

# Infrastructure Master Plan



**Department of Infrastructure Services  
And Community Sustainability  
Planning and Growth Management Branch  
Infrastructure Planning  
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## Prologue

The 2003 Infrastructure Master Plan was the first infrastructure planning document in the new City. The document has supported the Official Plan by providing the strategic directions and policy for infrastructure planning, as well as the major capital projects for the planning horizon of the Official Plan. This 2009 Update serves the same function for the Official Plan.

As the first infrastructure planning document in the new City, the Infrastructure Master Plan has attempted to build on the opportunities provided by amalgamation by presenting an integrated approach to growth planning. The strategic directions and policies in the plan pursue two distinct integrating opportunities:

- Integration of planning of water, wastewater and stormwater infrastructure; and
- Integration of growth planning with rehabilitation planning.

Through the inter-departmental consultation in the development of the Infrastructure Master Plan, significant support has developed for moving towards an even closer integration between growth planning and rehabilitation planning than with the 2003 document. As the owner, planner and operator of all infrastructure in the City, there should be a seamless process between growth planning and rehabilitation planning. As well, planning, engineering and operational initiatives should all be considered in developing solutions to the City's infrastructure challenges, whether they are new challenges resulting from growth or on-going challenges resulting from the ownership and operation of major servicing infrastructure.

Over time, the Infrastructure Master Plan will become part of the City's evolving coordinated Infrastructure Management Support System. An early step will be to consider and incorporate the City's policies related to management of existing infrastructure, followed by the development of a seamless integration of growth, rehabilitation and operational policy. A further step in this evolution will be to fully integrate the tools available for financing infrastructure with the priority and decision making related to infrastructure planning and management. Another step will be to bring full understanding of the relationship between environmental/climatic factors and infrastructure into the priority and cost decision-making processes.

Continued development of the Infrastructure Management Support System will occur over time. The intent stated here demonstrates to the residents of the City that the most effective infrastructure planning and management mechanisms will be developed, implemented, and monitored as servicing conditions change in Ottawa.



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## Section 1 – From Vision to Action

### 1.0 Introduction

The City of Ottawa is responsible for the provision of infrastructure services to a population of about 870,000 living in a large geographic area situated beside the Ottawa River and bisected by the Rideau River. Always the country's symbolic focal point, the amalgamated City is now among the country's most geographically extensive and populous urban areas. Over the next 22 years, the City's population will push past the one million mark. This level of growth will open new opportunities for the City and its residents, but will also bring enormous change and new challenges.

In 2003, the City produced an Official Plan and supporting Infrastructure and Transportation Master Plans. The 2009 Official Plan and the 2009 Infrastructure Master Plan do not change the fundamentals of the 2003 exercise. The 2009 Official Plan continues to provide a vision of the future of the city and a policy framework to guide the city's physical development to the year 2031. The Official Plan provides the basis for the planning and approval of infrastructure services to be carried out by the City in support of future growth. This 2009 Infrastructure Master Plan delivers the fundamental information needed to ensure infrastructure services – the major public water, wastewater and stormwater expansion projects and the City's role in protecting the natural resource base which supports private wells and septic systems – are provided through the planning period.

The 2009 Official Plan continues to recognize the important growth management role played by public and private investment in existing infrastructure. Maximization of the use of existing public infrastructure and ensuring the continued operation of private infrastructure will play an important role in sustaining growth. The 2009 Master Plan continues to provide general direction related to the City's intensification objectives. In a similar manner, the Master Plan Update also continues to describe how the City will provide services to assist rural residents in the ownership and operation of their private infrastructure.

The Infrastructure Master Plan provides strategic directions and an integrated infrastructure planning and policy framework that will direct the City's continuing efforts to maximize value, including the role infrastructure plays in protecting the natural environment. The intent is that it will play an active role by presenting priority short and medium term infrastructure opportunities considered to effect the greatest increases in the value of the services provided.

## 1.1 Scope of the 2009 Infrastructure Master Plan

The scope of the 2003 Infrastructure Master Plan changed from previous Master Plans. The 2003 Infrastructure Master Plan focused primarily on the many aspects common to the planning of all infrastructure systems (i.e. City priority setting related to all infrastructure spending; demand-side management to support cost-effective growth and maximization of use of existing infrastructure; asset management to ensure long term economic sustainability; and integrated consideration of the natural environment which supports both rural and urban infrastructure). Presenting an Infrastructure Master Plan which focused on integrating the common aspects of infrastructure was considered to be the best approach to ensure the integrity of planning for sustainable and affordable infrastructure to support the City's growth to 2021.

The 2009 Infrastructure Master Plan maintains the direction and intent of the 2003 Infrastructure Master Plan but with a longer time horizon and it provides more detailed policy direction in a few key areas:

- **Supporting Intensification through Capacity Management Strategies for piped infrastructure:** With the focus of the Official Plan on intensification targets, the Infrastructure Master Plan sets out the policy context in which infrastructure servicing for intensification will be provided. This addresses: capacity management issues, types of projects, education, funding and monitoring. Specific works to meet intensification targets will be undertaken within this framework.
- **Groundwater Resources:** Council adopted a Groundwater Management Strategy in May 2003 and the Infrastructure Master Plan incorporates changes into the Plan to provide more appropriate policy direction as a result of this and recent Provincial legislation and regulations such as the *Clean Water Act*, the *Safe Drinking Water Act*, the *Planning Act* and the Provincial Policy Statement.
- **Stormwater Management Policies:** Council adopted Stormwater Management Policies in September 2007 and these policies are incorporated into the Infrastructure Master Plan.
- **Annex 1, Major water, wastewater and stormwater projects for the period 2009 to 2031 – Annex 1** updates the project list that was included with the 2003 Infrastructure Master Plan and provides more detailed information on the individual capital works that are listed.

## 1.2 Structure of the Infrastructure Master Plan

The Infrastructure Master Plan is structured as follows:

- Section 1 provides an introduction to the Infrastructure Master Plan and the City's five Growth Management Plans and seven Growth Management Principles.

- Section 2 introduces three clear strategic directions that will guide long term infrastructure planning and decision making. The Section provides a proposed infrastructure planning process which helps to focus all infrastructure planning and decision making towards affordable and sustainable infrastructure systems. The Section also includes the required capital projects to support growth in Greenfield areas.

Subsequent sections expand on the strategic directions outlined in Section 2 by providing a detailed discussion of the policy issues, statements of policy and policy implementation recommendations.

- Section 3 – Understanding Growth Impacts
- Section 4 – Cost and Value
- Section 5 – Integrate Infrastructure Planning
- Section 6 – Capacity Management Strategy for Intensification

The final section – Section 7 – provides a brief summary of existing infrastructure systems and some of the major growth planning challenges for each of those systems.

### **1.3 Preparation of the Infrastructure Master Plan**

The 2009 Infrastructure Master Plan has been prepared within the broader context of the Official Plan, a planning process that will prepare the City to better manage the growth and change that it will experience to 2031.

The 2009 Infrastructure Master Plan incorporates a number of key elements:

- Consideration of the City’s population and land use growth expectations along with infrastructure planning opportunities and efficiencies – resulting in the preparation of technical “demand” projections;
- Preparation of capital project requirements to support infrastructure systems expansion required for population and land use growth;
- Consideration of those aspects of major system capital project requirements which are directed to the use of existing infrastructure to support intensification;
- Consideration of alternative infrastructure solutions to support development in rural areas;
- Reviewing and revising the infrastructure policy components in the Official Plan.

With the above and in partnership with the Official Plan, the strategic directions, policy framework and priority implementation initiatives of the 2009 Infrastructure Master Plan were developed and the Plan is being prepared for public consultation and submission to Committee and Council.

The 2009 Infrastructure Master Plan basically continues the same path as the 2003 Master Plan but updates its discussion, policies and list of major projects as a result of more current information and action.

## **1.4 Ottawa's Growth Management Plans**

As part of the 2003 Official Plan exercise, the City prepared five growth management plans. Taken together, the five growth management plans provide long-term strategic direction and form a comprehensive blueprint for the future of Ottawa and its communities. The development of each growth management plan has been associated with a consultation process, during which public comments were gathered as a basis for refining the plan.

The five City growth management plans are the:

**Official Plan** – Focuses on the land use, community design, transportation, transit and infrastructure policies necessary to direct the physical development of the city.

**Human Services Plan** – Focuses on the provision of community services, such as health, recreation, social services, arts and culture, libraries, housing and emergency protection

**Arts and Heritage Plan** – Champions culture and creativity. Identifies new initiatives and actions in areas such as access to cultural opportunities, public art, heritage preservation, cultural facilities development, and tourism.

**Economic Strategy** – Includes plans for key Ottawa business markets: the export sector, the local market and the rural sector.

**Environmental Strategy** – Directs environmental policy for the City.

## **1.5 The Guiding Principles**

In the spring of 2002, Ottawa conducted a series of public consultations designed to help establish the principles that would guide the City's growth. The "Charting a Course" consultations produced seven guiding principles that were endorsed by City Council in June 2002. The 2003 Infrastructure Master Plan was prepared in consideration of all of the growth management principles; however, two of the principles apply most directly to infrastructure planning in the city:

**“A Green and Environmentally Sensitive City”:** Some aspects of infrastructure planning can help to mitigate the impacts of population and land use on the natural environment.

**“A Responsible and Responsive City”:** Infrastructure planning ensures that the most efficient use is made of existing and proposed infrastructure.

The principles continue to guide the 2009 Infrastructure Master Plan.

In 2007, Council adopted a City Strategic Plan. In the City Strategic Plan: Term of Council: 2007 – 2010, Post-budget Version. Five of the City objectives contained in the Plan also guide the 2009 Infrastructure Master Plan.

#### **Infrastructure Renewal Priority**

**Objective 5:** Close the gap on sanitary and storm sewer and water line replacement by 2015.

#### **Planning and Growth Management Priority**

**Objective 2:** Respect the existing urban fabric, neighbourhood form and the limits of existing hard services, so that new growth is integrated seamlessly with established communities.

**Objective 3:** Encourage the development of existing employment lands to promote job creation and minimize infrastructure costs.

**Objective 4:** Ensure that the City infrastructure required for new growth is built or improved as needed to serve the growth.

#### **Sustainable Finances Priority**

**Objective 1:** Fund infrastructure renewal, including closing the gap in affordable and appropriate housing supply, in tax (through combination of capital levy, PAYGO and debt) and rate supported funding streams in 2008 budget.

## **1.6 Implementation of the Infrastructure Master Plan**

The strategic directions and policies in the 2009 Infrastructure Master Plan have been formulated to provide City staff and Council with direction when making decisions. The implementation initiatives presented are considered to be consistent with the strategic directions and policies; however action on implementation will only be achieved through Council authority and direction. Examples include Council approved:

- Planning studies such as alternative servicing scenarios and major system planning initiatives for water, wastewater, stormwater and groundwater, Environmental Assessment studies, and rural servicing;
- Operational studies that monitor system performance and efficiencies, such as flow monitoring for growth;
- Engineering studies dealing with system definition, inventory, modelling and rehabilitation such as capacity management studies;
- Major facility planning, engineering and operations initiatives for Lemieux and Britannia Water Purification Plants, City owned public water supply wells, the Robert O. Pickard Environmental Centre and stormwater management facilities;
- Asset management strategies which ensure adequate reinvestment in existing infrastructure, maintain levels of service and ensure sustainability;
- Creation and maintenance of design guidelines and engineering and construction standards;
- Innovation studies on new technologies and service delivery methods;
- Environmental assessments for capital projects that are required to receive Provincial and/or Federal consent.

Some of the assumptions underlying the strategies, policies and proposed implementation initiatives expressed in the 2003 Infrastructure Master Plan have changed over the planning horizon, now extended to 2031. In particular, in 2003, it was expected that Provincial legislation governing the municipal role of planning and delivery of infrastructure services might significantly alter the way the City plans its infrastructure. The 2009 Infrastructure Master Plan reflects these changes and will, itself, be reviewed on a regular basis in conjunction with the Official Plan review, and other significant impacts such as Federal or Provincial legislative changes and major City initiatives and documents. Finally, implementing this Plan will require the co-operation of a wide variety of actors outside the municipal administration. To that end:

- The City must partner with the Federal and Provincial governments and other municipalities on issues such as the health of the Ottawa River.
- The City must work with the Provincial government on issues such as implementation of the *Clean Water Act* and the *Safe Drinking Water Act*.



- A partnership with the Province of Quebec and Source Water Protection partners is important to understanding and protecting the Ottawa River as an important environmental and infrastructure asset to the municipalities along it.
- Work with the Conservation Authorities to develop Source Water Protection Plans by 2013.
- The private sector plays an important role in planning for and delivering new infrastructure to the City – today the private sector assists in delivering the majority of the City’s annual capital spending budget.
- Individuals and the choices they make can play an important role in the success of infrastructure planning in the city – individuals provide the value base on which infrastructure planning decisions are founded - from support of public water supply as a primary means of public health protection to placing value on the role of stormwater management in protecting the environmental integrity of our streams and rivers.

Each of these groups has resources to contribute to the infrastructure planning process. The City will make the best use of this network of resources by seeking out new partnership and innovative approaches to achieving the initiatives presented in the 2009 Infrastructure Master Plan. In addition, the City has plans to initiate an Infrastructure Management Support System that will enable staff and the public to easily access studies, data, guidelines and other information to support its decision-making processes.

## Section 2 – Strategic Direction

### 2.0 Introduction

Infrastructure plays an important, though sometimes unrecognized, role in supporting the high quality of life we enjoy in Ottawa. Each morning, urban and rural residents turn on their tap and some may take for granted the clean and plentiful supply of water and the safe and efficient means for disposal of wastewater available to them. The reliability with which the City provides infrastructure services is a testament to those who have planned and delivered those services over the years. The cost of those services, when compared to the benefits they provide, offer a very high value to the residents and businesses in the city.

The high-level of reliability of the City’s infrastructure services may also be an “Achilles’ heel” to gaining the required public support for infrastructure planning for growth and the on-going requirements to maintain assets. However, failures in our infrastructure systems, however infrequent, provide us with reminders of the importance of infrastructure in our daily personal and business lives and on their importance in protecting the quality of our environment.

The City must pursue strategic directions, which will ensure a continued high level of service and reliability, all in a cost effective and sustainable manner. With the City committed to good infrastructure planning, the residents of Ottawa will continue to turn on their tap in the morning and perhaps consider, if only briefly, the value of the services provided.

### 2.1 Setting the Stage

Ottawa has a history of engineering excellence. In an age when transportation projects were the major expression of society’s growth, Colonel John By’s construction of the Rideau Canal (1826 to 1832) and opening of the Alexandra Bridge in 1901 were some of the most significant engineering achievements of their time. This same record of excellence is seen throughout Ottawa’s public infrastructure history, right up to today and includes many notable achievements:

- Constructed in 1874, Ottawa’s original water supply system was located in the Fleet Street pumping station. This station used the hydraulic energy of the Ottawa River’s Chaudiere Falls to pump untreated river water into a distribution system. Remarkably, the station remains in operation today providing re-pumping of purified water as well as generating electricity.

- In 1969, the Region of Ottawa-Carleton became the first regional level government in the Province, assuming all water works and those trunk sewerage works and waste water control facilities considered regional in scope. The “Master Plan of Water Works and Waste Water Control” prepared at the time was based on population projections from a level of 450,000 in 1969 to 635,000 predicted in 1990 and 1,000,000 at some point between 2006 and 2031. At the time, only 60,000 people lived beyond the Greenbelt.
- In the late 1970s, the University of Ottawa led the world in pioneering academic research into the use of computers in stormwater management. Ottawa continues to benefit by having a unique level of expertise locally and evidence of excellence in award winning stormwater management projects such as the Clarke Bellinger Facility.
- In 1993, the City implemented an innovative strategy to provide the rural area of Carlsbad Springs with a safe water supply. The small diameter trickle feed system provided a cost effective means to deliver water and resulted in a partnership between the City and residents in providing a service that meets the needs of all involved.
- Today, the City is developing a real time control system that will regulate a number of collectors and help to manage sewage system flows to keep it in compliance with Ministry of Environment procedure F5-5 for Combined Sewer Overflows. The City is also working on a number of water quality initiatives for the Ottawa River.

Through the late 1980s and early 1990s, the City undertook some of the most significant initiatives in the planning of the City’s infrastructure in over 25 years. The 1989 Infrastructure Management Strategy (former City of Ottawa) and the 1997 Water and Wastewater Master Plans (former Region of Ottawa-Carleton) provided clear definitions of the challenges facing public infrastructure systems in Ottawa, and proposed very aggressive measures to address those challenges. The South Urban Community and East Urban Community plans (former Nepean, Gloucester and Cumberland) provided integrated transportation, water, wastewater and stormwater servicing plans to support the rapid growth in these areas. Significant commitment and public investment followed all of these planning initiatives and went a long way towards either moving forward on, or directly addressing, some of the major public infrastructure challenges in the city.

Through this same time period, the City became increasingly aware of its obligations to support the safety and sustainability of rural private infrastructure. Adoption of municipal responsibility for septic system approvals, studies of aquifer vulnerability and investigations of the condition of private services in Villages are examples of the City’s commitment to understanding and balancing rural settlement, public health and environment issues surrounding the use of wells and septic systems.

There will always be challenges in the planning of public infrastructure and the City will respond to those challenges with a level of excellence equal to the examples of the past. Aging infrastructure in the core and throughout the city represents a liability, which must be planned for. As the population at the perimeters of the developed area grows, extending sufficient services across the Greenbelt will result in new challenges. Planning for sustainable well and septic systems in support of the expected growth in the rural areas will be a challenge. Protecting the infrastructure base provided by the natural environment will be a challenge. And of course, provision of services at the highest possible value will always be a challenge.

## **2.2 Moving Forward – Strategic Directions**

“The more things change, the more they remain the same.” This is certainly true of infrastructure planning. The challenges brought about by the integration of public infrastructure systems with the creation of the Region of Ottawa-Carleton in 1969 are similar to some of the challenges we face today as a result of amalgamation. The pressures of providing infrastructure to service the growing population between 1956 and 1966 were, on a percentage growth basis, greater than we face today.

That having been said, master planning for infrastructure does change. In North America since the 1950s, many infrastructure master plans have focused unquestionably on the needed enlargement and expansion of piped infrastructure to support urban growth. Also typical, master plans have dealt primarily with the individual engineering performance and direct capital cost of either water or sanitary and storm systems. Through the 1970s and 1980s, computers changed the way master plans were prepared. At the same time master plans began to include recognition of the need for reinvestment in aging systems and the requirement to address more effectively the impacts on the environment. More recently, new ways of communicating and doing business, further increases in environmental expectations, fiscal constraints and many other factors have again pointed to the need for a new model for infrastructure planning.

The 2003 Infrastructure Master Plan outlined a new model for infrastructure planning in the City. In this new model, there was a shift away from a focus on the technical issues of infrastructure systems towards the broader planning and management issues important to long term sustainability and common to all infrastructure (e.g. cost of infrastructure and value of infrastructure). In keeping with this approach, the 2003 Infrastructure Master Plan recognized that infrastructure assets include not only “pipes”, but also the natural, fiscal and people assets important to the success and sustainability of infrastructure services. The 2003 Infrastructure Master Plan achieved this new model for planning by pursuing three strategic directions:

**Strategic Direction – Understand Growth Impacts on Infrastructure**

- The City will predict and monitor the impacts of population and employment growth on infrastructure in order to ensure that infrastructure and services are delivered on time to support orderly growth.
- The City will adopt a strong demand management approach to address the impacts of growth and in order to maximize the use and efficiency of both infrastructure and natural resources.
- The City will investigate all methods to provide service, address challenges and increase value, including continuing to incorporate innovation into the planning and delivery of services.

**Strategic Direction – Cost and Value**

- The City will determine the costs and value of infrastructure services required to support existing land uses and growth and ensure that mechanisms are in place to equitably assess costs and value and in particular recover the direct financial costs of growth infrastructure.
- The City will clearly define the social and environmental value along with the economic value of public services.
- The City will consider opportunities for the role of private enterprise in providing value to its customers.

**Strategic Direction – Integrate Infrastructure Planning**

- The City will recognize the important links between infrastructure and the environment by bringing public water, wastewater and stormwater planning as well as the City's role supporting private infrastructure services into one Infrastructure Master Plan.
- The City will integrate the assessment of needs and priorities in order to ensure that infrastructure planning – and spending – is directed towards achieving the priorities of the City.
- The City will understand the role and value of effective communication in infrastructure planning including obtaining the best value from the experience of municipal employees, our relationship with external agencies and the expectations of our customers and the citizens of Ottawa.

As noted earlier, Ottawa has a strong history of excellence in infrastructure planning. That history has included all of the objectives detailed in the three strategic directions above. The 2003 Infrastructure Master Plan incorporated these long-standing objectives into a new model for planning in order to meet the

challenges of sustainability, affordability and growth, for today and tomorrow. The 2009 Infrastructure Master Plan does not change this basic model.

### **2.3 Goal Setting Terminology**

The terminology and format used in the Infrastructure Master Plan is important to understanding how the full process of translation of the City's corporate strategic directions into action plans is achieved.

**The goal of the City** – “sustainable development and accommodation of growth and change without undermining the environmental or social systems on which we depend” was established through the Ottawa 20/20 process.

**Principles and Objectives:** Seven guiding principles were developed in response to the goal (see Section 1.5). Each of these includes objectives – the aims or ambitions for the future to be considered as the City responds to issues.

**Strategic Directions:** The Infrastructure Master Plan presents three strategic directions – the ways in which we will move forward towards meeting the principles and objectives. There are a number of ways in which strategic directions can be implemented:

- **Policy:** Policy is one means of implementing strategic directions. A policy is a definite course or method of action, chosen from among the range of possible alternatives. Taken together, policies represent a set of coherent actions whose long-term purpose is achievement of the principles and objectives. A policy must be such that it can be implemented by the City.
- **Policy Implementation Recommendations:** Policy can be implemented in many ways, through many avenues and in a timely fashion. The policy implementation recommendations provided are considered to be comprehensive and are intended to be implemented over time.
- **Public Service Areas:** The application of service areas, similar to the application of designations in land use planning, is another means of implementing the strategic directions. Service areas have unique terms related to the provision of infrastructure.
- **Actions of Council:** Priority setting and Council's approval of expenditures are important factors in implementing strategic directions.

## 2.4 The Infrastructure Planning Process

\$1.58 billion in spending over the next 10 years has been identified as required for water and wastewater capital projects in the 2007 Long Range Financial Plan III, 79% of which is required for system rehabilitation and upgrades of existing systems; 3% to meet regulatory requirements; 17% to fund new infrastructure projects for growth and strategic initiatives. This represents over 25% of all Capital spending by the City.

The identification, planning, scoping, prioritization, coordination, scheduling, funding and construction of capital infrastructure projects is one of the most complicated processes in which the City is involved. Today, the technical specialists who guide parts or all of this process are required to be generalists needing to be knowledgeable in the subjects ranging from ecology to economy to sociology, from water and wastewater engineering to urban design and regional planning, from governing legislation to how to effectively involve the public. Moreover, all of this knowledge must be integrated in problem solving.

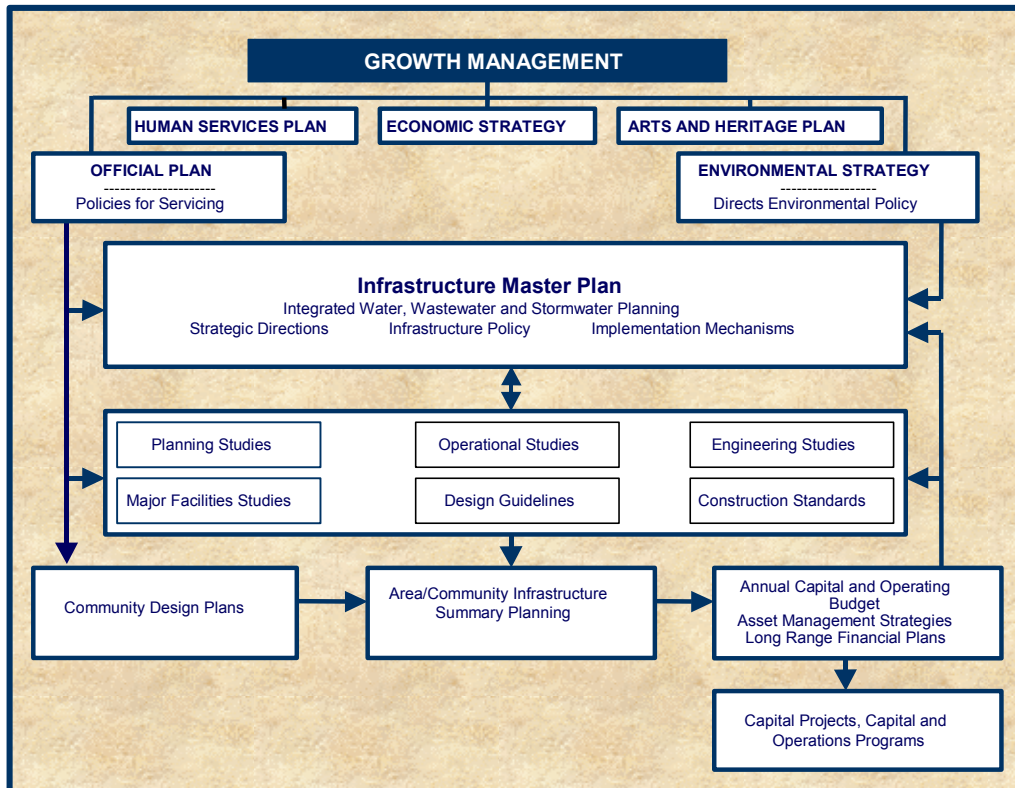
A well-defined infrastructure planning process is key to achieving successful implementation of an Infrastructure Master Plan and maximizing the benefit of expenditures on capital infrastructure projects. Infrastructure planning is an on-going and complex process requiring the coordination and efforts of a wide range of specialists. Figure 2.1 presents a schematic of an integrated infrastructure planning process. The integration of planning for water, wastewater and stormwater systems and recognizing the role of planning, engineering and operations in the success of infrastructure services is represented in the schematic.

In the planning process schematic, the City's 20/20 initiatives and growth planning principles are recognized as providing guidance and input. The final outcome or *product* of the process is the projected project and program requirements. What falls between input and final outcome is an integrating process representing the present status of all planning, engineering and operations experience and including environmental protection and fiscal issues. The City will take every opportunity provided by on-going planning improvements and efficiencies to improve the product – the nature, timing and costs of major capital project requirements.

Area infrastructure plans will consider capital project requirements to support growth and rehabilitation projects required to maintain and upgrade existing systems at a community level. Area infrastructure plans will identify opportunities to improve the cost effectiveness of capital works programs and the timing and phasing requirements of growth and rehabilitation projects. Area infrastructure plans will generally be completed in conjunction with, or preceding, community design plans and may be completed in conjunction with development or redevelopment of broader/secondary plan areas.

The City has adopted an infrastructure planning process schematic as a model to guide the planning of all infrastructure services.

**Figure 2.1 Infrastructure Planning Process**



## 2.5 Capital Projects Lists – Water, Wastewater and Stormwater

As the population of Ottawa continues to increase, capacity must be confirmed in existing infrastructure and new facilities, transmission mains and trunk sewers must be added. The Infrastructure Master Plan addresses the addition of major infrastructure elements of water, wastewater, and stormwater systems in order to ensure that the long range planning requirements for delivery of services are met.

The preparation of the major capital project requirements to support growth relied on the completion of a number of city-wide studies and area infrastructure plans and a review and update of the 2003 Infrastructure Master Plan. The review incorporated the new growth projections for the city and focused on new infrastructure required in the near term (2009-2019) as well as requirements to accommodate long-term growth (2020-2031).

The capital project lists presented in the Infrastructure Master Plan are not intended to represent City budget planning or long range financial planning. The projects identified are derived from a high level technical assessment of need based on projected population and employment growth. Once identified,



more detailed studies of planning, engineering and operational issues related to alternatives to provide services, manage capital resources and undertake design and construction, continue to be undertaken in order to confirm budget and long range financial planning. As a result of more detailed studies, as well as changing predictions of near term and long-term population and employment growth patterns, and financial analysis such as the 2009 Development Charges Background Study, the timing and scope of projects presented in the Master Plan may change.

### **.2.5.1 Major Water and Wastewater Capital Projects**

Figures 1 and 2, attached as annexes, provide a schematic representation of existing water and wastewater systems in the city. Stormwater systems are planned on a sub-watershed area basis. Figure 3 outlines sub-watershed areas of the city.

Figures 4 and 5 provide a schematic representation of the major growth-related capital projects that are anticipated during the 2009 to 2019 period. Annex 1, Table A1.1, list the City's priority water and wastewater projects based on reliability requirements, projected growth, and maintenance of existing levels of service.

It is expected that additional growth-related projects may be identified during the completion of area infrastructure plans, which support community design plans and development-related studies. These may affect the priority of projects in the list.

Figures 6 and 7 and Table A1.2 in Annex 1 present the major water and wastewater growth-related capital project lists for the period 2020-2031.

The long-term project lists identify priority projects that are anticipated to be required to provide water and wastewater services based on projected growth for this time period and continued maintenance of existing levels of service.

The projects included in Annex 1 will primarily be funded through development charges although projects for which there is a large reliability or rehabilitation component will be funded primarily through water rates and other sources of funding and only secondarily through development charges. This apportioning of costs will be determined through the Development Charges Review process.

The list of growth-related projects is derived from high-level technical analysis of infrastructure systems. From the lists, along with additional technical analysis, long range financial planning and budget planning is derived. The projects and capital requirements in the list may not match information provided in other City budget and capital planning documents.

The Infrastructure Master Plan identifies the need to implement detailed flow and physical condition monitoring programs. The benefit of undertaking more detailed monitoring programs, particularly in areas inside the Greenbelt, where intensification is anticipated, and the oldest infrastructure systems are located, will facilitate maximization of the use of available infrastructure system capacity and deferring to the extent possible, costly capital projects. As a result, some of the costs associated with a number of the growth-related capital projects may be able to be deferred, or capital resources can be directed to other priorities.

### **2.5.2 Stormwater System Planning and Major Stormwater Capital Projects**

The consideration of stormwater systems in an Infrastructure Master Plan is a new City initiative. As discussed in Section 7.4, master planning of stormwater system capital projects is fundamentally different from the planning of system-type water and wastewater projects. Stormwater infrastructure systems are designed on a more local basis and are a hybrid of engineered systems (pipes and stormwater management facilities) and natural systems (constructed wetlands, rivers and creeks). Planning of stormwater systems is to be on a subwatershed basis and additional capital projects will be identified based on subwatershed planning and local area development plans. Table A1.3 provides a preliminary list of the major stormwater growth-related capital projects anticipated during the 2009 to 2031 period.

## Section 3 – Understanding Growth Impact on Infrastructure

### 3.0 Introduction

Understanding how growth impacts infrastructure planning is one of the strategic directions in the Infrastructure Master Plan. For instance, plans for more intense development may allow delivery of services at less unit cost and at the same time put new pressures on rehabilitation needs. Also, denser rural development places stress on the natural resource base which supports private services; however, the densities required to make public services affordable are not characterized as “rural”. Another important issue in infrastructure planning is maintaining sufficient flexibility and responding efficiently when there are changes to the growth expectations upon which planning has been based.

- **Predict and Monitor:** The City will predict and monitor population and employment growth and distribution in order to ensure that infrastructure and services are delivered on time to support growth.
- **Demand Planning:** The City will adopt a strong demand management approach to its infrastructure planning in order to optimize the use and efficiency of our existing and future infrastructure and natural resources.
- **Innovation:** The City will continue to seek and implement innovative practices that improve service delivery, address challenges and increase the value of services provided.

