

# 2023 Infrastructure Master Plan - Preliminary Policies and Program Recommendations

INFRASTRUCTURE PLANNING BRANCH  
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## **List of Acronyms**

AMP	Asset Management Plan
CAM	Comprehensive Asset Management
CDP	Community Design Plan
DC	Development Charge
EMP	Environmental Management Plan
IMP	Infrastructure Master Plan
LID	Low Impact Development
MECP	Ministry of Environment, Conservation and Parks
MSS	Master Servicing Study
O&M	Operations & Maintenance
OP	Official Plan
PSA	Public Service Area
SWM	Stormwater Management
SWS	Subwatershed Study

# 1.0 Introduction

The City is in the process of preparing an update to the Infrastructure Master Plan (IMP) to support the New Official Plan (OP) which was adopted by City Council in October 2021.<sup>1</sup> The IMP addresses stormwater, wastewater, and drinking water servicing to support growth to 2046 and beyond. The IMP is expected to be approved by Committee and Council by Q2, 2023.

The IMP complements the City’s Asset Management Plans, which primarily address strategic maintenance and improvements to the systems that support existing development.

The purpose of the current document is to present preliminary IMP policies and program recommendations. The City is seeking input from stakeholders on this preliminary information so that it can be finalized for consideration by Council through the IMP approval process.

## 1.1 Alignment with the 5 Big Moves

The OP proposes five broad policy directions or “Big Policy Moves” which underlie the vision of becoming the most livable mid-sized city in North America over the next century. The five strategic directions pertain to growth management, mobility, urban and community design, resiliency, and economic development.



Growth Management



Mobility



Urban and Community Design



Climate, Energy and Public Health



Economic Development

While each of these five strategic directions have implications for infrastructure planning, Big Policy Moves 1 and 4, regarding intensification and resiliency are particularly relevant. Big Policy Move 1 is to achieve more growth by intensification than by greenfield development by the end of the planning period. Intensification is an important topic that has been considered as part of this IMP, and supplemental policy is proposed to complement policies within the OP to guide infrastructure planning for intensification. Big Policy Move 4 is to “Embed environmental, climate and health resiliency and energy into the framework of our planning policies.” This is also highly relevant to the IMP, and climate change as a cross-cutting issue is discussed in more detail in the following section. The IMP also supports Economic Development (Big Move 5),

<sup>1</sup> All references to the Official Plan (or OP) in this document refer to the New Official Plan as approved by City Council in October 2021.

where such development aligns with the OP, by facilitating the provision of the associated infrastructure capacity needs.

## 1.2 Climate Change

The OP identifies six major cross-cutting issues that affect policies throughout the plan. As for the relevant Big Policy Moves, the two cross-cutting issues of greatest relevance to IMP policies and programs are:

- Intensification; and
- Energy and Climate Change

To support the intensification projected in the OP, specific policies and programs are required to ensure that sufficient infrastructure capacity will be available. These policies and programs are described in Sections 2.7 and 3.4. This leaves climate change as the key cross-cutting issue that is addressed throughout the IMP, including the policies presented herein.

Through the Climate Emergency declaration in 2019, Council directed staff to embed climate change across all elements of City business. The Climate Change Master Plan is a framework for how Ottawa will mitigate and adapt to climate change over the next three decades. One priority of the Climate Change Master Plan (CCMP) is the application of a climate change lens to the OP and its supporting documents, asset management and capital planning.

### 1.2.1 A Climate Lens for the IMP

A high-level climate lens developed for the City's various master plans outlines key requirements and considerations to be addressed in these plans. It outlines considerations both for mitigation (GHG emissions reductions) and adaptation. In the context of the IMP, the climate lens has focused primarily on adaptation, due to limited opportunity for direct GHG emissions reductions.

Climate change projections for the National Capital Region were published in June 2020 and apply advanced climate science modeling to predict changes in temperature, precipitation, wind and extreme weather until the year 2100. The IMP has identified climate projections most relevant to the planning and performance assessment of each of the infrastructure systems. These projections along with climate resiliency objectives are considered in the planning of IMP infrastructure and the review of options to mitigate impacts on system performance, including capital improvements or operational response plans.

A comprehensive climate vulnerability and risk assessment for water, wastewater and stormwater infrastructure is being completed in 2022 and is using the climate projections data to assess the possible impacts and risks of climate change for these systems. The draft assessment confirms that many existing infrastructure planning practices and design guidelines already directly or indirectly consider potential risks to system performance that are posed by

climate change. Most importantly, performance of the City's water distribution and sanitary collection system is modelled under extreme demand or flow conditions resulting from extreme weather events. Further information will be provided in the service-specific sections of the IMP document.

### 1.2.2 Infrastructure Planning for Development

Infrastructure planning for new communities is required to ensure the availability, reliability and resiliency of infrastructure to support planned growth. A key goal of infrastructure planning is to identify preferred servicing solutions that optimize system performance objectives and support or align with other relevant community planning objectives, including those for climate change mitigation and adaptation.

A further review of the climate projections and the associated vulnerability and risk assessment recommendations described in Section 1.2.1 will be required to determine the need for amendments of the City's design guidelines that are used to support infrastructure planning for development.

### 1.3 Asset Management

Like the vast majority of North American municipalities, the City of Ottawa is managing an infrastructure renewal deficit that has been increasing and is expected to continue increasing over the next several decades. This means that the City must increase the amount of assets renewed per year in order to maintain the current state of good repair. This most likely will require an increase in renewal budgets. Infrastructure renewal deficits constitute the majority of the City's overall infrastructure deficit. The overall deficit could also include a deficit in operations and maintenance (O&M), level of service upgrades, and/or strategic infrastructure initiatives. These components of the infrastructure deficit can be more difficult to calculate as they are relative to target O&M levels, target levels of service, and planned enhancements and strategic initiatives whereas the renewal deficit is relative to infrastructure condition which may be easier to quantify and less subject to interpretation. Future Asset Management Plans (AMPs) will estimate these components of the overall infrastructure deficit.

The magnitude of the Renewal Funding Difference (i.e. the infrastructure renewal deficit) identified in the development process of the core AMPs is such that increased renewal funding alone will not be sufficient to close the gap. It is important that the City explore a range of financial and non-financial options for closing this gap. Options will need to consider the following:

- Life-cycle cost analysis to support the evaluation and design of project alternatives to ensure that service life and maintenance costs are given greater consideration;
- Optimization of which pipes are renewed and when they are renewed;

- Minimize renewal funding allocated to replacement of infrastructure that has remaining life;
- Optimization of cost-effective mid-life renewal strategies such as pipe lining to extend the life of assets;
- Application of an asset rationalization lens in the infrastructure planning process to minimize addition of new assets;
- Strategies to manage risks to service levels with “non-pipe” solutions;
- Preservation and restoration of ditch drainage systems; and
- Fair allocation of costs to intensification development; and
- The ability of the City organization and the local engineering and construction industry to gradually ramp up to deliver a larger program.

Renewal optimization strategies must consider the full life of an asset for managing the renewal deficit. Deferring replacement until it is required helps manage annual and long-range cash flow and financial solvency.

Any works needed to support growth that require asset replacement where the asset has remaining life will forfeit the value remaining in the asset. Upsizing of existing infrastructure to meet intensification needs also prevents the use of cost-effective renewal technologies such as structural pipe lining. However, it is also important to consider the increase in ratepayer density resulting from intensification that will have a beneficial effect on available rate budgets. Furthermore, any strategy that successfully aligns upgrades required for growth with end-of-life renewal can minimize potential impacts to the renewal deficit. Project funding formulae should consider all of the above factors to ensure a fair allocation between growth and renewal budgets and avoid negative growth-driven impacts on the renewal deficit.

