity of the particular facility.

By its design, public–private partnerships are most suitable for financing the upfront costs of new infrastructure and infrastructure extensions.

3.2 APPLICATIONS

3.2.1 UTILITY OR FULL COST RECOVERY MODELS

Base Utility Billing

Utility models for potable water services are well established in Canadian municipalities, even in fairly small communities. In the municipalities surveyed, 63 percent reported utility charges for potable water.

Typically, the water bill consists of a flat charge based on the meter size, and a variable amount that depends on the volume of water consumed. Sometimes, there is a minimum charge regardless of water usage. In other instances, the flat rate covers a certain quantity of water and, if the customer exceeds this allowance, a per-unit charge for water consumption is applied. Many municipalities also have a volume-based rate schedule for the variable portion of the water bill. Such schedules apply different unit rates (increasing, or decreasing) for water used falling into different quantity brackets. Municipalities where such systems were implemented include Edmonton (EPCOR), Alberta (fixed service charge plus volumetric charge based on an increasing rate schedule for residential customers and a declining rate schedule for multi-residential,

[4] Http://www.city.hamilton.on.ca/public-works/water/water-wastewater-treatment/default.asp
[5] Http://www.moncton.org/search/english/CITYHALL/water/watertreatment.htm

institutional, commercial, and industrial customers),[6] Chatham-Kent, Ontario (fixed service charge plus volumetric charge based on a declining rate schedule),[7] and the Township of Malahide, Ontario (minimum charge with a water allowance).[8] At the time of writing this document, the fixed service charges for the smallest meter size (5/8 inch) were typically in the range from about $5 to $19 per month, and the variable charges ranged from about $0.30 to $1.10 per cubic metre.

In some municipalities, users are charged a flat rate determined on the basis of various methodologies but not on individual water use. This happens particularly in situations where water meters are not available.

For example, residential customers in Peterborough, Ontario are billed a monthly flat rate that consists of a basic fixed charge, a per room charge, per lot area charge, and a charge for a swimming pool. Metered service is also available for a basic fixed charge and consumption charge with rates used for commercial customers.[9]

Surrey, British Columbia charges a flat rate that depends on the dwelling type. Metered services are also available with the utility charge equal to a fixed base rate and a variable charge that depends on the volume of water used.

In Calgary, Alberta residential flat rates for single-family dwellings are calculated at $3.25 per thousand square feet of actual lot area, plus $10.14 per thousand square feet of gross building area (the sum of the total floor areas of the dwelling unit including basement, main, and upper floors, excluding garage, swimming pool, and greenhouse). Duplexes are charged 50 percent of the single-family dwelling rate, outlined above, as applied to the total property.[10] Metered services are also available and the charge consists of a service charge plus a variable amount.

Levy on Utility Bills

Surcharges on water utility bills are not used very often. Among the municipalities surveyed, 10 percent indicated the use of such mechanisms. However, they are worth mentioning as they may offer municipalities a tool to raise funds for long-term infrastructure improvement projects.

For example, following a cryptosporidium outbreak, Kelowna, British Columbia, imposed a temporary surcharge of $1.32 per month for all residential customers on its water bills for the purpose of enhancing water quality.

6 See the Web site of EPCOR, the company providing water services in Edmonton <http://www.epcor.ca/EPCOR+Companies/EPCOR+Water+Services/Water+Rates/2004+Water+Rates.htm>

7 See the Web site of the municipality of Chatham-Kent <http://www.chatham-kent.ca/English/Community+Services/Living+in+Chatham-Kent/Public+Utilities/Water/Water+Rates.htm>.

8 See the Web site of the Township of Malahide <http://www.township.malahide.on.ca/water.htm>.

9 See Peterborough Utilities Commission, 2004 Water Rates <www.puc.org/files/water/wrates_p.html>.

10 See the Web site of the City of Calgary <http://www.calgary.ca/>. Water rates effective January 1, 2004.

3.2.2 PROPERTY TAX MODELS

Dedicated Tax Increment or Surcharge on Property Taxes
A surcharge on property taxes appears to be less common. Only 16 percent of the municipalities surveyed were using this mechanism.

Kelowna, British Columbia has a parcel tax of $50 per year for all residential customers.

St. John's, Newfoundland and Labrador has a surcharge on the property tax bill for the supply of water to residential properties. The charge is a flat rate in the amount of $280 per year and also covers sewer services, water treatment reserve, and a harbour cleanup program.

Corner Brook, Newfoundland and Labrador also uses a surcharge on the property tax bill to cover the costs of water and sewer services. The charge is calculated using a mill rate plus a flat fixed amount that also includes the sewer service and a water and sewer levy.[11]

3.2.3 FEE-FOR-SERVICE MODELS

Many municipalities use a wide range of fees in connection with water services that generate a cost to the municipality, including meter installation, inspection, repair, connection, disconnection, or transfer of service.

For example, in Edmonton, Alberta the company providing the water services established a schedule of fees for service application, reconnection, remote meter installation, meter reading, and emergency service. Meter tests and repairs are charged at the actual cost of service.

Regina, Saskatchewan has a similar schedule of fees for various services such as connection, reconnection, handling of returned cheques, collection of overdue accounts, replacement of broken seal, meter repair, meter removal, and meter installation and testing.

[11] See the Web site of the City of Corner Brook <http://www.cornerbrook.com/cityhall/po2004taxrates.html>. At the time of writing this document, the water rate amounted to 7.0 mills plus $240. The water and sewer levy amounted to $10 each.

3.2.4 OTHER MODELS

Local Improvement Charges

The interviews with the municipalities and the follow-up research revealed that local improvement charges are relatively well established in Canadian municipalities. Below we give examples of applications.

The District of Saanich, British Columbia has local and specified area charges for local water infrastructure improvements, such as main extensions. The charges cover the costs of the improvements and are paid by property owners whose property directly abuts the street where the work is performed. The municipality may grant partial financial assistance. The improvements may be initiated either by property owners or by the municipality. Initiatives from the property owners must be in the form of a petition signed by at least two thirds of the owners of parcels liable to be charged and having a value of at least 50 percent of the value of all parcels. Initiatives from the municipality are in the form of a recommendation to the Council. Once approved by the Council, the benefiting property owners are advised of the municipal initiative. The initiative is defeated if the majority of owners representing at least 50 percent of the value of the affected parcels petition Council against the initiative.[12]

Regina, Saskatchewan used local improvement charges for cast iron water main replacement. The specific locations for improvement works are selected based on the condition of the existing infrastructure. Residents in the selected area received an information package that contained information about the proposed project and estimated cost. The residents had the option to petition against the proposed work.

Development Charges

Development charges are well established in Canadian municipalities. In those surveyed, 58 percent reported they use development charges in relation to potable water infrastructure.

