



# New Official Plan

Infrastructure and  
Water Management

City of Ottawa  
Planning, Infrastructure, and Economic Development

March 2019



[ottawa.ca](http://ottawa.ca)     **3-1-1**  
TTY/ATS 613-580-2401

## CONTENTS

Introduction .....	1
Challenges and Opportunities: Funding Infrastructure and other Topics .....	3
The Infrastructure Gap .....	4
Intensification AND RESILIENCY.....	5
Infrastructure to Service Urban Expansion Areas.....	7
Servicing Villages in the Rural Area .....	8
Moving Forward .....	10
Strategic Directions: Finding the funds.....	10
Strategic Directions: Intensification and resiliency .....	13
Strategic Directions: Providing Infrastructure to Service Urban Expansion Areas.....	14
Strategic Directions: Servicing Villages in the Rural Area .....	14
Infrastructure and other discussion papers .....	15
Key Infrastructure Resources .....	15

## INTRODUCTION

The City of Ottawa manages over \$42 billion worth of public infrastructure including roads, bridges and pathways, buildings and facilities, buses, trains and other vehicles, water, wastewater and stormwater infrastructure, waste management infrastructure, and trees, forests and natural areas. Many of these assets are long-lived assets, expected to be in service for decades and in some instances for a century. Over their service lives, these assets face stresses from aging, demand changes and climate conditions. Older stormwater sewer systems, for example, were not built using dual drainage or low impact development (LID) principles to handle the volume of runoff resulting from extreme rainstorms, especially given the impermeability of urban development. Buildings, bridges and transit infrastructure need to withstand rising temperatures, more frequent and intense rainfall, and higher wind, snow or ice loads. Roads and pipes are weakened by high heat or more frequent freeze-thaw cycles.

[Comprehensive Asset Management \(CAM\)](#) is the process the City of Ottawa uses to plan and manage the City's infrastructure assets to ensure safe, sustainable and resilient services are delivered to our communities in a cost effective way. A key part of risk management is to understand the likelihood and consequence of aging, changing demands and climate risks, both from incremental change and from extreme weather events.

Asset management planning prioritizes the use of City resources to build, operate, maintain and replace infrastructure. Infrastructure investments must reflect future demands and climate conditions to ensure they perform under these changing conditions and deliver the services our community needs.

Infrastructure required for drinking water, wastewater disposal and stormwater management services is the foundation upon which all communities are built. Without well-designed and maintained water resources infrastructure modern communities could not flourish. Infrastructure is so integral to communities that the design and location of infrastructure can often strongly influence the form, density, location and safety of every home, school, park, institution, commercial enterprise and place of employment. Land use and infrastructure are so strongly inter-related that together they form the cornerstone of the City's growth management planning.

The Infrastructure Master Plan provides comprehensive documentation of the development and evaluation of water, wastewater and stormwater servicing strategies and projects to meet the growth needs of the City. The Official Plan in turn provides the vision, goals, and direction for the growth and renewal of land use in the City. In order for the City to be adaptable and resilient, it is vital that land use and infrastructure

policies are well aligned. Consideration of these issues will need to include the role of green and LID infrastructure in meeting infrastructure needs as the city evolves and grows through a resiliency lens.

As noted, municipal infrastructure extends beyond water, wastewater and stormwater to include roads, building and parks. Other discussion papers have been developed for energy, housing and climate resiliency.

Ottawa Next – Beyond 2036 is a report that gives a glimpse of the long-term changes that may shape the City over the next 100 years. The report was prepared to help the City build a more resilient and adaptable Official Plan and Master Plans. The current Official Plan has liveability as its central theme. Through Ottawa Next the two key concepts of resiliency and adaptability will also be added as themes, given their importance to ensuring liveability.

As we look further into the future, projections and predictions become much more uncertain. For this reason, Ottawa Next describes issues for the next century along with related general themes and multiple scenarios. The emphasis of Ottawa Next is largely about growth and environmental change. The final report also describes likely trends and potential ‘disruptors’ that will shape the future of the city. A key disruptor in the city’s future is climate change. The report also sets the stage for considering how Ottawa will look as a city of 2 to 3 million people.

