NIAGARA REGION

# STORMWATER MANAGEMENT GUIDELINES

DECEMBER 01, 2022

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The Niagara Region Stormwater Management Guidelines have been developed through a collaborative effort between the Region staff, Consultants, and members of the Technical Steering Committee which included the Local Area Municipalities. Input has also been received from the Public, and from Private Development representatives. While the full list of contributors is too exhaustive to include, the Region wishes to acknowledge the efforts and contributions of the following individuals:

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## Table of Contents


1.0 Introduction ..... 1
1.1 Stormwater Management Context ..... 1
1.2 Document Purpose ..... 1
1.3 Region Drainage System Context ..... 2
1.4 Integrated Approach ..... 9
1.4.1 Overview ..... 9
1.4.2 Planning and Design Process ..... 9
1.4.3 The Ecosystem Approach ..... 10
2.0 Current Legislative Climate (Legislation, Acts, Regulations and Guidelines) ..... 12
2.1 Federal ..... 12
2.1.1 Canadian Environmental Protection Act ..... 12
2.1.2 Canadian Fisheries Act ..... 12
2.2 Provincial ..... 12
2.2.1 Provincial Policy ..... 12
2.2.2 Provincial Legislation and Ministries ..... 16
2.2.3 Provincial Agency Guidelines and Requirements ..... 21
2.3 Region of Niagara Policies ..... 22
2.3.1 Niagara Region Official Plan (2022) ..... 22
2.4 Other Guidelines and Plans ..... 27
2.4.1 Source Protection Plan ..... 27
2.4.2 Guidelines for Private Waterbodies ..... 28
3.0 Development Application Process, Roles and Responsibilities ..... 29
3.1 Planning and Servicing Studies ..... 29
3.1.1 General Process ..... 29
3.1.2 Tertiary Watershed Plans ..... 31
3.1.3 Quaternary Watershed/ Subwatershed Studies ..... 31
3.1.4 Master Servicing Plans/ Assimilative Capacity Studies ..... 38
3.1.5 Functional Servicing Report ..... 39
3.1.6 Stormwater Management Report ..... 39
3.2 Roles and Responsibilities ..... 40
3.2.1 Region Stormwater Management Approvals Process ..... 40
3.2.2 Roles and Responsibilities for Review ..... 41
3.2.3 List of Potential Scenarios and Coordinated Review ..... 46
3.2.4 MECP Review and Consolidated Linear Infrastructrue ECA ..... 50
3.3 Relevant Stormwater Drainage Documents and Studies ..... 51
4.0 Stormwater Management Goals, Requirements and Technical Guidelines ..... 54
4.1 Goals/Objectives ..... 54
4.2 Key Issues and Results of Survey ..... 57
4.2.1 Stormwater and Environmental Management ..... 57
4.2.2 Climate Change ..... 60
4.3 Technical Guidelines ..... 65
4.3.1 Stormwater Management ..... 65
4.3.2 Analytical Methodology ..... 80

4.3.3 Conveyance Systems ..... 94
4.3.4 Erosion & Sediment Control (ESC) ..... 101
5.0 Operations, Maintenance and Local Performance Monitoring of Stormwater Management Infrastructure ..... 109
5.1 Operation and Maintenance ..... 109
5.1.1 Public ..... 109
5.1.2 Private ..... 110
5.2 Local Monitoring Requirements ..... 111
5.2.1 Public ..... 111
5.2.2 Private ..... 116

## List of Figures

Figure 1.1. Municipal Boundaries ..... 3
Figure 1.2. Quaternary Watersheds in Niagara Region ..... 5
Figure 3.1. Watershed and Municipal Planning Sequence ..... 29
Figure 3.2. Quaternary Watershed Study Framework ..... 33

## List of Tables

Table 1.1. Drainage Areas and Subwatersheds within the Lake Ontario Tertiary Watershed ..... 6
Table 1.2. Drainage Areas and Subwatershed within the Niagara River Tertiary Watershed ..... 7
Table 1.3. Drainage Areas and Subwatershed within the Lake Erie Tertiary Watershed 8
Table 3.1. SWM Considerations at Various Stages of the Land Use Planning Process ..... 30
Table 3.2. Roles for Review of SWM Applications ..... 41
Table 3.3. SWM Considerations at Various Stages of the Land Use Planning Process ..... 42
Table 4.1. Runoff Coefficients ..... 84
Table 4.2. Imperviousness Values ..... 86
Table 4.3. Currently Approved Hydrologic Models ..... 88
Table 4.4. Roughness Coefficients ..... 90
Table 4.5. Currently Approved Hydraulic Models ..... 92
Table 4.6. Maximum Maintenance Hole Spacing ..... 96
Table 4.7. Maximum Catchbasin Spacing ..... 97
Table 4.8. Catchbasin Lead Sizes and Slopes ..... 98
Table 4.9. Maximum Depth of Flooding for Roadways ..... 100