Some municipalities calculate a specific amount of the development charge for each infrastructure type. Other municipalities charge one flat rate that is collected into a single reserve fund from which funds can then be expended for the eligible infrastructure types and projects. Examples of the former include the Regional Municipality of York, Ontario and Hamilton, Ontario.[13] Examples of the latter include Welland, Ontario[14] and Whitehorse, Yukon).[15] In each case, the charge usually depends on the dwelling type and, sometimes, on the location of the new development within the municipality. The latter differentiation is typically due to differing costs of provision of services to various parts of the municipality.

[12] See the Web site of the District of Saanich <http://www.gov.saanich.bc.ca/business/development/eng/lip.html>.
[13] See pamphlets on development charges published by each municipality: *The Regional Municipality of York. Development Charges Summary*, March 2002 and *The New City of Hamilton Development Charges.*
[14] See the Web site of the City of Welland <www.city.welland.on.ca>.
[15] Interview with the City of Whitehorse, Yukon.

3.3 Summary

Table 3–1 provides a summary of key characteristics for mechanisms for financing potable water infrastructure, the scope of the mechanisms available to municipalities, and a list of municipalities where these mechanisms are being used. Some advantages and disadvantages of these mechanisms are also presented.

Table 3–1: Summary of Mechanisms for Financing Potable Water, Wastewater, and Storm Water Infrastructure

Potable Water Infrastructure				Waste Water Infrastructure			Storm Water Infrastructure		
MECHANISM	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**EXAMPLES CITED**	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**EXAMPLES CITED**	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**EXAMPLES CITED**
Utility Models									
Base Utility Billing	**Advantages** ■ **(A)** Users easily understand ■ **(B)** Can be collected frequently (e.g., monthly); improves municipal cash flow ■ **(C)** Effective in demand management (if based on metered water usage) ■ **(D)** Highly flexible rate structure; easy adaptation to local conditions ■ **(E)** Can be used in both large and small municipalities **Disadvantages/Limitations** ■ **(A)** Based on actual cost of service, O&M and capital; ■ **(B)** May require the development of activity-based costing.	Current O&M, capital replacement	Edmonton, AB Chatham-Kent, ON Malahide, ON Peterborough, ON Calgary, AB **Kelowna,** BC	**Advantages** All advantages except **C**, which reads: "Can be collected with the water bill; cost-effective". **Disadvantages/ Limitations** **A** and **B**, except that B may require the development of unit costs accounting instead of activity-based costing.	Same as Potable Water	Ottawa, ON Windsor, ON Kelowna, BC Surrey, BC Saskatoon, SK Edmonton, AB Chatham-Kent, ON Columbus, OH Huntsville, AL	**Advantages** All advantages except **A** and **C**. In addition, this mechanism can provide incentives for some users to develop their own measures for reducing runoff; some demand management aspects. **Disadvantages/ Limitations** **A** and **B**, except that B may require the development of unit costs accounting	Same as Potable Water	Edmonton, AB Regina, SK Surrey, BC Tampa, FL Columbus, OH Washington, NC Wichita, KS
Surcharge on Water Bills	**Advantages** ■ **(A)** Can be collected with the regular water bill; cost-effective ■ **(B)** Can be introduced with a sunset clause **Disadvantages/Limitations** ■ **(A)** Likely limited to two or three initiatives ■ **(B)** Likely more successful in larger municipalities where cost can be spread over many users	Long-term projects on rehabilitation, improvement, and expansion of existing infrastructure	Same as above	Same as Potable Water	Same as Potable Water	Windsor, ON London, ON	Same as Potable Water	Same as Potable Water	London, ON

Table 3–1: Summary of Mechanisms for Financing Potable Water, Wastewater, and Storm Water Infrastructure (cont'd)

Potable Water Infrastructure				Waste Water Infrastructure			Storm Water Infrastructure		
MECHANISM	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**EXAMPLES CITED**	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**EXAMPLES CITED**	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**EXAMPLES CITED**
Property Tax Models									
Dedicated Tax Increment/ Surcharge on Property Tax Bill	**Advantages** ■ **(A)** Can be collected with property taxes; cost-effective ■ **(B)** Separate item on the property tax bill; high visibility ■ **(C)** Can vary (at least to some extent) according to factors related to user profile; some degree of equitability **Disadvantages/Limitations** ■ **(A)** Much less effective in demand management than utility models (if used as a utility charge) ■ **(B)** Likely limited to two or three initiatives (if used as a special tax) ■ **(C)** Likely more successful in larger and fast-growing municipalities where cost can be spread over many residents	Current O&M, capital replacement Long-term rehabilitation and improvement projects	Kelowna, BC St. John's, NL Corner Brook, NL	**Advantages** Same as Potable Water **Disadvantages/ Limitations** **B** and **C** only**.**	Same as Potable Water	Same as Potable Water	**Advantages** Same as Potable Water **Disadvantages/ Limitations** **B** and **C** only.	Same as Potable Water	Could potentially be implemented but no specific examples were identified
User Fees, Frontage Fees, Tapping Fees	**Advantages** ■ **(A)** Highly flexible structure and coverage ■ **(B)** Can serve as an enforcement mechanism for the utility models (e.g., fee for collection of overdue accounts, or fee for repair of broken meter seal) **Disadvantage/Limitation** ■ **(A)** Establishment of costing of various services	Incidental costs of services and repairs to customers	Edmonton, AB Regina, SK	N/A	N/A	N/A	N/A	N/A	N/A
Development Charges	**Advantages** ■ **(A)** Promotes the principle that costs of growth are paid from growth-related sources; high equitability ■ **(B)** Can vary by profile and location of users or ■ beneficiaries; flexible rate structure **Disadvantages/Limitations** ■ **(A)** Restricted use; cannot be used to increase the level of service ■ **(B)** May have to be based on a long-range capital needs study	Incremental capital costs of new infrastructure or extensions	Regional Municipality of York, ON Hamilton, ON Welland, ON Whitehorse, YT	Same as Potable Water	Same as Potable Water	Same as Potable Water	Same as Potable Water	Same as Potable Water	Same as Potable Water