Ottawa Next suggests that the key drivers of change relating to infrastructure are: greater pressure on Ottawa’s natural environment from urban development; rising temperatures; increased frequency of extreme storm events; and increased costs associated with drinking water, wastewater, and stormwater management. In addition, the City’s Infrastructure Services (IS) staff note that significant further drivers include aging infrastructure, reduced water consumption, and people’s growing service level expectations.

The likely outcomes identified in Ottawa Next and identified by IS staff all result in increased stresses to the existing built and natural infrastructure of the city. Outcomes also point to the need for increased levels of investment due to more common extreme weather events, increasing population growth and density and stresses and loss of natural infrastructure. Currently the City already has plans underway under its Wet Weather Infrastructure Management Plan and its Comprehensive Asset Management Strategy that help address the planning, engineering and funding of infrastructure if we are to meet the challenge of being a liveable, resilient and adaptable city. In addition, Ottawa Next recommends these four specific actions:

1. Preservation and enhancement of wetlands, forests, streams and biodiversity to build environmental resilience and investment in green engineered infrastructure;
2. Development of innovative partnerships with rural landowners to manage stormwater through natural functions;
3. In new development the preservation and enhancement of water balance, both in quality and quantity; and
4. Implementation of water conservation measures, where appropriate\*.

In a global context, for Ottawa to continue to be a liveable city it is necessary to make substantial infrastructure investments. Affordability and reliability will be critical because the city will experience warmer winters, hotter summers and extreme weather events with increasing regularity. As we embark on preparing a new Official Plan there are many challenges and opportunities for infrastructure planning presented in this discussion paper to spur thought and suggest potential actions as we begin the process of preparing the 2022 Official Plan.

## CHALLENGES AND OPPORTUNITIES: FUNDING INFRASTRUCTURE AND OTHER TOPICS

The planning, engineering and construction of drinking water, wastewater, and stormwater infrastructure to support growth is a coordinated effort managed by the City and the development industry with input from the Province, National Capital Commission and other stakeholders.

The City is responsible for the provision of trunk drinking water and wastewater infrastructure which are the primary and largest capacity components of the system. Through City oversight and approvals the development industry provides local drinking water and wastewater systems. The City assumes responsibility for the long-term operation and maintenance of the trunk infrastructure and the vast majority of local drinking water and wastewater infrastructure. Guidance for how the City maintains its infrastructure comes from the Comprehensive Asset Management Strategy<sup>†</sup>.

Stormwater infrastructure is provided largely by the development industry based on Provincial guidelines and is approved by the City. Stormwater outlets to receiving

---

\* IS Staff notes that water consumption has actually decreased since the 1990's. In spite of the city's population growth, water production at the plant has not increased.

† The Comprehensive Asset Management Strategy is a council adopted document that defines itself as *“an integrated business approach involving planning, finance, engineering, maintenance, and operations geared towards effectively managing existing and new infrastructure to maximize benefits, reduce risk, and provide safe and reliable levels of service to community users. This is done in a socially, culturally, environmentally, and economically conscious manner.”*

watercourses are also approved by the Conservation Authority. Once constructed, the ownership and ongoing maintenance of stormwater infrastructure is normally the responsibility of the City.

The costs of the ongoing operation, maintenance, repair, replacement and expansion of infrastructure is, and will continue to be, one of the greatest economic challenges facing the City in the next 100 years. The primary reason for this is a challenge keeping up with the pace of renewing existing aging assets. This highlights the importance of providing assets that will support increased resiliency of our growing communities while reducing environmental impacts through green infrastructure and low impact developments.