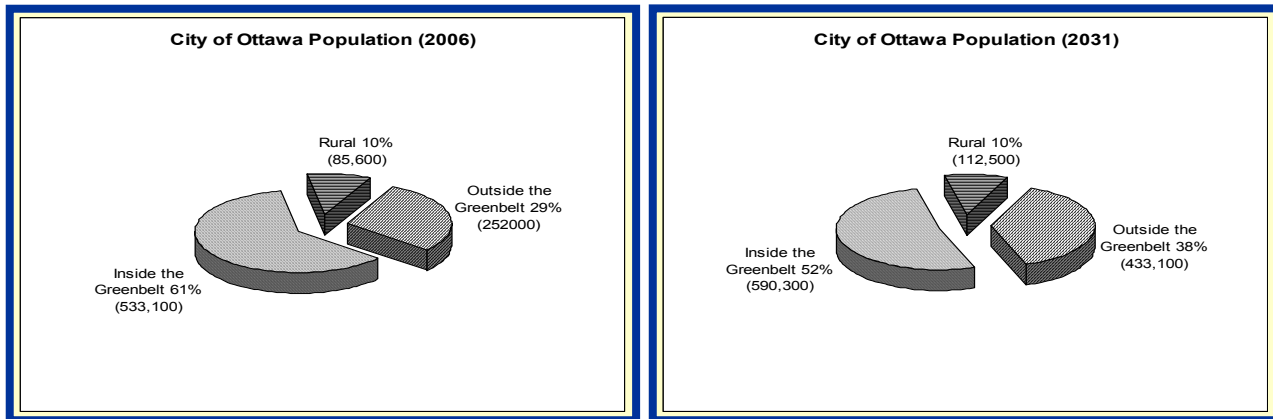
### 3.1 Population Growth

In planning for growth, one thing is certain – the population and employment base in Ottawa will grow. Where, how fast and how dense are issues which are less certain, and are some of the important topics dealt with in the Official Plan .

While raw estimates of population and employment growth are very important, more detailed considerations result in more effective infrastructure planning. For instance, are the plans for where, how fast and how dense being realized? Are water and wastewater use patterns changing as the population ages – or can use pattern changes be initiated as an infrastructure planning tool? How will land be used to support growth, and therefore how will it be serviced, in particular in the rural villages and general rural areas? Will more intense development require changes to the City’s stormwater management planning practices? These are some of the issues that will be considered by the City as it moves forward to address the challenges of infrastructure planning.

In the period 2006 to 2031, the population of Ottawa is expected to grow by 265,000 people, or 30% of the 2006 population. Figure 3.1 and 3.2 present the population growth expectations that have been used in the development of the Infrastructure Master Plan.

**Figure 3.1 Total Population Growth Expectations**



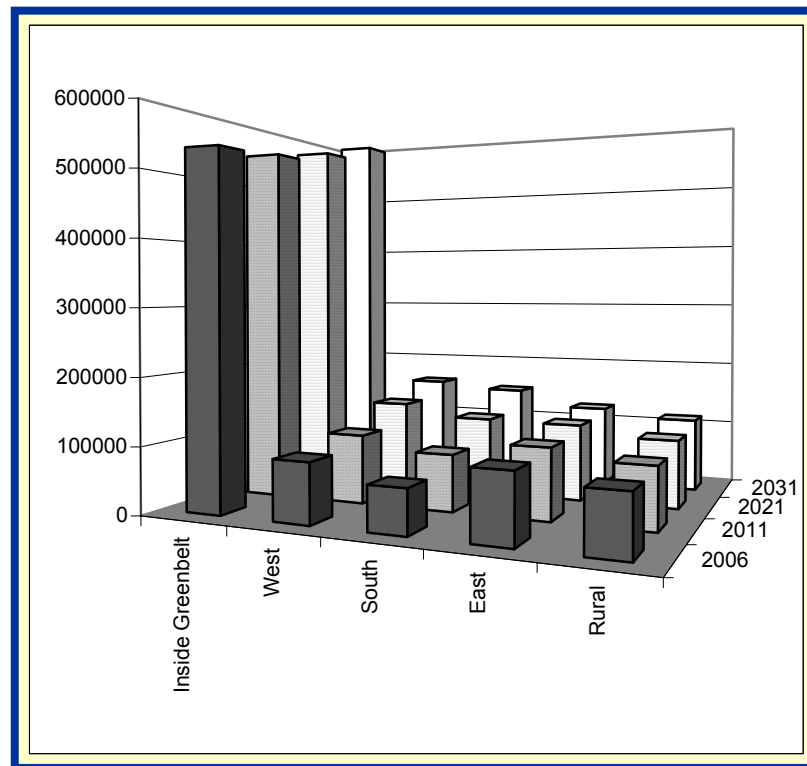
Source:: City of Ottawa population estimates, 2006 - 2031

A detailed assessment of the characteristics of population growth from a number of perspectives is required to effectively and efficiently provide water, wastewater and stormwater services at the level of service expected by the City's residents. The policies in this Plan have been formulated to address the characteristics of population growth which may impact infrastructure planning, including:

- **Spatial growth characteristics** – Where, and by how much current populations are projected to increase, and either requires extension of services (within designated serviced areas) or a study of the private service resource base?
- **Timing and rate of growth** – When will the increased demands from growth begin affecting present levels of service to warrant major facility upgrades or result in concerns for the sustainability of the private service resource base?
- **Changes in settlement characteristics** – How will the Official Plan emphasis of increased density and intensification within the Greenbelt, including targets, affect infrastructure requirements in built areas of the city?
- **Changes in employment characteristics** – How will the Mixed Use policies of the Official Plan and projected employment characteristics affect demand patterns within the urban boundary?

**Growth in the rural area** – What impact will growth in the rural area have on the need for the creation of new public service areas?

**Figure 3.2 – Area Population Growth Expectations, City of Ottawa, 2006 -2031**



Source: City of Ottawa population estimates, 2006 - 2031

### 3.2 Supply and Demand Management

Supply and demand management are two tools that City uses to help minimize the cost of growth.

Historically, **supply management** meant expanding water and wastewater system to meet growing demand. However, as financial and environmental resources have become increasingly limited, supply management has become more sophisticated, and now also comprises programs to improve **system efficiency** and thereby minimize the need for physical expansion. This includes programs such as the Leak Detection Program, which focuses on the early identification and repair of leaks in the City’s water supply.

**Demand management** is both an old and new concept. Early settlers often limited water use because they had to pump and carry it by hand. In modern times, demand management refers to promoting or regulating

**efficient behaviors** to reduce per capita consumption and thereby extend the useful life of existing infrastructure and minimize the size of new infrastructure. Demand management ensures that the expansion of new infrastructure can occur at a slower rate than population growth. An example of demand management is the City's outdoor water efficiency campaign or the Provincial *Plumbing Code* requirement for installation of low-flow toilets.

### **3.2.1 Supply Management**

Supply management will continue to be the basis upon which a major portion of growth planning is completed. Extension of infrastructure systems and major facilities expansions are planned as part of overall system management.

### **3.2.2 Demand Management and Choices**

Demand management initiatives offer opportunities to minimize the cost of new infrastructure and optimize the value of existing infrastructure. Much of that opportunity may rest with the residents, businesses and institutions of the city, whose choices dictate which demand management initiatives are successful. For example:

- Those on private wells can carefully control water consumption to ensure sustainability of well water supplies, and reduce the volume of wastewater returned to the ground.
- Those on the City's central water supply can change outdoor water use habits to reduce peak demands on the water supply system and thereby reduce the need to oversize infrastructure.
- Roof drainage on existing or new buildings can be directed to soft landscaped surfaces to promote groundwater.

The City must also make choices in order to realize the long-range benefits of demand management. A commitment now to infrastructure system planning practices, which reduce demand, will facilitate timely and orderly growth servicing and control the costs of providing new infrastructure. Examples of choices the City can make include:

- Provide public education programs to explain, promote and demonstrate the value of demand management initiatives and in particular those initiatives which require the participation of residents;
- Investigate and analyse the impacts of land development on groundwater resources to ensure that rural development is sustainable;
- Promote land development practices which reduce urban stormwater runoff;

- Make a commitment to the necessary level of monitoring so that the value of the City's initiatives can be confirmed.

### 3.2.3 Demand Management and the Environment

Successful demand management can reduce the impacts of land use and infrastructure on the environment and help to preserve natural resources. The City's overall commitment to environmental management is outlined in the Environmental Strategy. Further comment is also provided in Section 5.5.

### 3.2.4 Peak Demand and Total Demand Management

Demand management initiatives can be separated into two categories – peak demand management and total demand management.

All infrastructure systems have peak demand characteristics (i.e. when a large portion of the city does the same thing at the same time, such as wake up and take a shower). Infrastructure is designed to deliver an adequate level of service during peak demands. Clearly, by encouraging reductions in peak demand, the City can reduce the size and cost of infrastructure and service delivery. In this Infrastructure Master Plan, peak demand management is seen to have a strong and immediate link to the City's infrastructure needs to address growth in the most cost effective manner possible.

Total demand management differs from peak demand management, although the two are closely related. Total demand management can play an important long-term role in the overall sustainability of infrastructure and the natural environment. Conservation of water from private and public systems, reduction of the volume of planned wastewater discharges and promotion of infiltration of stormwater all help to preserve the natural functions that support infrastructure.

### 3.2.5 Infrastructure System Examples

Peak demand and total demand management principles are applicable to water, wastewater and stormwater systems. Each of these is discussed below.

#### Water Demand and Supply Management

Total water demand management and system supply management have been given a high priority by Federal and Provincial governments, resulting in significant changes to building codes and regulations. "Conservation" of water has also had a very high public profile. In Ottawa, total water production from the City's two central water treatment facilities has remained level over the past 10 years – a characteristic

which in part is considered to be the result of both regulatory changes and personal choices regarding water use.

There are many initiatives the City can undertake to encourage or achieve total water demand reduction. Leak detection and repair, wise use of water, rain barrel programs and promotion of xeriscape landscaping have all played a role in the City's past. The goals and objectives of such initiatives, total expected water savings, total expected infrastructure cost savings, cost to implement programs and permanence of water savings are all factors which must be considered in determining the initiatives the City should undertake to plan for a goal of per capita water demand reductions.

While total water demand is important to an overall City strategy of sustainability, only leak detection and repair is seen as having a reliably quantifiable benefit towards cost effective growth management in the near term. The role, cost and benefit of other total water demand measures, while important to overall sustainability, must be quantified and then analyzed before those measures can be included as known cost effective means to support growth planning.

It has long been recognized in Ottawa and elsewhere that peak demands on the water supply system occur as a result of summer outdoor water use – primarily lawn watering in the early evening. Also that the magnitude of those peaks is such that the opportunity for peak demand reduction from many other demand management measures may be insignificant in comparison. As the main cause of peak demands is well known, the most effective means to control those peaks is equally easily identifiable – control of outdoor water use. Controls on outdoor water use can be undertaken with various degrees of goals and objectives, ranging from public education to regulated bans on watering.

The full cost and value of outdoor water use controls and all other demand **management** initiatives must be fully understood, the benefit quantified and customers and the public informed for such measures to be accepted and become effective. A demand **management** initiative which specifically targets outdoor water use has previously been identified as the most effective means to achieve meaningful demand reduction and realize possible benefits of reduced or deferred infrastructure costs and increased reliability of service levels.

### **Wastewater Demand and System Supply Management**

Wastewater systems are designed to carry flows from three sources – domestic flow, drainage flow (e.g. foundations drains) and extraneous flow (e.g. groundwater leakage into collection systems). Total and peak demand **management and system supply management** for each of these can be addressed in different ways. An important consideration in wastewater management is that reductions in demand at one location have a benefit which is transmitted all the way downstream through the system.



Many initiatives in domestic water supply management result in wastewater demand **management**. For instance, reduction of domestic water use reduces the volume of wastewater directed to septic systems and public systems. At the same time, reductions in outdoor water use have little benefit to wastewater **system management**.

Drainage flows are accounted for in the design of wastewater systems. Reduction in drainage flows as a wastewater demand management initiative is achieved primarily through capital works to provide an alternate location for drainage flows – typically “disconnect” of foundation drains from wastewater systems to stormwater systems or in some cases dedicated foundation drainage systems. Detection of plumbing code violations, such as sump pumps directed to the wastewater system is another example of an effective demand management and system efficiency initiative for wastewater systems.

As with water peak demand **management**, the primary causes of wastewater system peak demands are well-known – extraneous flow during periods of wet weather. As the cause of peak demands is well known, again the most effective means to control those peaks is equally easily identifiable – control of the amount of extraneous flow in wastewater systems.

The mechanisms by which the City can reduce extraneous flows are well known, and there have been significant efforts, prioritized on a cost effective basis, to locate and remediate extraneous flow sources in the existing systems. These efforts will continue.

Equally, the City will undertake to limit and prevent extraneous flows through control of construction and approval practices and City design practices, all playing a role in long-term planning and sustainable growth. It is considered more cost effective to undertake to limit and prevent extraneous flows in new systems than to remediate excess extraneous flows in the future.

Peak demands on the wastewater systems occur as a result of drainage flows and extraneous flows in the system during wet weather events. The magnitude of the peaks during wet weather events indicates that the primary opportunity for peak demand reduction is through the control of drainage flows and extraneous flows.

The full cost and value of drainage flow and extraneous flow reductions and all other initiatives must be fully understood, the benefit quantified and customers and the public informed regarding the costs and benefits of City initiatives. A wet weather strategy focused on extraneous flow removal from existing systems and control of future extraneous flows has previously been identified as the most effective means to achieve meaningful demand reduction and realize possible benefits of reduced or deferred infrastructure costs and increased reliability of service levels.

### **3.2.6 Demand and Supply Management Policies**

**The City will:**

**For Private Services:**

1. Participate with area Conservation Authorities in drought forecasting for owners of private services.
2. Promote understanding of the role of demand management, proper operations and maintenance and environmental sustainability in the ownership of private services.

**For Water and Wastewater systems:**

1. Undertake or permit acceptable, beneficial and cost effective total demand management initiatives to reduce total demand in public systems.
2. Undertake or permit acceptable, beneficial and cost effective peak demand management initiatives to reduce total demand.

In order to achieve these policies, the City will over time:

**For private services:**

- Regularly advertise drought conditions as forecast by the Conservation Authority.
- Continue to provide well and septic ownership information through workshops.
- Undertake wide distribution of the City's "How Well is Your Well" booklet.
- Prepare an urban wells policy.

**For Water Services:**

- Inform water consumers of the need for water efficiency and how to become water efficient through the use of education programs, popular media and demonstration projects.
- Influence water consumers to reduce consumption, and alter consumptive patterns through partnership initiatives, rebates, and other financial incentives.
- Direct water consumers to change consumption patterns through judicious use of regulatory and financial tools, as warranted over time.
- Develop programs under a Water Efficiency Strategy to encompass education and awareness programs and a Peak Demand Strategy including municipal and private automatic irrigation management and private outdoor water use controls.

- Identify priority initiatives through development of a Water Loss Control Strategy indicating goals, objectives, costs, benefits and best value for the broadest range of total supply-side management activities and develop programs under a water loss control program to include: real loss reduction initiatives such as active leak detection, district metering for leak identification, speed and quality of repair and pipeline asset management and water balance audits to account for all water usage.

#### For Wastewater Services:

- Identify priority initiatives through development and maintenance of a Wet Weather Strategy indicating the goals, objectives, costs, benefits and best value for extraneous and drainage flow management initiatives.
- Continue to complete combined sewer separation outside of the Combined Sewer Area and provide for a range of solutions including: full separation of partially-separated sewers where storm drainage outlet is available; flow control; flow restriction; extraneous flow removal; and on-site storage of stormwater.

#### For Water and Wastewater Services:

- Recognize the supply management value resulting from on-going systems rehabilitation and consider the potential value as a factor in rehabilitation priority setting.
- For plans for demand and supply management, maintain a three-year priority action plan and work program including coordination with annual rehabilitation programs.
- For plans for demand and supply management, maintain 10-year long-range objectives and specify growth capital project requirements beyond the 10-year period based on achievement of those objectives.

### 3.3 Infrastructure System Monitoring

This Infrastructure Master Plan identifies a number of challenges that the City faces in providing services to accommodate projected growth over the next 22 years.

In the rural areas, monitoring of the natural systems which support private wells and septic systems, as well as monitoring and ensuring the integrity of the performance of those same systems will help to ensure the sustainability of rural growth. Section 5.4 provides policies directed towards groundwater management.

For stormwater systems, monitoring the overall health of receiving watercourses will assess the effectiveness of stormwater management initiatives in mitigating the impacts of growth. Section 5.2

provides an approach to stormwater management planning which will help to ensure sustainable development.

For public service systems including piped stormwater systems, there are two primary factors that will influence the timing and location of most capital projects – system demands (based on operational characteristics of existing systems and the location and rate of growth for new systems) and the physical condition of aging infrastructure.

Critical, to the determination of the timing and need for capital projects, is sufficient monitoring information. There are a variety of monitoring requirements, which support public infrastructure systems planning.

### **3.3.1 Monitoring System Demands**

In order to accommodate growth in the most effective manner, use of available infrastructure capacity in existing and future systems must be monitored

#### **Demand from Population Growth**

Monitoring when and where population and employment growth is occurring and projected to occur in the city is important, particularly due to the time frame required to implement major capital projects required to support growth.

#### **The City will:**

1. Monitor development approvals and other growth characteristics to ensure timely information for infrastructure planning.
2. Update capital project needs and timing based on the regular review of growth characteristics.
3. Assess how factors related to population growth, such as employment characteristics and demographics may impact infrastructure planning and incorporate Official Plan targets and phasing plans into the prediction of need and timing for infrastructure servicing.

In order to achieve these policies, the City will over time:

- Regularly review phasing plans.
- Adjust project priorities based on monitoring results.

### Demand Evidenced by Systems Performance

Direct monitoring of demand on infrastructure systems provides accurate information to the infrastructure planning process and is required to allow risk management while maximizing the use of infrastructure. In particular for sanitary sewer systems, for which performance is impacted more by wet weather events than population growth, permanent real time monitoring of system performance is essential to maximizing the use of existing infrastructure to allow for cost effective growth.

#### The City will:

1. Confirm system demands through real time system monitoring.
2. On a regular basis, review design factors and allowances based on data from real time monitoring.

In order to achieve these policies, the City will over time:

- Maintain sufficient permanent real time monitoring devices to provide the level of detail required to predict and plan for systems performance in both greenfields and intensification situations.
- Determine system performance based on detailed analysis of real time system monitoring.
- Determine water consumption patterns based on a detailed analysis of zone water consumption and water meter records.
- Identify potential priority areas for demand management initiatives based on real time performance and evidence of system deficiencies and constraints.

### 3.3.2 Monitor and Model the Physical Condition of Existing Infrastructure

The City currently undertakes monitoring and modeling of the physical condition of its infrastructure through its Infrastructure Management program. A city-wide model of the water system is maintained and a model of the wastewater system at the collector level. In addition, the City collects and analyses capacity information through inventory of systems, flow monitoring and computer models to predict performance. Because the success of the Infrastructure Master Plan is not only related to expanding and extending the existing infrastructure systems, but maximizing the use of existing system capacity through system rehabilitation, rehabilitation planning plays an important role in growth planning.

Section 6 discusses capacity management issues for existing infrastructure in intensification situations.

### **3.3.3 Other Monitoring**

Effective and efficient planning, design and operation of the City’s infrastructure systems is complicated and challenging. In order to meet these challenges, the City will look ahead to identify and monitor future issues and opportunities. Such monitoring activities can include:

- Monitoring legislative changes affecting system planning and design.
- Investigating technological advances and applications.
- Monitoring trends in infrastructure planning in other major cities in Ontario, Canada, and internationally.
- Searching for and identifying potential partnerships such as research initiatives.
- Identifying potential funding sources (infrastructure programs, public-private initiatives, etc.).

## **3.4 Service Delivery Methods and Alternatives**

In the public service areas in Ottawa the service delivery method is primarily by piped/treated systems. These types of systems have been well tested over time and have been found to be reliable, cost effective and environmentally appropriate. In addition, the design, materials and construction standards for these systems provide a well-defined, known and reliable product.

### **3.4.1 Public Systems Service Delivery Methods**

There are alternatives available to the City in providing public services. The daily planning, maintenance and operation of public infrastructure involves decisions on those alternatives. Fortunately, the industry that supports pipe/treatment systems maintains vast amounts of planning, engineering and operations specifications from which the City benefits directly without having to expend significant resources or capital. In addition, practices, often developed in response to unique problems faced by individual infrastructure owners at many locations across North America are subsequently documented again benefiting the City by helping us manage standards for planning, maintaining and operating infrastructure.

|                       |
|-----------------------|
| <b>The City will:</b> |
|-----------------------|

1. Maintain and regularly update service level standards to direct the design basis and service delivery basis for water, wastewater and stormwater infrastructure.

2. Maintain and regularly update the design, operating, maintenance, materials, construction and tendering standards for infrastructure works and services.

**Specialized Local Service Example  
Carlsbad Springs Water Supply**

The Carlsbad Springs Water Supply system delivers a low- pressure limited capacity water supply service to customers. Each home has a reservoir, which slowly fills and provides capacity for periods of high use. Fire flows are not provided in this system.

### 3.4.2 Considering Alternative Services

The City will continue to investigate new means to deliver services. One means to continue investigations is to support and partner with academic, research, governmental and professional associations who conduct infrastructure related research. Other activities include monitoring of infrastructure planning initiatives in other municipalities and participating in benchmarking processes to validate the effectiveness of our present practices.

Service alternatives including new technologies, techniques and material are continuously being developed. These may find general or specific application or be rejected because of technical limitations or cost effectiveness. It is important not only to consider and adopt new technologies but promote innovative engineering where it can be applied to produce more cost effective services. The City, as an active partner with research, educational and professional groups attempts to improve levels of service and regularly reviews products with a view to including them within City design standards.

In order to ensure that the City obtains value when considering new types of services, the City must understand all aspects of proposed new technologies and products. This includes the cost of service, level of service, the construction practices and materials, the operating requirements and any proprietary aspects of the services. Technologies may be demonstrated to be effective only in special circumstances or under specific conditions not generally applicable to City operations. Priority consideration will necessarily be given to the investigation of products with broad application and have the best potential to return good value.

**The City will:**

*For a range of innovative technologies and service delivery models:*

Promote and cooperate in research and monitor servicing technologies for inclusion in City design guidelines, materials specifications, operation and maintenance practices and procedures, construction specifications and life cycle cost recovery models.

In order to implement this policy, the City will over time:

- Cooperate in investigation and research related to materials, techniques and products for a range of innovative technologies and service delivery applications;

- Through a comprehensive servicing study which evaluates a range of servicing options and innovative technologies, investigate service delivery methods and applications for technologies either in standard municipal servicing or to respond to special servicing needs within the city;
- Review specifications, costs and benefits for technologies and service delivery methods with municipal application; and
- Adopt or revise service level criteria, design guidelines, materials specifications, operation and construction practices to incorporate servicing technologies and methods shown to provide cost-benefit to the City.



## Section 4 – Cost and Value

### 4.0 Introduction

Understanding the cost and value of infrastructure is one of the strategic directions in the Infrastructure Master Plan. The provision of public infrastructure services has a high capital and operating cost. Public and private infrastructure have high economic, social and environmental value. Understanding and balancing “cost” and “value” of infrastructure is an important aspect of infrastructure planning.

- **Cost of Growth:** The City will determine the cost and value of infrastructure services required to support existing land uses and growth. Mechanisms will be put in place to equitably assess the direct financial costs of growth infrastructure and to assess the cost of the life cycle of infrastructure and infrastructure services.
- **Value of infrastructure:** Assessment of the value of infrastructure will include social, environmental and economic value in order to make appropriate decisions on policy as well as how to define and assess value to customers and residents.
- **Public Private Partnerships:** The City will consider opportunities for the role of private enterprise in providing value to its customers when this is feasible.

The following describes some of the important cost and value considerations in infrastructure planning and presents some of the requirements the City expects to achieve in the near future related to cost and value – a Development Charge By-law Review and an Asset Management Strategy. The content of the Infrastructure Master Plan will provide input into these cost and value tools.

### 4.1 Costing and Paying for Growth

Infrastructure provided to support the extension of intensive urban land use, while costly, creates a return for the landowner and potentially for the municipality. In considering mechanisms and priorities for funding infrastructure extensions and upgrades required to support growth, it is important that the City obtain the best possible value for its residents. Advantageous cost per unit of servicing is reflected in lower taxes, lower development charges and lower use rates, all playing a role in making the City a preferred location for business and labour.

Provincial legislation sets out the process and municipal controls on growth financing of infrastructure. The choice lies either with paying through funds raised by property assessment or obtaining funds under the *Development Charges Act*. Water and sewer use rates, under Provincial legislation, are solely for the purpose of maintaining the existing systems on behalf of the benefiting owners using those services.

**The City will:**

Use development charges as the primary source of funding to build infrastructure for greenfields development and the combination of development charges and water rates or other revenue sources to fund infrastructure works that build capacity for intensification growth.

Consider in the formulation of revenue sources:

- The need to provide growth funding related to rehabilitation programs in the Development Charges By-law Review. The funds would be available to build capacity to accommodate growth when sewer and water facilities and pipes are replaced.
- The need to replace any reduction in funding created by discretionary exemptions, the central area residential exemption, and transition provisions with other City revenue sources or to eliminate these exemptions that reduce growth project funding.
- That the high percentage of dwelling units that are constructed inside the Greenbelt require: monitoring and analysis to identify infrastructure system capacity, replacement works to provide capacity to service them; and growth-related funding to support the system analysis and capacity-building capital projects.
- Official Plan targets and phasing should be mirrored in the timing of development charges and other revenues to support capital projects and the timing of operating budget increases to cover additional operating costs.
- Project estimates used for development charge estimates should reflect current actual costs for projects.
- Development charge and water rate funding must be coordinated to meet the costs of capacity-building infrastructure outlined in the Development Charges Background Study.
- Water efficiency, water loss, leak detection, and flow removal programs should be considered as other options to provide capacity for growth, which could be offered as potential lower cost capacity-building alternatives to the development community.

- The City's land use, servicing and financial planning documents and tools must be well-coordinated, so that the City can afford to provide the services required to support and sustain the growth projections of the Official Plan.

The process of determining and assessing costs directly to development is an effective strategy for deriving value from the infrastructure assets. Detailed engineering and financial plans are required in support of the Development Charges By-law in order to ensure an equitable division of costs and benefits. The infrastructure planning process and the development charge process, together, will provide a basic assurance that capital growth costs will be known and funded. The Infrastructure Master Plan identifies the major growth capital projects that will contribute to the formulation of development charges. It also identifies some of the growth challenges facing the City's infrastructure and provides strategies, policies, recommendations and action plans to address those challenges. In addition to the major growth-related capital projects identified in the Infrastructure Master Plan, the Development Charges By-law should include an assessment dedicated to all rehabilitation and reconstruction projects to recognize and plan for intensification growth and maximize the distribution of its rate funds. Consideration should also be given to the recognition of the capacity opportunities made available through demand and supply management projects such as water conservation and flow removal.

## **4.2 Reliability of Infrastructure**

Reliability is a key factor in ensuring value in public and private infrastructure services. Reliability has two main components – ability to meet service standards including peak demands on a consistent basis and ability to provide service in the event of system component failure.

Private systems are the responsibility of owners, and reliability depends mostly on good operation and maintenance practices.

The City's public infrastructure includes many reliability features including appropriate peak demand design allowances, backup power generation capability, redundancy in pump configurations, dual forcemain configurations and elevated water storage. Increasingly, systems have remote control features, which notify the City immediately in the event of problems. These reliability features are all specified in City design guidelines.

As the City grows at the limits of existing infrastructure systems, more and more residents are becoming dependent on systems that require significant investment to provide reliability. The degree of protection provided to ensure reliability must be carefully assessed. Incorporating reliability for protection from major system failures can be very expensive. However, major system failures can result in significant

expense in unplanned emergency responses, impacts on customers and in some cases safety and public health concerns. All of these must be balanced to determine the required investment in reliability.

**The City will:**

1. Design infrastructure systems to meet approved reliability factors in design guidelines.
2. Have in place contingency plans including public and customer notification plans in the event of both minor and major system component failure.

In order to implement these policies, the City will over time:

- Develop uniform reliability guidelines as part of development of new City design guidelines.

#### **4.2.1 Drinking Water Quality**

Maintenance of drinking water quality in public distribution systems is a unique type of reliability, which warrants special mention.

The following water quality reliability factors are considered in the design and operation of water system components, particularly at the furthest limits of the distribution system:

- Minimize storage volumes in the outer pressure zones, as detention times in larger volume tanks will likely be longer than in smaller storage facilities.
- Storage facilities should be operated to ensure minimum detention times and adequate turn-over and mixing within the tanks.
- Transmission watermain sizing should consider the impact on pipe velocities in the near and long term to maintain acceptable travel times throughout the system (particularly for large transmission mains to new growth areas and link pipes between pressure zones).
- System operations must ensure that watermains, which are constructed principally to provide secondary feeds and/or looping, are used regularly.
- Sizing of major transmission mains and storage facilities to meet maximum quantity demands (peak summer demands, fires and other emergencies) must be evaluated at the same time as water quality evaluations.

### **4.3 Cost and Value of Existing Systems**

The City is responsible for a significant portfolio of fixed (land, buildings, equipment, fixtures) and perpetual (rights of way and easements, pipe collection and distribution networks and water and wastewater treatment facilities) assets in its delivery of public infrastructure services. These assets are capital intensive to build, own and maintain and therefore can be considered based on a financial model asset management strategy. Such a strategy relates primarily to physical assets and is applicable to both existing assets and planning for increased assets resulting from systems expansion to address growth.

Ultimately, the success and economic viability of the City's infrastructure will rely in a large part on a clear, long term stewardship approach to protecting these significant capital investments. This approach must include minimization of the total capital and operating costs over the entire life of the assets as well as development of programs to sustain core service delivery and the provision of the expected service levels necessary to meet growth objectives.

A financial model for asset management will be supported by policies and processes, which ensure effective infrastructure planning and management. Such policies and processes are discussed throughout this document. The policies in this Plan are directed to ensure:

- Asset decisions (whether for renewal or new emplacement) are consistently made with the appropriate knowledge and consequence information representative of the total expected life or use of the asset;
- A continuous review and determination of reinvestment requirements through thorough condition management practices, risk assessment priority setting, technological improvements and adaptation to changing requirements;
- Implementation of optimization processes necessary to ensure system management, renewal and growth plans are implemented in such a manner as to provide continuous, safe and reliable services and the well managed environment expected for residents, business, innovation and growth;
- Protection of the assets while minimizing total cost of implementation, operation and renewal and delivering the service expected by residents and business communities;
- A means of benchmarking and monitoring the effectiveness of system management policies in conjunction with Infrastructure Master Plan and Operational Review performance measurement;
- A strategic link to the preparation and implementation of community design plans and the infrastructure planning process.

The Official Plan and growth strategies, the Infrastructure Master Plan and the City's asset management plans are all included in the infrastructure planning process, where the overlapping spheres of influence of each are recognized. Asset management plans provide a link between the broader growth policies, the Infrastructure Master Plan and the best possible management of the perpetual maintenance, operation, rehabilitation, renewal and replacement of infrastructure assets.

**The City will:**

1. Use a financial model based asset management strategy as one component of the City's overall infrastructure management program.
2. Report on a regular basis on the economic value and liability of the City's infrastructure as defined by the financial model component of the asset management plans.
3. Consider and acknowledge the life cycle cost, as predicted by the financial model component of the asset management strategy, of deferred operating, maintenance and capital investments.

#### **4.4 Alternative Value Assessments**

In an integrated infrastructure planning process, "value" incorporates social and environmental considerations as well as economic costs and benefits. In an environment of constrained capital resources, the social and environmental values become an increasingly important component of decision-making. The City must be able to clearly explain and justify the value – economic, social and environmental – of its growth management, capital and operational infrastructure spending decisions.