Potable Water Infrastructure				Waste Water Infrastructure			Storm Water Infrastructure		
MECHANISM	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**MECHANISM**	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**MECHANISM**	**KEY CHARACTERISTICS**	**FINANCING SCOPE**	**MECHANISM**
Property Tax Models (cont'd)									
Public-Private Partnerships	**Advantage** ■ **(A)** Development of key projects may be generally expedited and facilitated through the mitigation of the municipality's financial encumbrance ■ **(B)** From the perspective of the private entity, projects on which subordinate projects are predicated can be expedited ■ **(C)** From the perspective of the public entity, risk can be shared and financing costs can be spread over more time **Disadvantages/Limitations** ■ **(A)** Likely more successful in large municipalities where there are many potential partners with large financial resources ■ **(B)** Difficulty in negotiating a mutually advantageous agreement	Up-front costs of new infrastructure and infrastructure extensions	Moncton, NB	Same as Potable Water	Same as Potable Water	Edmonton, AB Regional Municipality of York, ON	Same as Potable Water	Same as Potable Water	Could potentially be implemented but no specific examples were identified
Other Models									
Local Improvement Charges	**Advantages** ■ **(A)** Can be proposed by both the municipality and residents, and can be rejected by the majority of residents ■ **(B)** Collected separately from taxes and other charges; high visibility ■ **(C)** Promotes residents' awareness of infrastructure needs and costs ■ **(D)** Only users who benefit from the project will pay; high equitability **Disadvantages/Limitations** ■ **(A)** Success of municipal initiatives may depend on the local community profile rather than life-cycle needs of the infrastructure ■ **(B)** Size of prospective projects is likely small ■ **(C)** Can potentially pit neighbour against neighbour	Extension, renewal, and rehabilitation projects in residential areas	Saanich, BC Regina, SK	**Advantages** Same as Potable Water **Disadvantages/ Limitations** **A** and **B** only.	Same as Potable Water	Same as Potable Water	**Advantages** Same as Potable Water **Disadvantages/ Limitations** **A** and **B** only.	Same as Potable Water	Same as Potable Water

4. MECHANISMS FOR FINANCING WASTEWATER INFRASTRUCTURE

4.1 Available Mechanisms

Most mechanisms for funding potable water services discussed in the previous section can also be adopted as dedicated funding mechanisms for wastewater, in particular:

- utility or full-cost recovery models (base utility billing or a surcharge on water bills);
- property tax models (dedicated tax increment or surcharge on property tax bill); and
- other models (local improvements, development charges, and public–private partnerships).

The principles and mechanics of these approaches for wastewater are very similar to the potable water application. Therefore, we refer the reader to the section on potable water for a detailed description of these measures. The next section of example applications shows how these mechanisms are being used in practice and highlights differences as compared to the potable water application.

4.2 Applications

4.2.1 UTILITY OR FULL-COST RECOVERY MODELS

Base Utility Billing

Utility models for wastewater are well established in Canadian municipalities. In the municipalities surveyed, 63 percent reported having utility charges for potable water. Since wastewater is a by-product of the use of water, the two utilities — potable water and wastewater — are related in the sense that the charge for wastewater is based on the usage of water and typically collected with the water bill. In many municipalities, the wastewater charge is calculated as a percentage surcharge on the total water bill. Other municipalities have a rate system similar to that for water with a fixed monthly charge and a volumetric charge for the amount of water used. Some municipalities charge a flat fixed rate that does not depend on the amount of water used.

Several municipalities have also recognized that a utility system based on the amount of water used makes a simplifying assumption that the amount of water used is equal to the amount of water discharged and entering the sewer system. This may not be true in the summer months when large amounts of water are used for outdoor watering, and some municipalities adopt an adjustment or a cap on the wastewater bill in the summer months to avoid overcharging users.

Some municipalities adopted a rate calculated as a percentage of the water bill. For example, in Ottawa, the sewer charge is equal to 166 percent of the total water bill.[16] In Windsor, Ontario the sewer charge is calculated at 140 percent of the water bill.[17] In Sarnia, Ontario the sewer surcharge on the water bill is calculated at 75 percent of the water consumption charge but is not charged on the flat monthly water service charges.[18]

In Kelowna, British Columbia, the sewer utility charge for residential customers consists of a monthly flat user rate and a parcel tax. For commercial customers, the sewer charge consists of a fixed base charge and a variable charge based on the amount of water used.[19] Surrey, British Columbia also has a flat rate that depends on the dwelling type. For metered customers in Surrey, the utility charge is calculated on the basis of the volume of water used, and a unit rate based on 80 percent of the actual water consumption.

In the municipality of Chatham-Kent, Ontario there is a fixed wastewater charge and a volumetric charge based on the amount of water used.[20]

Saskatoon, Saskatchewan has a utility system that consists of a fixed monthly charge and a variable charge based on the amount of wastewater produced. The amount of wastewater is approximated as 86 percent of water consumption.[21]

Brantford, Ontario has wastewater charges based on the amount of water used and a per unit rate. However, during May to September, the amount of water used for the calculation of the sewer bill is capped at 30 cubic metres.[22]

In Nova Scotia water utility assets are depreciated. The depreciation funds can be used to finance asset replacements or for new infrastructure. The Utility model can, along with depreciation, include as an expense Capital out of revenue to finance new or replacement infrastructure.

In Edmonton, Alberta, the sewer fee consists of a fixed charge plus an amount based on the amount of water and a per-unit rate. From April to September, the utility fee is based on the average winter usage plus no more than five additional cubic metres per month, even if the customer uses more water.[23] Edmonton also allows large customers to incur sewer charges for only a percentage of their water consumption if the customer has a water use assessment conducted by an

[16] See the Web site of the City of Ottawa <https://ottawa.ca/en/living-ottawa/water-utility-bills>. [17] See City of Windsor financial information for 2004.

[18] See the Web site of the City of Sarnia, Water Department section <www.city.sarnia.on.ca/visit.asp?sectionid=269>.

[19] See the Web site of the City of Kelowna, untitled information sheet. < http://www.getwatersmart.com/cgi-bin/rates.cgi >

[20] See the city Web site and Utilities and Services section <www.chatham-kent.ca>.

[21] See the Web site of the City of Saskatoon <www.city.saskatoon.sk.ca/or/water_treatment/water_rates.asp>.

[22] See the Web site of the City of Brantford and information on water rates <www.city.brantford.on.ca/environmental/water_rates.htm>.

[23] News release by the City of Edmonton, "Seasonal Sewer Pricing Provides Relief for Outdoor Watering," June 27, 2003.

independent professional engineer. Re-certification of the percentage is required at a minimum of every five years. This has helped commercial enterprises, such as laundries and the bottling industry, which are charged on a more accurate representation of their wastewater flows.

To avoid overcharging residential customers for the wastewater utility when large amounts of water are used for purposes that do not generate wastewater, such as outdoor watering, some municipalities in the United States offer the possibility of installing an auxiliary meter, which measures the use of water that does not enter the sewer system. The customers are not charged the sewer utility fees for this water. Examples of such applications include Columbus, Ohio,[24] and Huntsville, Alabama.[25]

Surcharge on Water Bill

Surcharges on utility bills are used relatively infrequently in Canadian municipalities. In the municipalities surveyed, 10 percent reported they use this mechanism, and another municipality was identified through additional research. However, it is potentially an effective and efficient mechanism for raising funds for long-term infrastructure improvements and thus worth consideration.

For example, in 2003, Windsor, Ontario introduced a special dedicated surcharge on the sewer portion of the water bill to fund the incremental costs and debt charges on the debentures used to finance the expansion of a water reclamation plant. This surcharge is calculated as a percentage of the water bill.[26]

In 1996, London, Ontario added a sewage surcharge to the sewage utility bill to finance the 20-year needs of infrastructure improvements and upgrades to the sewer system. The surcharge is calculated as the approved rate times the quantity of water used. Based on needs identified in a revised 20-year capital plan, the rate was increased by 7.4 percent per year from 2000 to 2004 and will be reviewed for sufficiency in 2005.