The initial capital costs of new greenfield infrastructure are typically fully funded by development. However, financing for Development Charge (DC) funded infrastructure can put pressure on City budgets, particularly when these projects include “post period capacity” that exceeds what is required to meet growth needs to the OP horizon and is therefore not fully eligible for DC funding. It is also important to note that, while greenfield infrastructure is generally cost-neutral to the City initially, it does increase O&M needs and future renewal funding needs as a result of the increased inventory of assets to be managed and maintained, and these costs are borne by the City.

The policies in this document have been drafted to ensure that infrastructure required for growth is cost-effective and can be assessed and incorporated into future updates of the Long-Range Financial Plan and Asset Management Plans.

## 2.0 Preliminary Policies

### 2.1 Overview

Policies governing drinking water, wastewater and stormwater servicing for development are found in Section 4.7 of the City's OP, as approved by City Council in October 2021. The purpose of this part of the IMP is to provide supporting detail to key policies within the OP and to establish additional technical policies to support infrastructure planning and approvals processes. Each policy section includes a preamble followed by a numbered list of policies. As noted above, climate change is a cross-cutting issue throughout many aspects of the IMP, and related policies are embedded throughout the IMP policy sections.

### 2.2 Level of Service

For the purposes of the IMP, Level of Service is generally equivalent to quantifiable system design criteria that govern the identification and sizing of projects needed to support growth.

These criteria are applied to models of the City's water, wastewater, and stormwater systems.

Existing City systems do not necessarily meet these criteria, as they have been built over the course of time since the City's founding in 1855.

Design criteria for municipal systems have changed a lot over this period, becoming more stringent over time to address evolving level of service and public health and safety expectations.

Based on current practice, the City's general objective for existing assets is to increase existing Level of Service to today's standards through the renewal program, but this is typically impractical or impossible to achieve for water resource networks that are constrained by topography or other system characteristics.

As such, the intent of the IMP is to ensure that, as a minimum, existing levels of service in each neighbourhood across the City do not degrade as a result of growth. The City's Comprehensive Asset Management (CAM) program addresses existing system issues such as the need to renew aging infrastructure and existing system performance problems. Subsequent versions of the Asset Management Plans will define Target Levels of Service that will apply to existing systems as part of the CAM program.

An example of a system design criterion is minimum watermain pressure in local water distribution networks. The City's distribution system is planned to ensure that minimum pressure criteria can be met. When incremental demands associated with projected growth

#### POLICY HIGHLIGHTS

- 1) For intensification in existing development areas, the minimum target level of service is the better of the original or existing level of service
- 2) Developers subject to *Planning Act* approvals must reduce fire flow requirements to match what is available locally or pay for local upgrades



are applied to the City's central system model, simulation of future hydraulic performance based on the existing infrastructure will identify specific areas that do not meet pressure criteria. Alternative infrastructure projects are tested to determine what works are most effective at addressing these pressure shortfalls. Hence the selection of design criteria is of critical importance in developing the IMP. The criteria align with the City's existing design guidelines, but some criteria are specific to system level planning, where the scale of analysis is much larger than a single development project.

Reliability is a particularly important consideration in the context of system planning. A major failure of a component of the trunk system has the potential to interrupt service to large areas of the City unless reliability features are built into the system. Standard pumping facility design requirements include a range of reliability elements such as redundant pumps and back-up power. Sanitary pumping systems are also designed with overflows to surface water to ensure that basements are not flooded under an extreme wet weather or complete station failure event. The water supply system includes entirely redundant pumping stations and feeder mains to ensure that the system does not depressurize due to a catastrophic failure. Critical failure scenarios are tested using the City's central system models as part of the planning process to ensure that appropriate reliability projects are identified.

Further information related to Level of Service is available in the following Comprehensive Asset Management program documents:

- Comprehensive Asset Management Policy;
- Strategic Asset Management Plan; and
- Service-based Asset Management Plans.

As noted above, these and future plans created and updated under the Comprehensive Asset Management program will provide further direction on Levels of Service as the City's asset management practices evolve.

The following level of service and reliability policies apply to the planning of growth-driven infrastructure:

- 1) System design criteria established in the IMP are intended to ensure that current City design and level of service guidelines can be met in future neighbourhoods. They are not intended to achieve improvements to levels of service in existing development areas.**
- 2) In light of affordability, topographic, and existing infrastructure systems constraints, the minimum City objective for existing development areas is to maintain the original as-designed levels of service, or the current level of service (whichever is higher). This means that system capacities in existing development areas will be managed such that intensification will not have a significant impact on current levels of service. The City will**

consider the impacts of climate change when planning for both intensification and infrastructure renewal.

- 3) The City will consider the impacts of climate change on capacity requirements when planning for intensification and infrastructure renewal.
- 4) Drinking water system planning is based on a design fire flow capacity that may not meet all site-specific development expectations. It is ultimately the responsibility of development proponents to incorporate site-specific fire protection measures as needed to ensure that demands do not exceed available capacities.
- 5) The City will continue to apply a risk-based approach to planning for potential major infrastructure failures, incorporating redundancies into system and facilities design and/or preparing and maintaining contingency plans, as appropriate. Affordability, operability, and sustainability are fundamental considerations in this approach.

Further Level of Service policies related to intensification are found in Section 2.7.

### 2.3 Public Service Areas

Public Service Areas (PSA) are defined areas of the City that are serviced or may be permitted to be serviced by a City water and/or wastewater system. Section 4.7.2 of the OP includes policies (1-7, and 11) relating to Public Service Areas.

Maps showing the coverage area of PSAs in the City will be provided in the IMP. In some cases, interpretation of the precise limits of PSAs are to be based on existing agreements and by-laws. These documents will be referenced in appended schedules, based on currently available information.

In general, all development inside the Urban Boundary or located in certain Villages is to be serviced by City-operated water and wastewater systems per OP Policy. Several exceptions to this general policy exist where development had been approved within the current OP urban and village boundaries on the basis of partial services (water-only, or wastewater-only), or where City water services had been approved in a Rural area for environmental or public health related reasons. Mapping of these areas will be provided in the IMP.

There are longstanding development areas inside the Urban Boundary that were approved on the basis of private services. OP Policy encourages the extension of City water and wastewater

#### POLICY HIGHLIGHTS

- 1) New mapping will identify public service areas and those areas with no or partial services
- 2) For proposed development abutting areas with no or partial services, servicing studies must consider additional capacity needed to bring services to those areas

services to these development areas. This will generally be achieved through the Local Improvement Process, with the majority of costs recovered from benefitting property owners.<sup>2</sup> Mapping of these areas will be updated and provided in the IMP.

There are several Federal facilities located within the Greenbelt that form part of the Public Service Area. All Federal facilities would be subject to the Public Service Area policies in the OP.

Consideration of PSA expansion proposals is subject to the policies in Section 4.7.2 of the OP and will be evaluated on a case-by-case basis. The following direction provides further clarification to these policies:

- 1) Notwithstanding OP policies that require proposed development with a PSA to be on the public services available, exceptions may be granted where the PSA is in the general rural area and insufficient capacity is available in the public system. An example of this would be the Carlsbad Springs area, where limited capacity exists in the trickle feed system.**
- 2) Any Master Servicing Study (MSS) that is prepared to support development on lands adjacent to existing development on private services (full or partial) must consider potential public servicing of the existing development, regardless of whether or not it is located within the PSA, and allow for consultation with the existing community prior to MSS approval by Council.**
- 3) The expansion of existing, or creation of new, Greenbelt Facilities (see OP Section 8.1) is to be supported by an MSS approved by City Council prior to submission of any Planning Act applications related to the new or expanded facility area.**

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<sup>2</sup> The City updated its Local Improvement Policy in 2021.