##### **4.4.1 Green Infrastructure**

The Ottawa 20/20 process has clearly identified that local natural resources are important to the long-term success of the city. The Infrastructure Master Plan identifies the role of the city's natural resources in supporting infrastructure (see Section 5.1). Application of an economic type model for the natural resource base – Green Infrastructure – could provide a mechanism to examine and compare the value being placed on the natural resource base.

The simplest mechanism for determining an economic indicator for the value placed on green infrastructure is to determine total spending on programs related to protection and enhancement of that infrastructure. Another mechanism of assessing economic value is to determine the costs related to replacement of the infrastructure with an alternate source. For example, how much would it cost the City to find and supply water if the Ottawa River were not available to us? Benchmarking studies are another means to assess, validate and set the City's level of spending on green infrastructure.

The City's Environmental Strategy provides further direction regarding the City's support for its natural environment.

#### **4.4.2 Personal Choices**

The values of the citizens of Ottawa are demonstrated every day by the personal choices they make. Providing opportunities for citizens to have a role in and make the types of personal choices, which impact infrastructure planning, is an excellent means by which to include the values of the citizens of Ottawa in infrastructure planning. Providing such opportunities in a manner, which offers a benefit over and above, the personal value placed on choices (e.g. reduced personal costs) is an effective means for the City to promote its own value objectives.

In infrastructure planning, "demand management" initiatives are seen as one of the best means to incorporate values and personal choice alternatives into the planning process. Many such planning initiatives, undertaken by a City for its own purposes (economic, social or environmental value), can be structured to provide opportunities for residents to participate and choose among alternatives. For instance, the present water and sewer rate structure in the City provides an affordable and valuable service, and provides the opportunity to reduce personal costs to those who make appropriate choices.

For residents to make personal choices, they require accurate and timely information regarding infrastructure planning and the impact their choices can make. The City's commitment to communication with customers and residents to provide such information is discussed in Section 5.8.

#### **4.4.3 Use of Special Area Charges**

The Province provides the City with an excellent tool for residents to make choices related to infrastructure. The *Municipal Act* allows residents to petition the City for improved infrastructure services. Authority under the *Municipal Act* to levy special area charges can be used to attribute some costs more directly to those who benefit.

### **4.5 Public Private Partnerships**

Public services were originally developed as a cost effective means to deliver a common service to growing populations, and as a mechanism of public health policy. In recent years, many municipal level governments have elected to put publicly owned infrastructure systems and service delivery into semi-public or private ownership. While the result of such decisions may be mixed, the opportunity for public – private partnerships should be considered in the overall planning of infrastructure and the delivery of value for service.

In order to obtain value from public-private partnerships, it is very important to first understand the value (economic, social and environmental) of existing services and to understand the model under which a public-private partnership would deliver those same services. Many municipalities across North America are embarking on various forms of public-private partnerships, and monitoring of the success of these efforts is seen as a key tool for the City to understand and confirm the value public-private partnership opportunities.

**The City will:**

1. Recognize and support the value of public service in infrastructure.
2. Consider cost-effective and sustainable opportunities for public-private partnerships in all areas of planning and service delivery.

In order to implement these policies, the City will over time:

- Communicate effectively with customers and the public to understand the values upon which the City can make decisions related to public-private partnerships.
- Benchmark the cost and value of the City's infrastructure services with other municipalities.
- Undertake detailed investigations of the models, costs and effectiveness of public-private partnerships in other municipalities in order to confirm the applicability of opportunities to the City.



## Section 5 – Integrate Infrastructure Planning

### 5.0 Introduction

Integration of infrastructure planning is one of the strategic directions presented in the Infrastructure Master Plan. In this plan, ‘integration’ is considered in the broadest possible sense in order to ensure maximization of opportunities to improve the value and sustainability of infrastructure services.

Opportunities for integration considered in the Infrastructure Master Plan include:

- **Infrastructure and the natural environment:** Integrating public water, wastewater and stormwater planning as well as the City’s role in private infrastructure services under the uniform strategic and policy direction of the Infrastructure Master Plan ensures that all infrastructure planning includes consideration of impacts on the natural environment.
- **Existing Infrastructure:** Integrating growth planning into existing infrastructure planning under the uniform strategic and policy direction of the Infrastructure Master Plan ensures that the City’s objectives of intensification and maximization of use of existing infrastructure are addressed in the remediation, rehabilitation and reconstruction of the City’s existing infrastructure.
- **Optimization:** Integrating planning, engineering and operational solutions to challenges and optimization by balancing all possible solutions ensures that the best opportunities for cost effective management of growth are identified.
- **Communication:** The Infrastructure Master Plan recognizes the role and value of effective communication in infrastructure planning including obtaining the best value from the experience of municipal employees, our relationships with external agencies and the expectations of our customers and the citizens of Ottawa.

### 5.1 Infrastructure and the Natural Environment

Recently, many municipalities in North America have adopted an integrated approach to infrastructure planning and the natural environment – in particular the water environment. Water supply, sanitary wastewater disposal and stormwater management processes all rely on and impact surface and/or groundwater. In areas where access to these resources has become limited (for any number of reasons including natural reduction in supply or quality, increase in growth beyond sustainable levels, increase in the cost to deliver the

services, etc.), the challenges to infrastructure planning have become enormous. While today Ottawa is fortunate to have an abundant supply of surface water and generally reliable supplies of groundwater, planning of infrastructure must put foremost the long-term sustainability of local water resources.

The relationship between infrastructure and the environment extends well beyond the planned use of surface and groundwater for water supply and wastewater disposal. Some of the stresses on the City's infrastructure are related to the natural environment. Extended hot dry periods result in the greatest demands on the City's public water supply system (primarily from evening outdoor water use) and cause concerns in rural areas when well water supplies may become constrained. Spring snow melting raises river levels and local groundwater levels resulting in increased infiltration into sanitary wastewater collection systems – the highest flows at the wastewater treatment facility occur during wet weather. In some cases, similar wet weather conditions result in problematic operation of rural septic systems. Intense summer thunderstorms can overwhelm the City's stormwater collection systems and drainage facilities and may as a result contribute to private property flooding. Planning for the full scope of the intricate relationship between the natural environment and the infrastructure helps to ensure good infrastructure planning.

Examples of opportunities arising out of integrated planning of infrastructure and the environment include:

- Recognition of the role and value of the natural resource base, and particularly the finite nature of those resources, ensures that all infrastructure planning decisions are sustainable in the longest possible term;
- Understanding the intimate and to some degree unpredictable role nature plays in the performance of infrastructure helps the City to better understand and manage risks; and
- Implementation of an integrated, science-based approach to assessing the health of local rivers and streams may lead to more effective ways to maintain and/or improve the overall health of these watercourses.

## **5.2 Stormwater Management Planning**

Land use changes, and in particular urban development, have long been associated with negative impacts to receiving streams and rivers. The nature of these impacts is well documented:

- Higher levels of imperviousness result in greater volumes of stormwater runoff and higher peak flows in receiving streams leading to increased flooding and stream bank erosion. Over the years, substantial capital has been spent to “fix” the problem through artificial protection of stream banks and the use of structural flood protection measures;
- Increased imperviousness can also result in a reduction of infiltration which can impact groundwater supplies and reduce base flow to local streams; and

- Regular wash-off of urban pollutants during wet weather contributes to the degradation of water quality and often results in the closing of area beaches.

These impacts, individually or in combination, can threaten property and infrastructure, significantly impair aquatic habitat and limit the recreational use potential of local rivers and streams.

### 5.2.1 Regulatory Requirements

Recognition of the above-noted impacts is reflected in the various regulatory requirements mandating that stormwater management be implemented through the land use planning process. The Provincial Policy Statement (PPS) (Section 2.2.1) states that the quality and quantity of water shall be protected, improved or restored by:

- Using the watershed as the ecologically meaningful scale for planning;
- Implementing necessary restrictions on development and site alteration to protect sensitive surface water features and their hydrologic functions; and
- Ensuring that stormwater management practices minimize runoff volumes and contaminant loads and maintain the extent of vegetative and pervious surfaces.

The PPS also supports the integration of servicing and land use for all stages of the planning process (Section 1.6.4.1).

Also at the Provincial level, the *Conservation Authorities Act* and its regulations require that increased runoff from development not increase regulatory flood levels, resulting in the need for stormwater management measures to control peak flows. Further, the *Ontario Water Resources Act* requires the implementation of stormwater management for new development to, “Provide for the conservation, protection and management of Ontario’s waters and for their efficient and sustainable use.” At the Federal level, the *Fisheries Act* precludes the discharge of deleterious substances, effectively requiring the treatment of urban runoff via stormwater management measures.

The above policies and legislation generally apply to new development; however, the PPS supports intensification and redevelopment on existing services wherever feasible (Section 1.6.4.2). In addition to ensuring adequate drainage services, stormwater management is also a consideration for these areas to address the cumulative impacts of infill and redevelopment on receiving watercourses.

### **5.2.2 Stormwater Management Policies**

Stormwater management policies have been developed to incorporate directions taken from the PPS and emerging concerns. For example, the PPS calls for stormwater management practices to minimize runoff volumes and maintain the extent of vegetative and pervious surfaces so policies have been developed to require not just the conventional peak flow control but runoff volume control as well. The PPS support for intensification and redevelopment on existing services has been reflected in the need to develop a city-wide Stormwater Management Retrofit Plan that will identify and prioritize a list of stormwater management retrofit projects to address both existing problems and mitigate the impacts of intensification. Finally, the anticipated impacts of climate change have been reflected in a policy calling for the implementation of “robust” drainage systems that will improve protection for events that exceed the design criteria capacity.

The stormwater management policies were adopted by City Council in September 2007. The City will develop a Stormwater Management Planning Guideline to further detail how the proposed directions promoted by the stormwater management policies are to be achieved.

The stormwater management policies address both Greenfield development and intensification and are grouped within seven categories including: Water Quantity; Surface Water Quality; Valley and Stream Corridors; Groundwater, Communications; Integrated Stormwater Management Planning; and Infrastructure.

#### **Water Quantity:**

**Objective: Reduce flood risk to public health and safety and to property**

**For Greenfield areas,**

#### **The City will:**

1. Require measures to protect against the capacity of the minor (pipe) system being exceeded.
2. Require sufficient major system flow capacity within public ownership or control to prevent flooding of private property.
3. Require the implementation of robust drainage systems that will improve protection for events that exceed the design criteria capacity.
4. Require the implementation of stormwater management measures, where required, that will ensure no increase in the regulatory flood elevation resulting from changes in land use.

**For existing areas,**

**The City will:**

1. Allow infill and redevelopment while not exceeding the capacity of existing stormwater/storm drainage infrastructure.
2. Improve the existing level of flood protection for known flood prone areas.
3. Give priority to the use of the major system (maximize flow on the surface) to protect the minor system.
4. Improve the existing level of flood protection for areas identified with major and/or minor system deficiencies.

**For all areas,**

**The City will:**

Ensure that the planning and implementation of stormwater management systems is consistent with Provincial floodplain policies and guidelines.

**Objective: Reduce erosion impacts that are detrimental to property and stream habitat**

**For Greenfield areas,**

**The City will:**

1. Delineate the limits of stream corridors to incorporate geotechnical and natural hazards, and ecological and geomorphological concerns.
2. Require the implementation of stormwater management measures to mitigate the impacts of urban runoff on existing erosion rates.

**For existing areas,**

**The City will:**

1. Remediate erosion threats to public safety, infrastructure, and private and public property.
2. Incorporate habitat improvements to the extent possible when implementing erosion protection works.

**Objective: Preserve and/or re-establish a more natural hydrologic cycle**

**For Greenfield areas,**

**The City will:**

Require the implementation of stormwater management measures that minimize or eliminate runoff from frequent events.

**For existing areas,**

**The City will:**

1. Promote and facilitate the implementation of retrofit stormwater management measures to reduce the volume of runoff to urban streams.
2. Maintain the water quantity benefits afforded by existing roadside ditches and swales.

**Surface Water Quality:**

**Objective: Reduce the impact of non-point source runoff on receiving watercourses**

**For all areas,**

**The City will:**

Require the implementation of stormwater management measures to improve the quality of runoff to acceptable levels.

**For existing areas,**

**The City will:**

1. Promote and facilitate the implementation of retrofit stormwater management measures to improve the quality of runoff from areas that developed without stormwater treatment.
2. Undertake operational activities to improve the quality of runoff.
3. Maintain the water quality benefits afforded by existing roadside ditches and swales.
4. Manage the combined sewer system consistent with Provincial requirements

**Objective: Eliminate contaminants originating from point sources.**

For all areas,

**The City will:**

Prevent the release of contaminants from point sources through the development review process.

For existing areas,

**The City will:**

Identify and eliminate the release of contaminants from point sources.

**Objective: Reduce the impacts of runoff on existing public beaches and maintain the potential for the provision of new public beaches and recreational activities.**

For Greenfield areas,

**The City will:**

Require the implementation of stormwater management measures to improve the quality of runoff to an acceptable level.

For existing areas,

**The City will:**

1. Implement retrofit stormwater management measures to improve the quality of runoff from storm outfalls that affect public beaches.
2. Undertake (non-structural) activities to improve the quality of runoff at beaches.

**Valley and Stream Corridors:**

**Objective: Protect, enhance or rehabilitate natural features and functions of valley and stream corridors.**

**For Greenfield areas,**

**The City will:**

1. Require the implementation of stormwater management/drainage servicing solutions that do not impact natural features identified for protection.
2. Identify and promote the preservation of low order and/or headwater streams.
3. Promote the rehabilitation of degraded streams in combination with the implementation of stormwater management to maximize benefits to servicing solutions and habitat improvement.
4. Acquire valley and stream corridors dedicated through the development review process.

**For existing areas,**

**The City will:**

Incorporate habitat improvement works in conjunction with the implementation of erosion and/or flood protection works.

**Groundwater:**

**Objective: Reduce the potential impact of runoff on groundwater drinking sources**

**For Greenfield areas (rural),**

**The City will:**

Screen and preclude any stormwater management infiltration measures that may threaten contamination of proposed drinking water wells (private and/or communal).

**For existing areas,**

**The City will:**



1. Screen and preclude any retrofit stormwater management infiltration measures that may threaten contamination of existing drinking water wells (private and/or communal).
2. Undertake operational activities to improve the quality of runoff.

**Communications:**

**Objective: Encourage communication within and external to the City to bring about greater collaboration among the City, public agencies, and the public.**

**The City will:**

1. Take the lead on sharing and integrating stormwater management information.
2. Consult widely with agencies, the general public, other municipalities and all other interested parties on stormwater management –related studies and initiatives.

**Integrated Stormwater Management Planning:**

**Objective: Integrate stormwater management planning with other City programs and functions.**

**The City will:**

1. Undertake stormwater management planning on a subwatershed basis.
2. Integrate stormwater management planning with land use planning to maximize opportunities to meet stormwater management objectives early in the planning process.
3. Integrate stormwater management planning with parks and open space planning to ensure the respective objectives of both groups are achieved.
4. Ensure that drainage infrastructure requirements inform future land use to avoid the need for substandard servicing.

**Infrastructure:**

**The City will:**

1. Comply with all applicable provincial and federal legislation, regulations, policies, guidelines and municipal by-laws in the planning, implementation and operation of stormwater management infrastructure.

2. Ensure the design and implementation of stormwater management infrastructure are consistent with state-of-the-art practices.
3. Ensure that the planning and design of stormwater management infrastructure and in-stream works are adequately supported by sufficient field data.
4. Manage receiving watercourses as an integral part of the City's drainage infrastructure.

### **5.2.3 The Value of Stormwater Management**

The resources dedicated to stormwater management are a reflection of the importance society attaches to protecting rivers, streams, and groundwater resources. The evolution of stormwater management practices over the last few decades parallels the growing public appreciation of the importance of healthy watersheds. Beyond the numerous benefits provided by healthy watersheds, river and stream corridors are also important components of the City's drainage infrastructure – without them, the drainage system could not function since all drainage eventually ends up in a local stream or river.

A financial model-based asset management strategy that addresses conventional infrastructure is discussed in Section 4.3. Beyond storm sewers and stormwater management ponds, a comprehensive asset management approach for stormwater management requires including river and stream corridors because of their essential role as receivers of stormwater runoff. Just like other conventional infrastructure, they require a sufficient level of spending to maintain the asset over the long term.

The need for capital and operating expenditures to protect and maintain river and stream corridors provides the justification for resources devoted to stormwater management. The City currently spends capital and operating resources for a variety of activities directly and indirectly related to stormwater management: planning, staffing, and infrastructure costs including: design, construction, operations, monitoring, maintenance, etc.

## **5.3 Role of the Ottawa River**

The City's surface water resources and in particular the Ottawa River can, in some ways, be considered as the infrastructure asset serving the greatest number of City residents. The Ottawa River provides the City with a clean and plentiful supply for the central water supply system and a safe location for the planned discharge of effluent from the wastewater treatment plant and most of the City's stormwater outlets.

In order to play a role in ensuring that the Ottawa River continues to serve the City as a sustainable asset, the City must consider its role in a wide scope of activities. From local surface water protection measures such as stormwater management to watershed level protection measures such as participating in watershed level

planning activities and to river water quality modeling, the City must be involved in protecting the environmental health of this infrastructure resource.

### 5.3.1 Local Source Water Protection Issues

Both the City of Ottawa and the City of Gatineau have water treatment and intakes and wastewater treatment and outfalls along the Ottawa River. Both municipalities are also responsible for stormwater outfalls along the River.

#### The City will:

1. Liaise with all source water protection partners regarding source water protection issues.

In order to implement this policy, the City will over time:

- Transmit and receive information to ensure mutual understanding of source water protection issues;
- Notify all affected municipalities in Ontario and Quebec regarding major water, wastewater and stormwater planning initiatives; and
- Approach all affected municipalities in Ontario and Quebec to form an Ottawa River Source Water Protection Working Group.

### 5.3.2 Watershed Source Water Protection Issues

Major watershed source water protection issues consider very long-range planning horizons and require significant multi-agency and jurisdictional coordination. The Ottawa River marks the border between Ontario and Quebec for much of its length and more than half of the watershed is in Quebec. The river also has substantial hydro-electric development. The City will determine its role and become involved in multi-jurisdictional watershed planning issues in order to ensure the sustainability of this important infrastructure asset.

The Cities of Ottawa and Gatineau form the largest concentration of population on the Ottawa River, with a total “point source” population that exceeds the total population of the watershed area upstream of the two cities. By virtue of their size, the two cities together are well placed to play a leadership role in watershed level source water protection initiatives for the Ottawa River.

**The City will:**

1. **Play an active role** in understanding and advocating for Ottawa River watershed source water protection measures.

In order to implement this policy, the City will over time:

- Work closely with Provincial agencies to implement watershed level initiatives aimed at source water protection for the Ottawa River; and
- Investigate opportunities and benefits arising out of an **Ottawa River Source Water Protection Working Group** for all agencies and municipalities operating in the Ottawa River watershed.

## **5.4 Groundwater Resources**

The City has modest and somewhat distributed groundwater resources. While those resources are important ecological and economic functions in the city, our understanding of those functions is limited. Groundwater sufficient in quantity and quality to supply private residential uses is generally available throughout Ottawa, playing an important role in the economy of rural settlements. **There are some more specific economic uses of groundwater in Ottawa – providing drinking water for livestock, crop watering and use in aggregate extraction operations are examples.** Groundwater flows into surface waters have been determined to play an important role in maintaining unique fish habitats in some area streams.

As groundwater is a natural environment resource, many of the issues surrounding the overall definition, protection and uses of groundwater are considered to fall under the City's environmental mandate. In some instances, the City's ability to fulfill a role in groundwater planning is limited by the Province's overriding authority in resource management. There are, however, some very specific links between groundwater, growth and infrastructure planning. **In order to play an effective role, the City has adopted a Groundwater Management Strategy. Currently, the City undertakes studies to define the groundwater resource by collecting baseline data and monitoring groundwater in the city and develops public information to assist residents who rely upon these resources.**

### 5.4.1 Municipal Well Systems

The City extracts groundwater for a number of municipal water supply systems: The City will play a role in planning so that these well supplies are maintained for the continued use of its customers.

#### The City will:

1. Control development and connection to well based municipal water supply systems to the stated capacity limits in the Infrastructure Master Plan.
2. Define wellhead protection areas for municipal wells and control land uses for the protection areas in consideration of risks to the groundwater supplying the municipal well.
3. Understand and monitor the performance of the existing wells to ensure sustainability.
4. Place controls on water use if required to maintain reliability.
5. Protect alternative wellhead areas for future developments, expansions and or replacements of existing well systems.

In order to implement these policies, the City will over time:

- Undertake comprehensive peer-reviewed studies to define wellhead protection areas and develop source water and ecological protection and reliability plans;
- Regularly update studies and plans in consideration of on-going well performance and environmental monitoring;
- Adopt, by means of a bylaw, the limits of wellhead protection capture zones and land use controls in those areas;
- Study new areas of possible alternative municipal well developments or expansions in order to plan for growth.

### 5.4.2 Land Use

The City approves land uses that can have an impact on groundwater resources. Hard surfacing resulting from intense land use can reduce infiltration and reduce groundwater volumes available for economic use or environmental function. Sewage systems, with substance discharge, can influence the quality of groundwater, raising nitrate levels as well as other constituents. Municipal management practices such as road salting can influence the quality of groundwater, raising chloride and sodium levels.

The Official Plan and the associated growth expectations and land use policies present an opportunity to establish a rural servicing strategy to meet the City's vision of rural settlement and population growth, including reliable private wells. Land use approvals must consider the impacts on the groundwater resource to ensure that they are reliable and able to support the land use as well as consider the possible impacts on future and adjacent land uses. Recognition in the Official Plan includes policy to:

- Consider impacts on the economic and environmental function of the groundwater resources as a factor in approval of land use;
- Direct intensification of land use to areas that minimize impacts on environmentally sensitive or economically beneficial groundwater resources; and
- Monitor the impact of developing land use on the groundwater resource to confirm impact predictions.

The City adopted a Groundwater Management Strategy in 2003 with a two-phased approach. In order to implement Phases 1 and 2 of the Strategy, the City will:

- Further develop a framework in which to identify, prioritize, and complete groundwater management activities outlined in the Strategy;
- Develop rural settlement studies based on reliable use of, and impact on, groundwater;
- Incorporate consideration of groundwater resources in watershed and subwatershed studies;
- Establish on-going monitoring and use existing wells to obtain regular data on groundwater functions;
- Develop water balance methodologies for area groundwater resources and monitor long range stresses, such as climate change and land use change, to understand possible impacts on water balance;

### 5.4.3 Rural Development Approvals

The City's requirements for approval of development on private systems are detailed in the Official Plan. The intention outlined here relates to the City taking an increased role and authority in some of those matters presently regulated by the Province. Other municipalities in Ontario have taken similar actions.

#### The City will:

- Ensure that its development review framework is sufficient to protect the economic and environmental functions of groundwater in the city, as well as meet the City's goals in the protection of public health.

To protect this interest, the City over time will:

- Consider the authorities delegated to the City for septic systems regulations under the Ministry of Municipal Affairs and Housing and consider the scope of City response to that authority, including consideration of implementation of septic re-inspection programs;
- Consider application to the Province for delegation of municipal authority under the *Ontario Water Resources Act* and other legislation governing the construction of wells and the use of groundwater, including delegation of well inspection authority and a review of its approval authority role in the Permit to Take Water process;
- Undertake studies to define the economic and environmental functions of groundwater; and
- Undertake studies to determine the existing groundwater asset condition and monitor for changes to that condition.

#### 5.4.4 Groundwater Stewardship

Stewardship choices residents can make every day, can play a very important role in the planning and protection of groundwater. The City's role in promoting stewardship is discussed in the Environmental Strategy. The City's role in promoting stewardship activities related to reliability of groundwater as it relates to private wells and sewage systems will be directed at the public's understanding of the resource and the proper use of wells and sewage systems.

#### To do this, the City will overtime:

- Develop, maintain and transmit information to assist residents in understanding their role in groundwater stewardship, including well and septic instruction workshops, participation in national and international awareness campaigns and programs such as Children's Groundwater Festivals.

### 5.5 Ecological Footprint

The delivery of public infrastructure services in the City has an environmental impact that far exceeds the municipal boundaries of the city. As water is used and returned to the natural environment, there is an impact that is transmitted beyond the boundaries of the city. As chemicals, supplies and energy are used to deliver the services, there have been impacts where these products have been manufactured and transported to Ottawa.

By including consideration of the city's natural resources in the Infrastructure Master Plan, the City is recognizing the link between infrastructure and the natural environment, and demonstrating that infrastructure

planning in the city considers both the impacts on the environment and the opportunities for the City to improve the environment.

In other sections of the Infrastructure Master Plan, there is mention of the overall benefits of reduced consumption. We must be well aware that a local “cost/benefit” analysis may not represent the full environmental cost of our decisions and that, generally, reduced consumption has a beneficial impact on the environment.

## **5.6 Growth Planning for Existing Infrastructure**

The City owns and maintains a significant stock of existing infrastructure. The City undertakes programs to maintain, rehabilitate and replace existing infrastructure. These programs address a wide variety of needs in existing infrastructure, including physical deterioration, life cycle planning and major system management initiatives.

It is anticipated that cost effective growth can be achieved by promoting intensification and development in serviced areas, therefore the considerations and methodologies for planning rehabilitation and reconstruction of this infrastructure include planning for growth.

### **5.6.1 Physical Needs Assessment and Prediction**

Needs and priority assessments are the tools used to ensure the goals and objectives of systems management are being achieved in the most efficient manner. In rehabilitation planning of public infrastructure, full ownership of individual infrastructure systems allows full assessment of needs and priorities. Also, ownership of all infrastructure systems offers the opportunity to actually assess needs and priorities across the water, wastewater and stormwater systems to ensure that the highest priority needs are being met.

Physical needs assessment and deterioration modelling form the foundation of effective needs assessment. To the greatest degree possible, objective methodologies for physical needs assessment are required in order to provide a reliable basis upon which to plan asset growth, rehabilitation and reconstruction. Similarly, knowledge of historical data, ongoing research and sufficient systems monitoring provide the basis to predict future performance.

Examples of opportunities arising out of integrated planning and needs and priority assessments include:

- Making the broadest possible assessment of the needs and priorities of the City, and ensuring that all programs are directed towards those priorities;



- Ensuring that the varied goals of the City, the development community, customers and residents are all included in a balanced manner in decision making;
- Ensuring that local communities are respected by coordination of major capital projects and minimization of disturbance to communities.

**The City will:**

1. Ensure objective decision making when assessing the physical needs of infrastructure systems;
2. Maintain service standards including risk criteria against which to assess and prioritize physical need issues;
3. Direct available resources in a balanced manner to address needs in separate systems and towards lowering the overall total need in infrastructure systems.

In order to implement these policies, the City will over time:

- Maintain comprehensive inventories of all assets, including deterioration characteristics inventoried with a frequency to ensure effective asset management.
- Utilize computerized inventory and assessment tools to promote objective decision-making.
- Integrate the comparison of needs and priorities across physical systems.

## 5.7 Optimization

Optimization in this Plan is characterized as applying potential planning, engineering and operational solutions to growth challenges, and choosing the best single or combined solution. Sometimes, an engineering solution (a capital project) may pose new operational challenges to the system or an operation change could require additional capital works. Overall, the best life-cycle solution must be determined. In this plan, optimization is considered to apply primarily to each separate infrastructure system; however, in some cases, there are opportunities where infrastructure systems do interact (e.g. leaks in watermains may contribute to infiltration in sanitary sewers). Optimization allows consideration of the best possible overall solution to achieve the City's growth management goals.

Optimization can be characterized in other ways. The City's efforts to implement real time controls on infrastructure systems and to standardize the design, configuration and function of standard infrastructure elements (e.g. pumps, regulators, control devices) are examples of operational optimization which can have

significant value in operational efficiencies and cost savings. Such opportunities are addressed in on-going operational reviews and through the City's efforts to incorporate innovative practices into its operations.

In many parts of the world, including Ontario, control of the impact of electricity deregulation on infrastructure planning has driven optimization efforts and, in particular, energy use optimization. Peak infrastructure demand often occurs simultaneously with peak electricity demand. Consideration of electricity rate structures and opportunities to achieve load shedding through optimization can result in substantial savings in the cost of providing infrastructure services. Also, planning for possible energy shortages is important to ensuring infrastructure systems' reliability. There are other examples of operational optimization opportunities.

Optimization opportunities will be identified and realized through integrated infrastructure planning. Examples of opportunities include:

- Land use planning can be used to prevent or defer challenges to service delivery. For instance, directing growth to locations where servicing costs are lower can result in better use of existing infrastructure and more cost effective growth;
- Engineering solutions can consist of capital improvements to allow service delivery and can address existing and future challenges. Construction of new infrastructure to service new growth or increasing the capacity of existing infrastructure can both be used to address challenges;
- Operational solutions, such as adopting alternative operating practices, might address challenges. Balancing the use of water supply pumping with reservoir storage may reduce electricity costs for pumping, but may also increase resident time for water in the distribution system and result in water quality concerns; and
- In some cases, challenges in one infrastructure system can be addressed through integration with planning of another infrastructure system (e.g. ensuring efficient stormwater drainage systems reduces the likelihood of surface water ponding and possible excessive infiltration into sanitary sewers).

## **5.8 Role of Communication in Infrastructure Planning**

Effective infrastructure planning is an on-going and complex process requiring the coordination and efforts of a wide range of specialists. Today, the technical specialists who guide parts or all of this process are required to be generalists needing to be knowledgeable in the subjects ranging from ecology to economy to sociology, from water and sanitary engineering to urban design and regional planning, from governing legislation to how to effectively involve the public. Moreover, all of this knowledge must be integrated in problem solving.

Clear understanding of the infrastructure planning process including a commitment to effective communication is an important element in the success of infrastructure planning.

Effective communication also depends on people. The people who deliver infrastructure services, the customers and the general public all have an important role to play in infrastructure planning. Open and effective communication within and between these three groups is essential to the success of infrastructure planning.

### **5.8.1 City of Ottawa Communication**

All City divisions, to a greater or lesser degree, have a role in infrastructure planning. To ensure effective communication, it is important that each player understands his or her own role and understands and respects the roles of others.

#### **The City will:**

1. Endorse an integrated communication process, as represented by the Infrastructure Planning Process, in order to recognize the potential benefits of on-going improvement processes and to ensure balancing of all of the City's objectives;
2. Establish and maintain formal communications mechanisms through the establishment and/or maintenance of interdivisional committees such as Water, Wastewater, Stormwater, Intensification-servicing and Rural-servicing which will meet on a regular basis and report on the activity of the committees annually; and
3. Recognize the value and needs of employees in the delivery of effective infrastructure services.

In order to implement these policies, the City will over time:

- Maintain and update the elements of the Infrastructure Planning Process, including area infrastructure plans, to represent the most current planning, engineering, operational and regulatory solutions to infrastructure planning challenges.
- Undertake and support pro-active employee training plans, programs and activities to ensure employees are prepared, to the best of their ability, to perform the services expected of them.
- Fully integrate infrastructure plans with land use and financial plans (e.g. community design plans with area infrastructure plans and capital and operating budgets).
- Co-ordinate area infrastructure plans with city-wide infrastructure plans and systems operations as they are prepared.

### **5.8.2 External Agency Communication**

External agencies are both regulators and partners in achieving the City's infrastructure planning objectives. Examples of opportunities arising out of integrated planning including effective communication harmonization and streamlining with external agencies include:

- More effective and timely approval processes;
- Opportunities for more creative solutions to problems; and
- Making best use of available expertise to assist the City in meeting its objectives.

#### **The City will:**

- Build effective partnerships with agencies with common interest in infrastructure planning issues.

In order to implement this policy, the City will over time:

- Continue to build its relationships with area Conservation Authorities, including partnering on matters delegated from the Province to the Conservation Authority but for which the City has an interest;
- Support the initiatives of the Federation of Canadian Municipalities related to infrastructure **planning**;
- **Maintain** and improve coordination mechanisms with utility companies;
- When opportunities arise, utilize the resources of area academic and other research type institutions to participate in, and conduct research related to, infrastructure issues in Ottawa; and
- Support technical associations through participation in conferences and presentation of City projects.