4.2.2 PROPERTY TAX MODELS

Surcharges on property taxes appear to be less common. Sixteen percent of the municipalities surveyed were using this mechanism. In these specific instances, the surcharge covered both sewer and water services. The examples of practical applications given in the section on potable water also apply to wastewater.

[24] See the Web site of the City of Columbus and its Division of Sewerage and Drainage <http://utilities.ci.columbus.oh.us/sewers_drains/rates.htm>.
[25] See the Web site of Huntsville Utilities <http://www.hsvutil.org/customer/rulesreg.shtml>.
[26] See City of Windsor financial information for 2004.

4.2.3 OTHER MODELS

Local Improvement Charges

As in the case of potable water services, interviews with municipalities and additional research showed that local improvement charges for the costs of local wastewater infrastructure improvements and upgrades are also relatively well established in Canadian municipalities. Examples of practical applications given in the section on potable water also apply to wastewater.

Development Charges

As in the case of potable water services, development charges for the costs of wastewater infrastructure are also well established in Canadian municipalities. Fifty-eight percent of the municipalities surveyed reported they use development charges in relation to wastewater infrastructure. The examples of practical applications given in the section on potable water also apply to wastewater.

An example of a development charge is a front-ending agreement. Front-ending agreements are agreements between a municipality and owners where owners provide payment to the municipality for the extension of services, such as roads or sewer lines, to their development. This provides a way to broaden a municipality's potential sources of funding.

Public–Private Partnerships

Public–private partnerships are used relatively infrequently in Canadian municipalities. Among the municipalities surveyed, only one indicated the use of such mechanisms, and another municipality was identified through additional research.

The City of Edmonton, Alberta partnered with developers and builders to finance the construction of major sanitary sewers to support a new development. Sharing these costs has reduced the fiscal burden on the City and enabled the development to proceed and be completed earlier than anticipated in municipal development plans.[27]

The Regional Municipality of York, Ontario entered into a partnership with a private developer for an accelerated extension of a sewer line financed partially by an upfront contribution of the private partner.

4.3 Summary

Table 3–1 in Section 3, provides a summary of the key characteristics for the mechanisms for financing wastewater infrastructure, the scope of the

[27] See pamphlet entitled "Edmonton's Infrastructure Strategy Overview." <http://www.gov.edmonton.ab.ca/portal/server.pt/gateway/PTARGS_0_2_272_214_0_43/http%3B/CMSServer/NR/rdonlyres/C57014E8-F31F-48EE-9EA8-F2EDDF2DEE7F/309/Infrastructure081803final1.pdf>

mechanisms available to municipalities, and a list of municipalities where these mechanisms are in use. Some advantages and disadvantages of these mechanisms are also presented.

A utility model can and should have elements of the other models noted such as Fee-for Service, Developers charges.

5. MECHANISMS FOR FINANCING STORM WATER INFRASTRUCTURE

5.1 AVAILABLE MECHANISMS

Historically, storm water management has been financed with revenues from property taxes, or implicitly included in the wastewater rate. However, there are mechanisms that can be used in a dedicated way for storm water management. Most mechanisms for funding potable water and wastewater services discussed in the previous sections can also be adopted for storm water, in particular:

- utility or full-cost recovery models (base utility billing or surcharge on water bill);
- property tax models (dedicated tax increment or surcharge on property tax bill);
- other models (local improvements, development charges, and public–private partnerships).

The principles of these mechanisms for storm water are similar to the potable water and wastewater applications. Therefore, we refer the reader to the section on potable water for a detailed description of the measures. The following example applications show how these mechanisms are used in practice and highlight differences compared to the water and wastewater utilities.

5.2 APPLICATIONS

5.2.1 UTILITY OR FULL-COST RECOVERY MODELS

Base Utility Billing

Utility models for storm water are not as common as for potable water and wastewater in Canadian municipalities However, while only a small number of the municipalities surveyed use a utility model for storm water, it is gaining popularity. One challenge with the storm water utility is the public perception that storm water is the result of rain, a random event, and the difficulty in understanding the needs of storm water management. Another difficulty is related to the use of the service and the fact that the amount of water that runs off a property cannot be easily measured as is the case with potable water and wastewater. However, a number of municipalities in Canada and the United States succeeded in developing an approach to a storm water utility or a user fee system for storm water.

In Tampa, Florida, the utility rate for storm water management is based on the equivalent square feet of impervious area (ESFIA), that is, the median amount of impervious area or the area covered by buildings, driveways, and other hard

surfaces, found on a residential site in the municipality. Single-family home sites are then charged the rate applicable to the ESFIA or a portion of it depending on the size of the footprint of their residence within a range of footprints. Small sites are charged a fraction of the ESFIA, medium sites are charged a rate equal to the ESFIA while large and very large sites are charged a multiple of the ESFIA. In Tampa, each ESFIA represents 3,310 square feet of impervious surface and is charged $12 per year.[28] Similar models have also been established in other US municipalities, including Columbus, Ohio,[29] Washington, North Carolina,[30] and Wichita, Kansas.[31] Residential rates in these cities vary between $17.40 and $48.00 per year and, typically, are based on properties with a smaller impervious surface area.

Regina, Saskatchewan implemented flat storm utility rates for various ranges of property size.

Edmonton, Alberta has a base rate for storm sewer utility, which is the same for all customers. The actual utility fee is calculated by multiplying the base rate by the property area, a coefficient reflecting the intensity of development and a coefficient reflecting the amount of runoff generated by various property types. A typical fee for a single-family home is about $3.75 per month (depending on lot size and land zoning). The new utility charge eliminated a portion of the property tax levy that previously paid for land drainage.[32]

In Surrey, British Columbia the drainage utility is a flat rate, in the amount of $150 per year for most properties in the city.

Surcharge on Water Bills

As with the potable water and wastewater infrastructure, this mechanism is used relatively infrequently, but is worth mentioning as a potential efficient mechanism for raising funds for long-term infrastructure improvement projects.

In 1996, London, Ontario introduced a stormsewer surcharge to finance the 20-year needs for infrastructure improvements and upgrades to the stormsewer system. The surcharge is a fixed flat tax added to each monthly water bill. Based on needs identified in a revised 20-year capital plan, the surcharge was increased by 7.4 percent per year from 2000 to 2004 and will be reviewed for sufficiency in 2005. Industrial customers are assessed the storm sewer improvement tax charges based on property size.