## THE INFRASTRUCTURE GAP

The infrastructure gap is the difference between the real costs of the ongoing operation, maintenance, repair and replacement of aging infrastructure and what funding is actually available for this work. Ottawa is very much like other cities in Canada and around the world; we spend a great deal on maintaining infrastructure and the inventory continues to expand as new infrastructure is constructed to meet the needs of the city as it grows. Development charges are meant to cover the cost of growth-related infrastructure construction, and maintenance is funded almost entirely by the City's ratepayers.

In 2016 (and again in 2017) the McKinsey Global Institute, a predominantly economic think tank, estimated that even though Canada and some other developed nations have raised investment in infrastructure substantially in the last 12 years it is still not sufficient. In particular, they found that a "pattern of underinvestment has produced a growing shortfall and allowed many foundational systems to deteriorate". Ottawa is a city with a mixture of very old and more contemporary infrastructure. Some infrastructure is more than 100 years old and beyond its original expected service life.

Since the first Long Range Financial Plan (LRFP) produced in 2002, the City identified the funding of capital infrastructure projects as a major issue. In the years since, the City's Long Range Financial plans have continued to describe the financial challenges of the infrastructure gap\*. Yearly expenditures are significant for what is estimated to be more than 20 billion dollars in water, wastewater, and

---

\* Water, wastewater and stormwater infrastructure has an estimated replacement value of more than \$20.9 billion and is considered to be in Fair to Good condition. This includes, but is not limited to 8,500 kilometers of water, sanitary and storm sewer pipes; two water purification plants (Lemieux and Britannia); the Robert O. Pickard Environmental Centre (ROPEC), the City's sewage treatment plant; 92 pump stations; and over 5,800 culverts (Report ACS2017- CSD-FIN-0023 Long Range Financial Plan V – Water, Wastewater and Stormwater Supported Programs, September 2017)

stormwater infrastructure assets that the City owns. For example, in 2018 the City allocated a budget of \$202 million dollars to rehabilitate, renew and build new water, wastewater and stormwater infrastructure across the city. The investments are necessary expenditures and collectively infrastructure is a major component of the City budget each year.

It will be a significant challenge in the years to come for the City to meet the costs of infrastructure maintenance and renewal. The Comprehensive Asset Management Strategy ensures that the City does the best that it can with the resources it has available but, as we examine in the following subsections, there are additional challenges and opportunities that should be considered in relation to future planning and development. In recent years, City Councils have recognized the need for predictable, sustainable and increased infrastructure investments.

## INTENSIFICATION AND RESILIENCY

Intensification is urban growth that features greater density of jobs or people at locations where existing services are already in place. Historically, intensification took place slowly across the former Ottawa-Carleton Region, and growth was concentrated at the urban fringe where suburbs grew rapidly at relatively low density on new greenfield areas. This type of growth is based on large scale and expensive expansion and extension of roads, transit and water infrastructure. In contrast, growth from intensification can be a positive benefit to cities and people because the necessary capacity of roads, transit and water infrastructure are generally already in place. Growth from intensification compared to growth in greenfield areas therefore has the potential to be more compact, efficient and less costly. The challenge is accommodating this growth while ensuring the infrastructure is resilient to changing climate conditions.

In the early 2000s, the City began to establish modest targets for intensification in the Official Plan. These early targets were met somewhat earlier than expected. Since then, the City has met or exceeded rising development intensification targets after each successive Official Plan update. This trend towards intensification is a reflection of the high desirability of compact, walkable urban neighbourhoods. The rate of intensification is expected to accelerate even further as the city implements each successive phase of light rail.

The most recent update of the Infrastructure Master Plan (2013) confirmed that existing trunk water and wastewater systems have more than enough capacity to accommodate intensification projections to at least the year 2060. In general, local infrastructure systems are also not expected to pose capacity constraints to intensification because:

- there has been a sustained downward trend in per capita water consumption over the last 25 years;
- new dwelling units are fitted with more water efficient fixtures;
- there is an opportunity to reduce stormwater inflow in partially separated sewer systems (in which foundation and roof drains are connected to the sanitary sewer, rather than the storm drainage system) through property redevelopment;
- new building service connections are less leaky than older connections;
- intensification does not necessarily involve an increase in impervious area and storm drainage;
- the City's site plan approvals require that stormwater be managed on site, so that peak drainage does not increase over existing conditions; and
- infrastructure renewal provides the opportunity to improve local system capacities that could allow for even higher levels of intensification.