## 2.4 Capacity Planning

One of the key objectives of the IMP is to ensure that capacity is available in the City's water supply, sanitary sewage collection, and storm drainage systems to support the growth projected in the City's OP. The IMP achieves this by:

- Identifying the major water and sanitary projects (and associated timing) needed to ensure that the backbone systems have sufficient capacity to accommodate the cumulative impacts of greenfield and intensification development;
- Providing direction on the preparation of MSS generally prepared by the development industry for future neighbourhoods; and
- Establishing new policies and programs needed to manage capacity in existing local systems that will service the projected intensification.

### POLICY HIGHLIGHTS

- 1) Backbone projects planned to meet 2046 growth but sized for a longer-term projection
- 2) Available capacity to be allocated to zoned land first
- 3) Remaining capacity to be allocated at time of draft plan approval on a first-come-first-served basis

The following policies, which build on policies in Section 4.7.1 of the OP, address issues related to backbone infrastructure capacity, planning horizons, infrastructure oversizing, and capacity allocation:

- 1) **Through the IMP, the City will be responsible for identifying “off-site” backbone water and wastewater projects needed to support growth, however, “on-site” infrastructure (i.e. located within future neighbourhoods) may also be identified in some areas where it is needed to support system-level performance requirements.**
- 2) **Through the IMP, the City will only identify backbone-level projects needed to meet the 2046 growth requirements, however, given that the life cycle of infrastructure can extend well beyond the City's Official Planning horizon, the City will consider longer-term projections for the purposes of sizing these projects. Through Council approval of the IMP, the City is making no commitment to development beyond the OP horizon.**
- 3) **Further to OP policy 4.7.1.15, as part of preparing area-specific Terms of Reference for MSSs, proponents will consult with the City on opportunities for over-sizing of infrastructure to allow for potential extension of public servicing into adjacent existing privately serviced development.**

4) Where infrastructure system capacity is limited, and is unable to meet all future development related demands, the available capacity will be allocated in the following order of priority:

- a. Zoned land not requiring a Site Plan Control approval
- b. Zoned land requiring a Site Plan Control approval
- c. Zoned land where the applicant is seeking a Consent to Sever

Any remaining capacity will be allocated at the time of draft approval on a first-come-first-served basis (unless an agreement is otherwise reached between all potentially benefitting property owners). If draft approval for a specific development expires, the associated capacity allocation will also expire.

## 2.5 Greenfield Infrastructure Planning and Design

This section describes the process of planning greenfield infrastructure and associated policies.

The process begins with City planning of major infrastructure through the preparation of the IMP. The projects in the plan are identified based on the projected cumulative impact of growth across the City, including all of the approved future neighbourhoods. These projects are funded through a mix of DCs and City Rate funding and implemented by the City, however, it is possible for eligible projects to be front-ended by a developer, subject to IMP and OP policies.

Infrastructure planning for new communities is completed as part of the Community Design Plan (CDP) process. As described in Section 5.6.2 of the OP, the Future Neighbourhood Overlay is applied to lands that have been added to the urban boundary to accommodate City growth in the Suburban Transect. OP Section 12 provides direction for the preparation of Local Plans which are required to remove the overlay on these lands. Local Plans are to be prepared in accordance with the structure outlined in Annex 4 of the OP, which details the elements to be included in the Local Plan, where relevant.

### POLICY HIGHLIGHTS

- 1) Policy clarifying greenfield infrastructure planning process
- 2) Policy identifying the servicing studies needed to inform decisions on transferring undeveloped rural estate subdivision rights to areas abutting Villages

The preparation of Environmental Management Plans<sup>3</sup> (EMP) and MSSs, are identified as critical studies to support infrastructure planning for new communities through the CDP process. These studies must also align with and be informed by other plans prepared as part of the Local Planning Framework (per OP Annex 4) such as Land Use Plans, Community Energy Plans, planned mobility networks, etc.

In most instances, the EMP is to be informed by an approved Subwatershed Study (SWS). The City may allow an EMP to proceed in the absence of an SWS in exceptional circumstances, depending on the scale and location of the community planning area relative to the subwatershed. In areas where an SWS is not available, the EMP will need to address the necessary information, assessments and analysis that would otherwise be found in such studies.

The EMP and MSS are coordinated efforts to ensure that infrastructure is located appropriately, and the stormwater management elements effectively mitigate the impacts of post-development runoff on existing environmental features such as watercourses and wetlands. Depending on the environmental and servicing complexities of the planning area, Master Drainage Plans are sometimes needed to establish a preferred conceptual drainage solution prior to preparing a more detailed MSS.

MSS requirements are discussed in Section 2.6. EMP requirements are covered in a Standard Terms of Reference prepared by the City to support implementation of the OP.

Approval of a proposed Draft Plan of Subdivision within local plan areas is subject to demonstration of alignment with the approved CDP, MSS, EMP, and other applicable plans. Proposed deviations from an approved MSS may require an amendment to the MSS (and associated Class Environmental Assessment, as needed), per OP Policy 4.7.1.16. Once draft approval is achieved, detailed design of the infrastructure will be approved if it is shown to be consistent with the draft approval, and the City's design guidelines and standards. Any required infrastructure that is not adequately covered by these guidelines and standards will require evaluation of design options and acceptance by the City's operating staff to ensure that the infrastructure is sustainable and can be expected to perform well over the long term.

With respect to rural estate subdivisions, OP Policy 3.4.8 establishes a new policy direction whereby undeveloped plans of subdivision that meet certain conditions may be transferred geographically to another location within the Rural Countryside designation that abuts a Village boundary. Policy 3.4.8 also provides some guidance on minimum lot sizes and acknowledges

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<sup>3</sup> For minor Future Neighbourhoods, an EMP may not be required. The scope of work for the required MSS would be adjusted to provide the necessary information needed to ensure that the proposed infrastructure addresses potential impacts on the environment.

that lots in the new location may be serviced either by full municipal water and wastewater services or by private individual on-site services subject to certain criteria.

The following policies apply:

- 1) Unless otherwise approved by the City under exceptional circumstances supported by a documented rationale, greenfield infrastructure shall be planned and designed as described above.**
- 2) For applications to transfer a rural estate subdivision to a new location that abuts a Village without municipal water and wastewater services, the applicant will be required to prepare and submit information demonstrating the appropriateness of development on private individual services in accordance with the OP policies in Section 4.7.2, and OP policy 9.2.3.5.c.**
- 3) For applications to transfer a rural estate subdivision to a new location that abuts a Village with full or partial municipal water and wastewater services, the City will determine if municipal servicing is feasible based on available system capacity and/or life cycle costs associated with existing system capacity upgrades. If it is determined that municipal servicing is feasible, then OP Policy 4.7.2.4.c will apply for the purposes of adding the abutted area to the PSA. Area Specific DCs would apply if off-site works are required, with front-ending of associated costs and/or works by the proponent.**



## 2.6 Master Servicing Studies

OP Policy 4.7.1.13 requires that Local Plans for Future Neighbourhoods be supported by a Master Servicing Study (MSS). OP Annex 4 outlines the framework for the preparation of the Local Plan and other elements to be included in the community planning. The MSS must align with and be informed by relevant aspects of these other plans or studies.

In exceptional cases, unanticipated greenfield development opportunities could arise within an urban area that were not anticipated as part of the original planning of the area (for example, the current Barrhaven Conservancy project). The City will require that such opportunities be supported by an MSS.

In some instances, such as for small areas that are not contiguous to other greenfield development areas, a scoped MSS is acceptable.

As per OP policy 4.7.1.13, a scoped MSS must include identification and evaluation of servicing alternatives and demonstrate that sufficient capacity exists (or will be provided through planned off-site infrastructure) to support the development.

Master planning of infrastructure generally requires a comprehensive analysis on a watershed / sewershed / network basis, that considers the cumulative impact of development on alternative servicing solutions. This analysis contributes to an overall evaluation of the alternatives against an accepted set of criteria to identify a preferred servicing solution that optimizes system performance objectives and supports or aligns with other relevant community planning objectives (per OP Annex 4). The completion of an MSS is intended to streamline the review and approval of individual development applications within the area of the local plan by ensuring site-specific decision-making supports broader system planning objectives and avoids potential servicing conflicts.