[28] City of Tampa Stormwater Funding Program information brochure, fiscal year 2003-2004.
[29] See the Web site of the City of Columbus and its Division of Sewerage and Drainage <http://utilities.ci.columbus.oh.us/sewers_drains/rates.htm>.
[30] See the Web site of the City of Washington, North Carolina <http://www.ci.washington.nc.us/client_resources/stormwater_resolution.htm>.
[31] Source: Frequently Asked Questions, City of Edmonton.

5.2.2 OTHER MODELS

Local Improvement Charges

As in the case of potable water services, local improvement charges for the costs of local storm water infrastructure improvements and upgrades are also well established in Canadian municipalities. The examples of practical applications given in the section on potable water also apply to storm water.

Development Charges

As in the case of potable water services, development charges for the costs of storm water infrastructure are also well established in Canadian municipalities. Fifty-three percent of Canadian municipalities surveyed reported the use of development charges in relation to storm water infrastructure. The examples of practical applications given in the section on potable water also apply to storm water.

5.3 Summary

Table 3–1 in Section 3 provides a summary of key characteristics for mechanisms for financing storm water infrastructure, the scope of the mechanisms available to municipalities, and a list of municipalities where these mechanisms are being used. As for the other measures, the key characteristics of a measure are grouped into two categories: those that present certain advantages and those that can be seen as having disadvantages or limitations.

6. MECHANISMS FOR FINANCING ROAD INFRASTRUCTURE

6.1 AVAILABLE FRAMEWORK

Roads are traditionally financed from general municipal tax revenue with an annual percentage of revenues directed toward road financing based on an assessment of needs and priorities. Some municipalities started experimenting and introduced dedicated mechanisms that, as in the case of water, wastewater, and storm water infrastructure, allocate funds specifically to roads based on their actual operation costs and capital needs assessment. With respect to the basis of the charge calculation, they can be categorized into one of the following models:

- usage models or road-based utility models;
- property tax models; and
- other models.

Usage models entail charges calculated directly on the basis of intensity of use of the road network by a municipal resident measured according to some methodology. This model can be seen as a counterpart of utility models for the water, wastewater, and storm water infrastructure. In property tax models, charges are calculated on the basis of property values and only in aggregate are directly related to the use of the infrastructure by the municipality. The category of other models represents a range of various mechanisms for raising funds, typically for specific projects.

The following mechanisms are used in the municipalities surveyed and were identified through additional research.

6.1.1 USAGE OR ROAD-BASED UTILITY MODELS

One challenge in the application of a utility model to road infrastructure is the development of an enforceable methodology measuring the intensity of use of the road network by a user. The extent of road network use is reflected by the number of kilometres driven and, possibly, by other factors such as vehicle type (car or truck), time of day of travel (peak hours or off-peak hours), and type of specific road facilities used (residential roads, major arterials, bridges, tunnels, etc.). Two main models have emerged as an application of road-based utility:

- toll models (the use of the road network is measured by the actual crossings of the infrastructure by individual users); and
- fuel tax models (the use of the road infrastructure is proxied by the amount of fuel used or purchased within the municipal area).

Another model that has been proposed in the policy research literature is the distance-based vehicle charge. In its proposed design, this instrument would replace fixed vehicle registration charges and involve a charge that depends on the number of kilometres driven by a vehicle. This model is still mainly a

concept and thus not discussed here in detail.[33] The discussion of tolls and fuel taxes follows below.

Tolls

Tolls are a fee-for-service for using road infrastructure, such as a major road, highway, or bridge. In its essence, tolls are similar to a utility model for water, wastewater and storm water infrastructure although, typically, they are intended for a specific infrastructure project, rather than the entire municipal road network. Ideally, tolls should cover all operations and maintenance costs and life-cycle capital costs of the infrastructure in question, whether it is a bridge or road section. Toll rates often depend on the type of vehicle (cars, trucks, and buses), and sometimes also differ by the time of day. Rate structures based on the type of vehicle reflect the differential wear impact and cost imposed by various vehicle categories on the facility. Tolls on infrastructure, such as bridges and tunnels are typically fixed rates, but on roads they may also depend on the distance driven.

Tolls are often proposed for entirely new infrastructure projects, such as a new bridge or in conjunction with major improvement and rehabilitation projects. In this application, tolls are a means to collect revenues to recover project costs. Thus, tolls are most suitable for infrastructure projects with a large volume of traffic that is relatively insensitive to the amount of the toll.

In its variation as congestion pricing or cordon pricing, tolls are intended primarily as a traffic management tool that reduces the traffic of private vehicles and helps recover costs of the road infrastructure, typically in a downtown core or on major arterial roads.

A certain caveat is required in terms of tolls as dedicated funding mechanisms for financing road infrastructure. While tolls provide a potentially useful source of dedicated funding, it is important to note that current provincial legislative frameworks do not provide municipalities with the required authority to implement them.

Fuel Taxes or Share of Fuel Tax Revenues

As the name of the tax indicates, fuel tax is a charge imposed on motor fuel at the gas station and collected by the fuel dealer. Each purchase of fuel contributes money to the pool of funds intended for road infrastructure. Sharing gas taxes involves a transfer to the municipality of a certain portion of fuel taxes collected by a higher-order government that can be attributable to taxes collected within the municipal area. The transfers may be unconditional or conditional and intended only for specific road infrastructure projects and costs. Ideally, the revenues should cover operation and maintenance, and capital costs of the eligible infrastructure.

[33] Research has identified only Switzerland as an example of practical applications of distance-based charges. The Swiss charge a heavy vehicle fee (HVF) on all trucks above 3.5 tons, both domestic and foreign transiting through Switzerland. The charge is calculated multiplying distance travelled, authorized weight, and the pricing rate. The average pricing rate is about Euro 0.20. For reference see a presentation by Bernhard Oehry at a conference in London, "The Committee of the Regions and European Transport Policy until 2010: Implementing Urban and National Road Charging Policies," March 18, 2004 <http://www.cor.eu.int/en/pres/pres_com01.html>.

6.1.2 PROPERTY TAX MODELS

Tax Increment or Surcharge on Property Taxes

This mechanism involves a tax levy on property tax bills specifically to cover the costs of management and operation of specific road infrastructure. The levy is collected with regular property taxes and appears as a separate line item on the property tax bill.

General Tax Revenue Allocations

Dedicated general tax revenue allocation is a "quasi-dedicated" mechanism that allocates a certain pre-determined percentage of total tax revenues to the specific infrastructure needs, including new infrastructure, current operation and maintenance costs, and capital reserves that would cover infrastructure improvements, rehabilitation, and replacement needs. The allocation is "dedicated" in the sense that the municipality is committed to these allocations and may have a history of making such allocations consistently. However, the breakdown of allocations is not necessarily shown on the property tax bill, and the municipal council retains the right to change or otherwise adjust the allocations.