### **5.8.3 Customers and the Public**

Integration of infrastructure planning offers the opportunity to bring forward a strong and consistent message regarding the planning of the services provided. At the same time, communication with customers and the public assists the planning process in addressing some of the value judgments and decisions regarding planning and service delivery.

Examples of opportunities arising out of integrated planning include:

- Customers and the public can identify a single point contact to answer questions and address their concerns regarding all aspects of infrastructure planning;

- Input from the public, particularly on broader environmental matters and values, can be incorporated into priority and decision making for all infrastructure planning;
- An integrated plan demonstrates to customers and the public that the City has considered all alternatives and balanced its objectives – customers and the public will have a greater sense of trust in the reliability and integrity of their infrastructure services.

**The City will:**

1. Maintain open and effective communication with its customers and the public regarding the City's infrastructure planning processes, objectives and projects.
2. Clearly define the role and opportunity of customers and the public in infrastructure planning decision-making.

In order to implement these policies, the City will over time:

- Establish, maintain and update content on [www.ottawa.ca](http://www.ottawa.ca);
- Establish, maintain and update publication materials in support of processes, objectives and projects;
- Regularly inform Council of the role the public has played in decision making; and
- Use the procedures set out in the Municipal Engineers Association Class Environmental Assessment Process as a model for public involvement where public input is desired in infrastructure studies and projects.

## Section 6 – Managing Capacity to Support Intensification

### 6.0 Introduction

Consistent with the direction of the Provincial Policy Statement, the Official Plan continues to promote intensification as a major element in its growth management strategy. The Official Plan identifies the expectations of growth in the Central Area, inside the Greenbelt, in Urban Communities outside the Greenbelt and in Rural Areas.

The Official Plan outlines three key policy areas related to intensification which provide direction for the Capacity Management Strategy:

- It establishes an overall target of 40% of all new urban residential development occurring through intensification, primarily inside the Greenbelt;
- It identifies the target areas for intensification: the Central Area; Mixed-Use Centres and Town Centres; and Mainstreets;
- It establishes density targets for some of these locations expressed as persons and employment (jobs) per gross hectare.

**The objective of the Capacity Management Strategy is to ensure that capacity exists, or can be made available to support the anticipated amount of intensification in specific locations. These form the priority areas for the implementation of the Strategy.**

With Ottawa's vast and varied sewer system, addressing the impact of intensification in any one location is not an easy task and, in most cases, detailed analysis is required to pinpoint the particular demands that new development and redevelopment will place on different parts of the system. In some situations, the local street sewers are the origin of surcharging. Mainly, surcharging has been a result of collector sewers that are at capacity. As a result of major flooding in 2004, the City undertook a detailed analysis of the 'pinch points' in the sewer system – to determine if in any one location, the 'pinch point' is a local, spine or collector pipe. A report with the results of this analysis was approved by City Council in November 2005. The report identified long and short-term improvements to the system and flooding areas requiring more in-depth study. Until these and other studies and specific capital improvements are completed, the Capacity Management Strategy provides a means of supporting intensification with a less than perfect, aging and diverse sewer system.

## 6.1 Addressing Capacity Management Challenges and Opportunities

The City has inherited water and sewer systems that have been built over a period of about 150 years. With complex systems that have been expanded and rehabilitated over so many years and that have accommodated changing building forms and densities, periods of exceptional growth and periods of stagnation, changes and advancements in system and pipe technology; and the amalgamation of former municipal and regional systems, it is not surprising that there would be some challenges related to providing capacity to support intensification projects inside the Greenbelt.

While the existing water system experiences strains due to the age of some pipes, it is the sewer system that creates greater concern in terms of intensification. In the core of the city, there are still some sewers that are more than 100 years old. Areas of intensification include those serviced by a variety of sewage and drainage systems: combined sewers, partially-separated sewers, fully-separated sanitary and storm sewers and sanitary sewers with ditches and/or culverts, all of which operate in different ways. Therefore, determining whether there is capacity in the existing sewer systems to meet the timing and location of intensification becomes a more complex matter than may be commonly recognized. This is due to the impact of wet weather flows and the way in which the various systems respond to and handle these flows. Added to this is the fact that each sewer system reacts differently to the particular storm conditions (e.g. long duration intense rainfalls, short duration intense rainfalls, snow melt, etc.).

Programs to disconnect partially-separated sewers, pursued by the former municipalities, alleviated some concerns in these systems. As well, annual rehabilitation programs in the combined sewer area have replaced many sewer and water pipes in the downtown and central areas. Since 2000, the operation of the wastewater collection system has been improved to divert flows when particular collectors are at capacity. For example, this has been effective in resolving some of the causes of the surcharging of the West Nepean Collector. Still, in extreme wet weather events, flooding can result - and, it is not economically feasible to build a system that can handle the extreme storms that we have occasionally experienced in Ottawa. What the City can do, over time, is make the infrastructure changes that will provide a high level of service to support both growth through intensification and existing residents and non-residential uses.

### 6.1.1 Provide Servicing to Support Intensification

As the capacity available in the infrastructure systems to support intensification is not easy to identify in particular locations, a greater level of detailed analysis is required than is possible in relation to the Official Plan and the Infrastructure Master Plan. Therefore, intensification areas, particularly ones with density targets, should be priority areas for the completion of community design plans and supporting area infrastructure plans. Providing servicing to support intensification will take a two-fold approach: undertaking the studies and plans

that are required and continue to assess development applications on an individual basis where this greater level of detail is not available.

**The City will:**

1. Prepare area infrastructure plans to support community design plans in areas with density targets identified in the Official Plan.
2. Where community design plans and supporting area infrastructure plans are not completed, continue to assess infrastructure capacity for development applications on an individual basis.

In order to implement these policies, the City will over time:

- Annually prioritize intensification areas with density targets for which a community design plan and supporting area infrastructure plan is to be completed;
- Complete community design plans and area infrastructure plans for intensification areas inside the Greenbelt on a high-priority basis in keeping with the annual priority list.
- Where intensification is promoted but a community design plan and supporting area infrastructure plan have not been completed, address development applications in the following manner:
  - Continue current review procedures for small- and moderate-scale development applications on a property basis to assess whether or not each application can be serviced (e.g. with precautionary measures such as disconnection where required and without resulting in detrimental negative downstream implications for the system). An example of ‘small scale’ would be individual single or semi-detached or small-scale apartment units. A ‘moderate scale’ might be a townhouse development.
  - For larger-scale intensification projects (e.g. the redevelopment of Federal sites or redevelopment of former commercial and/or industrial sites), identify, by means of a supporting servicing study, any system solutions required prior to approval of the application.
  - Where works are required to address capacity constraints, complete the works through the City’s rehabilitation program, the developer’s efforts (for smaller developer-led projects) or a front-ending agreement before approving a development application for the site.
  - When a development application has been approved and a building permit issued, keep a record that capacity to service the development has been committed.



- When capacity is recorded for intensification areas, it will remain at least for the duration of the site plan or subdivision agreement. If the development does not proceed as planned, then the information will be removed or the amount revised according to new information.

### 6.1.2 Make Collector and Spine Capacity Available for Intensification

Given that the Official Plan encourages intensification projects to make use of existing infrastructure services, water and sewer capacity in the City's collectors and spines must be made available to accommodate these future projects. Competition for this collector capacity may come from both existing properties inside the Greenbelt and occasionally from new projects in 'Greenfield' locations. To support its objectives, the City will ensure that all of these situations can be accommodated without detriment to the other. In an aging system with some collector and spines determined to be 'at capacity', this remains a key issue.

In areas in which combined sewers are still in place, intensification continues to present a challenge to already taxed systems. The City has been looking at its ability to address this operationally. In this regard, examples of studies completed and solutions implemented by the City in recent years include:

- Sandy Hill Drainage Area Flood Control Project
- O'Connor Drainage Area Flood Control Study
- Preston/Brown's Inlet Drainage Area Flood Control Study and Implementation Projects
- Rideau River Collector Capacity Improvement Projects
- Regulator Upgrades and Real Time Control Project
- Glen Cairn/West Nepean Flood Mitigation Project
- City-wide Trenchless Rehabilitation and Infrastructure Renewal projects

Even in partially-separated areas that were built in the period from 1950 to 1961, there are instances in which the system can surcharge due to wet weather flows and the City continues to identify major solutions.

Both water and sewer systems must be assessed in terms of present ability to service developments as well as future ability under a variety of intensification conditions. As capacity is available for dry weather flows, the challenge is to determine the capacity of a varied and aging system under a variety of potential future wet weather flows and then to address these issues through a number of means such as flow removal, increased conveyance, and local flood protection.

To determine when and how potential capacity issues could occur, more in-depth analysis of the impact of future growth on both the collectors and spines is being completed and solutions for these issues are being

determined. While the process of addressing any weaknesses in the capacity of this vast system of sewer pipes, pumping stations, and force mains continues, the City is also committed to supporting the growth of the general community in an economical and efficient manner. It is critical, therefore, to ensure that sufficient capacity to service future intensification projects is facilitated in key parts of the water, sewer and drainage systems. In some particular cases, ensuring this capacity for intensification is available may need to be addressed prior to meeting all of the requirements of specific Greenfield developments that rely on these same pipes and/or pumping stations, etc.

**The City will:**

Identify, by collector and spine, the capacity anticipated to be required for future intensification projects. Where there is a capacity constraint related to a collector or spine, the City will ensure that capacity to support a spectrum of intensification projects will be available.

In order to implement this policy, the City will over time:

- Continue to monitor and measure the existing capacity of collectors and spines that service areas inside the Greenbelt. Give special attention to collectors such as the West Nepean and Ottawa Outfall-Interceptor System that serve combined sewer areas and are subject to Ministry of Environment Procedure F5-5 which regulates Combined Sewer Overflows.
- Continue the monitoring of collectors, which includes an analysis of historical flooding. Assessment of capacity will include both current available capacity and potential capacity under conditions in which improvements to the local street systems are made to accommodate intensification (this could result in reduced capacity in collectors and spines).
- Continue to identify the trends regarding future intensification projects on an annual or semi-annual basis, continue to supplement this information by consulting with the industry and community representatives and take this information into consideration for rehabilitation programs.
- Review and determine the means and cost of providing capacity in the related collectors and spines to accommodate the targets, use, locations and phasing of future intensification that is anticipated within the time frame of the Official Plan and consider targeted intensification areas in operational (e.g. real-time control) and capital plans and programs.
- As an interim measure, record capacity information in current data base systems for future retrieval to enter capacity-related information into appropriate models.

### 6.1.3 Identify and Rectify Intensification Constraint Areas

Over the years, the City has collected information with respect to wet weather flooding and has used this information to pinpoint particular areas in which the sewer system is in need of attention. The information is also helpful as a basis upon which to predict if intensification in certain locations will further tax systems and increase the potential for flooding in wet weather. Within these constraint areas, the City considers it important to take timely steps to address surcharging to protect existing residents prior to entertaining any larger-scale intensification projects.

#### The City will:

For intensification areas, continue to identify growth constraint locations where the risk of wet weather flow conditions could lead to greater occurrence of basement flooding and rectify the problems.

In order to implement this policy, the City will over time:

- Continue to collect and maintain flooding information as a means to address pockets of historical flooding and to determine solutions.
- Give priority to the monitoring and modelling of identified flooding situations in intensification areas with density targets inside the Greenbelt.
- Continue major studies such as Wet Weather Flow Management and capacity studies for identified constrained sewer areas (e.g. Preston, O'Connor) and to implement solutions.
- Identify, through flow monitoring, area infrastructure plans, and other capacity studies, the level of intensification that the infrastructure in each of these areas could support and the work that must be completed to rectify problems.
- Recommend projects to correct capacity issues through the Capital Budget either as part of the annual rehabilitation programs or individually as development charges and water rate funding permits.
- Allocate additional resources to undertake monitoring and modelling and studies in order to complete this work on a timely basis.

### 6.1.4 Reserve Local Capacity for Intensification

If the City is to accommodate growth, where the infrastructure systems (roads, sewers, water, schools, recreation services, etc.) are in place, then it must take steps to also support future development wherever local system constraints exist. Therefore, wherever possible, sufficient capacity to meet both the needs of existing

properties and growth will be reserved in existing local infrastructure systems. The City will not jeopardize identified servicing levels for existing properties but, after addressing critical needs, resources will be focused upon projects that can provide both capacity for intensification and the maintenance of acceptable service levels for existing properties.

**The City will:**

Identify specific levels of service for collector drainage areas serving properties within potential intensification areas.

In order to implement this policy, the City will over time:

- Determine appropriate levels of service for collector tributary areas related to intensification areas with identified density targets.

**The City will:**

Within the context of servicing levels identified for intensification areas, undertake works to provide capacity in the local water and sewer systems to accommodate growth as per its emplacement guidelines (See Appendix B, City of Ottawa 2004 Development Charges Background Study, August 25, 2005 for the guidelines) or identify the works that are required to provide capacity.

In order to implement this policy, the City will over time:

- Regularly update area population, employment and housing projections for use in determining changes in water and sewer demand;
- On a regular basis (semi-annual or quarterly), analyze current information to determine, within established levels of service, available capacity to service specific anticipated major intensification projects through more detailed capacity management plans; and
- Allocate additional resources to complete the work of issue-based analysis and modeling of the local sewer system's capacity on a timely basis.

**The City will:**

When flow has been removed as a result of major intensification projects within a collector tributary area, reserve this freed-up capacity to support future intensification projects.

In order to implement this policy, the City will over time:

- Develop a centralized and coordinated information system with respect to sewer system capacity in relation to intensification areas.
- On a semi-annual basis, consult about the needs of growth and the capacity freed for growth as a result of compensation projects and other flow removal works (see Section 6.2, Public and Private Capacity Improvement Projects).

### 6.1.5 Add 'Growth Potential' to Rehabilitation Criteria Priorities

The City has identified potential general locations for future development and redevelopment in the Official Plan. While there are many opportunities to meet the Official Plan's future intensification targets, some of the potential locations for intensification can only be provided through redevelopment. Most of the sites may have sufficient servicing capacity to handle additional mixed-use development. Where this is not the case, the City can ensure that projects in its rehabilitation programs accommodate both future growth and existing properties in identified areas and that these projects are given more priority. This can be accomplished by including an additional criteria or weighted value related to 'intensification potential' as part of the determination of the City's priorities for rehabilitation work.

#### The City will:

Add 'intensification potential' to its present list of criteria to assess priority for its rehabilitation programs.

In order to implement this policy, the City will over time:

- In relation to its water and sewer rehabilitation programs, add an evaluation criterion or value for projects that have the ability to service identified intensification areas and projects, particularly ones with density targets; and
- After addressing critical risks to private property and the environment (e.g. a broken pipe, a collapsed sewer, repetitive flooding situations), review rehabilitation project lists and other major projects in light of growth pressures and give additional priority to projects that can both service intensification areas with density targets and maintain the defined level of service for existing properties within the sewer shed.

### 6.1.6 Assess Impacts of Climate Change on Capacity Management

Although the City has an abundant supply of water, available information on climate change suggests that climate change could negatively affect current capacities of the City's sewer systems. Climate change impacts are anticipated to include an increase in extreme wet weather events although generally conditions may be drier for the latitude that includes Ottawa.

Climate change impacts are very difficult to predict and many organizations are pursuing answers including the Federal government, other municipalities and Engineers Canada. If green infrastructure measures, such as swales or permeable parking lots, are not vigorously pursued, sewer design standards may need to be changed and sewer systems rebuilt over time to handle a greater intensity of rainfall expected from climate change. As intensification can burden systems that are at capacity, the City could consider actively pursuing green infrastructure or changes such as dual storm drainage systems rather than an option of enlarging new pipes. Other options include building storage into the system to accommodate the impacts of climate change.

**The City will:**

In its investigation of the potential impacts of climate change on its sewer systems, take into account the factors related to the accommodation of future intensification in constrained systems.

In order to implement this policy, the City will over time:

- Research and investigate the literature available on the anticipated impacts of climate change on sewer systems in similar climatic areas to that of Ottawa and ensure that the complexity of factors related to constrained sewer systems and growth pressures is thoroughly assessed in relation to any system changes resulting from this investigation; and
- Where specific measures are pursued to mitigate the impacts of climate change on the sewer systems, give greater consideration to the construction of green infrastructure measures and to corrective and rehabilitative measures such as dual drainage designs where existing systems are most constrained and intensification is anticipated.

## **6.2 Public and Private Capacity Improvement Projects**

Annex 1 includes a listing of the City's investigation and rehabilitation programs that are intended to both improve system capacity to support intensification and protect existing residents from basement flooding. In addition to these programs, the City will continue to undertake some specific projects to address capacity issues. There are also a number of innovative ways in which the City and the development community could cooperate to support intensification while the City continues to carry out the rehabilitation of its older systems. By pursuing and implementing a variety of initiatives, the City will address sewer capacity concerns.

### **6.2.1 Potential Extraneous Flow Removal Projects in Partially-separated Sewer Areas**

The partially-separated system presents a particular challenge in supporting intensification due to its performance during intense wet weather events. Under the Disconnect Programs of the former municipalities, many of the smaller, less-costly projects have been completed and the larger, more complex projects remain.

The City will continue to encourage individuals to disconnect their downspouts and weeping tile to avoid flooding under intense wet weather conditions. However, this alone may be insufficient where future growth is anticipated. To service intensification, priority will be given to completion of major projects in the locations expected to be of primary interest to developers. A list of the ‘disconnect’ infrastructure projects has been developed over the years and additions to the list will be made as solutions for local flooding continue to be identified.

#### The City will:

In the partially-separated sewer system, give priority to extraneous flow removal projects that provide capacity for intensification as well as benefit for existing properties.

In order to implement this policy, the City will over time:

- Develop a list of priority extraneous flow removal projects from previous lists from the former cities of Ottawa, Vanier, Nepean, and Gloucester and more recent additions as they relate to historical flooding situations;
- Consult regarding priorities for the completion of a suite of flow removal and green infrastructure projects in relation to priority intensification areas and projects; and
- Make revisions to priorities when the maintenance of designated service levels for existing properties will not be jeopardized.

### 6.2.2 Initiatives to Protect Private Property

The original core of the city contains combined sewers (the original sewers built before 1951 and newer combined sewers that were replaced after 1995), a few partially-separated sewers and fully-separated sewers (built after 1961). Surrounding this original combined sewer area like a half-donut is the predominantly partially-separated system built approximately between 1951 and 1961. These years were a time of major expansion for Ottawa, when population growth far exceeded expectations and the City doubled its infrastructure to both accommodate this increase in households and support the development of the original suburbs.

With combined sewers, both sanitary and storm flows enter the system and are conveyed to the treatment plant. Older residential properties in the combined sewer area rarely have weeping tile. During rainfall events, drainage from rooves and downspouts as well as lot drainage can enter the combined system through street grates unless drainage is retained on the lot. In combined sewer areas, wet weather flows can exceed system capacity particularly when there are high intensity storms. When this occurs, overflows in the sewer system are

conveyed to the river, which is not desirable from an environmental standpoint and could be in contravention to Ministry of Environment procedure F5-5.

With partially-separated sewers, although the road drainage is conveyed through separate storm sewers, much of the property drainage (e.g. rooftop drainage, through eaves troughs and downspouts, and roof and some lot drainage, through weeping tile) remains connected to the sanitary sewers. The partially-separated system is particularly sensitive to wet weather flows through these connections. In extreme storm events, the additional water from rooftops and foundation drains floods sanitary sewers that were not designed to take this volume of flows. After 1961, a new by-law prohibited connections of weeping tile and roof drainage to the sanitary sewers.

The City is exploring all feasible options to support growth through intensification while protecting existing properties and the environment. The concern for existing properties is particularly strong within the combined and partially-separated sewer system areas. Most new development projects should be able to incorporate adequate flood protection devices to ensure that individual basements will be protected. This includes: back flow valves in the combined sewer area; back flow valves on the sanitary sewer and a sump pump in the partially-separated area and a back flow valve on both of the sanitary sewer and storm sewer and a sump pump in the partially-separated area when the hydraulic grade line indicates this additional need.

In addition to this, compensation projects must be undertaken in conjunction with new development whenever feasible as it is important that intensification not reduce the designated level of service for existing properties. For the additional compensation works (flow removal projects that result in no net increase in surcharging of a system due to new development or redevelopment), offering a choice of cash-in-lieu or completion of compensation projects within the same collector drainage area could present developers with less-expensive options with equally-effective results as a project that the City would need to undertake. Provision could also be made for developers to share credits in cases in which one developer could undertake a compensation project with more benefit than another within the same collector drainage area (see Section 6.2.3 Alternative Compensation Projects). The City's overall concern would be that sufficient compensating flows be removed within the collector drainage area to justify a credit towards the development project.

For the cash-in-lieu option, the City would determine priorities for projects ahead of time and apply the funds according to its priorities. Cash-in-lieu would always be applied to municipal capital works.

This policy will require a well-designed implementation plan to accompany it.

Therefore, for any development or redevelopment projects within the intensification areas,



**The City will:**

1. Require, where deemed advisable, applicants to undertake measures that would protect structures from future flooding (e.g. sump pumps, back flow valves, slab on grade construction).
2. Require new development and redevelopment to undertake stormwater management, green infrastructure and/or a combination of other compensation projects (e.g. roof gardens, rain barrels, permeable surfaces, parking lot retention, etc.)

In order to implement these policies, the City will over time:

- Prepare a list of publicly built works and potential compensation works (flow removal) in collector tributary areas that are at capacity under wet weather conditions;
- Discuss compensation works during pre-consultation or at the time of site plan or subdivision review;
- Discuss the importance of retention of stormwater on-site with all clients seeking approvals under the *Planning Act* for properties within the combined sewer area;
- Produce information regarding on-site storage and post the information on its web site and at Client Service Centres.

**The City will**

For intensification projects, where extraneous flow removal is restricted, explore other opportunities for flow removal through such means as cash-in-lieu and/or alternative off-site compensation projects.

In order to implement this policy, the City will over time:

- Explore with inner-city developers where there may be opportunities to remove flows from their own properties or other properties within the same collector tributary area – or in other constraint areas;
- Where on-site compensation is not possible, explore development of a program where developers can provide cash-in-lieu of on-site compensation work so that the City can undertake larger works that will maintain and/or improve sewer system capacity or offer other off-site compensation works undertaken within the same drainage area;
- Where any innovative measures require a new by-law or program to facilitate them, bring a report forward for Council approval.

### **6.2.3 Alternative Compensation Projects**

Some of the larger developers in the city both build and manage properties (this includes private developers, government and public agencies). There may be instances related to existing properties, in which opportunities are available to remove flows from the sewer system through disconnection of flat roofs, construction of roof gardens, parking lot retention, on-site storage, etc. Through the Greater Ottawa Home Builders Association (GOHBA) and the Building Owners and Managers Association (BOMA), the City will undertake the exploration of these opportunities and work with private property developers to encourage these types of projects. For those developers who participate, the City will provide credits towards requirements for compensation projects and/or facilitate the exchange of credits among these developers. The goal would be to facilitate improvements to the system with the least cost. These works will be voluntary and through individual agreement with the City. The amount of the credit would be determined by the flow removed through a compensation project and the benefit for the system (e.g. flow removed upstream in the system would have more benefit than the same flow removed downstream in the system.) Arrangements between developers would be left to the individual developers, but the City would oversee and inspect privately completed works.

Both the City and other government and public agencies are also major managers of properties in Ottawa. Therefore, the City will not only work with private developers on this initiative but also lead by example by reviewing its own opportunities to remove flow whenever developing properties and it will approach other government levels as well.

#### **The City will:**

Explore opportunities for contributing to alternative compensation projects that could help to reduce and/or delay the construction of future infrastructure capital works.

Such a program will incorporate the following features:

- Identification of compensation works for existing properties (type of project, location, drainage area affected, amount of flow removed, benefit to the system due to location, developer credited, completion date).
- Identification of the intensification project to which the flow credit would apply (project details such as size, type, location, drainage area affected, impact on the system due to location, developer to be debited, completion date).

In order to implement this policy, the City will over time:

- Meet with major property developers (who build and manage buildings) to determine if such a program has merit and if there are opportunities to remove flows from existing properties;

- Depending upon the conclusions, seek to establish, with the development community, a voluntary program to allow for a credit system with respect to removal of flows from existing properties to off-set flow restrictions for infill and intensification projects;
- Review compensation proposals to receive flow credits against flow debits and to determine, through modeling, system benefits due to location of the works;
- Provide through the program, credits to the developer for flow removed.

Flow credits can be used by the developer to offset compensation requirements within the same collector drainage area or can be exchanged with another developer who is building within the same collector drainage area. For example, an owner might be able to remove X litres per second as a result of developing a roof garden and disconnecting the downspout on a flat-roofed apartment building and remove another X litres per second through a combination of on-site storage measures at another location. Depending upon the location of the projects along the pipe, with these credits, the developer may be able to develop on a new site where this otherwise would be restricted without a third-pipe solution or construction of a new sewer. Or he/she could give the credits to another developer with a proposal in the area in exchange for credits he/she may have related to another collector drainage area of interest.

- Sign an agreement with the developer(s) involved in the program;
- Register the agreement on the title of the property and add a map, for easier future reference, to situate the property; and
- Track the actual removal and uptake of flows through the agreements.

#### 6.2.4 Discourage Design Features that Increase Flooding

Occasionally, City requirements intended to address other issues could result in a conflict with the municipality's desire to reduce flooding on private property. For example, both the City's private approach by-law and its zoning by-law contain slope requirements. The one is intended for private property and the other for public property. With depressed driveways, the requirements of the two by-laws needed to be harmonized. By harmonizing the requirements of these by-laws at the lot line, both concerns were satisfied with a minimum of design adjustment.

For esthetic, planning and logistical reasons, depressed driveways are a positive design feature for some narrow infill sites and yet, in combined sewer drainage areas, they increase flows into the sewers and require corrective measures and potentially a warning of the implications for the homeowner. Therefore, depressed driveways should be strictly limited.

Whenever these types of situations come to light, the City will take steps to reconcile any of its design, placement, etc. requirements that do not support its objective to reduce private property flooding.

**The City will:**

Resolve any situations in which its requirements lead to design features and/or lot configurations that contribute to flooding in intensification areas.

In order to implement this policy, the City will over time:

- Be sensitive to and identify design features and/or lot configurations that could contribute to flooding of private property along with any new design features or solutions (e.g. green buildings with on-site storage that would alleviate flooding);
- Review planning and building processes and municipal engineering requirements for both private development and public facilities to determine potential conflicts and to jointly recommend solutions (e.g. require a grading plan review and corrective measures such as back flow valves and sump pumps for depressed driveways as a condition of their approval); and
- Where useful, such as in the case of depressed driveways, develop information for the public to inform citizens of the implications of such designs for its sewer system and the homeowner's property.

### **6.2.5 Use of Green Technology**

The benefits of green building technology are gaining recognition in North America. While many of the features related to green building technology focus on building materials, insulation and house construction/reconstruction techniques, there are both housing and lot measures that can be considered 'green' and that contribute to the reduction of water use and stormwater leaving the lot. Many people would be willing to undertake these measures to benefit the environment but they require information on what to do, how to do it, firms and/or agencies that can assist them to do it, the benefits of doing it, etc. The City can both provide local information specific to the Ottawa situation and provide web sites and hard copy documents that would be of benefit to residents generally.

**The City will**

Encourage all intensification projects to use green building technology so that any additional demands on existing infrastructure systems can be minimized.

In order to implement this policy, the City will over time:

- Prepare information on green building technology for distribution to the development community when it applies for building and planning approvals, at Client Service Centres and through GOHBA, BOMA and the Ottawa Construction Association and encourage the Ottawa Housing Corporation to model new technologies;
- Conduct or facilitate seminars encouraging uses of green building technology in new development and redevelopment projects, focusing on projects and retrofitting that would minimize demands on water, sewer and drainage systems;
- Investigate the use of the Green Municipal Investment Fund and/or the Green Municipal Enabling Fund to further the public's knowledge of means to construct and/or retrofit homes in ways that reduce demand on underground infrastructure systems.

#### The City will:

Explore the use of green technology in relation to its infrastructure construction and reconstruction projects so that the demand on existing infrastructure systems can be minimized. Exploration will include the municipal role in facilitating such options as green infrastructure, potential reuse of grey water or reuse of heat generated from private property.

In order to implement this policy, the City will over time:

- Research and consult about potential green infrastructure projects that could positively impact water, sewer and drainage systems;
- Prepare a report to make recommendations to Council about green technology that could be used to maximize the reuse of such resources as water and heat; and
- With Ottawa Housing Corporation, implement the results of this exercise in City infrastructure projects wherever possible where there will be positive impacts on water, sewer and drainage systems.

### 6.3 Intensification Benefits in Partially-separated Sewer Areas

Intensification in partially-separated areas (e.g. under severance conditions, minor variance, redevelopment of properties, etc.) can actually be beneficial for sanitary system capacity when new development or redevelopment does not greatly increase the population being serviced and developers undertake disconnection measures required for development approval. Few in the public would readily believe that often infill projects could improve the situation unless the dynamics related to the functioning of partially-separated systems are explained. Therefore, the City will prepare information in layperson terms to explain the potential benefits of intensification and widely distribute the information to the public.

It should be noted that development, on vacant properties or a change in use (e.g. school site changed to housing) that results in a doubling or more of the population, may not provide these benefits for the system unless they are accompanied by further system improvements. As well, greater levels of intensification can tax partially-separated storm pipes during wet weather. These and any other qualifications will be acknowledged in education materials.

Within the partially-separated areas,

**The City will:**

Continue to encourage small and moderate-scale intensification (see Section 6.1.1) when disconnection requirements are met. The City will provide information to the public to better inform citizens of the benefits of these projects for improving system capacity.

A well-developed public education campaign will include the following features:

- ❑ In easily understood terms, apprise citizens of the potential benefits of intensification on underground infrastructure when disconnect measures are taken;
- ❑ Provide examples and illustrations of the way in which development projects can improve system capacity;
- ❑ Inform citizens within partially-separated and other constraint areas of ways to protect their own properties from flooding;
- ❑ Inform citizens of the mechanics of flood-protection devices, identify properties at risk of flooding, explain the principles of flow management; and
- ❑ Distribute timely information to people and locations that will best ensure that the public is well informed about measures specific to individual properties.

In order to implement this policy, the City will over time:

- Continue to provide engineering approval of intensification projects within partially-separated areas where required disconnection measures are carried out;
- Publish information for public distribution highlighting the potential benefits of intensification projects to the partially-separated system where disconnection measures have been taken. Such information will be available on the City's website, distributed with the water bills for ratepayers, and be available at Client Service Centres;

- Distribute information to new home buyers through real estate agencies, GOHBA, BOMA, and developers' offices;
- Prepare information for community newspaper articles.

## 6.4 Funding Capacity Works

One of the primary challenges in providing capacity in aging infrastructure systems to support intensification is the level of funding available to undertake the work required. Investigation and analysis of infrastructure systems is costly and time-consuming. Rehabilitation of deficiencies in capacity usually involves the coordination of road, water and sewer works as well as utilities. It is easier to build new infrastructure systems than to replace existing ones, aside from the fact that these new additional pipes and facilities must themselves be replaced in later years.

With aging infrastructure systems serving areas of intensification, the City must pursue a number of programs to both support intensification and ensure that existing residents and non-residential properties are well-served. A rationale sometimes given for the lack of developer contribution to infrastructure rehabilitation projects is that they would be completed regardless of whether growth occurred. While this argument has merit in some instances, the existing sewer system inside the Greenbelt does require upgrading, and rehabilitation projects reduce inflow and infiltration, thus providing capacity for growth. There are also other means by which capacity to support intensification can be provided and the Infrastructure Master Plan focuses on these opportunities for the City and the development community to work together, sometimes in innovative ways, to provide a spectrum of works and funding mechanisms to bring these about.