## List of Appendices


Appendix A Background Documents

- Map of Region Tertiary Watersheds (2022)
- Niagara Official Plan (2022) Chapter 3 – Sustainable Region
- Niagara Official Plan (2022) Chapter 5 – Connected Region
- Region Protocol for Stormwater Review (2018)
- Ministry of the Environment, Conservation and Parks ECA Design Criteria (April 2022)
- Ministry of the Environment, Conservation and Parks ECA Application Template (May 2022)

Appendix B Technical Steering Committee (TSC) Correspondence

- Survey of Municipalities - Standards/Criteria
- Survey of Municipalities - Questionnaire
- TSC Review Comments and Responses

Appendix C Development Community Workshop and Feedback

- Workshop Presentation
- Development Community Review Comments and Responses

Appendix D Public Presentation and Feedback

- Public Presentation Slides
- Public Comments and Responses

Appendix E Modified Rational Method Example

Appendix F Background Review for Chlorides, Phosphorus and Water Budget

# 1.0 Introduction

## 1.1 Stormwater Management Context

Stormwater Management (SWM) broadly refers to the process of how water, stemming from precipitation (rain and/or snowmelt events) is managed and controlled. In natural settings, precipitation is largely infiltrated through pervious landscapes or evapotranspirated back into the atmosphere, particularly in areas with high vegetation coverage. Any remaining water which is not infiltrated will typically run off and be directed to overland features, and ultimately to larger creeks and watercourses.

When natural areas are converted to urbanized land uses, pervious areas are typically reduced, and impervious land coverage (buildings, roadways, parking areas, etc.) increased. Without the implementation of stormwater management controls, this conversion of land use results in a shift in the hydrologic cycle. Infiltration and evapotranspiration are reduced, due to the reduced availability of pervious surfaces and vegetation cover, and surface runoff is correspondingly increased. Furthermore, in these urban settings, conveyance infrastructure (ditches, storm sewers and roadways) is required to convey and direct surface runoff safely to receivers. In addition, the water quality of the resulting increased stormwater runoff is typically reduced by the urbanization process, given the build-up of contaminants on impervious surfaces and corresponding rapid wash-off ("first flush") during storm events. Without properly designed and implemented stormwater controls, both quantity (erosion, flooding, water balance) and quality (contaminant, sedimentation) issues result, with associated impairment to receivers (watercourses and lakes), and the overall natural environment, including aquatic life/habitat.

The impacts of uncontrolled stormwater, particularly in urban settings, have long been recognized as a concern. The intent of the Niagara Region is to remain at the forefront of the stormwater management field and ensure that appropriate guidelines are provided to practitioners and designers within the Region, specifically to guide future development and redevelopment as well as infrastructure renewal projects. This document is intended to outline current methodologies and tools, regulatory requirements, and current "best practices".

## 1.2 Document Purpose

The Stormwater Management Guidelines (Guidelines) are intended to be used by practitioners in the design of storm drainage infrastructure within the Niagara Region. The Guidelines are to be used, in conjunction with other relevant and companion documentation, to support the planning and design process for new land development and re-development (infills/intensification), as well as infrastructure renewal projects.

The Guidelines outline the desired attributes of stormwater infrastructure, as related to the Niagara Region overall governing policies and vision as outlined in the Niagara Official Plan (2022), outlined in Sections 2.3.1 and 4.1.

The Guidelines provide hierarchal guidance, direction and consistency for the various stages of development, specifically related to the planning, design and review of:

- Regional Master Servicing Plans (RMSPs),
- Functional Servicing Report (FSRs), and
- Stormwater Management (SWM) Reports

The Guidelines also are intended to assist practitioners by detailing specific submission requirements including:

- Series of study specific processes
- Deliverables and associated requirements submission checklists.

**Please note that the following technical guidelines (details in Section 4.3) are not intended to replace the technical guidelines of local area municipalities. Proponents, when developing SWM plans for development applications, must adhere to the technical guidelines of the local area municipality in which the development is located. These technical guidelines are intended to apply in instances where local area municipality guidelines do not exist, or where the proponent is developing a SWM plan that impacts Region owned infrastructure.**

### 1.3 Region Drainage System Context

The Niagara Region encompasses a number of local municipalities. Municipal boundaries are presented in **Figure 1.1** (attached). The following municipalities are located within the Niagara Region:

- Town of Fort Erie,
- Town of Grimsby,
- Town of Lincoln,
- City of Niagara Falls,
- Town of Niagara-on-the-Lake,
- Town of Pelham,
- City of Port Colborne,
- City of St. Catharines,
- City of Thorold,
- Township of Wainfleet,
- City of Welland, and
- Township of West Lincoln.