Based on the above factors, the infrastructure costs to support intensification are significantly less than the cost of supporting new greenfield development in the suburbs. The City's operating and maintenance costs for infrastructure to support intensification are also less because the costs are shared among a greater number of ratepayers on an existing system.

Intensification is also supported by the City's Wet Weather Infrastructure Management Plan (WWIMP), which consists of strategic programs for managing wet weather flows within the City's wastewater and stormwater collection systems. These programs, which are in various states of development and implementation, include Extraneous Flow Reduction (wastewater system), Capacity Management (to track and allocate residual capacities), Flood Control (related to servicing in existing development areas), Sewer Separation (in combined sewer area), and other programs related to operations and maintenance and pollution prevention and control.

There are, however, some challenges to providing infrastructure to support intensification.

A significant challenge is to maintain adequate surface drainage and reduce environmental impacts of surface drainage through green and low impact developments. A particular challenge is in urban areas currently served by roadside ditches. When low-rise intensification occurs on an existing street in the urban area, it is common for building permits to be issued without the need to complete a site plan control process. Because the building permit process does not require analysis of local infrastructure, deficiencies may not become apparent until after development. It is also difficult to anticipate surface water infrastructure needs because neither local neighbourhood intensification plans, nor reliable long-term

forecasts of local intensification of sufficient detail are available. Lacking information on where deficiencies may arise, it is difficult for the City to identify and prioritize suitable long-term local infrastructure needs. Finally, there are no funding sources available for intensification-related upgrades unless projects can be pre-identified in a Development Charge By-law.

Larger infill developments that are subject to site plan control may also present some challenges. To begin, in some areas the City may lack readily available and reliable local system capacity data. In this case development proponents may be required to analyze local systems that extend far beyond their project location. While local system upgrades needed to support developments such as this are somewhat rare they may become more common as intensification and utilization of existing local system capacity increases.

## INFRASTRUCTURE TO SERVICE URBAN EXPANSION AREAS

At the time an Official Plan is updated, the City is required to assess whether there is a need to expand the urban boundary to provide additional lands (called greenfields) for new neighbourhoods. Historically, more than half of all growth in the city has taken place in this way. However, with intensification starting to account for a significant amount of growth in population and employment (more than 40%), future growth patterns will be much more balanced between greenfields and established built-up areas. In the long-term, there may be a wholesale trend reversal that will see the majority of growth take place through intensification.

Nevertheless, if an expansion of the urban boundary is needed, consideration of greenfield expansion areas will continue to form part of the process of establishing where growth takes place. This process is very complex and the source of much analysis and discussion. The key factors include a broad range of planning, transportation, environmental, and infrastructure related criteria. Each of these criteria are weighted to make a final decision. Infrastructure issues are commonly a significant consideration but challenges can arise later as infrastructure generally does not drive the ranking of candidate expansion areas. For instance, the majority of recent urban expansion areas established in the 2007 update to the Official Plan were in flat, low-lying areas with poor drainage and soil characteristics that make servicing more difficult and expensive.

When an urban expansion area has poor drainage conditions it is often necessary for the developer to provide significant grade raising so that there is adequate drainage in new development. This seems a simple remedy but where poor soil conditions exist the time and costs to raise the grade can be quite high. In addition, the resulting developments can be less resilient in terms of their ability to withstand

extreme rainfall events because they remain at relatively low elevation with respect to their drainage outlets. The City considers climate change an important challenge in these situations because the associated drainage systems are less robust relative to urban expansion areas on higher elevation lands that have superior drainage characteristics.