Standard Terms of Reference for an MSS will be appended to the IMP and will therefore be subject to Council approval.

MSS policies are as follows:

- 1) The complexity and corresponding scope of an MSS can vary depending on area specific conditions, and the *Planning Act* approvals required to support development. For the**

### POLICY HIGHLIGHTS

- 1) Standard Terms of Reference for MSSs will be provided with the IMP
- 2) Policies clarifying when/where MSSs are required, their scope, and the process to be followed
- 3) Evaluation of servicing alternatives shall factor the full life cycle cost of the future City assets
- 4) MSSs shall identify how the recommended servicing is to be funded, financed, and implemented



purpose of implementation of OP Policy 4.7.1.13, the scope of a complete MSS will be determined by the following three categories of local plans:

- a) Previously approved Local plans in Annex 5, 6, or 7 of the OP, where changes to land use are proposed or a change in the environmental setting require existing servicing policy to be updated; or
  - b) Local plans in the Future Neighbourhood Overlay which require a Community Design Plan; or
  - c) Local plans in the Future Neighbourhood Overlay which require a Concept Plan.
- 2) The Infrastructure Master Plan will identify the Future Neighbourhood Overlay areas that will require a complete MSS to support infrastructure planning in a CDP area. It will also show where a scoped MSS can be completed in support of servicing of Future Neighbourhood areas to be approved by Plan of Subdivision. The requirements of complete versus scoped MSSs are explained in the Standard Terms of Reference that will be appended to the IMP.
- 3) Further to implementation of OP Policy 4.7.1.13, local plans prepared to support re-development or intensification in existing communities or along transit corridors, will require completion of a scoped MSS.
- 4) Where no MSS and/or EMP exists to support a greenfield development application in the existing urban area, the City will determine how site-specific design criteria are to be established and if any MSS requirements will apply prior to submission of an application for draft plan approval.
- 5) Completion of an MSS requires fulfilling the following five study steps:
- a) Pre-consultation by landowner(s) representing the majority interest of land in the local plan area;
  - b) Preparation of a study-specific Terms of Reference consistent with the Standard MSS Terms of Reference and to the satisfaction of the General Manager of the Infrastructure and Water Services Department;
  - c) Completion of an MSS consistent with the approved study-specific Terms of Reference;
  - d) Completion of the Municipal Class Environment Assessment process, including the required public consultation; and
  - e) Approval of the MSS concurrent with approval of the local plan. MSSs supporting local plans identified in IMP policy 2.6.1a will require Council approval concurrent with approval of a CDP and EMP.

- 6) The implementation of OP policies set out in Section 11 of the OP includes reliance on specific and detailed implementation tools including design guidelines. In this regard:
  - a) Terms of Reference for master planning of water, wastewater and stormwater infrastructure are to be guided by current City Design Guidelines and Hydrogeological and Terrain Analysis Guidelines.
  - b) MSS recommendations for local plans subject to the Future Neighbourhood Overlay are to be consistent with current City Design Guidelines and Hydrogeological Guidelines. Subject to approval by the General Manager of the Infrastructure and Water Services Department, exceptions to these guidelines in MSS recommendations in local plan areas in OP Annex 5, 6, or 7 may be considered where existing constraints inhibit construction of new infrastructure consistent with City Design Guidelines.
- 7) The MSS is to be supported by an EMP to establish stormwater management criteria, development limits, input to evaluation of alternative servicing solutions, etc. Where a study area is exempt from an EMP, the scope of the MSS may need to complete additional assessments and analysis that would otherwise be established through the EMP.
- 8) Only in exceptional circumstances will diversions between watershed boundaries be approved. In such circumstance, the MSS is to document the full scope of potential impacts to both watercourses, and identify any necessary mitigation measures.
- 9) Evaluation of servicing alternatives shall
  - a) factor the full life cycle cost of the future City assets, including operation and maintenance costs, and future renewal and replacement, based on current data provided by the City for the purposes of the MSS; and
  - b) support or align with other relevant community planning objectives.
- 10) Planning of infrastructure systems shall evaluate performance under extreme operating conditions and consider a range of options to mitigate impacts on system performance.
- 11) All MSSs shall identify how the recommended servicing is to be funded, financed, and implemented.

## 2.7 Intensification

Existing infrastructure systems have a finite capacity based on standards that governed design at the time of development. Engineering principles dictate that calculations be based on conservative parameter values to ensure that performance objectives are met or exceeded. Furthermore, actual per capita water demand (and therefore sanitary sewage generation) has dropped significantly over time. For these and other reasons, available system capacities are often greater than what is actually being used.

All stormwater systems are designed for a particular scale of rainfall event. As such, the capacity of any storm system will inevitably be exceeded in response to an extreme rain event that exceeds the design assumptions. Storm systems are also designed for a particular level of imperviousness, and therefore development intensification can increase the risk of flooding due to net increases in imperviousness beyond the original design assumptions. Intensification project proposals also sometimes involve alteration or filling of open drainage ditches, which can have a negative impact on existing storm system capacities if not properly planned and designed.<sup>4</sup> Furthermore, intensification has the potential to disrupt existing overland flow routes that function during large events, which could also create flooding problems.

All wastewater systems are designed for a particular population and employment level plus a certain level of wet weather influence, such as infiltration of groundwater flow through pipe cracks. Older wastewater systems also allowed for direct connection of foundation drains and/or roof drainage connections. As for stormwater systems, there is a risk that system capacities will be exceeded under extreme wet weather conditions, which are expected to

### POLICY HIGHLIGHTS

- 1) Policies that support the recommended new programs
- 2) Minimum target levels of service for existing neighbourhoods will be based on the better of the original design assumptions or the existing level of service
- 3) Any project that involves a significant net increase in impervious area shall be subject to on-site SWM
- 4) City to seek to protect overland flow paths and adjacent structures through development approvals process
- 5) City to review funding and financing of intensification-driven local infrastructure upgrades to ensure a fair allocation of costs
- 6) City generally responsible for completing all system analyses needed to support intensification

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<sup>4</sup> The City is updating its [Ditch Alteration Policy](#) in 2022.

increase due to climate change. The risk of capacity exceedance may increase as population and employment increase above the system's original design allocation.

The impacts of intensification are cumulative and may not be apparent until years after a re-development is completed. They are also difficult to remedy after re-development has occurred. As such, the potential impacts of intensification must be addressed through existing system analysis and planning of infrastructure upgrades based on growth projections, as well as through development approval processes. It is also important to note that intensification can often improve existing system performance in several ways, including via removal of foundation drains from the sanitary system and opportunities for regrading. New programs and approval processes are needed to ensure that the net impacts of intensification are adequately addressed.

The policies in this section have been established to ensure that infrastructure capacity in intensifying neighbourhoods is appropriate and sufficient to meet the needs of the future, considering the levels of service that were intended to be provided through the original development of these neighbourhoods. Some of these policies build on OP policies 4.7.1.4 and 4.7.1.6, which require that:

- Impacts of additional runoff from increased imperviousness as a result of redevelopment be identified and mitigated;
- Various measures be implemented to protect new development from urban flooding; and
- The City implement new intensification-related programs and policies to manage stormwater capacity, including new regulatory mechanisms to impose on-site stormwater management more broadly than is currently the case.<sup>5</sup>

Intensification policies are as follows:

- 1) The minimum target levels of service for existing neighbourhoods will be based on the design assumptions for the original development, or the current level of service (whichever is higher). City capacity management programs will apply a risk management approach intended to limit any temporary impacts of intensification on these original levels of service that might occur prior to implementation of any local infrastructure upgrades that may be required.**

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<sup>5</sup> The proposed requirement for on-site stormwater management to mitigate the impacts of intensification is unrelated to the City's Rain Ready Ottawa program. The former is intended to avoid increases in *peak runoff rates* from individual properties to ensure that drainage system capacities are not exceeded. The latter is focussed on mitigating water quality and erosion impacts on local watercourses, mainly through the reduction of runoff *volume* from existing development.