### 6.4.1 Front-ending Infrastructure Required by Intensification

The City has a front-ending policy to accommodate the needs of development when works are required prior to their anticipated municipal construction date. This policy may require amendment to accommodate intensification situations (e.g. advancing wastewater reconstruction and rehabilitation projects). Where front-ending 'pay-back' from the City is anticipated, it will be tied to the year in which the reconstruction or other rehabilitation works have been programmed in the City's Capital Budget.

For most required projects, developers will be responsible for the specific works to accommodate their developments. The City's mechanism for 'pay-back', development charges, is related primarily to larger infrastructure that may include the replacement of an existing pipe and/or facility. If there is a question of responsibility for the works, the City's emplacement guidelines should be consulted. In instances in which additional infrastructure works will be required to accommodate more than one intensification project, the City can make use of the front-ending agreement provisions contained in the *Development Charges Act*.

**The City will:**

Use its front-ending policy and/or negotiated agreements to accommodate the special needs of intensification projects within the following guidelines:

- Provide for individual front-ending agreements and/or negotiated agreements between the City and developers whose intensification projects will require additional major infrastructure and/or require the advancement of major rehabilitation work and/or require enlargement/ change of planned infrastructure.
- If intensification projects require the advancement of major new or rehabilitation works, permit the developer to fund these works with reimbursement scheduled in the year the works are planned for construction.
- Encourage developers to undertake local works to accommodate their developments where such works are not of sufficient size to be included as development charge projects.
- If projects will benefit more than one development, make use of the Front-ending Agreement provisions of the *Development Charges Act*.

In order to implement this policy, the City will over time

- Review its front-ending policy to ensure that larger municipal works required for intensification projects are eligible;
- Continue to prepare a three-year rehabilitation program (which will be updated annually);
- Negotiate the front-ending agreements with developers where applicable;
- Verify that the front-ending provisions of the *Development Charges Act* can be used in cases in which local infrastructure works must be funded by a developer to permit construction of his intensification project and such works benefit more than one developer;
- Prepare the background for and draft, agreements when required.

There will be corporate implications related to front-ending agreements between a developer and the City and these will need to be carefully considered in light of the City's Long Range Financial Plans. With respect to each individual front-ending agreement with the City, the project(s) and expected construction date(s) must first be included in the Capital Budget.



Otherwise, required infrastructure projects to support intensification projects are to be funded by the developer. Where the City is involved in the administration of private front-ending agreements among developers, staff costs would be offset as per the provisions of the *Development Charges Act*.

#### 6.4.2 Pursuing Water Efficiency, Water Loss, Green Infrastructure and Flow Removal Savings

In addition to the City's rehabilitation programs, the flow removal, water loss and the water efficiency programs effectively contribute to increased water and sewer system capacity. Examples of projects that could be undertaken by citizens and/or developers include: disconnection of flat roofs, roof storage, local underground storage, parking lot storage, infiltration swales, curbside stormwater retention areas, rain barrel systems, alternate day watering, etc. City projects include: replacement or relining of pipes, a variety of surface measures to keep stormwater from entering sewers, etc.

Under the current rules of the *Development Charges Act*, only the growth portion of capital projects can be charged to a Development Charges By-law. While flow removal and water efficiency projects do result in the reduction of flows entering the sewer system and, thus, allow future room for flows generated by growth, they are often not specifically growth-related capital projects. The *Development Charges Act*, in effect, encourages the City to build new larger pipes rather than pursuing measures (operating and capital) that would result in similar benefits at a much lower cost. This is an issue that merits further discussion with the development community. Once capacity-building projects under the water efficiency, water loss, green infrastructure and flow removal programs are identified, the City should consult with representatives of the development community so that the financial benefits of these works in place of more costly traditional capital projects can be fully understood. If the financial benefits are fully explained and illustrated, developers may be amenable to the voluntary pursuit of funding these less-costly projects.

#### The City will:

In recognition of the potential lower-cost opportunities to provide capacity for growth afforded by water efficiency, water loss, green infrastructure and flow removal measures, explore the use of development charges or an alternative source of growth funding to provide greater support for these programs.

In order to implement this policy, the City will over time:

- Further develop the water efficiency, water loss, green infrastructure and flow removal programs and list projects to be completed within the next five-year period with the cost estimates for these projects. Priority will be given to intensification areas with density targets identified in the Official Plan and community design plans;

- Explain these programs to representatives of the development community, including the financial benefits of pursuing this option. The representatives will be given three alternatives;
  - ❑ To jointly voluntarily fund water efficiency, water loss, green infrastructure and flow removal projects through development charges by endorsing the City's use of development charges for these programs (based upon funds equivalent to the major capital projects or percent of major capital projects that they would replace);
  - ❑ Decline the use of development charges for these programs and continue to pay towards the more costly major capital works; or
  - ❑ Adopt a Voluntary Program under which individual developers can opt to fund water efficiency, water loss, green infrastructure and/or flow removal works within a collector drainage area that are equivalent to the cost of the water and sewer portions of their development charges and be exempted from paying that portion of the development charge.

If there is agreement to funding a portion of these programs in the future under development charges, the programs and amount will be added to the list of development charges projects. If there is no agreement, development charges will continue to reflect the cost of major capital projects required without the benefit of water efficiency, water loss, green infrastructure and flow removal works.

Once a funding source has been determined and secured for the programs, the City will develop a public information strategy to inform the public about the details of the water efficiency, water loss, green infrastructure and flow removal programs and to encourage the support of the public in assisting the City to attain the objectives of these programs.

### **6.4.3 Exploring Alternative Funding Sources**

Given the variety of demands on existing municipal funds these days, it will be necessary for the City to give priority to the consideration of all potential sources of funding for infrastructure initiatives that would provide capacity for intensification. Other municipalities in Ontario use similar sources as the City (e.g. development charges, sewer charges). There are also some interesting approaches used in municipalities in the United States and Europe to fund stormwater management projects that might be worth pursuing. Potential sources of funding include: a revolving fund, linked deposit programs, loans, water rights exchange, resource reductions and a foundation.

There are also means of raising funds that are pertinent to sewer systems that are at capacity. One such method used in the United States is to measure the percentage of each pipe being allocated to storm infiltration (this

could be based on the run-off from a specific lot). Then Equivalent Runoff Units can be used to compare run-off from different properties to determine if the standard is appropriate and to adjust it if required. Flow allocated to individual units would then be based upon dry weather flow and this set amount of infiltration. Growth would pay through development charges or other funding source for a portion of the pipe flow accordingly (with the costs determined and distributed based upon anticipated dwelling units within the time span of the Official Plan). Current users would pay through the sewer rates. The funds paid from growth projects could then be used to fund projects that would increase the capacity of the systems (e.g. storage, pipe bursting, etc.).

The objective of the research would be to find new, appropriate and equitable sources of funding so that growth can both be encouraged and supported without it placing an undue burden on the tax base for existing properties.

#### **The City will:**

Give priority to the use of development charges funding and the exploration of other feasible funding opportunities to support capacity management projects in intensification areas.

Such opportunities will include but not be limited to:

- Use of development charge funding for the growth portion of projects completed within the City's rehabilitation programs (e.g. enlargement of pipes, new sections, enlargement of pumping stations, etc.).
- Make representations to the Federal and Provincial governments to financially support projects (e.g. the Provincial government in light of the PPS, Federal programs through the Federation of Canadian Municipalities such as the Green Funds).
- Exploration of changes to development charges such as: elimination of discretionary exemptions and exemption areas, recognition of growth capacity allowances in rehabilitation projects, improved accuracy in estimates.
- Coordination of development charge and water rate funding to support capacity management projects.

In order to implement this policy, the City will over time:

- Further research alternative funding sources used in other municipalities to support stormwater management or systems at capacity and the use of these sources to support the strategies contained in this document;
- Where found applicable, make recommendations for use of these alternative sources;

- If pursuing development charges to more fully support the water efficiency, water loss, green infrastructure and flow removal programs is not accepted by the development community, explore a special levy for new properties inside the Greenbelt to finance these programs. This would be combined with a future reduction in major capital works projects that would no longer be required under development charges.
- Investigate the use of the Green Municipal Investment Fund and/or the Green Municipal Enabling Fund to address partially-separated capacity issues in conjunction with other work.
- Pursue other alternative funding mechanisms that appear promising from research it has completed.

## **6.5 Monitoring Capacity Management Initiatives**

The stage of planning that is sometimes forgotten is the timely monitoring of the policies and initiatives of the Plan to ensure that these are being carried out effectively and efficiently and that they are still the ones that will move everyone towards the objectives set out in the plan. As the City gains more data and analysis about the capacity in its infrastructure systems; as some of the earlier projects recommended in the Infrastructure Master Plan are undertaken, and as the City and the community work together on initiatives, it may be advisable to make some adjustments. These could include: a change in policy, a change in funding priorities, different ways of implementing the policy direction. The Infrastructure Master Plan will be reviewed every five years but for intensification areas, more frequent monitoring of the impact of changes to the infrastructure systems and their implications for any adjustments in the policies of this section of the plan should be undertaken.

### **6.5.1 Monitoring and Evaluating Progress**

The City will place greater priority on monitoring its infrastructure systems that service property inside the Greenbelt to ensure that the policies of this plan continue to be appropriate and are being implemented on a timely basis. Density target areas such as Mixed-Use Areas are sometimes adjacent to residential areas of known historical flooding. Additional local sewer information will be required in these areas. Where intensification is indicated by the Official Plan, community design plans, and secondary plans, priority will be given to ensuring that relevant information on both the local system and the collectors and spines will be generated and rectification of capacity issues well be addressed

#### **The City will:**

Monitor system changes on an on-going basis to identify the current and expected future status of the system's capacity as intensification and system improvements proceed.

In order to implement this policy, the City will over time:

- Continue to both model the sewer system and to monitor the capacity of the collectors and spines and to record the information so that it can be accessed in relation to intensification projects;
- For areas of intensification identified by the Official Plan, community design plans, and secondary plans, put more resources towards the modeling and detailed analysis of the local infrastructure system with regard to capacity constraints and opportunities;
- As development proceeds in these areas and infrastructure is replaced, record the information in a model on a quarterly basis so it can be accessed in relation to future intensification projects.

**The City will:**

Monitor and evaluate its progress with regard to allocating sufficient capacity in existing systems to support intensification and adjust strategies and implementation plans as required.

In order to implement this policy, the City will over time:

- Convene a meeting once a year with key staff to monitor the policies and implementation plans in this strategy and, where there is a need to make adjustments in implementation, to recommend this.
- Where change in strategic direction or other policy adjustments are required, prepare a report to propose changes
- Ensure that the capacity management strategy policies remain appropriate to implement and enhance the direction of the Infrastructure Master Plan.



## Section 7 – Existing Systems

### 7.0 Introduction

The focus of the Infrastructure Master Plan is the overall strategic directions and policies required to support integrated infrastructure planning for growth in the city. There is, of course, an important element of understanding of existing systems required to plan for extensions of existing systems and intensification within existing systems.

Much of the existing urban area infrastructure has been constructed over many years and it has been subject to changes in land use, changes in design standards, continuous growth in demand or intensified use and greater service level expectations over the course its history. Over the years, these pressures have been addressed through system optimization, renewal and rehabilitation initiatives to support the demand requirements

Given the optimization, intensification and level of service pressures to date, the current renewed focus on intensified use of these networks presents a renewed challenge in finding cost effective and timely solutions to meet both existing and growth service level expectations. Trunk transmission and collection systems assessments, modeling and real time monitoring programs are well developed and refined. One of the challenges for the City will be to enhance these types of initiatives to the collector, distribution and local sub networks representing the most significant proportion of current system inventories.

As in the past, in many instances, these requirements can be met through coordinated planning and rehabilitation efforts. In these instances, the issues, which must be addressed, are largely ones of balancing growth demand requirements and timeline considerations with existing level of service requirements and program priorities.

In some instances meeting the growth demand requirements may represent requirements for major works and initiatives which must be balanced with the significant capital and timeline constraints relative to the needs and priorities for service level considerations. These instances represent the most significant infrastructure challenge of the current growth management plan objectives. In keeping with the Official Plan direction regarding growth, the City will need to address questions such as:

- How can the City direct growth to areas where existing infrastructure can readily support that growth?
- How should the City manage capital resources to balance systems management with addressing growth pressures?

- What level of effort should the City undertake to maintain inventories of trunk and core system capacities and integrate existing level of service needs with growth demand planning requirements?
- What level of effort should the City consider in order to achieve sufficient analysis of local or subsystem needs and optimization opportunities in order to develop more comprehensive inventories of system capacities and identify opportunities for directing growth?

This Section of the Infrastructure Master Plan provides a brief discussion of the existing infrastructure systems as well as some perspective regarding the engineering and operational challenges to accommodating growth in existing infrastructure systems. It is beyond the scope of the Infrastructure Master Plan to determine all of the operational, maintenance and rehabilitation opportunities that might contribute to supporting growth. The integrating intent of the Infrastructure Master Plan, the infrastructure planning process presented in Section 2.3 and the implementing policies of this plan, will help to ensure continued coordination between growth planning and systems management, all towards ensuring that the overall priorities of the City are addressed in the most efficient and cost effective manner.

## **7.1 Public Service Areas**

Public service areas are those areas where the City provides for public water and wastewater services. In the urban area, new development is required to proceed on the basis of public services. Stormwater public service areas are discussed in Section 7.1.3.

### **7.1.1 Major Public Water and Wastewater Service Areas**

The greatest portion of the population of Ottawa is served by the central water and wastewater facilities provided inside the urban boundary of the city. These areas make up the largest Public Service Areas in the city. The serviced villages make up the other major public services areas (see Table 7.1).

### **7.1.2 Other Public Service Areas**

In addition to the major public service areas, there are a number of locations where the City provides public services. However, provision of those services is subject to unique constraints such as capacity limitations or restricted connection privilege. In these cases, it is usual to provide drinking water services only. The purpose of identifying these areas in the Infrastructure Master Plan is to ensure understanding and orderly planning of these unique areas. Complete references regarding the terms of service provision in these areas is detailed in separate municipal by-laws and legal and servicing agreements.



Each of the village water supply systems (except Manotick) operate as separate pressure zones and the supply infrastructure is designed to support delivery of water to a maximum population (Table 7.1).

The City has committed to sell water outside of the city limits to the Township of Russell. This will be supplied through a new pump station and watermain to be constructed in 2009. The pump station is to be located on Bank Street, between Blais and Rideau Road.

**Table 7.1 – Major Public Service Areas**

| Public Water Service Area        | Approved Service Capacity<br>(Dwelling Units or Equivalent)     |
|----------------------------------|---|
| Central Water Service Area       | Capacities defined based on existing infrastructure components. |
| Manotick Water Service Area      | 400*  |
| Vars Water Service Area          | 2000  |
| Carp Water Service Area          | 2000  |
| Richmond Water Service Area      | King's Park Subdivision<br>560                                  |
| Munster Water Service Area       | 1100  |
| Public Wastewater Service Area   | Approved Service Capacity<br>(Dwelling Units or Equivalent)     |
| Central Wastewater Service Area  | Capacities defined based on existing infrastructure             |
| Manotick Wastewater Service Area | Service Area defined.<br>Infrastructure not in place.           |
| Munster Wastewater Service Area  | 480   |
| Richmond Wastewater Service Area | 2,800   |
| Carp Wastewater Service Area     | 700   |

*\*Only water service to Manotick is currently available. Additional servicing is under construction.*

**Private Service Enclaves**

Within the Urban Area, there are a limited number of small communities that remain serviced by private wells and/or private waste disposal systems (see Figure 9). These communities are in well-established neighbourhoods that have either become surrounded by serviced lands or have been encompassed by expanding urban boundaries. Capacity to service these areas is available in existing systems; however it is not the policy of the City to extend services to these areas. There are mechanisms under the *Municipal Act* for residents of these areas to apply for the extension of service to them at their own cost. The Official Plan provides mechanisms for small-scale development on the basis of private services in these areas.

### **Greenbelt Property Servicing**

There are a number of developments in the Greenbelt, which have been provided with servicing. Federal properties and the Queensway Carleton Hospital are examples. Servicing of these properties has typically been completed under servicing agreements and the servicing capacity to these sites may be limited by agreements.

### **Transmission Main Servicing**

At some locations where transmission mains front property, limited connection to the transmission main has been allowed.

### **Stittsville North Water Service Area**

Public water with fire flow has been provided in an area north of Stittsville to remedy risk posed by groundwater contamination. Connection is limited to properties of record.

### **Carlsbad Springs Water Service Area**

The Carlsbad Springs Water Service Area provides a low pressure “trickle feed” to a specified number of lots in a defined service area. System capacities and connection permission are limited to lots of record at the time of implementation of the system. No fire hydrants are provided.

### **South Gloucester Water Service Area**

Water service was extended down Bank Street to Mitch Owens Drive and east for one concession to remedy risk posed by groundwater contamination. Limited connection was made available for properties of record along the route for a total of 210 units but no provision was made for extension.

### **Central Canada Exhibition Association Move to Rideau Road at Albion Road**

When the Central Canada Exhibition Association moves to Albion and Rideau Road, it and related properties will be serviced as provided for in the City Council Resolution of November 24, 2002.

### **Notre Dame de Champs Water Service Area**

Public water supply with fire hydrants has been provided to the Village of Notre Dames des Champs Station that abuts the urban area to provide service for 165 dwellings now existing in this area. No provision was made for extension.

### Fallowfield Water Service Area

Water has been extended east of Moodie Drive on Fallowfield Road to remedy a groundwater contamination problem.

### Private Water and Waste Disposal Systems

Most lands where development would be permitted in the Rural Policy Area of the Official Plan are to be serviced using private water supply and wastewater disposal systems. The City has a planning role to play that is central to the management and protection of the quantity and quality of groundwater systems servicing the Rural Policy Area.

By the year 2031, population projections indicate Ottawa's rural population will grow by as much as 31% to 112,000. In order to plan for this level of growth in areas where servicing is to be predominately on private water and waste disposal systems, the City will undertake programs geared towards the following:

- Safeguarding existing groundwater quality and quantity.
- Ensuring new development is located where it can be supported by an adequate supply of potable water.
- Ensuring new development is located where adequate wastewater disposal system can be provided on each development.
- Implementing "at source" pollution prevention measures where practical (e.g. septic system re-inspection).

### 7.1.3 Stormwater Service Areas

The City plays a role in stormwater drainage at all locations in the city. The City owns a large stock of piped and open drainage systems. Conditions are placed on new development regarding the nature and design basis for stormwater drainage. Roadside ditches, culverts, ditch inlets, catch basins, municipal drains and stormwater pumping stations make up other components of the City's drainage systems.

The City also plays an important role in stormwater management. Stormwater management includes a wide range of practices related to controlling the quantity and quality of stormwater collected by drainage systems and transmitted to outlets into local rivers and streams. The Official Plan recognizes that the planning of stormwater management should be at the subwatershed level. Service areas, and the terms under stormwater management which is provided, are defined in existing watershed, subwatershed, and master drainage plans. Such plans are being completed and will define the drainage and stormwater

management requirements for areas in the city. Section 5.2 describes the approach the City will take for stormwater management planning.

## **7.2 Public Water System**

The Infrastructure Master Plan identifies strategies, policy and major capital infrastructure projects for the public water system to accommodate **anticipated growth to 2031**. The planning of the existing public water system has been developed based on the following objectives:

- **Quality:** to provide drinking water that meets or is better than all federal and provincial health guidelines, standards and regulations.
- **Quantity:** to provide enough water to meet the needs of existing population and future growth, taking into account the patterns of peak demand and fire fighting needs.
- **Reliability:** to ensure a constant supply of water, even under emergency conditions such as the failure of a part of the supply system.
- **Demand Management:** to pursue demand **management** as one of the most cost effective means of ensuring sustainability in the City's water supply system.
- **Affordability:** to minimize the life-cycle cost of the water supply system in balance with adequate life cycle funding to sustain assets and level of service.

The design of Ottawa's water supply system has evolved over the years based on management practices, legislative requirements, engineering methods, public health and safety considerations. The water supply system is fully metered and completely self-funded (user pay). The current design practices and revenue streams (water rates, fire supply charges and development charges) have allowed the City to establish a water supply system, which provides a good level of service and value to the residents and businesses of Ottawa.

### **7.2.1 Public System Water Demands**

Prediction and planning for water demand is one of the most important elements of water supply master planning. Water **demand varies by** land use. For instance, there is a significant difference in water consumption in the more dense downtown area when compared to the surrounding suburban areas. The City continually monitors demand and updates its **forecasts on a regular basis**.

Planning for water demand includes making estimates and incorporating water demand patterns into design processes for basic day (no outdoor water use), maximum day (maximum consumption in a single day) and peak hour (highest hourly usage on the day of maximum demand) to ensure acceptable performance under most possible demand conditions. Demand management also includes initiatives to control demand. These are discussed further in Section 3.2.

Due to the high variability in water consumption patterns, especially during the peak demand period, separate water demand projections in each pressure zone are used to complete master planning. Table 7.2 shows the major pressure zones and the populations used to determine demand.

**Table 7.2 – Water Demand Projections for 2031**

| <b>Zone</b>         | <b>Population</b> | <b>Employment</b> | <b>Basic Day<br/>MLD*</b> | <b>Peak Day<br/>MLD</b> |
|---------------------|-------------------|-------------------|---------------------------|-------------------------|
| 1E                  | 150,640           | 105,880           | 69                        | 100                     |
| 1W                  | 212,700           | 262,685           | 118                       | 163                     |
| 2E                  | 105,910           | 21,791            | 34                        | 72                      |
| 2C                  | 120,648           | 62,372            | 52                        | 83                      |
| 2W                  | 132,868           | 126,473           | 62                        | 103                     |
| 3C                  | 137,055           | 53,815            | 46                        | 84                      |
| 3W                  | 143,023           | 50,359            | 50                        | 103                     |
| Barrhaven           | 27,825            | 14,064            | 11                        | 19                      |
| Total City<br>Urban | 1,030,669         | 697,439           | 442                       | 728                     |

\*MLD – Million litres per day

Figure 7.1 – City-wide Water Demand – Basic Demand

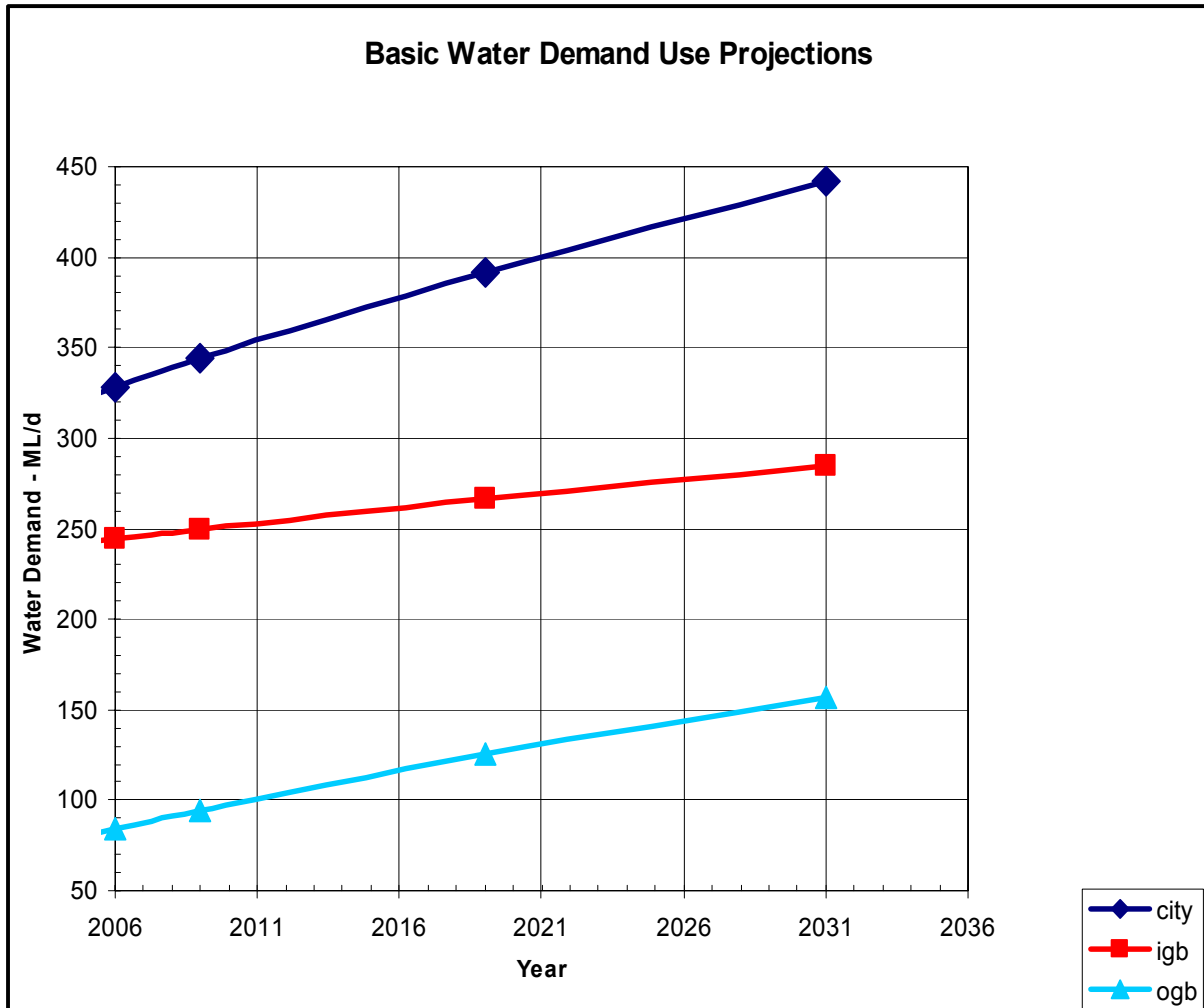
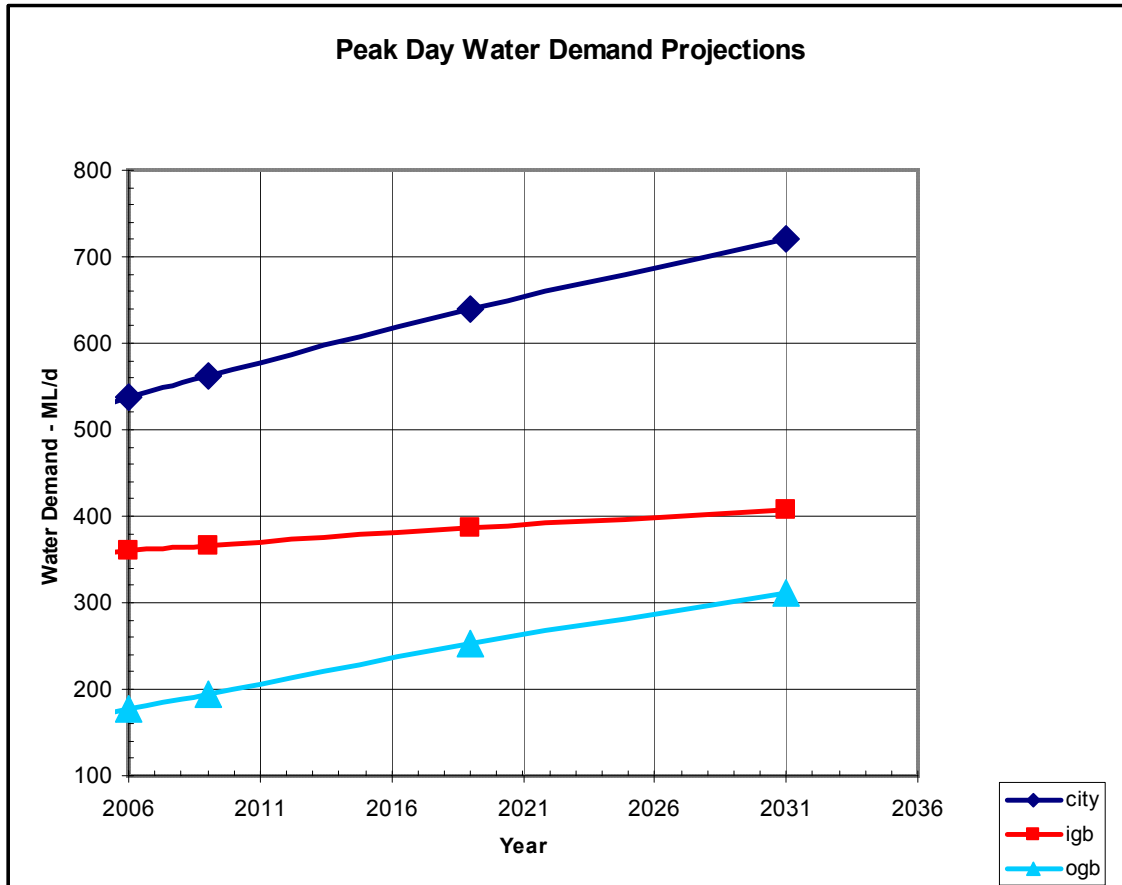
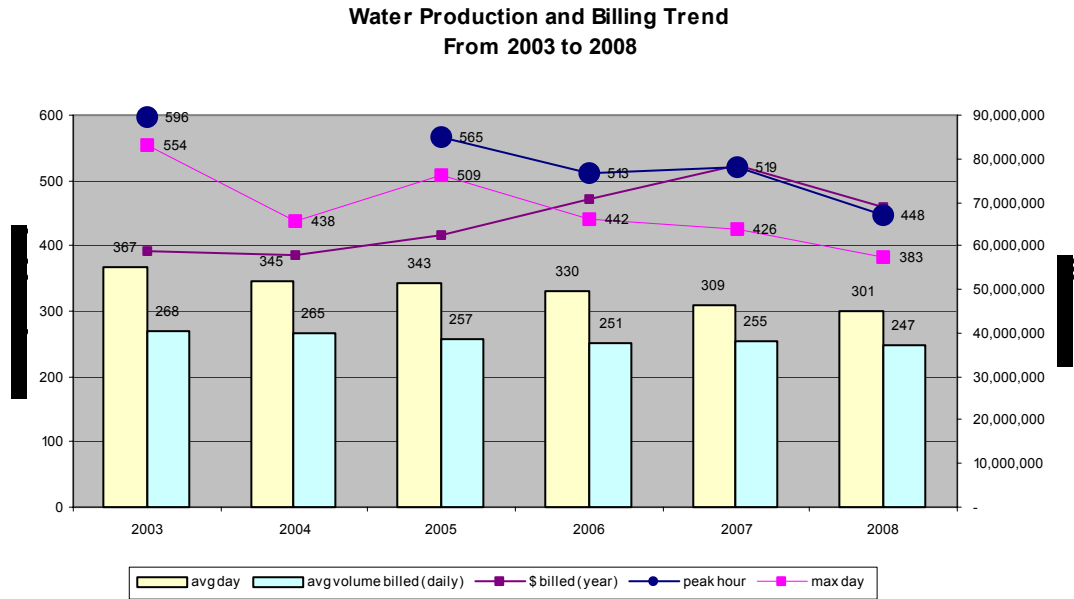


Figure 7.1 and Figure 7.2 show the predicted city-wide water demand over the planning period. These figures compare the expected serviced growth city-wide to that inside the Greenbelt (IGB) and outside the Greenbelt (OGB).

Figure 7.2 – City-wide Water Demand – Peak Day Demand





**Figure 7.3 Water Production and Billing, 2003 to 2008**

Since 2003, average daily water production has dropped by 18% and the maximum day water production dropped by 31%. Over the past 2 years, average water demand seems to be leveling off, however, it should be noted that the population has been steadily increasing since 2003; so water production per capita has been declining overall. Supply, demand and infrastructure renewal programs such as the Water Efficiency, Water Loss Control, and watermain rehabilitation and renewal programs combined have contributed to the reduction in water production within the City of Ottawa.