In the common instance of clay soil conditions, geotechnical constraints limit potential grade raises. These limits can be exceeded if light-weight fill is used. Alternatively, it would be necessary to preload greenfield areas with metres of fill for several years to ensure the underlying soil is adequately consolidated before development can take place. Failure to address poor soil conditions can lead to differential settlement of the soil after development. Differential settlement can lead to negative outcomes such as uneven road surfaces, cracked pavement and building foundations, and even infrastructure pipe failures.

Recently, the City completed an Infrastructure Standards Review. One of the goals of the review was to reduce development-related costs. One measure that was recommended and implemented by City Council was the use of sump pumps in urban and village expansion areas (and elsewhere). In areas of higher elevation and well drained soils, building foundations carry water by gravity into the storm sewer system. In urban expansion areas of lower elevation and poor soil drainage sump pumps installed below the building foundation reduce the need and the amount of fill necessary because the building foundations can sit below the storm sewer system and excess water around the foundation is pumped up to the sewer. Sump pumps can reduce development costs compared to grade raising, but it places responsibility of maintaining and operating a sump pump in perpetuity on future home owners. There are therefore significant advantages to locating future urban expansion areas in areas of higher elevation, with better draining soils that will make it easier to implement LID and make infrastructure more resilient to climate change.

## SERVICING VILLAGES IN THE RURAL AREA

The current Official Plan directs 10% of future growth to the rural area. Of this growth most is directed to villages where schools, shops, employment, community facilities and services exist. The three main villages that receive this growth are Manotick, Greely and Richmond. The goal of the current Official Plan is to make rural development more sustainable and efficient for the city and residents by emphasizing growth in villages that are already the most complete communities. Growth outside serviced areas is limited under current Official Plan policies and is based on a minimum lot size of 0.4 hectares which, compared to smaller lot sizes, is better able to support a well and septic system in the long term.

Providing services to a distant village has its challenges. The comparatively higher costs (per benefiting resident or business) are due to higher capital, operating and maintenance costs associated with smaller communal village infrastructure systems serving lower densities. It is estimated that the annual operating and maintenance costs (including the average annual cost of renewing aging infrastructure per cubic metre of water consumed) is approximately six times higher for the City's five communal well systems than for the City's urban drinking water system\*.

Servicing for growth in Richmond and Manotick has been planned and designed to allow for the conversion of existing privately-serviced (well and septic) lots to public services over time. One of the reasons for this is that existing privately serviced lots within these villages are smaller than what would be required to support sustainable private services based on current criteria. When lots are too small there is a greater long-term risk to groundwater quality and public health in such areas; particularly if private services are not properly maintained or replaced when needed. The one-time cost of design and construction to convert from well and septic to public service infrastructure (either partial, in the case of drinking water or sewer only, or full servicing) is anticipated to be paid for through a Local Improvement process.

Local improvement costs vary depending on the availability of nearby system connections and the potential need for new pumping facilities for sewage<sup>†</sup>. In some cases, this cost can be as high as \$50,000 to \$100,000. Currently the only two Local Improvement processes that have occurred have been in Manotick. The village of Richmond already has public wastewater services for all properties so future Local Improvement processes would be limited to providing water supply.

The Local Improvement process can take several years because it requires the general commitment of a whole neighbourhood before it can be planned, designed, and implemented. Lengthy Local Improvement timelines make it difficult to take advantage of opportunities (and reduced costs) to coordinate Local Improvements with other City projects such as roadway maintenance and stormwater drainage improvements.

Converting to public services in Richmond and Manotick is the key to the future adaptability and resilience of these villages because growth on services allows for increased diversification of housing and employment and can also permit intensification in more dynamic village neighbourhoods. It also manages risks

---

\* The five communal systems are in Carp, Vars, King's Park in Richmond, Shadow Ridge in Greely and Munster. Manotick is also serviced with drinking water piped from the urban area.

† Provincial policy does not generally allow partial services such as drinking water only.

associated with groundwater quality. The challenge in the future will be the coordination and affordability of conversion.