- 2) Any intensification project that involves a significant net increase in impervious area for a property compared to existing conditions shall be subject to on-site stormwater management requirements to address drainage infrastructure capacity constraints.

The City will develop a guide for on-site stormwater management for small residential redevelopment projects that are currently not subject to a Site Plan Control process. This guide will define when on-site stormwater management (SWM) is required, present practical options for on-site SWM, and provide all of the sizing and design information needed to support a building permit application.

- 3) The City will identify where overland flow from municipal drainage systems cross private property and establish development approval processes and requirements that will ensure maintenance of existing overland flow routes and protection of adjacent structures.
- 4) Through the Comprehensive Zoning By-law Review process, the City will encourage more intensification in areas where existing infrastructure is expected to be sufficient to meet future demands at the 2046 Planning Horizon. This approach will allow the City to better manage risks to service.
- 5) The City's Ditch Alteration Policy defines the process by which ditch filling may be approved. This policy is applicable in the context of development approvals.
- 6) The City will develop a new permanent program to manage capacity in support of intensification. This program will:
  - a) identify upgrades to existing local infrastructure that are needed to support intensification in advance of the expected year of renewal;
  - b) manage risks to level of service by scheduling any needed local projects so as to avoid apparent impacts without freezing local development;
  - c) prioritize upgrades in key intensification areas such as in the vicinity of transit stations;
  - d) be funded independently of the renewal program to ensure that existing systems are maintained in a state of good repair; and
  - e) address climate change adaptation.
- 7) Notwithstanding Policy 6b, approval of specific (typically larger) projects subject to Site Plan Control may be withheld if it is determined by the City that there is insufficient local capacity available. The developer would be responsible for funding any immediate upgrades needed to allow the development to proceed.

- 8) **The City will review funding and financing of intensification-driven local infrastructure upgrades to ensure a fair allocation of costs to development and existing rate payers.**
- 9) **The City is generally responsible for completing all existing drinking water and sanitary system analyses needed to support intensification. For major “campus” types of infill or redevelopment projects, these responsibilities will be negotiated between the proponent and the City on a case-by-case basis.**

## 2.8 Establishing Legal Stormwater Outlets

Statutory approvals are required to establish stormwater outlets for proposed development areas that are both legal and sufficient. Stormwater plans prepared in support of development must respect Common Law Rights of landowners along downstream major channel outlets. Under Common Law no landowner has the right to collect surface or subsurface water in artificial channels and then discharge such waters on the lands of another, with the exception of riparian landowners discharging to a natural watercourse.

With the exception of private drainage systems, there are two primary forms of legal stormwater outlets available in the City of Ottawa: i) natural watercourses; and ii) petition drains, or other drains (commonly referred to as municipal drains). Under Common Law, a legal stormwater outlet to a natural watercourse exists, provided the drainage originates within the natural watershed of the watercourse and outlet to the natural watercourse is provided without requiring drainage through private property. Under Ontario’s Drainage Act, a municipal drain may be established to provide legal outlet for lands requiring drainage. Legal stormwater outlet to a municipal drain exists for those lands that have been assessed for outlet to the drain. A sufficient outlet is defined in the Drainage Act as “a point at which water can be discharged safely so that it will do no damage to lands or roads”.

Development approvals under the Planning Act are guided by the Provincial Policy Statement, which generally does not allow development to aggravate existing flood or erosion conditions in receiving watercourses. To support proposed land use changes that will affect drainage, the sufficiency of available stormwater outlets is typically determined through an engineering study, and a sewage works approval under the Ontario Water Resources Act is required before the stormwater outlet can be constructed. Stormwater plans that require modifications to

### POLICY HIGHLIGHTS

- 1) Development applications must demonstrate a legal and sufficient outlet exists or that adequate progress has been made towards achieving this requirement
- 2) MSS approval will be contingent on sufficient notification and opportunity for input from affected property owners regarding the need for legal outlets

existing approved sewage works will trigger the need for amendments to secure the right to discharge to an existing outlet.

The scope of MSSs prepared in support of Local Plans includes the need to identify preferred stormwater outlets, and the preferred implementation process through which legal outlets are to be established.

Policies 4.7.1.7 and 4.7.1.8 in the OP address requirements related to establishment of Legal Outlet. Further direction is provided in the following policies:

- 1) Further to OP Policy 4.7.1, prior to draft plan approval, development applications must demonstrate that:**
  - a) a legal and sufficient outlet for the project already exists through a previous process; or**
  - b) the existing downstream drainage system is sufficient to accommodate post-development flows and volumes; or**
  - c) a legal and sufficient outlet can be established to support the development by confirming that a Drainage Engineer has been appointed by Council to establish a legal outlet through the appropriate Drainage Act process; and that proposed works on the downstream drainage system would be sufficient to accommodate the post-development flows and volumes; or**
  - d) all affected downstream property owners have consented to the need to enter into formal agreements with the proponent and the City to carry out works on their properties to achieve a sufficient outlet.**
- 2) Further to Section 4.3.5, the EMP shall identify where legal stormwater outlets are required and MSSs must identify the process through which legal outlets are to be established for each of the outlets identified. MSS approval will be contingent on sufficient notification and opportunity for input from affected property owners regarding these outlets.**



## 2.9 Riverine Flood Hazards

The Ontario Ministry of Northern Development, Mining, Natural Resources and Forestry defines the regulatory flood event standard for different regions of Ontario. For Eastern Ontario, the 1 in 100-year flood event is the regulatory standard for floodplain mapping and does not capture potential changes to flood magnitude or frequency that are anticipated to occur with climate change. Local climate projections indicate trends that suggest increased risk of extreme riverine flooding which exceeds the 1 in 100-year flood event.

The Provincial Policy Statement requires municipalities to reduce the risks associated with climate change. The City has introduced new policies in the OP to mitigate the effects of more severe flooding and improve resiliency to climate change and defines a climate change flood vulnerable area as the area between the 1 in 100-year floodplain and the 1 in 350-year floodplain.

New development in these areas will be required to assess riverine flood risks and include mitigation measures to reduce or avoid identified flood risks where an approval under the Planning Act is required to permit the development.

Existing infrastructure planning and design practices do include considerations for extreme rainfall events, however, they have not historically included considerations for the risks and impacts of increased riverine flood hazards as this data has only been generated over recent years.

Section 10.1.3 of the OP introduces policies regarding areas vulnerable to flooding under climate change. The following policy shall apply to the planning and design of infrastructure:

- 1) The siting and design of new infrastructure located in proximity to a watercourse shall consider available 1:350 riverine flood hazard mapping and include appropriate measures to mitigate impacts and risks from riverine flooding.**

### POLICY HIGHLIGHTS

- 1) Siting and design of new infrastructure located in proximity to a watercourse shall consider available 1:350 riverine flood hazard maps



## 2.10 Groundwater Resource Protection

Drinking Water Source Protection safeguards public health from drinking water threats by raising awareness about these threats and by protecting groundwater and surface water resources. Ontario's *Clean Water Act* requires municipalities to implement Source Protection Plans to protect existing and future sources of municipal drinking water from various threats.

The City has a proactive approach to raising public awareness and managing threats to drinking water resources as part of its Source Water Protection Program, this includes developing risk management plans for existing activities that may be a threat to drinking water sources, screening all new development applications within drinking water protection zones to ensure new activities to not pose a threat to drinking water sources, monitoring activities at municipal infrastructure (i.e. physical plants and sanitary sewer infrastructure), and outreach to impacted residents.