6.1.3 OTHER MODELS

Local Improvement Charges

As in the case of water infrastructure, a local improvement charge for road infrastructure is a mechanism by which the municipality collects a share of the costs from property owners for local road improvement projects, such as the replacement of sidewalks, curbs, or road upgrading and repair. As for other infrastructure types, specific improvement projects may be proposed by the municipality or by local residents. The mechanics are outlined in a provincial act, and municipal bylaws typically lay out the operational details. Local improvement charges often involve a vote or petition by the residents on the project in question. If the project has the support of the majority of residents, all residents of the area are required to pay for the improvement. The individual rate or charge is often assessed on the basis of property frontage or lot size. The charges can be collected with the property tax bill or through a special assessment notice.

By its design, this mechanism is best suited for residential road, land and sidewalk network renewal and rehabilitation projects. Additionally however, local improvement charges can also implemented in business improvement areas to provide upgraded lighting and streetscapes.

Development Charges

As in the case of the water infrastructure, development charges in relation to road infrastructure are fees required from new private developers to cover the incremental capital costs of construction of roads to the proposed development and installing road infrastructure, such as curbs and sidewalks.

As with water infrastructure, development charges finance primarily the capital costs of entirely new infrastructure or infrastructure extensions. They are not intended for future operation and maintenance costs or future capital replacement costs of the infrastructure constructed with the funds.

Collaborative Partnerships

Collaborative partnerships between different orders of government may provide a way to extend municipal resources through the strategic use of government funding.

6.2 Applications

6.2.1 USAGE MODELS

Tolls and Congestion Pricing

Tolls for a broader municipal infrastructure appear to be a difficult proposal primarily due to public resistance to the idea of introducing pricing for roads that were always free. There may also be some technical problems with monitoring and enforcement, as well as traffic slowdowns when entering the infrastructure, although with current technology developments the latter two factors should not present a significant barrier.

These issues, as well as the lack of general legal authority to impose tolls, are perhaps some of the reasons why tolls are not used frequently in Canadian municipalities on municipal roads and other facilities. None of the municipalities surveyed was using this mechanism, and additional research identified only two examples of toll bridges in Halifax-Dartmouth, Nova Scotia and one in Saint John, New Brunswick.[34] In both cities, the bridges are operated by a bridge authority (the Halifax-Dartmouth Bridge Commission and the Saint John Bridge Authority), which set the toll rate schedules and make other operational decisions.

In Halifax-Dartmouth, the toll on both bridges is $0.75 for passenger cars. For trucks, the toll varies between $1.75 and $5.25, depending on the truck weight. The toll can be paid in cash each time users cross the bridge, or through an electronic pass system called MACPASS. The MACPASS users obtain an electronic transponder and open an account from which funds are deducted each time they cross the bridge. When the account reaches a low balance of one third of monthly payments, the system generates for the user a yellow LOW ACC (low account) light in the toll lanes. The monthly payments can be made on-line, through telephone banking, or by visiting the customer service centre. A pre-

[34] There are several toll bridges on border crossings between Ontario and the United States. Examples include the Ambassador Bridge in Windsor, the Blue Water Bridge in Sarnia, and the Peace Bridge in Fort Erie. The Windsor-Detroit tunnel is also a toll facility providing connection between the two cities. However, these facilities serve a much broader range of users than municipal residents and businesses and thus are not discussed here. Other tolled road facilities in Canada include the Confederation Bridge providing access to Prince Edward Island, Highway 407 north of Toronto, and the Coquihalla Highway, which runs from Hope to Kamloops in British Columbia. Note that as a result of current mitigating provincial legislative frameworks none of the aforementioned examples relate to municipally owned infrastructure.

authorized account replenishment option is also available. The MACPASS users obtain a discount over cash payment as well as enjoy time savings when crossing the bridge.[35]

Tolls on the Saint John Harbour Bridge are $0.25 for passenger vehicles, and $0.35 to $1.75 for buses, vans, and trucks. The toll can be paid with cash at a toll booth or using an electronic pass that works in a similar manner to the one in Halifax.[36]

In the United States, there are several examples of interstate toll roads and tolls, in general, are gaining greater public acceptance as a method of financing road infrastructure, including municipal infrastructure. Examples of municipal applications include bridges and tunnels providing access to Manhattan in New York City, the I-10 Katy Freeway in Houston, and the Dulles Greenway in Virginia providing access from Washington, D.C, to Dulles Airport.

Internationally, there are also several examples of congestion pricing.

In February 2003, London, England implemented a cordon pricing system for its central area. Motorists entering an 20 square kilometers (8 square mile) area of central London between 7:00 a.m. and 6:30 p.m. are required to pay a daily fee of £5. Under the program, single fees can be paid by phone, over the Internet, and at retail outlets and self-service machines. Weekly, monthly, and yearly passes are also available. The system is enforced by a network of cameras in conjunction with a computer system that matches licence plates on the road to those whose fees have been paid. Exemptions and discounts are available to buses, emergency vehicles, and residents within the charging zone. A similar system has been in operation for several years in Singapore.[37]

Oslo, Norway has a cordon pricing toll ring system consisting of 19 toll plazas situated in a three to eight kilometre radius of the Oslo city centre. It is impossible to drive to downtown Oslo without paying a toll. Electronic punch cards and season tickets make it possible to pass into the downtown without a speed reduction. A similar system has also been implemented in Bergen, Norway.

Other European cities are reviewing and evaluating similar proposals, including Bristol, England, and Edinburgh, Scotland, Genoa, Italy, and Gothenburg, Sweden.[38]

[35] See the Web site of the Halifax-Dartmouth Bridge Commission and information about the MACPASS <http://www.hdbc.ns.ca/news.asp?id=19&searchwords=macpass> .

[36] See the Web site of the Saint John Bridge Authority, information about toll schedules and Bridge Pass <http://www.saintjohnharbourbridge.com/News.html> and <http://www.saintjohnharbourbridge.com/Pass.html>.

[37] Singapore was perhaps the first city to introduce congestion pricing in 1975. Initially, it was a paper licence system that required manual monitoring and enforcement; it was later replaced by an electronic system.

[38] For reference and details see the Web site of PROGRESS, a demonstration project on road user pricing sponsored by the European Commission <http://www.progress-project.org/>.

Other variations on congestion pricing models exist. Lane rentals consist of municipalities charging a fee to private owners who need part of the roadway closed; usually for development/construction purposes. This ensures that some of the extra wear and tear, which alternative roadways will face due to increased use, will be accounted for. Pavement degradation fees (see DMIP 05) are fees charged to an agency which cuts the pavement, in addition to any repair costs charged to the agency. The fee is meant to account for the reduced life of the pavement infrastructure which occurs as a result of the excavation process.

Fuel Taxes or Share of Fuel Tax Revenues

Canadian municipalities do not have the authority to impose local fuel taxes. Any direct benefit of the fuel tax collections within the municipality has to come through a refund transfer from the provincial or federal governments, which collect these taxes. There is no legal obligation on the part of higher-order governments to share the fuel tax revenues with municipal governments, and only a few municipalities have been successful in negotiating an agreement.