### Water Loss Control

Comparison of water production at the City’s central treatment facilities and the amount of water billed to customers indicates that not all of the water produced is accounted for in City water bills. In fact, approximately 16% of overall treated water production is considered to be “non-revenue” water production. In 2007, the volume of non-revenue water reported was 18,201 million litres and total water production was reported as 111,660 million litres. Non-revenue water is a known characteristic of public water systems, and the levels of non-revenue water in the City compare favourably with other similar cities.

Non-revenue water is likely the result of several factors including:

- Watermain and service line leaks



- Inaccurate system flow meters
- Inaccurate in-house water meters
- Watermain and service line breaks
- Un-billed authorized and illegal water-taking
- Fire fighting and fire hydrant maintenance
- Water system maintenance

The City has initiated an aggressive water loss control program that includes elements such as active leak control, speed and quality of repairs, and asset management. The main key performance indicator of the water loss control program is the infrastructure leakage index. The City's objective is to reach an infrastructure leakage index of less than 4.0; which is indicative of good water loss control practices and effective maintenance programs. In 2007, the infrastructure leakage index was 4.8 and the trend is showing that the City is on track to meet its objective within the next few years.

### **7.2.2 Public Water System Components**

Water from the Ottawa River is treated and distributed to the central supply area at the Lemieux Island and Britannia Water Purification Plants. The central system serves lands within the urban area. There are a limited number of locations where the central supply service has been extended to serve areas outside of the urban boundary. The City also operates four groundwater wells that supply areas in the communities of Vars, Richmond, Munster Hamlet and Carp. Treatment of source water is provided at each source location.

The principle elements of the City's water supply system consists of water treatment, water transport (by pipes and pumps) and water storage. Strategically located storage is used to augment the treatment plant supply during high water demand and subsequently reduce the treatment plant size and also reduce the pumping and water transmission pipe sizes. It is refilled during off peak periods.

The system, including water pipes, is valued at over \$12 billion. Tables 7.3 to 7.6 summarize the major facilities.

Different pressure zones are required because of topography to provide water at useable pressures to the public. The pressures are generally maintained between 275 Kilopascals (40 pounds per square inch) and 550 Kilopascals (80 pounds per square inch) within these. There may be some exceptions, normally resulting from localized topography that is higher or lower than the typical range in the pressure zone.

The water distribution system also includes servicing to the Carlsbad Springs Area by means of a “trickle feed” system. This system provides treated water to a reservoir or cistern in the customer’s home. An inlet valve limits the filling rate for the home’s cistern. The water from the cistern is then pumped within the house. Limiting the rate of water draw from the central system permits the use of much smaller watermains to service the properties. Fire protection was not designed in the “trickle-feed” system as it would increase water pipe requirements substantially.

**Table 7.3 – Existing Pump Stations**

| <b>Pump Station</b>     | <b>Discharge HGL* (Meters)</b> | <b>Existing Firm or Total Capacity (MLD)</b> |
|-------------------------|--------------------------------|--|
| Carlington 2W           | 131                            | 48   |
| Barrhaven Reservoir     | 155                            | 7  |
| Ottawa South            | 151                            | 31   |
| Billings Bridge         | 134                            | 115  |
| Britannia 2W            | 134                            | 225  |
| Glen Cairn              | 160                            | 108  |
| Forest Ridge            | 134                            | 43   |
| Lemieux                 | 115                            | 290  |
| Fleet                   | 115                            | 200  |
| Britannia 1W            | 115                            | 250  |
| Carlington- Meadowlands | 154                            | 25   |
| 3W - Campeau Drive (1)  | 160                            | -  |
| Hurdman                 | 115                            | 290  |
| Barrhaven               | 155                            | 73   |
| Orleans                 | 134                            | 65   |
|                         |                                |  |
| (1) Under construction  |                                |  |

\* hydraulic grade line

**Table 7.4 – Existing Water Reservoirs**

| <b>Reservoir</b> | <b>Existing Volume (Million Litres)</b> | <b>Maximum Water Elevation (Meters)</b> |
|------------------|---|---|
| Ottawa South     | 8                                       | 112.6                                   |
| Glen Cairn       | 34                                      | 131                                     |
| Barrhaven        | 18                                      | 131                                     |
| Carlington       | 109                                     | 112                                     |
| Orleans          | 81                                      | 114                                     |
| <b>Total</b>     | <b>250</b>                              |   |

**Table 7.5 – Existing Elevated Tanks**

| <b>Elevated Tank</b> | <b>Existing Volume (Million Litres)</b> | <b>Maximum Water Elevation (Meters)</b> |
|----------------------|---|---|
| Stittsville          | 4.5                                     | 131                                     |
| Moodie               | 6.8                                     | 155                                     |
| Conroy               | 9                                       | 131                                     |
| Innes                | 4.5                                     | 131                                     |
| <b>Total</b>         | <b>24.8</b>                             |   |

**Table 7.6 – Existing Water Treatment Plants**

| <b>Facility</b>              | <b>Existing Capacity (Million Litres per Day)*</b> |
|------------------------------|--|
| Lemieux (under construction) | 400  |
| Britannia                    | 350  |

### 7.2.3 Public Water System Quality Control

Water quality control is currently provided at the source locations for the City’s water supply systems. Water quality control in the distribution system is provided by secondary disinfection practice of chloramination at both water purification plants. Chlorine added with ammonia form chloramines that provide for a disinfectant within the water distribution system that is more persistent than just adding chlorine alone. This form of disinfection is successful for the City’s vast distribution system, since levels of chlorine residual tend to lower due to temperature and longer travel times. The City monitors water quality in the distribution system to ensure that regulatory standards for the allowable limits of chlorine residual in a public water system are maintained.

At Britannia and Lemieux Water Purification Plants, sophisticated water purification techniques are used to treat Ottawa River water to drinking water quality standards. The source water from the river, while of excellent quality, does present a number of challenges to the treatment process. Seasonal variations in temperature and suspended organic loading in the summer require changes and on-going monitoring of the treatment processes and resulting water quality. The water treatment process consists primarily of the removal of particles from the source water by the processes of coagulation, mixing, settling and filtration. Once the partially treated water is passed through the filters, chlorine is added as a primary disinfectant in order to meet the Ontario Drinking Water Quality Standards. Other chemicals are also added to the water for corrosion control purposes within the distribution system and for dental health purposes. The Ministry of the Environment inspects all of the City's drinking water systems on an annual basis and have found them to produce excellent water quality.

Groundwater for the City's five groundwater-supplied water systems requires a more simple treatment process. The source water quality in City wells is good and remains relatively consistent year round. The well water at each site is disinfected using a process of continual chlorination. The Vars well water is further treated using an activated carbon filtration system and a greens and filtration system in order to remove organic compounds and to remove naturally occurring iron and manganese from the groundwater..

## **7.2.4 Public Water System Growth Challenges**

Population growth to the year 2031, will provide challenges to the existing public water systems. The challenges noted here are in part due to the anticipated growth in the city and in part due to the on-going operation of a major infrastructure asset. The Infrastructure Master Plan presents strategies and policies to address issues related to growth. Management of the existing systems will be undertaken through operational reviews, on-going rehabilitation and other City programs aimed at maintaining the cost effectiveness and value of the City's water supply systems.

### **Water Supply Treatment**

The City undertakes major planning studies, outside of the scope of the Infrastructure Master Plan, to direct the timing and scope of water treatment requirements including future plant expansions. The Infrastructure Master Plan provides the information regarding growth required for the planning of the capacity of treatment facilities. Separate reports will be brought forward to Council reporting on the planning and implementation initiatives for the City's treatment facilities.

Lemieux Island Purification Plant is currently being expanded by 110 million litres/day, to 400 million litres/day. It is predicted that the City's major treatment plants will require expansion to support both the

growth in the planning horizon of the Official Plan and to provide some redundancy under contingency situations.

### Distribution System Water Quality

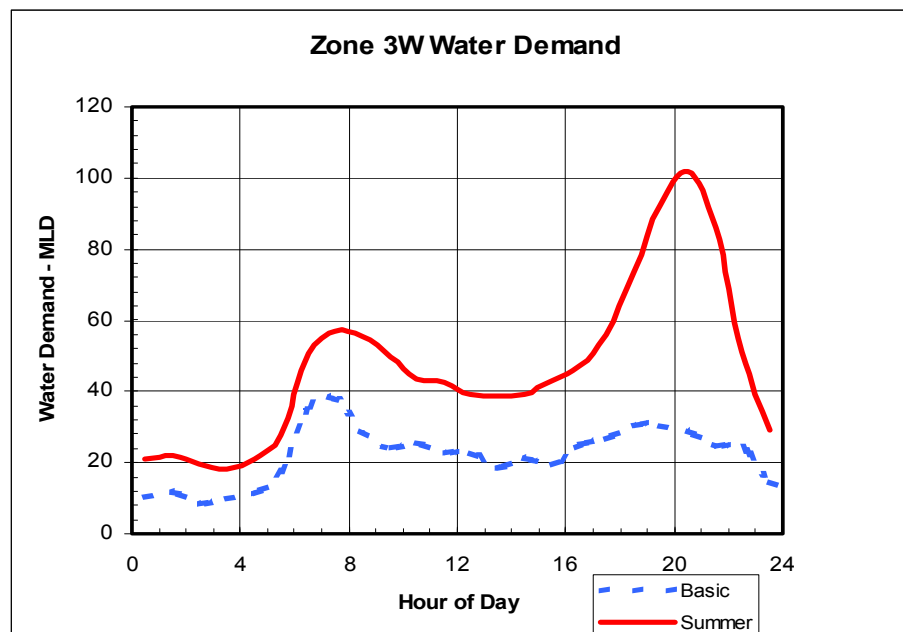
As the system expands from its present limits, the time of travel of water from treatment facilities to users increases. As the treated water ages, its chlorine residual decreases. Ensuring water quality throughout the system will become an increasingly important design and cost element.

### Peak Demand Planning

Peak water supply demands are generated not by domestic use but by summer outdoor use. Substantial design allowances are made to deliver peak demand. Figure 7.3 compares the normal winter base day demand to a summer peak demand in Kanata.

Reduction of peak demands provides opportunities to accommodate growth in a sustainable manner. Reduced peak demands makes more efficient use of infrastructure and can provide a means to support growth in a cost effective manner. There are many ways in which peak demands can be planned for, reduced and controlled. Reduced outdoor water use is one means to reduce peak demands. Intensification can also have a profound effect on water use. The majority of outdoor water use is distributed to single-family dwellings as these have the largest irrigable land area. Smaller lots, supporting large dwellings, have reduced the irrigable area dramatically. An overall priority and strategy framework can best direct overall goals for peak demand management (see Section 3.2).

**Figure 7.4 Comparison Basic and Peak Water Demand in Kanata**



### **System Rehabilitation**

Life cycle investment in all system components is required in order to ensure that the system continues to deliver a high level of service and that maintenance or rehabilitation liabilities do not impact on the City's ability to continue to provide cost effective services.

### **Reliability**

Water supply is considered by many to be one of the most important services provided by the City. As the population outside the Greenbelt grows, the City will face new challenges in systems operation and maintenance of reliability. In particular, significant investments in redundancies (additional pipes as a secondary system) will be required to assure the reliability of services outside of the Greenbelt. The Capital Projects presented in Annex 1 include reliability projects.

### **Well System Protection and Sustainability**

As the number of residents who rely on the public well systems increases as a result of growth and as land use becomes more intense in the vicinity of the City's wells, the City must take efforts to ensure the protection of the wellhead area and have an understanding of the sustainable capacity of the existing or possible future public wells (see Section 5.4).

### **New Regulatory Requirements**

Considerable changes to the Provincial regulation of public and private water supply systems have been made since the 2003 Infrastructure Master Plan. One of the most significant is the requirement for implementing a Drinking Water Quality Management System. This is a quality control process that governs the production and delivery of potable water. The City will continue to address these changes as they are made and future Infrastructure Master Plans will incorporate the changes as appropriate.

## **7.3 Public Wastewater System**

The Infrastructure Master Plan identifies strategies, policy and major capital infrastructure projects for the public wastewater system to accommodate anticipated growth to 2031. The planning of the existing wastewater systems has been developed based on the following objectives:

- **Protection:** to protect public health and the long term health of the water environment.
- **Reliability:** to ensure the safe and continuous removal of wastewater.

- **Demand Planning:** to pursue demand planning as one of the most cost effective means of ensuring sustainability in the City's wastewater system.
- **Affordability:** to minimize life cycle costs including: capital, operations and maintenance in balance with adequate life cycle funding to sustain assets and level of service.

The design of Ottawa's wastewater system has evolved over the years based on management practices, legislative requirements, engineering methods, public health and safety considerations. The system is fully funded by user charges such as the water rate. The current design practices and revenue have allowed the City to establish a wastewater system, which provides a good level of service and value to the residents and businesses of the city.

### 7.3.1 Public Wastewater System Demands

The design and configuration of the wastewater system in the city is governed by the flows that the sewer system must collect, store, pump and treat. The City continually monitors demands, and updates estimates and predictions of demands.

There are three major demand sources contributing to wastewater flows in the system:

- **Sanitary Flow** (or dry weather flow) is the flow resulting from the use and discharge of water to the wastewater system. Most sanitary flow (approximately 70 percent) comes from residential buildings. Commercial properties and institutions contribute approximately 22 percent and 7 percent respectively (the remaining 1% comes from other sources).
- **Extraneous flow** in the system is any flow that is not specifically designed to be included in the wastewater system (in other words it can be considered as 'leaks' into the system.) The sources of leaks are many and the occurrences of leaks are random throughout the system. The approach taken at the design stage is to make an allowance for extraneous flows.
- **Drainage flow** is defined as any flow that originates from a drainage system, including stormwater runoff and building foundation drainage. Drainage systems in new areas are now built totally separated from wastewater (sanitary) systems. However, planned drainage flows into existing combined and partially separated systems (built from 1951 to 1961) are addressed in assessing system capacity needs.

Demand management in the wastewater system includes making estimates and incorporating into the design process, average day demands for population, allowances for extraneous flow and drainage flow, as well as peaking factors in order to ensure reliability of systems performance under a variety of demand

conditions. Demand management also includes initiatives to control demand on wastewater systems. This is discussed further in Section 3.2.

### **7.3.2 Wastewater Collection System Components**

The wastewater collection system in the city conducts wastewater to be treated at the R. O. Pickard Environmental Centre. The Centre has a capacity of 545 million litres per day (ML/d) and can sustain peak flows up to 1362 ML/d. Septage from private systems maintenance is transported to the Centre for treatment.

The City's wastewater collection system has developed since the late 1800s. The City maintains over 2,100 kilometres of storm sewers and 2,400 kilometres of sanitary and combined sewers. This includes the following sewer types and characteristics:

- **Combined sewers**, initially constructed between the late 1800s and 1950, were designed to collect sanitary wastewater flows and surface drainage flows. Originally, combined sewer flows were conducted directly to the rivers. Today, part of the central area of the city will remain serviced by combined sewers and the combined sewers discharge to larger collector sewers, which conduct flows to the central treatment facility. In some cases, the combined sewer system overflows into the Ottawa River – such overflows are monitored and controlled by the City. The Provincial government regulates the amount of overflows to the rivers.
- **Partially separated sewers**, which date from 1951 to 1961, collect sanitary wastewater and some drainage flows (primarily foundation drainage, and in some cases directly connected roof drains and driveway drains) in the sanitary pipe and road drainage in the storm pipe.
- **Separated sanitary sewers**, which have been constructed since 1961 and constitute the majority of the City's sanitary sewer system, are designed to carry sanitary flows only. A design allowance is made for extraneous flows in separated sewers.

The major system components of the wastewater system include collector sewers described below and, in addition, pump stations, odour control facilities, corrosion protection facilities and temporary storage facilities.

- **Collector sewers** serve as the backbone of the collection system. These larger sewers typically do not service local areas (no direct service connections).



- **The core area trunk system**, serving the older areas of Ottawa, Nepean and Gloucester, is the West Nepean-Ottawa Interceptor-Outfall Sewer system, which runs parallel to the south shore of the Ottawa River. Sewers of all kinds (combined, partially separated, and separated) feed into this system.
- **The suburban trunk systems** serve areas around the core, made up primarily of separated sanitary sewers. The West Rideau Collector, the Lynwood Collector and the South Ottawa Tunnel make up the major facilities supporting the suburban system.

### 7.3.3 Wastewater System Growth Challenges

Population growth to 2031 will provide challenges to the existing public wastewater systems. The challenges noted here are in part due to the anticipated growth in the city and in part due to the on-going operation of major infrastructure assets. The Infrastructure Master Plan presents strategies and policies to address issues related to growth, both greenfield growth and intensification. Management of the existing systems will be undertaken through operational reviews, on-going rehabilitation and other City programs aimed at maintaining the cost effectiveness and value of the City's wastewater collection and treatment systems.

#### Treatment Plant

The City undertakes major planning studies, outside of the scope of the Infrastructure Master Plan, to direct the timing and scope of future treatment facility modifications or expansions. The Infrastructure Master Plan provides the information regarding population growth required for facility planning. Separate reports will be brought forward to Council reporting on the planning and implementation initiatives for the treatment facility.

Presently it is predicted that treatment plant modifications, and possibly expansions, will be required to support the growth in the planning horizon of the Official Plan.

#### Peak Flow Management

Peak wastewater flows are part of systems management and allowances are factored for the peaks in system design and planning. During wet weather events, the amount of extraneous inflow can greatly exceed the dry weather flow. Substantial allowances are made to transport and treat these flows. In some cases, extreme wet weather events may result in system flooding, attributed in part to extraneous flows.

Reduction of extraneous flow in existing systems and control of potential for extraneous flow in new systems provides opportunities to accommodate growth in a sustainable manner. Reduced extraneous flows allow for more efficient use of infrastructure, and reduction of extraneous flows in existing systems

can provide a means to support growth in a cost effective manner. There are many ways in which extraneous flows can be planned for, reduced and controlled. The individual house service connections are the largest contributor to the existence of extraneous flows. An overall priority and strategy framework can best direct goals and resources for wet weather flow management. To illustrate the potential, the monitored wet weather flow rate for the Village of Carp, which is a relatively new system, is 0.093 litres/hectare/second. whereas the rate for Kanata is 0.24 litres/hectare/second for the same event

### **Intensification Inside the Greenbelt**

Population and employment growth anticipated inside the Greenbelt will create challenges to the provision of infrastructure capacity to serve the intensification. Some of the older existing systems inside the Greenbelt already operate at or near maximum capacities. While servicing development using existing systems and maximizing the performance of those systems provides an opportunity for cost effective growth, the integrity of the performance of the existing systems must be protected.

Understanding the performance of existing systems is critical to maximizing the operation of those systems. System assessment including: camera inspection, condition rating and monitoring flows, will continue to be an important factor in directing and confirming decisions related to both rehabilitation requirements as well as planning for intensification on existing systems.

### **New Regulatory Requirements**

Considerable changes to the Provincial regulation of public and private wastewater disposal systems are expected in the near future. The City will address these as they become known and future Infrastructure Master Plans will reflect the changes as required.

## **7.4 Public Stormwater Collection Systems**

The City has over 2,100 kilometres of storm sewers (and outlets to surface waters as well as many kilometers of open drains within the urban and rural areas). Municipal drains have been constructed under the *Drainage Act* to provide drainage for agricultural areas and rural road systems.

Stormwater collection systems are designed on a smaller scale than the large central water and wastewater systems, typically in conjunction with community design plans, studies and subdivision plans. The design of the systems is directed by available subwatershed plans and current design guidelines. The Infrastructure Master Plan includes strategies and policies related to intensification, stormwater management, demand management, asset management and system monitoring.

### 7.4.1 Major Stormwater Collection System Challenges

Population growth to 2031 will provide challenges to the existing public stormwater systems. The challenges noted here are in part due to the anticipated growth in the City and in part due to the on-going operation of major infrastructure assets. The Infrastructure Master Plan presents strategies and policies to address issues related to greenfields growth and intensification. Management of the existing systems will be undertaken through operational reviews, on-going rehabilitation and other City programs aimed at maintaining the cost effectiveness and value of the City's stormwater collection systems.

#### Major Flow Paths

Today, design of stormwater collection systems includes consideration of major flow path requirements – the management of ponding surface water during severe storms. Many areas in the city, which have developed over a long period of time, do not have effective major flow paths to allow surface flows to be transmitted efficiently during severe storm events.

Temporary ponding of water during average storm events does not typically result in problems; however, during severe events ponding water can disrupt traffic, result in surface private property flooding and promote excess extraneous flow into sanitary sewers. Major flow path remediation can be considered in road rehabilitation and control of sources of extraneous flow can be considered in sanitary and combined sewer operation and rehabilitation.

### 7.4.2 Stormwater Management Facilities

The City owns and operates a large number of stormwater management facilities to control the quantity and/or quality of stormwater discharges to surface waters. Stormwater management facilities were first constructed in Ottawa in 1974, primarily in response to addressing water quality problems that existed in the Rideau River that were resulting in beach closures. Since the first stormwater management facilities were constructed to address water quality concerns, a wide variety of stormwater management facilities have been constructed across the city with a variety of design criteria. In many cases, particularly in drainage systems outside of the Rideau River watershed, quantity control criteria have been used in the design of both public and private stormwater management facilities to enable development to proceed without negatively affecting the capacity of the receiving drainage system.

Since the early 1990s, however, new developments have been required to provide a combination of quantity and quality controls city-wide. As a result, the design of stormwater management facilities has evolved from “bath-tub” type dry-ponds providing quantity control, to more elaborate wet-ponds and constructed wetlands. More recently, as a result of subwatershed planning initiatives, the design criteria of stormwater management facilities has expanded to address watershed specific criteria that could include

controls based on the fluvial geomorphology of receiving drainage systems, to specific temperature criteria to avoid thermal impacts to fish habitat.

In most instances, the construction of stormwater management facilities in new development areas follows the same process as other municipal infrastructure – the infrastructure is planned, designed and built by private land developers for a subdivision to City Specifications, and after a certification period, the City takes ownership of the facilities. By implementing the Integrated Planning Process (Section 1.6), the City will look to improve current stormwater management facility planning, design and construction, by:

- Coordinating stormwater management facility planning and design with subwatershed planning and **community design plans.**
- Seeking all opportunities to reduce the number of stormwater management facilities required to support development while still achieving subwatershed objectives.
- Implementing controls where the greatest environmental benefits can be realized at a reasonable economic cost.

## Annex 1

### – Water, Wastewater and Stormwater Projects –



**Annex 1 – Water, Wastewater and Stormwater Projects**

The following tables list short and long range capital projects and provide an estimate of the total expected cost for those projects. Notes follow Table A1.2 and Table A1.3. In addition, after the three tables, a description of each project is provided with the total cost and the cost of the growth component outlined.

**Table A1.1 - Major Water and Wastewater Growth-Related Capital Projects, 2009 to 2019**

| <b>Water Projects</b>  |              |
|--|--------------|
| <b>Feeder mains</b>  |              |
| Hazeldean Watermain (Glen Cairn Pump Station to Carp Road)     | \$15,000,000 |
| Kanata West Feedermain   | \$6,100,000  |
| 1W – 2W Feedermain Link (from Britannia to Kanata)             | \$47,000,000 |
| Strandherd Watermain   | \$3,750,000  |
| 2C/2W Feedermain   | \$15,000,000 |
| South Urban Community Greenbank Watermain                      | \$1,600,000  |
| Orleans 2E Watermain (in Hydro Corridor)                       | \$2,600,000  |
| Orleans Supply (Transmission Main Blair to St. Joseph)         | \$15,350,000 |
| Leitrim Supply Watermain                                       | \$4,400,000  |
| March Road. Pipe Upgrade                                       | \$650,000    |
| 3C/2W Pressure Zone Separation in South Urban Community        | \$350,000    |
| Fallowfield Road Barrhaven Reservoir Pump Station to Cedarview | \$800,000    |
| Limebank Feedermain (Spratt Road to future Elevated Tank)      | \$4,200,000  |
| SUC Watermain Woodroffe, Strandherd to Jockvale                | \$6,400,000  |
| Britannia Feedermain, Ottawa River Parkway to Carling          | \$1,700,000  |
| Heron Road Watermain Upgrade – Finn to Walkley                 | \$1,600,000  |
| Bronson Feedermain (Wellington to Queensway)                   | \$5,400,000  |

|   |                      |
|---|----------------------|
| <b>Pump Stations</b>  |                      |
| Ottawa South Pump Station Upgrades  | \$2,700,000          |
| Brittany Pump Station   | \$2,500,000          |
| Carlington Heights 2W Pump Station Expansion  | \$3,100,000          |
| Barrhaven Pump Station Conversion to 3C Zone Operation  | \$800,000            |
| Barrhaven Reservoir Pump Station Upgrades   | \$330,000            |
| Stittsville Pump Station  | \$2,100,000          |
| Woodroffe Pump Station and Connection (Formerly Riverside Pump Station)                                 | \$6,000,000          |
| Glen Cairn Pump Station (pump upgrade)  | \$550,000            |
| Forest Ridge Pump Station (pump upgrade)  | \$600,000            |
| Hurdman Pump Station 2C Upgrade   | \$500,000            |
| <b>Reservoirs</b>   |                      |
| Ottawa South Reservoir Storage  | \$3,200,000          |
| Glen Cairn Reservoir Expansion  | \$15,500,000         |
| Barrhaven Reservoir Expansion   | \$6,340,000          |
| <b>Water Purification Plant Upgrades</b>  |                      |
| Britannia Water Purification Plant Expansion  | \$48,000,000         |
| <b>Estimated Total Cost of Water Forcemain, Pump Station, Reservoir and Purification Plant Projects</b> | <b>\$224,120,000</b> |
| <b>Wastewater Projects</b>  |                      |
| <b>Collector Sewers</b>   |                      |
| North Kanata Sewer Phase 2  | \$8,500,000          |
| Replacement of Tri-Township Collector and March Ridge Trunk   | \$4,000,000          |
| South Nepean Collector Phase 2  | \$3,000,000          |
| South Nepean Collector Phase 3  | \$4,800,000          |
| Kanata West Pump Station and Forcemain  | \$21,250,000         |



|   |                      |
|---|----------------------|
| Kanata West Trunk Sewer   | \$7,875,000          |
| Fernbank Sanitary Sewers  | \$2,500,000          |
| March Pump Station Conversion   | \$950,000            |
| Hazeldean Pump Station Upgrades   | \$3,710,000          |
| Orleans-Cumberland Pump Station   | \$7,100,000          |
| <b>Estimated Total Cost of Wastewater Collector and Pump Station Projects</b> | <b>\$63,685,000</b>  |
| <b>Intensification-support Programs and Works</b>                             |                      |
| Extraneous Flow Removal   | \$7,350,000          |
| Infrastructure Management   | \$15,477,000         |
| Trenchless Rehabilitation   | \$21,750,000         |
| Flow Monitoring   | \$6,556,000          |
| Collector Sewers Rehabilitation   | \$56,532,000         |
| Regulators – Upgrade and Real Time Control                                    | \$10,000,000         |
| Integrated Sewer Separation   | \$80,000,000         |
| Local Sanitary Rehabilitation – Projects located in Intensification Areas     | \$215,292,000        |
| <b>Estimated Total Cost of Intensification-support Projects</b>               | <b>\$412,957,000</b> |
| <b>Community-specific Water and Wastewater Works</b>                          |                      |
| Upgrades to Signature Ridge Pump Station & Forcemain                          | \$1,718,000          |
| Upgrades to Jackson Trail Pumping Station                                     | \$200,000            |
| Kanata West Transmission Mains  | \$2,622,000          |
| Kanata West and Hazeldean Road Sanitary Sewers                                | \$4,579,000          |
| Gloucester EUC Sanitary Sewers  | \$1,260,000          |
| Reliability Links for St. Joseph Blvd, Tenth Line Rd & Mer Bleue Rd.          | \$9,183,000          |
| SUC (Riverside) Sanitary Sewer System   | \$2,975,000          |
| Leitrim Sanitary Pumping Station Expansion                                    | \$450,000            |

|  |                      |
|--|----------------------|
| SUC Nepean Sanitary Sewer System                           | \$2,146,000          |
| <b>Estimated Total Cost of Community-specific Projects</b> | <b>\$25,133,000</b>  |
| <b>Village Water and Wastewater Projects</b>               |                      |
| Village of Carp Water Upgrades                             | \$1,216,000          |
| Manotick Feedermain – Riverside to Manotick                | \$4,500,000          |
| Manotick Pump Station and Forcemain                        | \$20,770,000         |
| Richmond Pump Station & Wastewater Upgrades                | \$10,600,000         |
| <b>Estimated Total Cost of Village Projects</b>            | <b>\$37,086,000</b>  |
| <b>Estimated Total Growth Project Cost – 2009 - 2019</b>   | <b>\$762,981,000</b> |

**Table A1.2 – Major Water and Wastewater Growth-Related Capital Projects, 2020 to 2031**

|   |                     |
|---|---------------------|
| <b>Water Projects</b>   |                     |
| <b>Feeder mains</b>   |                     |
| Bronson Feedermain (Queensway to Billings Bridge)   | \$10,000,000        |
| SUC Fallowfield W/M (Woodroffe to Barrhaven Pump Station)   | \$3,520,000         |
| <b>Pump Stations</b>  |                     |
| Britannia 2W Pump Station (Expansion)   | \$4,620,000         |
| Billings Bridge Pump Station 2C Pump Upgrade  | \$500,000           |
| <b>Elevated Tanks</b>   |                     |
| River Ridge 3C Elevated Tank  | \$5,600,000         |
| 3W Elevated Tank  | \$5,600,000         |
| Tenth Line 2E Elevated Tank   | \$5,600,000         |
| <b>Water Purification Plant Upgrades</b>  |                     |
| Lemieux Water Purification Plant Expansion  | \$26,000,000        |
| <b>Estimated Total Cost of Water Feedermain, Pump Station, Elevated Tanks and Purification Plant Projects</b> | <b>\$61,440,000</b> |

| <b>Wastewater Projects</b>  |                      |
|---|----------------------|
| <b>Collector Sewers</b>   |                      |
| Signature Ridge Pump Station Expansion                                      | \$3,710,000          |
| <b>Estimated Total Cost of Wastewater Projects</b>                          | <b>\$3,710,000</b>   |
| <b>Intensification-support Programs and Works</b>                           |                      |
| Extraneous Flow Removal   | \$6,600,000          |
| Infrastructure Management   | \$16,869,000         |
| Trenchless Rehabilitation   | \$24,000,000         |
| Flow Monitoring   | \$6,943,000          |
| Local Sanitary Rehabilitation – Intensification Areas                       | \$259,494,000        |
| Collector Sewers Rehabilitation   | \$72,178,000         |
| <b>Estimated Total Cost of Intensification-support Projects</b>             | <b>\$386,084,000</b> |
| <b>Village Water and Wastewater Projects</b>                                |                      |
| Village of Carp Water Upgrades  | \$1,760,000          |
| Village of Carp Wastewater Upgrades   | \$5,080,000          |
| <b>Estimated Total cost of Village Projects</b>                             | <b>\$6,840,000</b>   |
| <b>Wastewater Treatment Plant Upgrades</b>                                  |                      |
| R.O. Pickard Environmental Centre Upgrades and Expansion<br>(2004 estimate) | \$283,416,000        |
| <b>Estimated Total Cost of Treatment Plant Projects</b>                     | <b>\$283,416,000</b> |
| <b>Estimated Total Growth Project Cost – 2020 - 2031</b>                    | <b>\$741,490,000</b> |

**Notes: Tables A1.1 and A1.2 - Major Water and Wastewater Growth-related Capital Projects 2009 to 2019 and 2020 to 2031**

1. Projects listed are required to support growth, but could also address a current or future reliability and/or rehabilitation need. Therefore, the total cost of a project and its growth component are included in the individual project sheets that follow.
2. Estimated total growth project cost is provided as an indication of the scope of costs for the period. Allocation of individual project costs based on growth versus existing need will be further established during the Development charges by-law and Capital Budget processes.
3. Projects listed in the Master Plan have been identified based primarily on technical analysis and growth assumptions. The projects and timing will be assessed against further criteria such as operational needs and funding sources in order to provide input into further planning, annual City capital budget and long-range financial planning needs. Projects in the Master Plan may not agree with projects as identified in budgets and long-range financial planning documents.