Private wells are regulated by the Province, however, the City monitors the effects of development on aquifers, and will require that developers assume responsibility for impacts on private wells in the vicinity of development lands.

The following policies apply:

- 1) Potential impacts on local groundwater systems and wells shall be considered in the preparation of EMPs and MSSs, and may also be required for draft plans of subdivision and site plans, subject to site-specific circumstances.**
- 2) Where construction activities will occur in the vicinity of drinking water wells, City approval of a pre-construction sampling program will be required. This program will establish a baseline of water levels and water quality in existing wells, in order to respond to water quality and quantity complaints from residents in the area. Program requirements, including public communications requirements, are to be established as part of MSS approval where applicable, or as a condition of approval of draft plan of subdivision or site plan approval.**

### POLICY HIGHLIGHTS

- 1) Potential impacts on local groundwater systems and wells shall be considered as part of the development planning process
- 2) Policy requiring well water sampling in advance of development in vicinity of existing wells
- 3) City to conduct groundwater characterization studies in Villages and other privately serviced enclaves to identify potential risks to public health

- 3) The City will conduct and periodically update (as required) groundwater characterization studies in Villages and other privately serviced enclaves that rely on local groundwater systems in order to identify potential risks to public health.**

### 2.11 Low Impact Development

Low Impact Development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible. LID comprises a set of site design strategies that minimize runoff through distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater. Measures may be designed to manage stormwater at source (at the property parcel level where rain falls) and along linear systems that convey runoff to an end-of-pipe facility or an outlet to a watercourse. Typically, these measures are intended to reduce runoff volume, but they may also be designed to provide quality treatment before discharge to an outlet. Runoff volume control objectives can include groundwater recharge, watercourse baseflow augmentation, and/or mitigation of in-stream erosion impacts. LIDs generally provide limited benefits in terms of peak flow control during large storm events.

LID requirements stem in part from the City's Stormwater Retrofit Program, which was a recommendation of the Ottawa River Action Plan. Further, new Consolidated Linear Environmental Compliance Approvals issued by the Ministry of Environment, Conservation and Parks (MECP) for the City's infrastructure systems under the Ontario Water Resource Act, identifies new stormwater system performance criteria which include requirements for runoff volume control as part of growth and renewal projects.

The provincial direction allows for area-specific runoff volume control targets to be established through subwatershed level studies. The OP policies are aligned with this direction, requiring that SWSs and EMPs define the targets to be implemented in stormwater management plans for development applications. More detailed direction is provided in the following policies:

#### POLICY HIGHLIGHTS

- 1) MSSs to include a conceptual LID plan that is aligned with approved SWS or equivalent
- 2) In the absence of an approved SWS or equivalent, development must meet the criteria defined by the MECP
- 3) Downsizing of end of pipe facilities based on LID approach not permitted unless supported by MSS
- 4) Until local LID design guidelines are available, requirements established at pre-consultation

- 1) MSSs are to include a conceptual LID plan for integration with proposed land use plan and conceptual stormwater management plan, and demonstrate that the concept meets applicable targets identified in the corresponding SWS or EMP. Where an MSS is completed without a SWS or EMP, the MSS must first review and define runoff volume control targets.**
- 2) Changes to planned infrastructure in an approved EMP or MSS that involve elimination or downsizing of end-of-pipe facilities in favour of LIDs are not permitted.**
- 3) Development applications must implement applicable LID concepts of an approved MSS, and demonstrate that targets identified in subwatershed scale studies (SWSs or EMPs) will be achieved through the proposed stormwater management plan.**
- 4) Where no guidance is available in an approved SWS, EMP or MSS, the proposed stormwater management plans must meet the runoff volume control criteria defined by MECP. In these cases, downsizing/elimination of end-of-pipe facilities will also not be permitted.**
- 5) Until local LID design guidelines and standards are available, the City will confirm at the time of development pre-consultation, what information is to be used to guide the design of any LID infrastructure as well as commissioning and monitoring requirements.**

The above policies will be reviewed when new City LID and/or provincial guidelines are implemented.

## 2.12 Monitoring, Modelling, and Forecasting

This section describes the purpose of capacity-related monitoring and modelling of existing and proposed water resource systems, and associated policies. This section also describes expectations and policies related to monitoring and modelling when required to support development.

Monitoring and modelling are required to meet various needs related to the planning, design, operation, and upgrade of stormwater, sanitary, and drinking water systems. It is essential in order to optimize capacity utilization and identify infrastructure needed to support growth, and thus is central to the development and implementation of the IMP.

Monitoring is generally focused on flow rates in existing watercourses or sewer systems, water levels in storage facilities, and pressures within the drinking water distribution system. Monitoring takes place over a period of time to capture a sufficient range of wet weather events and system operating conditions. Performance monitoring is also required for new facilities and LID installations (per Section 2.11) prior to assumption by the City. Monitoring is also generally needed to support the development of SWSs, EMPs, and MSSs. Monitoring in this context may be associated with confirming available wastewater capacity in the receiving systems, or with characterizing pre-development flow conditions in existing watercourses

Modelling is intended to simulate the operation of existing and proposed drinking water, wastewater, and stormwater systems under the expected range of operating conditions. Where modelling of existing systems is required, models that are calibrated using monitoring data generally improve representation of actual operating conditions, lowering risk in decision making that relies on model results.

Modelling of proposed infrastructure systems is required to support the planning of infrastructure recommended in MSSs, and the detailed design of infrastructure for subdivisions and site plans. Information that supports the modelling of infrastructure systems is available in City design guidelines.

The following policies apply to the monitoring and modelling needed to support development:

### POLICY HIGHLIGHTS

- 1) Monitoring to be of a sufficient duration to capture a range of conditions
- 2) Monitoring and reporting to be defined and approved as part of EMP or MSS
- 3) Identify and apply future monitoring requirements, strategies and measures achieve EMP/MSS objectives
- 4) Modelling approaches and methods to be defined in Terms of Reference for EMP and MSS

- 1) **The duration of existing conditions monitoring should be sufficient to capture an appropriate range of conditions (seasonal or other) to inform system modelling and analysis, including sufficiently large rainfall and/or snowmelt events. Monitoring must meet the minimum requirements identified in the relevant study Terms of Reference, as approved by the City.**
- 2) **Monitoring and associated reporting to support specific development or capital project triggers under interim development conditions is to be defined and approved as part of preparing an EMP or MSS and will be the responsibility of the developer.**
- 3) **To verify that EMP and MSS objectives are being achieved, these documents are to identify future monitoring requirements and strategies, adaptive measures, and management options (as well as associated responsibilities) to be applied if monitoring indicates that objectives are not being achieved.**
- 4) **Modelling approaches and methodologies needed to support preparation of an EMP or MSS are to be defined in Terms of Reference for these studies. The modelling software selected for the study should be accessible and available to all relevant participants and stakeholders.**

### 2.13 Affordability and Financing

This section provides an overview on how growth-related infrastructure projects are financed. In general, these capital projects are funded by DCs collected and applied in accordance with Ontario's Development Charges Act. The DC capital program for water, wastewater and stormwater services are initially identified in various city-wide or area-specific master planning documents, such as the IMP or a MSS. Many of the growth-driven projects also provide a benefit to existing development. The "benefit to existing" (BTE) cost component is paid for by contributions from existing ratepayers. Project-specific funding requirements are subsequently listed in the City's Development Charges Background Study, which is required to be updated every five years.