Edmonton and Calgary, Alberta have negotiated a fuel tax sharing agreement with the provincial government and receive a rebate of a portion of fuel taxes collected within their municipal areas. These fuel tax revenue shares replaced previous per-capita grants. For both cities, the rebate amounts to $0.05 per litre of gasoline sold within their municipal areas. The rebate can be used only for specific projects, primarily for capital projects on major arterial roads.

Surrey, British Columbia has access to a share of fuel taxes through grants from the Greater Vancouver Transportation Authority (GVTA). Funding from the GVTA is dedicated for major roads that form a part of the regional transportation network. The GVTA gives a set amount based on lane-kilometres of roads and a share of fuel tax sold within the municipality.[39] More specifically, the funding amounts to $0.06 per litre of gasoline sold and $12,000 per lane-kilometre of eligible roads.

In the United States, local fuel taxes are allowed under state legislation in some states.[40] The legislation regulates the details of implementation and use of raised funds. Typically, the revenues are collected by the state and then redistributed back to local governments.

[39] The Greater Vancouver Transportation Authority (GVTA) was created in response to challenges in transportation management, including downloading of some responsibilities by the province on the local municipalities, by an agreement between the Province of British Columbia and the Greater Vancouver Regional District (GVRD). A share of fuel taxes for fuel sold within the GVRD became one of the sources of funding for the GVTA.

[40] The states where local option fuel taxes are allowed include Alabama, California, Florida, Hawaii, Illinois, Missouri, Montana, Nevada, Oregon, and South Carolina. For reference, see a publication providing the overview of state and local gasoline taxes compiled by the Office of Legislative Research <http://www.le.state.ut.us/interim/2003/pdf/00001275.pdf >.

6.2.2 PROPERTY TAX MODELS

Surcharge on Property Taxes

Tax surcharges on property taxes for the purpose of road financing are very infrequent in Canadian municipalities. Only one of the municipalities surveyed, Regina, Saskatchewan reported using this mechanism. In Regina's case, it is used for the maintenance of all gravel and paved back alleys. Each year, the city reconstructs and does maintenance work on a priority basis by assessing the condition of all alleys.

Dedicated General Tax Revenue Allocation

Kelowna, British Columbia has established a capital replacement reserve fund specifically dedicated for the renewal of the road network. The reserve is populated on the basis of a 10-year capital plan that identified all capital component funding needs. Each year, a specific percentage of tax revenues is allocated to the fund. The allocations do not appear as a separate line item on property tax bills but are published in the municipal budget documents. Council retains the right to change the allocations every year.

The Greater Vancouver Transportation Authority (GVTA), British Columbia has recently approved a pre-set budget allocation for roads and transit. The allocation is based on the mill rate in relation to the assessed property values in the area.

6.2.3 OTHER MODELS

Local Improvement Charges

As in the case of water, wastewater and storm water infrastructure, interviews with municipalities and follow-up research revealed that local improvement charges for the road network are relatively well established in Canadian municipalities. A few examples follow.

The District of Saanich, British Columbia has local improvement and specified area improvement charges for local improvements such as roads, sidewalks, curb and gutter, and street lighting. The principles and implementation procedures are the same as for potable water, as outlined above.

Whitehorse, Yukon has a local improvement bylaw that gives the city the authority to carry out improvements to local residential streets and impose charges on the residents who benefit from the improvements. When a project involving a local improvement is approved in the capital plan, all affected property owners are advised of the proposed project and its estimated cost to them. If more than 50 percent of the property owners object, the project is halted. The cost to property owners is assessed on the basis of frontage or lot size of the property. Typically, the residents pay 33 to 55 percent of total assessed costs of the improvement, and the rest is covered from the general tax revenue. The improvement projects are proposed both by the city on the basis of assessment of

local needs as well as by a petition from the residents of the area where the improvement would be implemented.

Regina, Saskatchewan has local improvement charges for work and services, such as sidewalk and gutter installation or replacement, road or alley paving, and alley lighting. The paved and gravel alley levy is assessed on all properties abutting an alley where work is done, and the funds are used to carry out a 30 to 40 year replacement cycle for the alleys. The specific locations for improvement works are selected based on the condition of the existing infrastructure and on petitions from property owners requesting work to be done. Residents in the selected area receive an information package that contains information about the proposed projects and estimated cost. The residents have the option to petition against the proposed work.

Development Charges

As in the case of potable water, wastewater, and storm water services, development charges for the cost of construction of roads and road infrastructure are well established in Canadian municipalities. Fifty-eight percent of Canadian municipalities surveyed reported the use of development charges in relation to roads. Examples of practical applications given in the section on potable water also apply to the road network.

6.3 Summary

Table 6–1 provides a summary of key characteristics and the scope of the mechanisms available to municipalities, and a list of municipalities where these mechanisms are being used. As for the other measures, the key characteristics of a measure are grouped into two categories: those that present certain advantages and those that can be seen as having disadvantages or limitations.

Table 6–1: Summary of Mechanisms for Financing Road Infrastructure

Mechanism	Key characteristics: advantages and disadvantages	Financing scope	Examples Cited
Usage Models or Road Based Utility Models			
Tolls and congestion pricing	**Advantages** ■ Reduce traffic; demand management aspects ■ Only drivers who use the tolled facility pay for it; equitable in relation to use ■ Highly flexible as to the rate structure; ease of adaptation to local conditions **Disadvantages/Limitations** ■ Likely more successful in large municipalities and on infrastructure with large volumes of traffic ■ More feasible for selected infrastructure facilities rather than for the entire road network ■ May require application of sophisticated technologies to monitor and enforce the system; high implementation costs	Current O&M, capital replacement	Halifax-Dartmouth, NS Saint-John, NB New York City, NY Houston, Texas Washington, D.C. London, England Oslo, Norway Bergen, Norway
Share of fuel taxes	**Advantage** ■ Directly related to the intensity of infrastructure use in a municipality **Disadvantages/Limitations** ■ Requires negotiation effort with provincial governments ■ Depends on the volume of traffic; some uncertainty as to the future stream of this revenue	O&M, rehabilitation, improvement, and expansion of existing infrastructure	Edmonton, AB Calgary, AB
Property Tax Models			
Surcharge on property tax bill	**Advantages** ■ Can be collected with property taxes; cost effective ■ Separate item on the property tax bill; high visibility ■ Can vary (at least to some extent) according to factors related to user profile; some degree of equitability **Disadvantages/Limitations** ■ Likely limited to two or three initiatives (if used as a special tax) ■ Likely more successful in larger and fast-growing municipalities where cost can be spread over a large number of residents	Rehabilitation and improvement projects	Regina, SK
General tax revenue allocations	**Advantages** ■ Allocation of a predetermined percentage of tax revenues to roads ■ Municipal council retains the right to change allocations ■ Many competing priorities exist from which municipal councils must choose to support. Roads may not incur proportional funding via general tax revenue because more short tern or more visible priorities may gain leverage.	Current O&M Capital replacement costs Infrastructure extensions	Kelowna, BC Surrey (GVTA), BC
Other Models			
Local improvement charges	**Advantages** ■ Can be proposed by both the municipality and residents, and can be rejected by a majority of residents ■ Collected separately from taxes and other charges; high visibility ■ Promotes awareness of residents of infrastructure needs and costs ■ Only users who benefit from the project will pay; high equitability **Disadvantages/Limitations** ■ Success of municipal initiatives may depend on the local community profile rather than life-cycle needs of infrastructure ■ Size of prospective projects is likely small	Extension, renewal, and rehabilitation projects in residential areas	Saanich, BC Regina, SK Whitehorse, YK
Development charges	**Advantages** ■ Promotes the principle that costs of growth are paid from growth-related sources ■ Can vary by profile and location of users or beneficiaries; flexibility as to the rate structure **Disadvantages/Limitations** ■ Restricted as to the exact use; cannot be used to increase the level of service ■ May have to be based on a long-range capital needs study	Incremental capital costs of new infrastructure or extensions	