Development in the village of Greely has historically taken place on private wells and private septic systems. Lot sizes have varied from the quite large to somewhat less than currently required 0.4 ha. More recently, growth in Greely has taken place in Shadow Ridge where smaller lots have been supported by communal water and wastewater services. Another subdivision (Lakeland Meadows) on communal services is also proposed in the village.

An issue that has arisen in Greely is water quality. The City manages a groundwater monitoring program across the rural area that investigates groundwater quality in the City's villages to ensure it is safe. The City is actively monitoring nitrates and will advise local residents as required but there is concern that additional development on private services within the village could contribute further to the already rising nitrate levels in drinking water. Depending on how high these levels reach, local improvements may be necessary to service the village of Greely.

## MOVING FORWARD

As the City prepares a new Official Plan, with anticipation of on-going intensification in the established urban area, potential urban expansion, and increasing demand for village growth, there are a number of key infrastructure-related challenges and opportunities to consider. In this section we will provide some options and potential strategic directions to consider as we move forward with a new Plan.

## STRATEGIC DIRECTIONS: FINDING THE FUNDS

The greatest infrastructure challenge is securing adequate funding for growth-driven projects, as well as the long term, consistent funds necessary for the ongoing operation, maintenance, and renewal of the existing infrastructure system as it evolves to meet development needs.

Ontario cities fund infrastructure services with only three main tools under their control: property taxes, user fees and development charges. In the case of drinking water, wastewater and stormwater drainage, property taxes are the least common source of funds. With few exceptions, property taxes fund the vast majority of city operations, from operating community centres, to providing emergency services to maintaining roads in the urban and rural area. In contrast, water resource services are largely funded by user fees and development charges. It is important then to understand how each of these two tools is used.

User fees for water and sewer are assessed directly to landowners through metering of their municipal water use and, in the case of stormwater, on the basis of property type, service type, and service area. Changes to user fee rates over time are based on projected costs of operating and maintenance of the system. Rate increases account for the increased costs from inflation and increasing renewal needs due to infrastructure aging.

Historically, the City included the costs of stormwater services within the overall user rate for water and sewer. This changed in 2016 when it was decided that the user fees for stormwater would be assessed separately from water and wastewater fees. It was also decided that for the first time user fees (for stormwater services) would be assessed for those that benefit in the rural area - even if they did not have municipal water and sewer services.

User fees are considered to be fair to consumers because the direct costs of operating and maintaining infrastructure is passed on to those that use the services most. The costs of user fees, however, have been continuing to grow over time at a rate greater than inflation. Criticisms of user fees are that they impact lower income households much more significantly than those of higher income households. This affects the overall affordability of housing. A challenge will be to balance rate increases without harming economic development.

Development Charges are one-time fees levied by the City on all new developments. This fee is intended to pay for the portion of the capital infrastructure needed to support growth. If growth-related infrastructure also provides a benefit to existing residents and businesses, some funding may also come through the City's water, sanitary, or stormwater rate budget. Trunk infrastructure (which includes major facilities and pipe networks) that are required to support growth are mainly funded through Development Charges, whereas local infrastructure to service growth (including communal or private services) is implemented and paid for by individual developers. Large growth-driven infrastructure projects like trunk mains are particularly expensive for the City to construct and the developer contribution to these projects is established in the Development Charges By-law, which is updated at least once every five years.

There are two types of Development Charges and they are based on the project type and the existing level of service: City-wide Development Charges and Area-specific Development Charges. City-wide charges pay for major facilities, such as trunk sewers, pump stations, and treatment plant capacity upgrades, that serve large areas of the City. Area-specific charges fund local projects that support development by a limited number of developers.

Because there are often multiple landowners in a development area, legal agreements may be required to establish payment details. Projects are sometimes “front-ended” by a single developer if the project needs to be built before its projected construction date in the City’s capital forecast. This helps speed infrastructure construction to meet a developer’s desired development timelines and can sometimes help to coordinate other development infrastructure in the same area. When a developer front-ends the moneys needed for infrastructure they can recoup the costs associated with infrastructure construction through a front-ending agreement. In many cases, however, the City uses available DC funds (incurring debt if insufficient funds for a specific project have been collected) to pay the upfront cost of major infrastructure.