#### POLICY HIGHLIGHTS

- 1) Any oversizing of projects proposed by a greenfield developer in a MSS will have no effect on eligibility for DC funding
- 2) Policies regarding the funding of new infrastructure programs required to support intensification
- 3) Review of front ending agreement policies, to be updated and appended to the IMP as needed

IMP capital projects are forecasted to meet the demands associated with the City's Official Planning Horizon. For this IMP, the planning horizon is to 2046, per the OP approved by Council

in October 2021. Some of these projects may involve the expansion of servicing capacity that exceeds the requirements of the planning period since infrastructure cannot be expanded on a gradual ongoing basis to service growth. As such, various projects will be oversized based on longer-term growth projections prepared by the City. These longer-term projections are not Council-approved, and the oversizing does not imply any intent to approve new development areas beyond the 2046 planning horizon. This incremental oversizing cost is initially funded by rate-based funding sources, and potentially would be eligible for recovery through future updates to the DC By-law and Background Study if post-2046 development benefits from this excess capacity.

Currently, very limited funds are recovered from intensification growth to cover servicing costs. In general, this growth has leveraged excess capacity available in local infrastructure systems, and through the City's renewal program, there have been opportunities to oversize the replacement of aging infrastructure at minimal additional cost. Only in exceptional cases have intensification development projects triggered upgrades to existing local infrastructure in advance of any renewal needs, however, as intensification continues, the City anticipates that more intensification-driven replacement of infrastructure will be needed. Therefore, the City has initiated a study investigating alternative funding mechanisms to ensure that development pays for its fair share of the cost of replacing existing infrastructure, whether it be driven by condition-based renewal needs or by intensification needs.

As part of the annual budgeting process departmental staff will prioritize, based on affordability, the funding of various growth-related capital projects for the upcoming fiscal year. They will consider the timing of when the infrastructure is required in conjunction with the available DC funding. Recommendations will be made as to which projects will be included and forecasted in the annual capital budget. In addition, there are policies in place related to the front-ending of growth-related projects by developers, prior to City funding being available to pay for the projects. These detailed policies are being reviewed and updated through the IMP process. The intent of the front-ending policy review is to ensure that repayment is more closely tied to the collection of sufficient DCs associated with the benefitting development area.

The following policies related to funding of growth-related infrastructure are in addition to the related policies in the OP.

- 1) Allocation of costs to the City for oversizing growth-related IMP infrastructure projects is to be based on the difference between the cost of the project if sized only to meet the 2046 servicing requirements and the cost of the project identified in the IMP.**
- 2) Any oversizing of projects proposed by a greenfield developer in a MSS (if approved subject to OP Policy 4.7.1.15) will have no effect on eligibility for DC funding. In all cases, the proponent will be responsible for the incremental cost of such oversizing.**

- 3) The City will periodically reassess average renewal program oversizing costs attributed to intensification and implement adjustments to cost allocations through the appropriate funding mechanism.
- 4) Through user fees, the development industry will fund a new City program that will identify and plan, intensification-driven upgrades of existing infrastructure that are required to support new development in advance of any plans for renewal. (These fees are not intended to fund the capital costs associated with specific projects).
- 5) The City will establish funding and financing formulae to appropriately attribute the bulk of costs for intensification-driven projects to development, subject to legislative constraints. This is critical to ensure that the City is able to maintain the existing system in a state of good repair through an appropriately funded, condition-based renewal program.
- 6) Upgrade of existing infrastructure to provide a higher level of service than originally designed will generally be subject to a Local Improvement process, in accordance with the City's Local Improvement Policy, wherein the City recovers the majority of costs from the benefiting property owners. This would include projects such as: Upgrade from rural to urban local road cross-section including replacement of ditch with storm sewer system; Extension of public services (watermains and/or sewers) to privately serviced properties within the Public Service Area; and Ditch Alteration.
- 7) Further to Policy 6, the City may also consider extension of services within the Public Service Area under a private servicing agreement, with a single property owner, where the full cost of the project is offset by the property owner.



## 3.0 Preliminary Program Recommendations

### 3.1 Overview

The City's infrastructure master planning program focusses on identification, planning, design, and implementation of major capital projects needed to support growth to 2046. These are generally "off-site" drinking water and sanitary infrastructure projects that consider the cumulative impact of greenfield and intensification development. Major "on-site" infrastructure to be located within greenfield development areas is generally planned, designed and implemented by private development groups, subject to City approval processes. While the City currently lacks a formal infrastructure program dedicated to managing capacity needed for intensification, it does have related supporting programs such as:

- Asset management programs focused primarily on condition-based infrastructure renewal;
- Asset management program focused on correcting level of service issues in existing development areas; and
- Wet weather flow removal program, intended to remove extraneous flow from sanitary collection systems.

It is also important to understand that there are a number of factors that have allowed intensification to proceed without impacts to service levels in existing development areas, such as:

- A major drop in unit water demands over time, particularly since changes to the plumbing code in the early 1990's;
- Opportunities to remove existing roof and foundation drainage from existing sanitary systems as part of site redevelopment; and
- Requirements to control stormwater on private property as part of site redevelopment subject to site plan control.

Notwithstanding the above programs and factors, net impacts to existing service levels are beginning to arise in some areas, and some development projects have been subject to lengthy delays due to existing system capacity constraints. With the OP projecting more than 50% of new residential units to be built in existing development areas of the City over the course of the planning horizon, there is a need for new programs that are specifically dedicated to managing capacity to support intensification.



Section 3.2 and 3.3 describes existing growth-focused programs that will continue (subject to any updated policies that affect program details) following approval of the IMP update. Section 3.4 provides preliminary intensification program recommendations.

### **3.2 Infrastructure Project Planning and Implementation**

As part of preparing the IMP, future demands on the existing water supply and sanitary sewage systems are calculated based on OP growth projections, including intensification in existing development areas and “greenfield” growth in vacant urban or approved future neighbourhoods. These demands are applied to detailed hydraulic system models to identify growth-related performance deficiencies and alternative infrastructure upgrades that would address these deficiencies. From this work, a list of major capital projects are recommended, along with Class D cost estimates and the approximate timing needed to ensure that growth demands can be met without compromising service to existing areas.

Following Council approval of the IMP, planning for most of the projects will be further developed on a priority basis in order to satisfy all Class Environmental Assessment requirements and generate a functional design. A project charter will then be prepared and responsibility for implementation is transferred to the City’s Construction Services team.

The IMP projects are mainly funded through DCs. Any benefits to existing development are evaluated at the project planning stage, in order to determine the share of project costs to be covered by the City rate budget. The City’s Long Range Financial Plan and DC By-law are updated based on these project costs, funding sources, anticipated project timing, and affordability considerations. In many cases, a developer will enter into an agreement with the City to front-end the cost and/or project implementation, if they require the capacity before the project is scheduled based on the City’s Long Range Financial Plan.

### **3.3 Greenfield Infrastructure Planning**

Developer Owners groups are generally established for each urban or village future neighbourhood. These groups are responsible for preparing EMPs and MSSs for City approval before submission of an application for draft plan of subdivision approval. These studies identify the “on-site” infrastructure needed to service the development area and are required to satisfy Class Environmental Assessment requirements for the recommended projects. Detailed servicing plans for subdivisions or site plans within future neighbourhoods are required to conform with the approved MSS.

### **3.4 Intensification**

#### **3.4.1 Program Requirements**

The City’s Infrastructure Master Plan has traditionally accounted for projected intensification in the identification of backbone system upgrades to the water and wastewater systems.



For various technical reasons local water and wastewater systems generally have had excess capacity available to accommodate intensification, however, the level and rate of intensification in existing development areas has reached a point where the City can no longer rely on the availability of excess local system capacities. Renewal of local infrastructure has provided opportunities to increase pipe capacities to meet future demands, however, renewal priorities cannot be expected to align with intensification capacity priorities.

Intensification-driven upgrades to existing stormwater systems have largely been avoided through the Site Plan Control process, that requires on-site stormwater management to control post-development runoff to pre-development rates, however, the majority of intensification (on an areal basis) is now taking place in the form of low-rise residential development that is not subject to SPC and is therefore not currently subject to on-site stormwater control requirements.