**Table A1.3 - Major Stormwater Growth-Related Capital Projects, 2009 to 2031**

| <b>Stormwater Management Facility Projects</b>                                 |                      |
|--|----------------------|
| SUC Gloucester Ponds 3, 4, 5 and 6, Related Trunk Storm Sewers and Tributaries | \$89,927,000         |
| Leitrim Pond 1, 2 and Related Trunk Storm Sewers                               | \$27,572,000         |
| SUC Nepean Ponds and Related Trunk Storm Sewers                                | \$56,585,000         |
| SUC Nepean Ponds in Parks, Longfields, and Davidson Heights                    | \$728,000            |
| Shirley's Brook Pond 1 West  | \$951,000            |
| Monahan Drain Constructed Wetland Stormwater Management Ponds                  | \$6,361,000          |
| Gloucester EUC Pond 1 and 2 and Related Trunk Storm Sewers                     | \$25,262,000         |
| Neighbourhood 5 Pond, Channelization and Related Trunk Storm Sewers            | \$15,019,000         |
| <b>Other Stormwater Projects</b>   |                      |
| McEwan Creek Water Quality and Erosion Control                                 | \$4,733,000          |
| Cardinal Creek Erosion Monitoring  | \$958,000            |
| Osgoode (Greely) Erosion Control   | \$651,000            |
| Taylor Creek Erosion Works   | \$892,000            |
| <b>Estimated Total Cost of Projects – 2009 - 2031</b>                          | <b>\$229,639,000</b> |

**Notes: Table A1.3 – Major Stormwater Growth-related Capital Projects 2009 to 2031**

1. Growth Projects listed are primarily required to support growth, but could in-part address a current or future need.
2. Estimated total growth project cost is provided as an indication of the scope of costs for the period. Allocation of individual project costs, based on growth versus existing need, will be further established during the Development charges by-law and Capital Budget processes.
3. Projects listed in the Master Plan have been identified based primarily on technical analysis and growth assumptions. The projects and timing will be assessed against further criteria such as operational needs and funding sources in order to provide input into further planning, annual City capital budget and long-range financial planning needs. Projects in the Master Plan may not agree with projects as identified in budgets and long-range financial planning documents.

## Water Projects – 2009 to 2019

### Feeder mains

#### Hazeldean Watermain (Glen Cairn Pump Station to Carp Road)

##### Justification and Scope

This watermain that will replace a smaller 600mm pipe that links the Glen Cairn pump station to the Stittsville elevated tank. The additional capacity is required to service new development in Kanata West, Fernbank and Stittsville. The current 600mm pipe is to be replaced rather than rehabilitated from Campeau Drive to the Stittsville Tank as part of the Hazeldean Road widening. The upsizing costs (from 610mm to 914mm and 750 mm) to accommodate growth are allocated to the DC reserve. The need was identified in the Zone 3W Pump Station Study and confirmed in the City of Ottawa Water System Optimization Study.

##### Timing

The project will be completed in phases with road widening. It is expected to be completed in the early part of the 2009 to 2019 time period, beginning in 2011.

##### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$15,000,000. This project is 41% growth-related (41% development charge, 59% rate funds).

##### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study confirmed the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

Monitor development needs to ensure infrastructure is constructed in a manner that concurs with development.

## Kanata West Feedermain

### Justification and Scope

This project was identified in the report entitled "Kanata West Concept Plan - Water Supply - Interim Draft" (Stantec Consulting Ltd.; April, 2002) and confirmed by the City of Ottawa Water Supply System Optimization Study. It is required to service the Kanata West area and provide a reliability link from the north to this area.

### Timing

This project is expected to be required in the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$6,100,000

This action is considered 41% growth related (41% development charge, 59% rate funds)

### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

### **1W – 2 W Feedermain Link (From Britannia to Kanata)**

#### **Justification and Scope**

This project was identified in the report entitled "Barrhaven, 2W and 3W Pressure Zones Infrastructure Assessment" (Stantec Consulting Ltd.; July, 2002).

The existing Zone 3W is currently fed through a single 1220mm watermain. The second watermain will provide the required reliability to this area as well as added capacity to meet future growth.

#### **Timing**

Reliability concerns determine the timing for this project. It is needed in the beginning of the 2009 to 2019 time period.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$47,000,000.

This action is considered 41% growth related (41% development charge, 59% rate funds)

#### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.



## Strandherd Watermain

### Justification and Scope

This watermain is required to provide servicing to the industrial / commercial area in Barrhaven, near Highway 416. It will also permit better utilization of the Moodie Drive Tank.

### Timing

It is expected that this project will be completed during the 2009 to 2019 time period in conjunction with the Strandherd road widening.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$3,750,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections, development pressures and continued monitoring of system performance will confirm service delivery objectives and determine the exact timing of this projected.

## **2C/2W Feedermain**

### **Justification and Scope**

This project is required to provide a second source of water to the South Urban Community (including Leirim). The new pipe will complete a loop for the supply system to the south. This will permit greater flexibility in operation and maintenance as well as provide the required reliability.

### **Timing**

This project is needed by 2010 to meet growth and reliability needs and will require the completion of upgrades to the Ottawa South pump station to be functional.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$15,000,000

This action is considered 53% growth-related (53% development charges and 47% rate funded).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has confirmed the size of the pipe needed for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

### SUC Greenbank Watermain Extension

#### Justification and Scope

This watermain will increase the water supply to the south Barrhaven zone and provide added reliability. It is needed to allow continued growth.

#### Timing

The project is expected to be required in the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$1,600,000  
This action is considered 100% growth related (100% development charge, 0% rate funds)

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

### **Orleans 2E Watermain (in Hydro Corridor)**

#### **Justification and Scope**

This watermain was identified in the 1997 Water Master Plan. The City of Ottawa Water Supply System Optimization Study has confirmed the need for this project although at a smaller size.

#### **Timing**

The construction of this project is expected to occur in the 2009 to 2019 time period.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$2,600,000  
This action is considered 100% growth related (100% development charge, 0% rate funds)

#### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## Orleans Supply Transmission Main (Blair to St. Joseph)

### Justification and Scope

This project was identified in the 1997 Water Master Plan. The need and sizing was confirmed in the City of Ottawa Water Supply System Optimization Study (2007). This project will improve the reliability of the water supply to the Orleans area as well as reduce the pumping power requirements at the Hurdman Pump Station. The added flexibility of a second transmission main will also facilitate maintenance operations.

### Timing

Construction is anticipated during the early part of the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$15,350,000

This action is 31% growth-related (31% development charges and 69% rate funded).

### Follow Up Actions

This has a high priority because of the reliability improvement.

## **Leitrim Supply Watermain**

### **Justification and Scope**

This watermain is required to provide added capacity for continued growth in Leitrim and will supplement the existing 406mm watermain. This second pipe to Leitrim will also provide the required reliability.

### **Timing**

Timing is dependant on the growth in Leitrim but is expected to occur in the early part of the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$4,400,000.

This action is 52% growth related (52% development charge, 48% rate funds).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

## March Road Pipe Upgrade

### Justification and Scope

The March Road watermain is predominately 600mm with the exception of some short sections of 406mm watermain . These 406mm sections need to be replaced with 600mm pipe to reduce pressure losses to the north Kanata area

### Timing

This project is anticipated to be required during the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$650,000

This action is considered 100% growth-related (100% development charge, 0% rate funds).

### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. Water demand projections and pressure monitoring will be used to confirm the timing for this project.

### **3C/2W Pressure Zone Separation in South Urban Community**

#### **Justification and Scope**

The creation of the new 3C pressure zone will increase the pressure in a small area of Davidson Heights. Pressure reducing valve chambers will be required to reduce pressures to building code standards.

#### **Timing**

This project is anticipated to be required during the 2009 to 2019 time period.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$350,000

This action is considered 100 % growth related (100% development charge and 0% rate funds).

#### **Follow Up Actions**

This project is needed to implement the City of Ottawa Water Supply System Optimization Study and will be coordinated with other projects needed to create the 3C pressure zone.



### Fallowfield Rd Watermain Barrhaven Reservoir (Pump Station to Cedarview)

#### Justification and Scope

This larger watermain will permit more effective use of the Barrhaven Reservoir Pump Station as a second source of water to the Barrhaven Pressure Zone.

#### Timing

It is expected that this project will be required during the early part of the 2009 to 2019 time period. 2011 has been targeted.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$800,000

This action is considered 100 % growth related (100 % development charge, 0 % rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

**Limebank Feedermain (Spratt Road to future Elevated Tank)**

**Justification and Scope**

This watermain provides a connection to the future elevated tank in Riverside South.

**Timing**

The project is anticipated for the 2009 to 2019 time period. Timing will be coordinated with any road work and with in the installation of the elevated tank.

**Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$4,200,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

**Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

**South Urban Community - Woodroffe Watermain (Strandherd to Jockvale)**

**Justification and Scope**

This project is require for meeting demand in the SUC. It will augment the existing Greenbank watermain and provide a second source of supply to Barrhaven under contingency conditions.

**Timing**

It is expected that this will be required during the 2009 to 2019 time period.

**Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$6,400,000

This action is considered 100% growth-related (100% development charge and 0% rate funds).

**Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

**Britannia Feedermain (Ottawa River Parkway to Carling)**

**Justification and Scope**

This watermain will reduce the pumping Total Dynamic Head needed under future conditions and will provide improved reliability for the discharge from Britannia 2W.

**Timing**

It is expected that this project will be required during the latter part of the 2009 to 2019 time period.

**Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$1,700,000

This action is considered 41 % growth related (41 % development charge, 59 % rate funds).

**Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### Heron Rd. Watermain Upgrade (Finn to Walkley)

#### Justification and Scope

The larger watermain will allow the Conroy tank to be used more effectively.

#### Timing

It is expected that this project will be required during the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$1,600,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### **Bronson Feedermain (Wellington to the Queensway)**

#### **Justification and Scope**

The Bronson feedermain will be upgraded from a 610. The project is needed to supply the Hurdman Bridge Pump Station via 1E – 2C interconnect and maintain adequate 1W pressure east of the Rideau Canal under maximum day conditions. The project will be completed in two parts: the first part is an upgrade of the pipe between Wellington and the Queensway and the second part will include the section between the Queensway and Billings Bridge.

#### **Timing**

The project will be constructed in 2010 to 2011.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$5,400,000. The growth portion of the cost is \$1,266,000.

This action is considered 77% growth related (77% development charge, 23% rate funds).

#### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. This will be completed as part of the City's rehabilitation and system upgrade work.

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## Water Pump Stations

### Ottawa South Pump Station Upgrades

#### Justification and Scope

This project was identified in the 1997 Water Master Plan. The expanded function and capacity were defined in the Ottawa Water System Optimization Study. The Ottawa South Reservoir is currently designed to provide water to the Ottawa airport and to the Leitrim area. This project will add pumping capacity to provide water to the new 3C zone. It will initially be the primary water source to the Riverside area. Completion of this project will ensure continued and reliable service delivery to the existing development and new growth for the Zone 3C area.

#### Timing

This project is recommended to be built during the 2009 to 2019 time period to improve the service level and reliability of water supply to Zone 2C.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$2,700,000

This action is considered 53 % growth related (53% development charge, 47% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The project will need to be coordinated with the 2W/2C watermain project.

## **Brittany Pump Station**

### **Justification and Scope**

The project is intended to improve the reliability of the pumped water supply to the Montreal Pressure, including the future Rockcliffe Air Base redevelopment.

### **Timing**

This project is expected to be undertaken during the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$2,500,000

This action is considered 13% growth related (13% development charge, 87% rate funds).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project. The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.



## Carlington Heights 2W Pump Station Expansion

### Justification and Scope

The output of this pump station is hindered by pump capacity and suction supply. Improvements are needed so that this pump station can provide peak demand pumping from the reservoir to meet growth requirements as well as provide water to the 2W zone under contingency situations.

### Timing

The project is proposed for construction in 2009 and 2010.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$3,100,000. A new pump station will be constructed to replace the existing one.

This action is considered 42% growth-related (42% development charge and 58% rate funds).

### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

## **Barrhaven Pump Station Conversion to 3C Zone Operation**

### **Justification and Scope**

This is the main station supplying the Barrhaven zone. Under future conditions, the 3C zone will be greatly expanded, encompassing the River Ridge area on the east side of the Rideau river, the existing 2W zone areas to the west of the river (including Manotick) and the south part of the Barrhaven zone. Under these conditions, this conversion will contribute to the supply of the expanded 3C zone via the Greenbank watermain. The pump station will continue to serve the Barrhaven Pressure Zone and will become a two-zone station with separate pumps for each zone.

### **Timing**

Based on current growth projections, this pump station conversion is required immediately. Construction is proposed in 2009 and 2010.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$800,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### Barrhaven Reservoir Pump Station Upgrades

#### Justification and Scope

Upgrades to the Reservoir Pump Station are required to provide a redundant pumped water supply to the Barrhaven Zone.

#### Timing

Based on current growth projections, this project is required in the 2009 to 2019 time period. It is being proposed for construction in 2011.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$330,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

## **Stittsville Pump Station**

### **Justification and Scope**

This pump station will service the newly created Stittsville Pressure Zone. Provision of this pump station will allow continued delivery of design service levels and allow better operation of the 3W pressure zone by removing the need to maintain high Stittsville Tank levels.

### **Timing**

The project has been started in 2008 but will be constructed during the early part of the 2009 – 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$2,100,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### Woodroffe Pump Station and Connection (formerly Riverside Pump Station)

#### Justification and Scope

The proposed Woodroffe Pump Station will be a main supply to the western half of the new 3C Zone and will work in conjunction with the upgraded Leirim Pump Station.

#### Timing

The project is required during the latter part of the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$6,000,000

This action is considered 100 % growth-related (100% development charge and 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has confirmed the size of the pipe needed for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### **Glen Cairn Pump Station (Pump Upgrade)**

#### **Justification and Scope**

Additional pumping capacity will be required to meet increasing water demands in the Kanata/Stittsville areas.

#### **Timing**

Based on current growth projections, this additional pump station upgrade is required during the latter part of the 2009 to 2019 time period.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$550,000. Additional improvements will likely be required at this time because of the age of the station and will add to the cost.

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections, development pressures and continued monitoring of system performance will confirm service delivery objectives and Timing of the project.

### Forest Ridge Pump Station (Pump Upgrade)

#### Justification and Scope

The project is needed to maintain adequate pressures throughout 2E under maximum day demand. Forest Ridge is the main pumping station for 2E.

#### Timing

It is expected that this project will be required during the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$600,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### **Hurdman Pump Station 2C Upgrade**

#### **Justification and Scope**

The project is required to provide redundancy to 2C pumps, which are needed during a failure of the Billings Bridge Pump Station. It is the main supply to zones 1E, 2E and Montreal. It is needed to maintain adequate pressures in high elevation areas in 1E

#### **Timing**

The project is anticipated to be required in 2015.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$500,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.



## Reservoirs

### Ottawa South Reservoir Storage Expansion

#### Justification and Scope

The existing 8 ML of storage needs to be expanded by another 8ML. This will provide peak demand balancing to the Riverside area of 3C.

#### Timing

The project is expected to be required in the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$3,200,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## **Glen Cairn Reservoir Expansion**

### **Justification and Scope**

The reservoir maintains adequate pressures in the zone and stabilizes pressures in the 2W zone. The reservoir expansion to 64 ML will reduce peak 2W pumping requirements and supply 3W via the Glen Cairn Pump Station. It will also supply some reliability in the event of a failure of the Britannia Treatment Plant.

### **Timing**

The project is anticipated during the latter part of the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$15,500,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## Barrhaven Reservoir Expansion

### Justification and Scope

A second 18ML tank is proposed. The added storage is needed to reduce the peak supply rate to the SUC. It will provide storage floating on the 2W pressure.

### Timing

It is expected that this project will be required during the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$6,340,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## **Water Purification Plant Upgrades**

### **Britannia Water Purification Plant Expansion**

#### **Justification and Scope**

The timing of expansion of the Britannia Water Purification Plant is based on providing sufficient water for basic demand under shutdown of the Lemieux Water Purification Plant. The additional capacity will also be needed for peak day conditions but the reliability capacity governs the timing.

#### **Timing**

Based on current growth and demand projections throughout the City, it is expected that this project will be required in the middle part of the 2009 to 2019 time period. Design and construction of the project will take several years.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$48,000,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### **Follow Up Actions**

The Official Plan projections and water demand projections, based on monitored current water use, will determine the exact timing of this project.

## Wastewater Projects – 2009 to 2019

### North Kanata Sewer Phase 2

#### Justification and Scope

The North Kanata Sewer is required to provide capacity for the North Kanata growth area. It was identified in the 1997 Wastewater Master Plan to provide infrastructure to convey the projected flows for the planning period. Follow up studies such as the Environmental Assessment, Condition Assessment, Functional Design and Preliminary Design of sewers in the study area refined and confirmed the infrastructure, phasing, schedule and costing.

#### Timing

The first phase, replacing the lower end of the Tri-Township (tr00100 to tr01000), was completed in 2006. The second phase is about 1900 m from tr01000 to Hertzberg Road, and includes a gravity connection with the Marchwood Trunk. It is scheduled for construction beginning in 2011.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$8,500,000

This action is 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of this project. Monitor flows in the system to determine when thresholds are being approached, trigger design and construction initiatives.

## **Replacement of Tri-Township Collector and March Ridge Trunk**

### **Justification and Scope**

With the Fernbank Lands development there is a need to replace the Tri-Township Collector since the existing sewer will be too small to convey the expected flows. The replacement is recommended in the 2008 Master Servicing Study for the Fernbank Community Design Plan. Previous studies for the North Kanata sanitary servicing recommended the rehabilitation of the Tri-Township Collector, however with flows from Fernbank development this option is no longer feasible.

### **Timing**

It is expected that this project will be required before the 2014 but the rate of growth of the Fernbank and West Kanata developments will determine the final project timing.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, project management, etc.) = \$4,000,000

This project is considered 41% growth-related (41% development charge, 59% rate funds).

### **Follow Up Actions**

## South Nepean Collector Phase 2

### Justification and Scope

An additional sanitary trunk sewer is required to service growth in the south Nepean community. This is a staged project to extend sewer service in the South Nepean Urban Area. Phase 2 extends from the existing manhole at the Jockvale Road just north of Jock River to the east side of the existing Kennedy Burnett Stormwater Management Facility. This portion of the sewer is located in the planned South Nepean Town Centre.

### Timing

The actual need is based on the development rate within the community and the need to provide services to meet the development. The project is dependent on land acquisition by developers and establishing subdivision layout to determine detailed sewer alignment. It is proposed for construction around 2012.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$3,000,000

This action is 100% growth related (100% development charge, 0% rate funds).

### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of this project. Monitor developer needs to ensure sufficient trunk sewer installed ahead of proposed subdivision completion.

### **South Nepean Collector Phase 3**

#### **Justification and Scope**

An additional sanitary trunk sewer is required to service growth in the south Nepean community. This is a staged project to extend sewer service in the South Nepean Urban Area. Phase 3 extends from the east side of the existing Kennedy Burnett Stormwater Management Facility to the intersection of Strandherd Road and Kennevale Drive. The portion of the sewer located under Strandherd Road should be constructed together with planned Strandherd Road widening.

#### **Timing**

Phase 3 of the project is expected to be required during the 2009 to 2019 time period with a portion under Strandherd Road to be constructed in 2013.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$4,800,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### **Follow Up Actions**

The Official Plan projections and actual development pressures will determine the exact timing of this project.



## Kanata West Pump Station and Forcemains

### Justification and Scope

The main Pumping Station for Kanata West, associated forcemains, and upgrades to the existing Signature Ridge pumping station are needed to service the West Kanata growth area.

### Timing

The project is expected to be required in the 2009 to 2019 time period but the rate of growth of the area will determine the final project Timing.

### Action Item Funding

Capital cost estimate for the Kanata West Pumping Station and Forcemains (including contingencies, engineering, GST) = \$21,250,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The Official Plan projections and actual development pressures in the Kanata West area will determine the exact timing of this project. Continued monitoring of system performance will confirm service delivery objectives.

Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

### **Kanata West Collector Sewer**

#### **Justification and Scope**

A Kanata West Trunk Sewer is needed to service the West Kanata growth area.

#### **Timing**

The project is expected to be required during the 2009 to 2019 time period although growth will determine final project Timing.

#### **Action Item Funding**

Capital cost estimate for the Kanata West Trunk Sewer (including contingencies, engineering, GST) = \$7,875,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### **Follow Up Action**

The development of these lands will determine the timing of the project.

## Fernbank Sanitary Sewer

### Justification and Scope

To service the proposed Fernbank Lands development a new trunk sanitary sewer is proposed parallel to the existing Stittsville trunk. The possibility of integrating the both sewers and abandoning the Stittsville trunk know for the high infiltration rates will be investigated further.

### Timing

Timing of the project is dependent on the progress of the Fernbank Lands development. It has been proposed fro construction in 2010.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, project management, etc.) = \$2,500,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The development of these lands will determine the timing of the project.

## **March Pump Station Conversion**

### **Justification and Scope**

Modifications to the March Pump Station are required to convert to the low lift and to connect to the North Kanata Sewer, with the decommissioning of the March Forcemain.

### **Timing**

This last phase is required when the flows to the March Pump Station near 480 L/s. The project is projected to be required after 2016.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, project management, etc.) = \$950,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

### **Follow Up Actions**

The sewage flows at the station will be monitored to determine exact timing of the project.

## Hazeldean Pump Station Upgrade

### Justification and Scope

To provide wastewater service to the new Fernbank lands development. Upgrades to the existing Hazeldean pumping stations are proposed to accommodate the additional flows required by this development.

### Timing

The timing is dependent upon growth. It is expected that the work will be undertaken during the latter part of the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate for all of the upgrades (including contingencies, engineering, project management, etc.) = \$3,710,000

This action is considered 100 % growth- related (100% development charge, 0 % rate funds)

### Follow Up Actions

The development of these lands will determine the timing of the project.

## **Orleans-Cumberland Pump Station**

### **Justification and Scope**

A major pumping station is planned for the end of Orleans - Cumberland collector to improve the hydraulic grade line, avoid pipe sedimentation and provide additional pumping capacity.

### **Timing**

This project is expected to be required during the early part of the 2009 to 2019 time period. It will be tendered in the spring of 2009 and should be completed within 18 months.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$7,100,000

This action is considered 31% growth related (31 % development charge, 69 % rate funds)

### **Follow Up Actions**

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## Intensification-support Programs and Works 2009 - 2019

### Extraneous Flow Removal

#### Justification and Scope

The development of a wet weather flow management strategy was a major recommendation of the previous Wastewater Master Plans and the City's Infrastructure Master Plan adopted in 2003. The strategy includes development of an overall approach to wet weather flow management, investigation of identified problem areas, implementation of high impact low cost Flow Removal Programs and recommendations to general concerns such as design standards for the components of the system. Priorities are related to further detailing of the strategy components, identification of specific Flow Removal projects, and investigation of alternative approaches to address concerns related to partially- separated areas.

#### Timing

This is an annual, on-going program.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$7,350,000. Of this, \$1,470,000 is considered of direct benefit to intensification projects. The Program size may vary annually over the 2009 – 2019 time period.

This action is considered 20% growth related (20% development charge, 80% rate funds)

#### Follow Up Actions

Projects within the program are prioritized annually

## **Infrastructure Management (Wastewater)**

### **Justification and Scope**

This is an ongoing program related to performance monitoring and condition assessment of the City's roadway, watermain, sanitary and combined and storm sewer networks. Funding provides for testing, network level data collection, miscellaneous soil evaluations, and development and updates to approved products, design guidelines, construction specifications and asset management implementation initiatives.

### **Timing**

This is an annual, on-going program.

### **Action Item Funding**

Capital cost estimate for the sewer component (including contingencies, engineering, GST) = \$15,477,000. Of this, \$3,095,000 of the work is considered related to intensification. Program varies annually but is set at approximately \$280,000 per year for wastewater intensification-related work.

This action is considered 20% growth related (20% development charge, 80% rate funds)

### **Follow Up Actions**

Individual projects are prioritized annually.



## Trenchless Rehabilitation

### Justification and Scope

Funding provides for relining of sewers, of access structures and spot repairs at various locations. The work will improve both structural integrity and hydraulic performance to assist in reducing basement flooding, extraneous flows and improve the overall operation of the system. These improvements will also help to address system capacity issues.

### Timing

This is an annual on-going program.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$21,750,000. Of this, \$4,350,000 is considered related to growth.

This action is considered 20% growth related (20% development charge, 80% rate funds)

### Follow Up Actions

Projects within the program are prioritized annually.

## **Flow Monitoring**

### **Justification and Scope**

Ongoing flow monitoring of the City's wastewater collection system is required to support the operation and maintenance of the existing system. Continuous long term data is needed to establish trends which will be used to determine capacity for growth, effectiveness of rehabilitation programs, identification of infiltrating sewers and flow contributions in problem areas, and control of flows at regulators and diversion structures. This funding request provides for upgrade, renewal, replacement and extension of the City's permanent flow monitoring network.

### **Timing**

This is an annual, on-going program.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$6,556,000. Of this, \$1,311,000 is considered intensification-related flow monitoring.

This action is considered 20% growth related (20% development charge, 80% rate funds)

### **Follow Up Actions**

Projects within the program are prioritized annually.

## Collector Sewers Rehabilitation

### Justification and Scope

On-going rehabilitation of the City's sanitary collector system is required to support the operation and maintenance of the existing system. The work will improve both structural integrity and hydraulic performance to assist in reducing basement flooding and extraneous flows; improve the operation of the overall sanitary sewer system; and provide some capacity for intensification. This program includes the rehabilitation of the Cave Creek Collector and the Preston, Bank, Argyle and Catherine Street sewers.

### Timing

This is an annual on-going program..

### Action Item Funding

Total capital cost estimate (including contingencies, engineering, GST) = \$56,532,000. Of this, \$5,994,000 is considered work directly benefiting intensification.

The projects in this program are considered overall to be 10% growth related (10% development charge, 90% rate funds)

### Follow Up Actions

Projects will be prioritized within the program of improvements.

## **Regulator Upgrades and Real Time Control**

### **Justification and Scope**

A number of existing regulators were built about 35 years ago to provide for the control of combined wastewater inflow to the Ottawa Interceptor Outfall Sewer. Inspection of the facilities confirmed that they are at the end of their design life and need to be upgraded or replaced. In addition, the expansion of these facilities is necessary for the development of the real time control strategies. This component of the program is for the rehabilitation and refurbishment of the existing regulators and implementation of a real time control system in order to meet MOE Procedure F5.5 Combined Sewer Overflow control objectives.

### **Timing**

The 2009 request provides funding required for completion of works that have already been initiated.

### **Action Item Funding**

Total capital cost estimate (including contingencies, engineering, GST) = \$10,000,000. Of this \$1,121,000 is considered work of direct benefit to intensification.

This action is considered 14% intensification-related (14% development charge, 86% rate funds)

### **Follow Up Actions**

## Integrated Sewer Separation

### Justification and Scope

A focussed schedule escalation of the program of converting existing combined sewers outside of the designated combined sewer area to separate storm and wastewater drainage systems is a key component of the overall Ottawa River Fund capital program. The overall scope of this program includes mainline sewer works and service connections to the property line for both systems and well as the coordination of any identified watermain rehabilitation needs and full width roadway reinstatements.

### Timing

The program will be undertaken for 5 years, from 2009 to 2013.

### Action Item Funding

Total capital cost estimate (including contingencies, engineering, GST) = \$80,000,000. \$23,200,000 is considered of direct benefit to intensification. The 2009 amount provides the authority necessary to develop and program the integrated works for the escalated program as well as to initiate design and tender package preparation for the first phase of construction. The 2009 program allocation for sewers is small (\$580,000) but for the next four years, about \$5.8 million of the total program is expected to be spent in targeted intensification areas. Project specific budget requests will be provided as part of the 2010 budget cycle upon completion of the first phase in 2009.

This action is considered 29% growth related (29% development charge, 71% rate funds)

### Follow Up Actions

Projects within the program are prioritized annually.

## **Local Sanitary Rehabilitation – Projects located in Intensification Areas**

### **Justification and Scope**

Ongoing rehabilitation of the City's wastewater collection system is required to support the operation and maintenance of the existing system. The work will improve both structural integrity and hydraulic performance to assist in reducing basement flooding, extraneous flows and improve the overall operation of the sanitary sewer system and provide some capacity for intensification. This rehabilitation program includes the rehabilitation of sewers located in business areas as well as other sanitary sewers located in residential areas. This rehabilitation program does not include the rehabilitation of local pipes outside of intensification areas. These projects are included in separate programs.

### **Timing**

This is an annual, on-going program.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$215,292,000. Of this, \$21,529,000 is considered to be of direct benefit to intensification. The program varies in size annually. For the first few years to the end of 2012, the program size varies annually and then is set at about \$2,100,000 for the remaining years.

This action is considered 10% growth related (10% development charge, 90% rate funds)

### **Follow Up Actions**

Projects within the program are prioritized annually.

## Community-specific Works 2009 – 2019

### Upgrades to Signature Ridge Pumping Station and Forcemain

#### Justification and Scope

The Signature Ridge Pumping Station and Forcemain are in need of expansion to support the proposed development proceeding in the immediate area. Increases in flows due to development necessitate the expansion of the station which will initially involve internal upgrades to station components but in the future will require the construction of a second wet well and forcemain in order to service the additional flow. A sanitary overflow to the storm water management facility will also be constructed as part of the works. A separate description of future works is included in projects for the 2020 to 2031 time period.

#### Timing

The upgrades to the pump station and forcemain are expected to take place within the 2009 to 2019 time period although development pressures will determine the exact timing.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$1,718,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

#### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the upgrades.

## **Upgrades to Jackson Trails Pumping Station**

### **Justification and Scope**

The Jackson Trails Pumping Station is in need of expansion to support the proposed development proceeding in the immediate area. Increases in flows due to development necessitate an upgrade of the station, which involves internal upgrades to station components (impellers) in order to service the additional flow.

### **Timing**

The upgrades to the pump station are expected to take place within the 2012 to 2013 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$200,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

Actual development pressures will determine the exact timing of the upgrades.



## Kanata West Transmission Mains

### Justification and Scope

To service growth, transmission water mains are required to provide trunk services for the entire Kanata West development area. Transmission mains were identified in the Kanata West Master Servicing Study (Stantec, June 2006).

### Timing

The transmission mains are to be completed as development takes place within the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$2,622,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the upgrades.

## **Kanata West and Hazeldean Road Sanitary Sewers**

### **Justification and Scope**

To service growth, trunk sanitary sewers are required to provide trunk services for the entire Kanata West development area. Trunk sanitary sewers were identified in the Kanata West Master Servicing Study (Stantec, June 2006).

### **Timing**

The trunk sanitary sewers will be completed as development takes place. This is expected within the 2009 to 2019 time period but the rate of development will determine the exact timing.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$4,579,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The Official Plan projections and actual development pressures will determine the exact timing of the upgrades.

## Gloucester East Urban Community Sanitary Sewers

### Justification and Scope

The “Gloucester East Urban Community Infrastructure Servicing Study Update,” (Stantec Consulting Ltd, March 2005) identified the sanitary sewer infrastructure required for the Gloucester East Urban Community. This study recommended related trunk sanitary sewers to support growth. Gloucester EUC is in the general area bounded by Mer Bleue Road to the east, Innes Road to the north, Page Road to the west and the urban boundary to the south.

### Timing

The sanitary sewers are to be completed as development takes place, which is expected to be within the 2011 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$1,260,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The actual development pressures will determine the exact timing of the sewers.