Projects included in Development Charge By-law updates are based on approximate project estimates derived from plans such as the City’s Infrastructure Master Plan, or a Master Servicing Study that supports development in an urban expansion area. These estimates are updated as more detailed project planning and design work is carried out and, as information becomes available, the estimates can sometimes increase significantly. When this occurs the City incurs debt to cover the difference. The difference will normally be recouped through a new DC by-law. A challenge for intensification areas is the limited ability to allocate Development Charge funding when growth is dispersed and may not occur through a concentrated development.

The options available to address Development Charges shortfalls are constrained by the Provincial Development Charges Act which dictates what projects and associated costs are eligible for funding and how the funds are collected. A further complication is that the Development Charge is determined based on a wide range of services, including transportation, transit, parks, fire stations, community facilities, as well as water, wastewater and stormwater infrastructure. When the Development Charges Bylaw is reviewed every five years, the rates are subject to negotiation and adjudication with the development industry. The central principle guiding the review of the Development Charges By-law is that “growth will pay for growth”. The challenge is to find a balance that supports high quality development to meet the needs of future communities without the City taking on debt that can compromise service to existing communities in the long term.

To limit the risk of having to incur debt in the provision of growth infrastructure, key cost factors will be given careful consideration in the preparation of planning level estimates prepared as part of the Infrastructure Master Plan, and appropriate contingencies applied. To ensure that existing infrastructure can be maintained sustainably, the City will follow the principles outlined in its Comprehensive Asset Management Policy, as approved by Council in 2012. These principles are

supported by risk and value-based programs aimed at minimizing the life-cycle cost of asset ownership.

## STRATEGIC DIRECTIONS: INTENSIFICATION AND RESILIENCY

As discussed earlier, intensification can be an opportunity for cities, if it is well managed. Intensification allows the city to increase urban density without additional investments in growth infrastructure capacity. This is because some areas of the city have latent capacity for water, wastewater and stormwater. Adding more density in these areas requires limited infrastructure investment on the part of the development industry, represents little cost for the City, and increases the overall number of rate payers in the system. This is beneficial for everyone.

Intensification also has the potential to create infrastructure-related challenges that cannot easily be addressed based on existing planning and development processes and funding mechanisms. For example, in the case of neighbourhoods with roadside ditches, drainage problems can arise because new development increases the overall impermeable area without any on-site control of the additional stormwater runoff that is generated. Because intensification takes place over individual properties, and often with just a building permit issued, it is difficult to plan for infrastructure needs and it is difficult to establish a funding process to pay for necessary upgrades. Issues associated with intensification and stormwater management in these areas could be addressed through a form of site plan control over intensification development - including new detached dwellings. This process would ensure that an infrastructure assessment takes place. This would need to be balanced with the increased time and costs associated with small-scale intensification projects, and may not address the cumulative impact of incremental intensification. Where neighbourhood-scale infrastructure upgrades are necessary, development could be slowed to organize the cooperation of several property owners to address any local infrastructure upgrade needs.

Another intensification challenge is related to neighbourhoods consisting of low to medium density dwellings served by roadside ditches. These often prompt requests for upgrades to piped drainage systems which cannot be addressed in isolation of single redevelopments. These neighbourhoods tend to require more specific assessments to balance level of service, implementation of lot level controls, and green or LID infrastructure to enhance resiliency to wet weather events. These assessments would require the City to refine local intensification projections City-wide, identify local infrastructure upgrade needs, and prioritize implementation based on current local intensification demand and risks to service levels. This would

need to be supported by a carefully planned development-supported funding strategy. The City has established a task force to investigate options and identify the most appropriate approach to managing potential intensification-related needs.