Problems associated with intensification have become apparent in recent years. Some intensification projects have been delayed as a result of a lack of local system capacities and have required significant public and private investment in off-site work to create the required capacities.

Stormwater flooding problems, typically in the form of nuisance surface ponding, have arisen as a direct result of intensification in some areas. Pilot area analysis has demonstrated that on-site stormwater management is the solution that can effectively mitigate the impacts of projected intensification, while storm sewer and ditch system upgrades should be focussed on renewal of degraded infrastructure, and addressing reduction of existing flood risks as well as climate change adaptation. On-site stormwater management is the one solution that allows low rise residential intensification to proceed without the need for municipal system upgrades so that existing levels of service can be maintained.

It is important to note that intensification can often *improve* existing system performance in several ways. Here are some typical examples where intensification can immediately improve the existing system in a manner that is extremely difficult otherwise:

- Removal of foundation drainage from the sanitary system: This is by far the biggest source of risk in sanitary sewer systems leading to basement flooding. Actively removing foundation drainage from existing properties often requires detailed study and custom solutions for each home depending on plumbing, age, and other risks. When a tear-down rebuild type of intensification occurs, foundation drainage is easily removed from the system and the entire neighbourhood risk is permanently lowered.
- Drainage affecting intensifying property: Redevelopment provides the opportunity to regrade the property, raise the existing foundation, provide a new foundation drain and

backwater valve, and create additional measures to reduce the risk of flooding to that property.

- Overland flow affecting the neighbourhood: Low rise residential intensification that includes on-site stormwater management will not only ensure that post-development peak flows to the sewer system are maintained to pre-development levels but will also include improved grading to contain the volume of large events in the stormwater management system. This will have the cumulative effect of improvement overland flow in the neighbourhood in large events.

Staying ahead of intensification with proactive infrastructure upgrades as a broad strategy will be an important challenge for the City. Though there will be opportunities to leverage lifecycle renewal or third-party infrastructure improvements, many forms of intensification are small scale, geographically dispersed, and their characteristics (including zoning amendment requirements) and timing are difficult to predict at a local level.

To address this challenge, the City will need to proactively plan for infrastructure upgrades at the trunk level, prioritizing key intensification target areas, and where long lead times may be required to provide adequate servicing. The City will also need to carry out local system studies in key areas to identify and accommodate growth requirements in areas with significant contiguous intensification potential. For all local systems a risk-based approach involving on-going application tracking, local area projection updates, capacity allocation, flow monitoring and system analysis will be required to ensure capacity for growth while maintaining existing service levels.

Going forward, management of infrastructure capacity to support intensification requires implementation of new on-going City programs. The general program recommendations are described in the following sections.

### 3.4.2 New Intensification Capacity Management Program

A new on-going program is needed to identify, plan, design and build intensification-driven upgrades to existing local water, wastewater, and stormwater systems. It is essential that this program be highly responsive to evolving local intensification pressures as it will often not be clear that costly upgrades are needed until specific local projection thresholds are exceeded, which often may not happen until short-term development needs arise. Needs for local stormwater system upgrades are expected to be limited due to the benefits provided by the proposed stormwater management program described in the section which follows. Key program requirements are as follows:

- A risk management framework to ensure that:
  - The right infrastructure is upgraded at the right time to avoid unnecessary (or premature) projects and degraded system performance; and
  - Temporary or permanent risk mitigation measures, such as backwater protection valves or local contingency plans are adopted where needed.
- Prioritized studies of existing trunk and local infrastructure systems that are expected to experience the greatest increases in demand as a result of intensification, for example in the vicinity of transit stations.
- Geospatial tracking of planning, development, capacity allocation, and fire risk information, including new business processes to ensure that the data remains current.
- Frequent updates to local development projections, based on current planning and development data.

#### PROGRAM HIGHLIGHTS

Program Goal

- To enable the City to plan and implement local system capacity upgrades to support intensification

Program Objectives

- On-going identification and prioritize intensification-driven projects
- Complements the existing infrastructure renewal program

Program Features

- Manages risks associated with degradation of system performance
- User fee (developer) funded program
- Individual projects to be cost shared between development and the City's rate budget
- The options for funding and cost sharing are being studied

- Development and maintenance of hydrologic and hydraulic models of local systems to support the planning of local system upgrades. This would leverage work already done in many areas of the City to support investigation of servicing issues, but priorities for modelling work would be driven by current intensification data and projections.
- Flow and level monitoring of key sewers to track and validate system performance and available capacity. This would expand on existing City flow and level monitoring work.
- Co-ordination with the City's renewal program to optimize the planning and delivery of projects to meet both renewal and intensification needs.

Climate change enhancements to municipal storm sewer systems generally would be identified through prioritized area-specific studies and implemented through the City's existing renewal program. Rehabilitation of existing ditch drainage systems, including those in areas subject to intensification, would also be addressed through the renewal program. Planning for the latter work is being prioritized in order to better prepare these areas to support intensification. Mitigation of intensification impacts will generally be addressed through the stormwater management program described below.

New user-fee (developer) funded staff resources will be required to manage and run the program. New capital funding sources that will not compromise the objectives of the City's existing renewal program are also needed. Potential funding options for intensification-driven projects are currently being studied to identify how implementation costs can be fairly allocated between development and existing rate-payers.

### 3.4.3 New On-Site Stormwater Management Program

Given constraints that limit the feasibility and benefits of public stormwater system upgrades, it is essential that on-site stormwater management requirements be imposed on a much broader scope of development intensification projects.<sup>6</sup> It is also critical the existing overland flow paths for stormwater runoff not be obstructed as a result of development, and that both existing and future development be adequately protected from runoff. Key program requirements are as follows:

- On-site stormwater management requirement to be imposed on all building permit projects involving a significant net increase in imperviousness, including those projects that are not subject to Site Plan Control.
- Maintenance of overland flow routes on private property through the development approvals process, where existing overland flow paths already cut through these properties.
- Flood protection requirements (such as grading adjustments and depressed driveway prohibitions) for redeveloping properties that intersect overland flow routes.
- Geospatial database to maintain information on imperviousness, overland flow routes, on-site stormwater management infrastructure, and local service levels / flood risks; this

#### PROGRAM HIGHLIGHTS

##### Program Goal

- To enable the City to manage and control the impacts of intensification on storm drainage

##### Program Objectives

- To avoid net increases in peak storm discharge rates to City systems
- To limit City exposure to complaints and claims
- Provide new planning tools and databases to support development approvals

##### Program Features

- New development approval requirement
- Overland flow easements and local flood protection
- Information management and storm project identification

<sup>6</sup> The objectives of the proposed SWM program, and the types of on-site measures that would be required under the program, differ greater from those of the on-going Rain Ready Ottawa (RRO) program. The proposed SWM program is intended to reduce *peak runoff rates* from individual properties to ensure that the existing drainage system capacities are not exceeded. However, the RRO program is intended to reduce *runoff volume* and improve runoff quality for small and frequent storm events, in order to reduce erosion and improve water quality in local watercourses and downstream beaches. The RRO program is focussed on areas of the City where the expected benefits to local watercourses is high, whereas the SWM program proposed here would required wherever intensification is taking place City-wide.

information is needed to support development approvals, identification of municipal system upgrades, and the new provincial Environmental Compliance Approval system.

To support program implementation, a guide to design on-site stormwater management measures will be developed. A regulatory mechanism will also need to be established to require the broadening of on-site SWM requirements to include projects not subject to Site Plan Control. Options for this mechanism include a new Stormwater By-law or a scoped Site Plan review process. The latter is preferred as it would constitute applicable law under the Ontario Building Code and therefore the review, inspection, and enforcement work could be done through existing business processes.

New user-fee (developer) funded staff resources will be required to manage and run the program, including additional resources for the review, inspection, and enforcement of on-site stormwater management measures. A rate-funded program is also needed to ensure appropriate maintenance of on-site stormwater management systems.

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