## **Reliability Links for St. Joseph Blvd, Trim Road, Tenth Line Road and Mer Bleue Road**

### **Justification and Scope**

The installation of a watermain link along St. Joseph Blvd from 2nd Ave to Trim Road is required to provide system improvements and reliability in the 1E high pressure zone to support new development in the area.

Reliability links are also required along Trim Road to provide an extension of trunk watermain infrastructure to support growth in the Orleans area north of Innes Road, along Tenth Line Road from the Hydro Easement to Lakepointe, and along Mer Bleue Road just north of Vanguard Drive to just south of Renaud Road.

### **Timing**

The reliability links are to be completed as development takes place, which is expected to be within the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$9,183,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The actual development pressures will determine the exact timing of the sewers.

## SUC (Riverside) Sanitary Sewer System

### Justification and Scope

The “Riverside South Community Infrastructure Servicing Study Update,” (Stantec Consulting Ltd, September 2008) identified the preferred servicing plan for the Riverside South Community. This study recommended a sanitary sewer system servicing the community and connected to the existing West Rideau Collector. The SUC Gloucester sanitary drainage area lies to the north of Rideau Road and is bounded by the Rideau River to the West, Bowesville Road to the east, and Leitrim Road to the north.

### Timing

The sanitary sewers are to be completed as development takes place, which is expected to be both within the 2009 to 2019 and 2020 to 2031 time periods.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$2,975,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The actual development pressures will determine the exact timing of the sewers.

## **Leitrim Sanitary Pumping Station Expansion**

### **Justification and Scope**

The existing Leitrim Sanitary Pumping Station must be upgraded to accommodate the recently constructed forcemain. The modifications pertain to upgrading two existing pumps and the installation of a third pump to accommodate the ultimate design flow capacity. This upgrade is required to accommodate future development.

### **Timing**

The pumping station expansion is to be completed as development takes place within the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$450,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The actual development pressures will determine the exact timing of the pumping station expansion.

## South Urban Community Nepean Sanitary Sewer System

### Justification and Scope

The “Barrhaven South Master Servicing Study” (Stantec Consulting Ltd, June 2007) identified the preferred servicing plan for Barrhaven South Community. This study recommended a sanitary sewer system servicing the community and connected to the existing South Nepean Collector. The Barrhaven South Community sanitary drainage area extends south of the Jock River, east of Highway 416 and Greenbank/ Cambrian/ Jockvale Roads being eastern boundary.

### Timing

The sanitary sewers are to be completed as development takes place within the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$2,146,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The actual development pressures will determine the exact timing of the sewers.

## Village Water and Wastewater Projects 2009 - 2019

### Village of Carp Water Upgrades

#### Justification and Scope

Upgrades to existing water treatment, high lift pumping and distribution system are needed to accommodate and support village growth as anticipated by the approved Community Design Plan and Carp Airport Development.

#### Timing

The timing is dependent upon growth. It is expected that the work will be undertaken during the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate for all of the upgrades (including contingencies, engineering, project management, etc.) = \$1,216,000

This action is considered 75% growth- related (40% development charge, 35% Carp Airport Development, 25% rate funds).

#### Follow Up Actions

The Class EA projections have provided an estimate of the timing of the works but actual development rates will determine the exact timing of the required upgrades.



### Manotick Feedermain (Riverside to Manotick)

#### Justification and Scope

This will include a second feed to Manotick. It is required to meet the increased water demand as a consequence of growth in Manotick and to provide a redundant source of water under contingency situations.

#### Timing

It is expected that this project will be required during the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$4,500,000

This action is considered 91 % growth related (91 % development charge, 9% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

## **Manotick Pump Station and Forcemain**

### **Justification and Scope**

The City of Ottawa Official Plan supports a gradual transition from private individual services to central water and wastewater servicing for the Village of Manotick. Two separate petitions, for the installation of wastewater collection infrastructure, as Local Improvement works for Hillside Gardens and the Core Area had been submitted and approved by Council. Three separate tenders were issued to undertake the wastewater servicing in Hillside Gardens, in the Core Area and for the main pumping station, forcemains and trunk gravity sewer line.

### **Timing**

The construction is expected to start in late 2008 and to take approximately 18 months to complete.

### **Action Item Funding**

Capital cost for the installation of the main pumping station, forcemains, and trunk sewer is estimated at \$20,770,000. The local improvement charge for Hillside Gardens and the Core Area will cover \$ 5,865,000 and the \$ 14,905,000 will be recovered over time from the Future Areas (new development and existing neighbourhoods).

The funding for this project is in place. The recovery for this funding will be worked out by agreement with the developer, the City and the residents who receive a local improvement.

### **Follow Up Actions**

The Official Plan projections and actual development pressures (e.g. the Minto proposed development) will determine the exact timing of this project.

## Richmond Pump Station and Wastewater Upgrades

### Justification and Scope

This project includes an upgrade to the Richmond Pumping Station and Forcemain, a new Richmond Trunk Sewer and local sewers. These changes are required to accommodate growth and to reduce extraneous flows for existing residents.

### Timing

This project is expected to be required during the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, project management, etc.) = \$7,000,000 for the Pumping Station and Forcemain, \$2,000,000 for the Trunk Sewer and \$1,600,000 for new local sewers.

This action is considered 65 % growth related (65 % development charge, 35 % rate funds)

### Follow Up Actions

The timing of these works is dependent upon the demand from growth in the village.

## Water Projects – 2020 to 2031

### Feeder mains

#### Bronson Feedermain (to Billings Bridge)

##### Justification and Scope

The Bronson feedermain will be upgraded from a 610. The project is needed to supply the Hurdman Bridge Pump Station via 1E – 2C interconnect and maintain adequate 1W pressure east of the Rideau Canal under maximum day conditions.

##### Timing

The project is expected to be required during the 2020 to 2031 time period.

##### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$10,000,000

This action is considered 58% growth related (58% development charge, 42% rate funds).

##### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

### SUC Fallowfield Watermain (to Barrhaven Pump Station)

#### Justification and Scope

This is a 610mm feed to the Barrhaven zone and the Barrhaven Reservoir. It is required to provide redundancy.

#### Timing

The projected requirement is during the 2020 to 2031 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$3,520,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## Water Pump Stations

### Britannia 2W Pump Station Expansion

#### Justification and Scope

The Britannia 2W Pump Station is the main supply to a major portion of the city that is experiencing significant growth. The project is essential for meeting projected demand under maximum day demand.

#### Timing

The expected Timing for the project is in the 2020 to 2031 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$4,620,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

### Billings Bridge Pump Station 2C Pump Upgrade

#### Justification and Scope

This pumping station is required to supply 2C and 3C via the Ottawa South Reservoir and Pump Station under all basic day conditions and some of the peak day demand.

#### Timing

The project is expected to be undertaken during the 2009 to 2019 time period

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$500,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

## **Elevated Tanks**

### **River Ridge 3C Elevated Tank**

#### **Justification and Scope**

The tank will stabilize 3C pressures and reduce peak pumping requirements.

#### **Timing**

It is anticipated in the 2020 to 2031 time period.

#### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$5,600,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.



### 3W Elevated Tank

#### Justification and Scope

The tank will reduce 3W peak pumping and stabilize pressures in the zone. It is needed when the existing Stittsville tank needs to be replaced.

#### Timing

This project will be undertaken when the existing Stittsville Tank is decommissioned and relocated. This is expected to be during the 2020 to 2031 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$5,600,000

This action is considered 41% growth-related (41% development charge, 59% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## **Tenth Line 2E Elevated Tank**

### **Justification and Scope**

The tank will reduce 2E peak pumping and stabilize pressures in the zone. It will provide storage floating on 2E pressure. It is needed to maintain adequate pressures in the east and south parts of 2E.

### **Timing**

This project will be undertaken when the condition of the existing Innis Road tank requires it to be decommissioned. It is expected that this will take place during the 2020 to 2031 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$5,600,000

This action is considered 31% growth-related ( 31%development charge,69 % rate funds).

### **Follow Up Actions**

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and actual development pressures will determine the exact timing of this project.

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## Water Purification Plant Upgrades

### Lemieux Island Water Purification Plant Expansion

#### Justification and Scope

The timing of expansion of the Lemieux WPP is based on providing sufficient water for basic demand under shutdown of the Britannia WPP. The additional capacity may also be needed for peak day conditions but the reliability requirements govern the timing.

#### Timing

Based on current growth and demand projections throughout the City, it is expected that this project will be required during the 2020 to 2031 time period. However, construction of the Britannia Plant expansion may delay this project beyond the 2031 period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$26,000,000

This action is considered 100% growth related (100% development charge, 0% rate funds).

#### Follow Up Actions

The City of Ottawa Water Supply System Optimization Study has identified the need for this project.

The Official Plan projections and water demand projections based on monitored current water use will determine the exact timing of this project.

**Wastewater Projects – 2020 to 2031**

**Signature Ridge Pump Station Upgrades**

**Justification and Scope**

To provide for the predicted flows from the development area, the existing station will require expansion beyond its current rated capacity including: the provision of second wet well, the expansion of the existing building, an addition of a second forcemain and the replacement of a section of the Penfield sewer.

**Timing**

Based on current growth and demand projections throughout proposed drainage are, it is expected that this project will be required by 2022.

**Action Item Funding**

Capital cost estimate (including contingencies, engineering, project management, etc.) = \$3,710,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

**Follow Up Actions**

The sewage flows at the station will be monitored to determine exact timing of the project.

## Intensification-support Programs and Works 2020 - 2031

### Extraneous Flow Removal

#### Justification and Scope

The development of a wet weather flow management strategy was a major recommendation of the previous Wastewater Master Plans and the City's Infrastructure Master Plan adopted in 2003. The strategy includes development of an overall approach to wet weather flow management, investigation of identified problem areas, implementation of high impact low cost Flow Removal Programs and recommendations to general concerns such as design standards for the components of the system. Priorities are related to further detailing of the strategy components, identification of specific Flow Removal projects, and investigation of alternative approaches to address concerns related to partially- separated areas.

#### Timing

This is an annual, on-going program.

#### Action Item Funding

Total capital cost estimate (including contingencies, engineering, GST) = \$6,600,000. Of this, \$1,320,000 is considered of direct benefit to intensification projects.

This action is considered 20% growth related (20% development charge, 80% rate funds)

#### Follow Up Actions

Projects within the program are prioritized annually

## **Infrastructure Management (Wastewater)**

### **Justification and Scope**

This is an ongoing program related to performance monitoring and condition assessment of the City's roadway, watermain, sanitary and combined and storm sewer networks. Funding provides for testing, network level data collection, miscellaneous soil evaluations, and development and updates to approved products, design guidelines, construction specifications and asset management implementation initiatives.

### **Timing**

This is an annual on-going program.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$16,869,000. Of this, \$3,374,000 of the work is considered related to intensification.

This action is considered 20% growth related (20% development charge, 80% rate funds)

### **Follow Up Actions**

Individual projects are prioritized annually.

## Trenchless Rehabilitation

### Justification and Scope

Funding provides for relining of sewers, of access structures and spot repairs at various locations. The work will improve both structural integrity and hydraulic performance to assist in reducing basement flooding, extraneous flows and improve the overall operation of the system. These improvements will also help to address system capacity issues.

### Timing

This is an annual on-going program.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$24,000,000. Of this, \$4,800,000 is considered related to intensification.

This action is considered 20% growth related (20% development charge, 80% rate funds).

### Follow Up Actions

Projects within the program are prioritized annually.

## **Flow Monitoring**

### **Justification and Scope**

Ongoing flow monitoring of the City's wastewater collection system is required to support the operation and maintenance of the existing system. Continuous long term data is needed to establish trends which will be used to determine capacity for growth, effectiveness of rehabilitation programs, identification of infiltrating sewers and flow contributions in problem areas, and control of flows at regulators and diversion structures. This funding request provides for upgrade, renewal, replacement and extension of the City's permanent flow monitoring network.

### **Timing**

This is an annual on-going program.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$6,943,000. Of this, \$1,389,000 is considered intensification-related flow monitoring.

This action is considered 20% growth related (20% development charge, 80% rate funds)

### **Follow Up Actions**

Projects within the program are prioritized annually.



## Local Sanitary Rehabilitation – Projects located in Intensification Areas

### Justification and Scope

Ongoing rehabilitation of the City's wastewater collection system is required to support the operation and maintenance of the existing system. The work will improve both structural integrity and hydraulic performance to assist in reducing basement flooding, extraneous flows and improve the overall operation of the sanitary sewer system and provide some capacity for intensification. This rehabilitation program does not include the rehabilitation of trunks or the rehabilitation of local pipes outside of intensification areas. There are separate programs.

### Timing

This is an annual, on-going program during the time period, 2020 to 2031.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$259,494,000. Of this, \$25,949,000 is considered intensification-related works. On an annual basis, about \$2.1 million of the program is related to these projects directly related to intensification.

This action is considered 10% growth related (10% development charge, 90% rate funds)

### Follow Up Actions

Projects within the program are prioritized annually.

## **Collector Sewers Rehabilitation**

### **Justification and Scope**

On-going rehabilitation of the City's sanitary collector system is required to support the operation and maintenance of the existing system. The work will improve both structural integrity and hydraulic performance to assist in reducing basement flooding and extraneous flows; improve the operation of the overall sanitary sewer system; and provide some capacity for intensification.

### **Timing**

This is an annual on-going program.

### **Action Item Funding**

Total capital cost estimate (including contingencies, engineering, GST) = \$72,178,000. Of this, \$7,218,000 is considered work directly benefiting intensification.

The projects in this program are considered overall to be 10% growth related (10% development charge, 90% rate funds)

### **Follow Up Actions**

Projects will be prioritized within the program of improvements.

## Village Water and Wastewater Projects 2020 - 2031

### Village of Carp Water Upgrades

#### Justification and Scope

Upgrades to existing water storage, well supply and high lift pumping are needed to accommodate and support village growth as anticipated by the approved Community Design Plan and Carp Airport Development.

#### Timing

The timing is dependent upon growth. It is expected that the work will be undertaken during the 2020 to 2031 time period.

#### Action Item Funding

Capital cost estimate for all of the upgrades (including contingencies, engineering, project management, etc.) = \$1,760,000

This action is considered 100% growth- related (75% development charge, 25% Carp Airport Development).

#### Follow Up Actions

The Class EA projections have provided an estimate of the timing of the works but actual development rates will determine the exact timing of the required upgrades.

## Village of Carp Wastewater Upgrades

### Justification and Scope

New pumps for the existing sanitary pumping stations, twinning of forcemains and the replacement of undersized sewer lines including the first 900 mm of the Hines Road Trunk in Kanata are needed to accommodate and support village growth as anticipated by the approved Community Design Plan and to comply with the current design guidelines.

### Timing

The timing is dependent upon growth. It is expected that the work will be undertaken during the 2020 to 2031 time period.

### Action Item Funding

Capital cost estimate for all of the upgrades (including contingencies, engineering, project management, etc.) = \$5,080,000

This action is considered 75% growth- related (75% development charge, 25% rate funds).

### Follow Up Actions

The Class EA projections have provided an estimate of the timing of the works but actual development rates will determine the exact timing of the required upgrades.

## Wastewater Treatment Plant Upgrades

### R.O. Pickard Environmental Centre Upgrade and Expansion

#### Justification and Scope

A number of projects that involve the upgrade and expansion of the R. O. Pickard Environmental Centre were included in the 2004 Development charges Study. Some of these projects have been undertaken. Other projects will be undertaken only as development requires.

#### Timing

Some of the projects have been undertaken but the major works such as the plant upgrades are expected to be required during the 2020 to 2031 time period. The amount of future peak wet weather inflows will influence the timing of the projects.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$283,416,000 (2004 estimates).

This action is considered partially growth related (23 % development charge, 77 % rate funds)

#### Follow Up Actions

Continued monitoring of system performance will confirm service delivery objectives. Monitoring of peak demand reductions resulting from demand planning initiative will ensure the timing for the project is understood.

## **Stormwater Management Facilities and Other Stormwater Projects**

### **Stormwater Management Facility Projects**

#### **SUC Gloucester Ponds 3, 4, 5, and 6, Related Trunk Storm Sewers, and Tributaries**

##### **Justification and Scope**

The “Riverside South Community Infrastructure Servicing Study Update,” (Stantec Consulting Ltd, September 2008) identified the preferred stormwater management strategy for the Riverside South Community. This study recommended 6 storm water management ponds and related trunk storm sewers along with the tributary catchment areas corresponding to each pond. Ponds 1 and 2 are fully constructed with Pond 1 in operation. Works for 7 tributaries required for fish compensation as well as onsite and offsite fish compensation have also been identified. The SUC Gloucester drainage area lies to the north of Rideau Road and is bounded by the Rideau River to the West, Bowesville Road to the east, and Leirim Road to the north.

##### **Timing**

The ponds, trunk sewers, and tributaries are to be completed as development takes place within the 2009 to 2031 time period.

##### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$89,927,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

##### **Follow Up Actions**

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## Leitrim Pond 1, 2 and Related Trunk Storm Sewers

### Justification and Scope

The “Final Serviceability Report Leitrim Development Area City of Ottawa,” (IBI Group, March 2007) identified the preferred stormwater management plan for the Leitrim community. This report recommended 2 storm water management ponds and related trunk storm sewers, along with the tributary catchment area corresponding to the ponds. Pond 2 will be located at the northwest corner of White Alder Drive and Kelly Farm Drive. Pond 1 is fully constructed and in operation. Construction related to Pond 1 storm sewers, a wetland berm, and fish compensation are ongoing. The SUC Leitrim drainage area is generally bounded by Leitrim Road to the north, Albion Road to the west, Bank Street to the east, and Findlay Creek Drive to the south.

### Timing

The project is to be completed as development takes place within the 2009 to 2014 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$27,572,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## **South Urban Community Nepean Ponds and Related Trunk Storm Sewers**

### **Justification and Scope**

The “Barrhaven South Master Servicing Study” (Stantec Consulting Ltd, June 2007) and the “Jock River Reach 1 Subwatershed Study” (Stantec Consulting Ltd, July 2006) identified the preferred stormwater management strategy for the Barrhaven and Barrhaven South Community. These studies recommended 5 storm water management ponds and related trunk storm sewers north of the Jock River and 5 storm water management ponds and related trunk storm sewers south of the Jock River, along with the tributary catchment areas corresponding to each pond. The landowners representing the lands south of the Jock River have requested that the 5 storm water management ponds south of the Jock River be excluded from the Development Charges By-Law. The SUC Nepean drainage area is in the general vicinity north and south of the Jock River, east of Highway 416, and west of Woodroffe Avenue.

### **Timing**

The ponds and trunk sewers are to be completed as development takes place within the 2009 to 2031 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$56,585,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.



## SUC – Nepean Ponds in Parks, Longfields, and Davidson Heights

### Justification and Scope

The “Longfields and Davidson Heights Review and Update of 1993 Serviceability Study Report” (Erion associates, Stanley Consulting and Ainley Graham, February 1998) identified the stormwater Management plan for the Longfields and Davidson Heights community. This report recommended several “pocket” park storm ponds and related trunk storm sewers outletting to the proposed Longfields and Davidson Heights Stormwater Facility (LDHSWF) along with the tributary catchment area corresponding to the pond. The LDHSWF and most of the “pocket” park ponds are already constructed and in operation. The Longfields and Davidson Heights drainage area is generally bounded by CNR corridor/Fallowfield Road to the north, Prince of Wales Drive to the west, Greenbank Road to the east, and Strandherd Road to the south.

### Timing

The remaining “pocket” ponds are to be completed as development takes place within the 2009 to 2011 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$728,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## **Shirley's Brook Pond 1 West**

### **Justification and Scope**

The "Kanata North Environmental/Stormwater Management Plan," (CH2MHILL, February 2001) identified the preferred Stormwater Management Plan for the Shirley's Brook Community. The study recommended storm water management ponds along with the tributary catchment area corresponding to the ponds. Shirley's Brook storm water management facility, east of the benefiting area, has been fully constructed. The Shirley's Brook Pond 1 West is located north of Klondike Road, east of March Road, and west of the main branch of Shirley's Brook. "Shirley's Brook Stormwater Management Facility 1 – West Functional Design Report," (Novatech, October 2008), includes detailed design and construction costs for Pond 1 West.

### **Timing**

The pond is to be completed as development takes place within the early part of the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$951,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## Monahan Drain Constructed Wetland Stormwater Management Ponds

### Justification and Scope

Master Drainage studies dating back to 1993 have identified storm water management facilities for the Monahan Drain area and a final design report was also completed in 1993 subsequent to the studies. A storm water management facility is required east of Eagleson Road and north of Fernbank Road and another is required west of Eagleson Road and south of Fernbank Road. The facility east of Eagleson Road is fully constructed and the facility west of Eagleson is currently under construction. The Monahan Drain benefiting area is bounded by Terry Fox Drive to the west, Hope Side Road to the south, and the Bridlewood community to the east.

### Timing

The pond is to be completed as development takes place within the early part of the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$6,361,000

A Front-Ending Agreement is currently in place for the design, land acquisition, and construction of the Monahan Drain storm water facility to an upset limit of \$6,361,125.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## **Gloucester EUC Pond 1 and 2 and Related Trunk Storm Sewers**

### **Justification and Scope**

The “Gloucester East Urban Community Infrastructure Servicing Study Update,” (Stantec Consulting Ltd, March 2005) identified the preferred Stormwater Management Plan for the Gloucester East Urban Community. This study recommended 3 storm water management ponds and related trunk storm sewers, along with the tributary catchment area corresponding to the pond. Gloucester EUC Pond 1 is located east of Page Road, south of Innes Road and straddles the Hydro Easement. Pond 2 is located south west of the intersection of Renaud Road and Mer Bleue Road. Construction of Pond 3 is completed, however, trunk storm sewers are required for this Pond 3 as development progresses.

### **Timing**

The ponds and trunk sewers are to be completed as development takes place within the 2009 to 2019 time period.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$25,262,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## Neighbourhood 5 Pond, Channelization, and Related Trunk Storm Sewers

### Justification and Scope

The Mer Bleue Community Design Plan Infrastructure Servicing Study (IBI, April 2006) identified the preferred storm water infrastructure needs for the Neighbourhood 5 (N5) area of Cumberland. The study was completed in accordance with the Phase I and II Class Environmental Assessment process. A storm water management pond, related trunk storm sewers, and the channelization of McKinnon's Creek are required to support development in this area. The N5 area is bounded by Mer Bleue to the West; Tenth Line Road to the east; the Hydro Electric Power Corridor to the north; and the urban boundary to the south.

### Timing

The pond, channelization, and trunk sewers are to be completed as development takes place within the 2009 to 2019 time period.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$15,019,000

A Front-Ending Agreement is currently in place for the design, land acquisition, staged construction of the pond, and the channelization of McKinnon's Creek to an upset limit of \$11,165,000.

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## Other Stormwater Works

### McEwan Creek Water Quality and Erosion Control

#### Justification and Scope

The “Environmental Assessment Screening Report, October 2002” and the “McEwan Creek Stream Protection & Restoration Project (CH2MHILL, July 2003) identified the preferred stormwater management plan for the McEwan Creek area. These studies recommended a stormwater management facility and erosion control works for the creek, along with the tributary catchment area corresponding to the pond. The facility is located west of Highway 417, east of Bank Street, north of Hunt Club Road, and south of Heron Road. The urban drainage is currently collected in the Eastern Community Trunk Storm Sewer, and discharges directly into McEwan Creek. The proposed end-of-pipe stormwater management facility would mitigate the impact of existing and proposed development on stormwater quality and degradation of McEwan Creek.

#### Timing

The project is to be completed as development takes place within the early part of the 2009 to 2019 time period.

#### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$4,733,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

#### Follow Up Actions

The Official Plan projections and actual development pressures will determine the exact timing of the ponds.

## Cardinal Creek Erosion Monitoring

### Justification and Scope

In accordance with the Environmental Assessment for Cardinal Creek Stormwater Facility, there is a need to assess and monitor erosion, as well as design and construct erosion control measures within the Cardinal Creek ravine system. The erosion control measures will protect the creek environment and stabilize the banks of Cardinal Creek, abutting the existing and future development lands.

### Timing

The project is to be completed in 2009 to 2010.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$958,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

Future works may be required based on constant monitoring.

## **Osgoode (Greely) Erosion Control**

### **Justification and Scope**

The Greely/Shields Creek Stormwater and Drainage Study fulfilled Phase 1 of the Municipal Class Environmental Assessment process. The study identified remedial works required along the creek's banks that is needed to protect the property and the health of the creek. This project will involve corrective measures to stabilize the creek banks and to protect the banks from on-going erosion.

### **Timing**

The project is to be completed as development takes place in 2009 to 2010.

### **Action Item Funding**

Capital cost estimate (including contingencies, engineering, GST) = \$651,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### **Follow Up Actions**

The proposed erosion control recommendations outlined in the study above of remedial works will be undertaken in 2009 and 2010.



## Taylor Creek Erosion Works

### Justification and Scope

A study of erosion control measures for Taylor Creek from the north side of St. Joseph to the south side of North Service Road has been completed under a Schedule "B" Environmental Assessment. Erosion measures have been implemented for Phase 1 of the work, which included the stream segment from St. Joseph to Highway 174. Phase 2 works are proposed between Highway 174 and the North Service Road. These works will provide stabilization where active erosion has occurred. This is a development charge funded project.

### Timing

The project is to be completed as development takes place in 2009 to 2010.

### Action Item Funding

Capital cost estimate (including contingencies, engineering, GST) = \$892,000

This action is considered 100% growth related (100% development charge, 0% rate funds)

### Follow Up Actions

The erosion works will be undertaken in 2009 and 2010.

**ANNEX 2 – BIBLIOGRAPHY**

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## ANNEX 3 – SECTION 6: GLOSSARY OF TERMS

### **Backflow Valve**

A check valve designed for use in a gravity storm sewer system. The valve is normally closed.

### **Brownfields**

Abandoned, idle or underused properties where expansion or redevelopment is complicated by real or perceived environmental contamination. This impediment is often exacerbated by building deterioration and/or obsolescence and/or inadequate infrastructure.

### **Capacity Allocation**

Setting aside for use, the quantity that can be contained or the rate of flow that can be conveyed within or by a conduit or structure without adverse effects.

### **Collector Sewer**

The component of the combined, sanitary or storm minor system that conveys the flow from the spines to the discharge point. For the sanitary sewer system, it is the component that conveys flows equal to or greater than 170 l/s to the discharge point.

### **Combined Sewer**

A sewer intended to receive both wastewater and stormwater flows in a common pipe.

### **Combined Sewer Overflow**

A discharge to the environment from a combined sewer system that usually occurs as a result of a precipitation event when the capacity of the combined sewer or the treatment plant is exceeded.

### **Community Improvement Plan**

A provision of the Planning Act which permits municipalities to prepare plans for designated community improvement project areas that require community improvement as a result of age, dilapidation, overcrowding, faulty arrangement, unsuitability of buildings, or for any other environmental, social or community economic development reason.

### **Compensation Project**

A flow removal project that results in no net increase in surcharging of a system at capacity due to new development or redevelopment.

### **Constraint Areas**

Areas in which basement flooding has been experienced and further development and/or redevelopment could lead to future wet weather flooding unless changes to the wastewater system and/or individual building property infrastructure systems have been undertaken.

### **Density Targets**

The minimum land use density in people and jobs per hectare required for all development in specified target areas.

### **Development charges**

Fees levied on residential and non-residential properties that help finance a portion of the cost associated with new infrastructure and municipal service expansion to support growth.

### **Dry Weather Flows**

Flow in a combined, partially-separated or separated sewer which is not significantly affected by stormwater but along with wastewater flows includes a certain amount of groundwater infiltration related to the level of the groundwater table.

Since the groundwater table fluctuates seasonally, a dry weather flow period is classified as a period of flow where groundwater conditions are relatively stable and there is no direct influence from precipitation or snowmelt. Spring groundwater infiltration levels are usually the most critical as the water table is usually at its highest level during this period.

### **Flow Management**

The management by several processes of the quantity or rate of movement of a fluid discharge or the total quantity carried by a conduit or channel. This could include flow attenuation (the process of reducing the peak flow rate by redistributing the same volume over a longer period of time), flow control (the process by which sewer flows or a portion of those flows are blocked, detained, or diverted within a certain portion of the collection system) and flow reduction (the process of decreasing flows into a sewer system or removing a proportion of the flow that is already in the sewer system or eliminating flow sources).

### **Green Infrastructure**

Projects that keep stormwater from entering the sewer system. Such projects are intended to make sewer systems more resilient and provide capacity in sewer systems. These are particularly helpful in areas serviced by combined sewers. Such projects include: rain barrels, roof gardens, permeable parking lots, swales, stormwater planters, storm curb extensions, etc.

### **Greenfields**

Lands that have not been built upon. These lands have not been divided and no infrastructure services have yet been provided.

### **Intensification**

Residential intensification means intensification of a property, site or area that results in a net increase in residential units or accommodation and includes: redevelopment; development of vacant or underutilized sites; infill development; and the conversion or expansion of existing residential buildings to create new residential units. Employment intensification means: intensification of a property, site or area that results in a net increase in jobs and/or gross floor areas and may occur by: redevelopment of existing employment uses at a higher density; expansion of existing employment uses; infill of vacant or underutilized land within employment areas; and replacing uses with a low number of employees with uses with a higher number of employees. For a complete definition, see Official Plan Section 2.2.2.

### **Intensification Target**

The minimum share or number of dwelling units to be provided through intensification during a given period of time.

### **Local System**

The street pipes for water distribution and wastewater collection systems that connect with individual private or public systems.

### **Ministry of Environment Procedure F5-5**

Ministry of Environment's Procedure F- 5-5, Determination of Treatment Requirements for Municipal and Provincial Combined and Partially Separated Sewer Systems, is a policy document for controlling combined sewer overflows. It supports Guideline F-5, "Levels of Treatment for Municipal and Private

Sewage Treatment Works Discharging to Surface Waters”. The Procedure requires municipalities to treat all dry weather flow and 90 percent of the volume of wet weather flows from April 1 to September 30.

**Partially-separated Sewer**

A separated sewer system in which household foundation drains and roof drains contribute a direct source of stormwater and groundwater inflow to the sanitary sewer.

**Protective Plumbing Program**

A City of Ottawa program that provides subsidy for home owners who wish to protect their properties from future flooding during extreme wet weather events. Greater subsidy is provided to homeowners who have directly experienced basement flooding from sewers and a lower subsidy is available for homeowners who reside in an area of flooding. Information about the program is available on the City of Ottawa web site.

**Rehabilitation**

All aspects of upgrading the performance of existing sewer systems. Structural rehabilitation includes repair, renovation and renewal. Hydraulic rehabilitation covers replacement, lining, flow reduction or attenuation as well as structural rehabilitation.

**Separated Sewer**

A sewer system in which wastewater flows and storm flows are collected by separate pipe systems.

**Spine**

A component of the combined, sanitary or storm minor system that connects the collector or trunk pipes with the local sewers.

**Sump Pump**

A mechanism used for removing water or wastewater from a sump or wet well. It may be energized by air, water, steam or electric motor. Ejectors and submerged centrifugal pump station either float or manually controlled are often used for this purpose.

**Trunk Sewer**

A trunk sewer is considered to be the same as a collector sewer.

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### **Wastewater System**

Flows in a combined, partially-separated or separated sewer system including waste flows and extraneous flows.

### **Water Conservation**

Measures taken by individual home and building owners and the municipality to reduce the amount of water required by individual property owners. Such measures could include: roof gardens, use of rain barrels, perforated parking lots, reduced watering of lawns, etc.

### **Water System**

Flows in a central water piped system that include local watermains and trunks.

### **Wet Weather Flows**

Flow in a combined, partially-separated or separated sewer that is influenced by meteorological conditions such as rainfall and snowmelt. The wet weather flow is comprised of the dry weather flow as well as event derived infiltration/inflow.