## STRATEGIC DIRECTIONS: PROVIDING INFRASTRUCTURE TO SERVICE URBAN EXPANSION AREAS

As the city's urban footprint expands, challenges can exist in finding ideal greenfield lands for urbanization. In particular, low-lying lands and poor soil conditions can present problems for servicing because of drainage and loading constraints. Light-weight fill, pre-loading, and sump pumps can all help to address these constraints, but there are disadvantages associated with these measures, such as impacts on development timing and costs, long-term home-owner maintenance responsibilities, resiliency limitations, and effectiveness of low impact development (LID) measures.

Avoiding the selection of low-lying expansion areas with poor soils would be the most effective way to avoid the associated issues. This may not always be possible but increasing the importance of servicing issues during the evaluation of alternative urban expansion areas should be considered. The ability to drain foundations by gravity is preferable to the use of sump pumps and so drainage-related scoring and weighting should be reviewed accordingly relative to other factors. Consideration of such detailed drainage and soil-related criteria would require a more detailed analysis compared to previous expansion area selection exercises that have been completed by the City. Furthermore, other expansion area constraints, such as prime agricultural land, may limit opportunities to avoid low-lying areas with poor soils. However, this approach is recommended to ensure that development in future expansion areas is resilient and cost-effective and allows the ability to leverage the effectiveness of green and LID infrastructure.

## STRATEGIC DIRECTIONS: SERVICING VILLAGES IN THE RURAL AREA

The current Official Plan directs 10% of the future growth to the rural area and most of this growth is allocated to the three largest villages which are Richmond, Manotick and Greely. Growth in these villages helps to reinforce them as complete, self-sustaining communities outside of the urban area. Addressing the infrastructure needs to support growth in these villages can represent a significant challenge. This is mainly due to the cost and time associated with providing infrastructure in rural villages. Furthermore, in the case of Richmond and Manotick, changing existing lots over to full municipal services is expensive for the local residents and the process of change can be time consuming. Local Improvements based on partial services for

existing development in Manotick would be less expensive than full services. This would need to be assessed to safeguard risk to health or the environment.

To help reduce the potential costs of Local Improvement on residents the City could also establish a pro-active program where the City's capital program is reviewed on an annual basis to identify where there is a corresponding Local Improvement opportunity. If an opportunity is identified, local residents could be directly informed so that they are aware of the potential cost savings of coordinating capital programs such as a road repairs and resurfacing with a Local Improvement.

Within the villages of Richmond and Manotick, the current approach is to proceed with Local Improvements at a neighbourhood level. Conversion of larger areas would permit efficiencies of scale and capital project coordination to reduce project costs making conversion to municipal services more affordable to land owners. This could also be beneficial in fostering economic development in rural villages.

Finally, a review of the 10% growth objective in rural areas should be considered as part of the Official Plan review to ensure it remains an appropriate target. Growth in the villages should be directed to lands that are or can be serviced. This would encourage mixed uses to foster complete communities and promote local economic development.

## INFRASTRUCTURE AND OTHER DISCUSSION PAPERS

The provision, operation and maintenance of infrastructure is a topic that impacts many land use considerations. The following discussion papers provide added context and linkages to the infrastructure topic.

- *Climate*, which considers potential impact of climate change on existing drainage systems and the growing importance of green infrastructure.
- *Rural Ottawa*, which considers existing trends and needs in the rural area, including the City's villages.

## KEY INFRASTRUCTURE RESOURCES

### The Comprehensive Asset Management Strategy

- This is a city plan and program that provides systemic, long-term direction for the management of the City's physical assets (such as water infrastructure) based on the Council approved Comprehensive Asset Management (CAM) Policy. The CAM strategy deals with the City assets during their entire lifecycle and addresses the need to ensure that the City's infrastructure is resilient to changing climate.

### The Wet Weather Infrastructure Management Plan

- This is a plan prepared by the City under the Ottawa River Action Plan that addresses urban flood protection, capacity for growth and pollution control.

### Watershed and Subwatershed Studies

- These plans prepared by the City under the Ottawa River Action Plan that addresses stormwater retrofits in areas of the City where streams have been degraded through urbanization.