7. ASSESSMENT

7.1 Overall Cost and Effectiveness

The costs of developing and operating the dedicated funding mechanisms outlined above may include items such as:

- upfront costs of background studies to determine funding needs and necessary revenues;
- periodic reviews of capital needs studies and rates;
- public consultations to increase acceptance of the proposed measures;
- staff and other costs of billing of utilities, collection and tracking of fees, taxes and other charges; and
- negotiation and lobbying with higher levels of government.

However, all municipalities interviewed stated that these costs are relatively small, although the impact of potential resource relocation should be recognized. The administration and operation costs are well below five percent of total program costs. These costs are included in the various charges and taxes, so there is no net cost item to the municipalities. Many of the cost items and steps required to develop and implement the mechanisms, such as long range infrastructure studies and capital plans identifying infrastructure needs, would have to be done by municipalities even if the mechanisms in question were not in place. Thus, the incremental cost attributable to the dedicated funding mechanisms is minimal.

Therefore, the costs of the mechanisms discussed in this document, although very likely not negligible in the initial phase of development and implementation, should not present a barrier to the implementation of the various dedicated funding options.

Municipalities interviewed also indicated that, in general, the mechanisms they use are effective as dedicated funding systems will often provide predictable and targeted streams of revenue, which in turn provide many benefits in coordinating infrastructure maintenance and funding. The infrastructure for which they are intended can be maintained more easily and backlogs can be addressed. Given this, the long-term benefits to this approach warrant the potential challenges municipalities may face in implementing dedicated funding systems in the short term.

7.2 Limitations

This best practice demonstrates there are well-established methodologies for funding water, wastewater, and storm water infrastructure. The wide range of instruments available makes it possible to develop a financial approach providing funds for current operations and maintenance, infrastructure extensions, and infrastructure replacement and rehabilitation. Whether or not the infrastructure is

fully funded will depend on the magnitude of fees and charges. As mentioned earlier, municipalities interviewed indicated their infrastructure is in fairly good condition.

On the other hand, for roads, the range of available mechanisms appears to be smaller, particularly for financing current operation and maintenance costs, and replacement of the existing infrastructure. The major difference between roads and the other infrastructure types is that there is no counterpart of utility models for roads. This situation is directly related to the divergent provincial legislative frameworks that exist between water and wastewater and roads. In essence the relatively permissive legislative framework afforded municipalities in terms of water and wastewater is not available to municipalities in terms of roads. Thus while tolls and congestion pricing have the potential to partially fill this gap by providing a mechanisms for key infrastructure facilities, municipalities are inhibited by a lack of legal authority to do so.

Fuel taxes, on the other hand, have the obvious limitation in that Canadian municipalities do not have the legal authority to impose local fuel taxes, and any share of taxes collected by the provincial and federal governments have to be negotiated. To date, only Calgary, Edmonton, Montréal (through the l'Agence Métropolitaine de Transport), Victoria, and Vancouver (through the Greater Vancouver Transportation Authority) have been able to negotiate a sharing agreement whereby the provincial government transfers a certain percentage of fuel taxes collected within their municipal areas.

Dedicating general tax revenues to roads (and other infrastructure) may be a promising mechanism, but it requires well-informed decisions that understand prudent financial management principles and life-cycle infrastructure needs. Developing this understanding or conveying the messages about infrastructure needs is not an easy task. Several municipalities interviewed indicated that roads are seen by the council — as well as the public — as being, in general, in good condition and thus are not a high priority, even if there is a backlog of unsatisfied capital needs.

Dedicated tax increment or surcharges on the property tax bill or on utility bills also offer some excellent opportunities to raise revenues for roads and other infrastructure. However, the number of specific charges that can be used at one time is likely limited to two or three. The public may strongly oppose the use of several surcharges at the same time, even if they are intended for pressing infrastructure needs.

7.3 CHALLENGES

One challenge in the implementation and operation of dedicated funding mechanisms is the management of public acceptance. Municipalities interviewed use several strategies, including:

- public consultations and information sessions on proposed new mechanisms or rate adjustments;
- workshops, surveys, and focus groups to identify most acceptable mechanisms and options;
- demonstration of serving community interests; and
- demonstration of equity in the sense that those using the service the most and benefiting the most from the infrastructure pay the most.

Other challenges that were identified through the interviews and research include:

- developing and setting the appropriate rate or charge;
- organizational and management resistance to change;
- resistance on the part of municipal council and representatives of other municipal services; and
- residual funding gaps and development of strategies to address them.
- Municipal asset depreciation (CICA) (see pg.6).

Several municipalities have been operating a water utility for many years, and it seems that there is, in general, public acceptance of the notion that water is not a free resource. Thus, the introduction of a water utility and charges for water consumption should not present substantial challenges.

The Regional Municipality of York promotes the idea “Growth Pays for Growth” and recovers the majority of infrastructure expansion costs related to growth from development charges. This principle is, in general, well received, and the municipality is able to collect sufficient funding for growing roads, water, and sewer infrastructure needs.

Interviews with municipalities also suggested that there may be “windows of opportunity” for the introduction of dedicated infrastructure funding mechanisms, or times when local circumstances make dedicated mechanisms more acceptable to the public and councillors.

For example, Surrey, British Columbia introduced its storm water utility after a few years of bad weather with large amounts of rain and visible problems with drainage and flooding. Public opinion studies following the problems revealed then that many residents would be prepared to pay something to upgrade the

infrastructure and avoid the problems in the future. Saskatoon, Saskatchewan, had adequate funding for local infrastructure in the form of provincial grants until the early 1980s. But when funding was terminated, the city had to look for alternatives to cover the costs of infrastructure gaps and address complaints of residents regarding growing service problems. The measures applied were, in general, well received as a means to fix the problem.

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