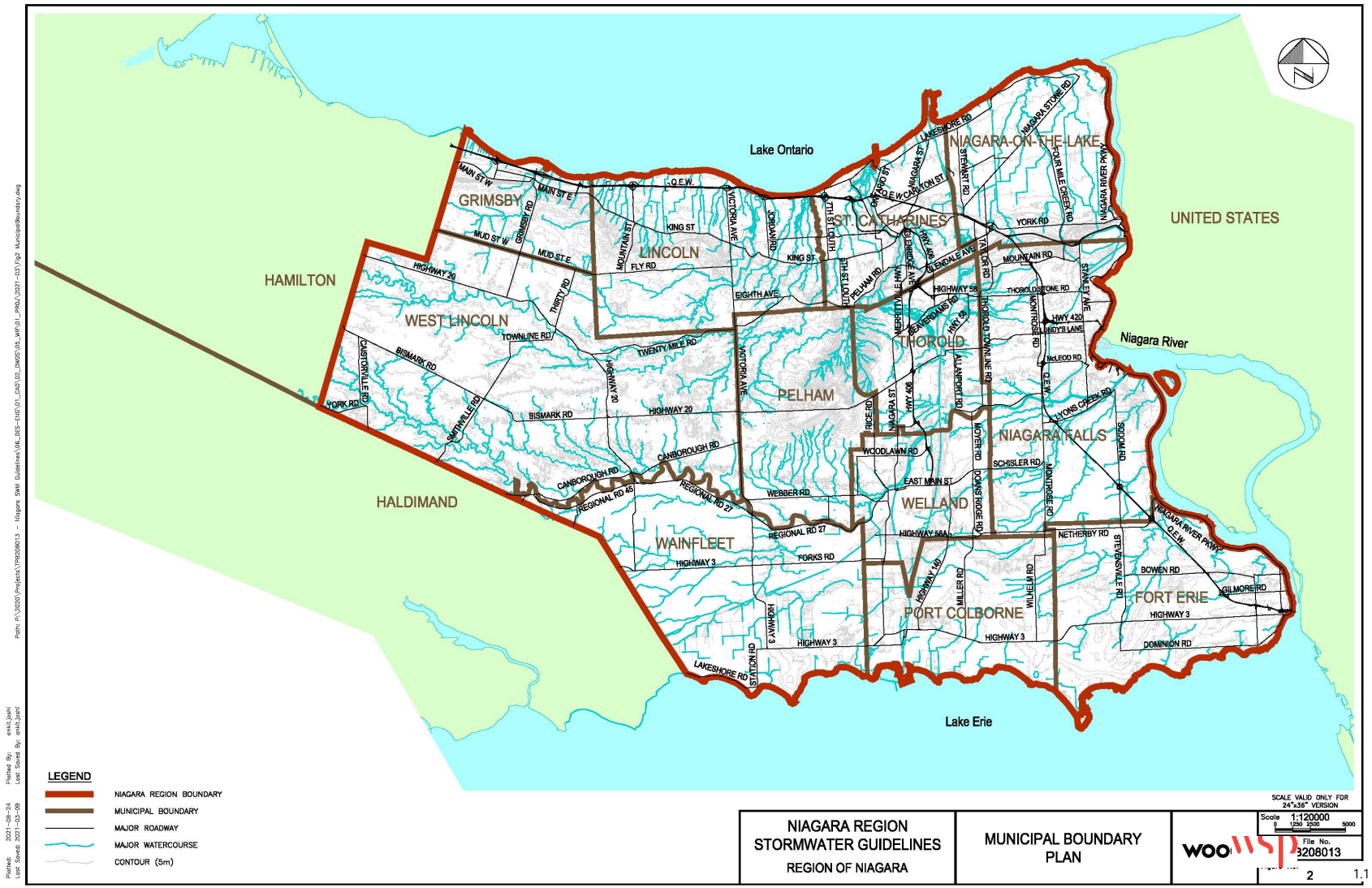



**Figure 1.1. Municipal Boundaries**

Most of the Niagara Region is located within the jurisdiction of the Niagara Peninsula Conservation Authority (NPCA), except for a small section in the northwest area of the Town of Grimsby. Surface drainage within the Niagara Region is generally split between three receiving systems, namely Lake Ontario, the Niagara River, and Lake Erie. These receiving systems are identified as Tertiary Watersheds within the Niagara Official Plan. Drainage to these receivers is further split into Quaternary Watersheds, and further into Subwatersheds. There are twelve (12) Quaternary Watersheds and forty-six (46) Subwatersheds. Quaternary watersheds and Subwatersheds are presented in Figure 1.2 (attached).

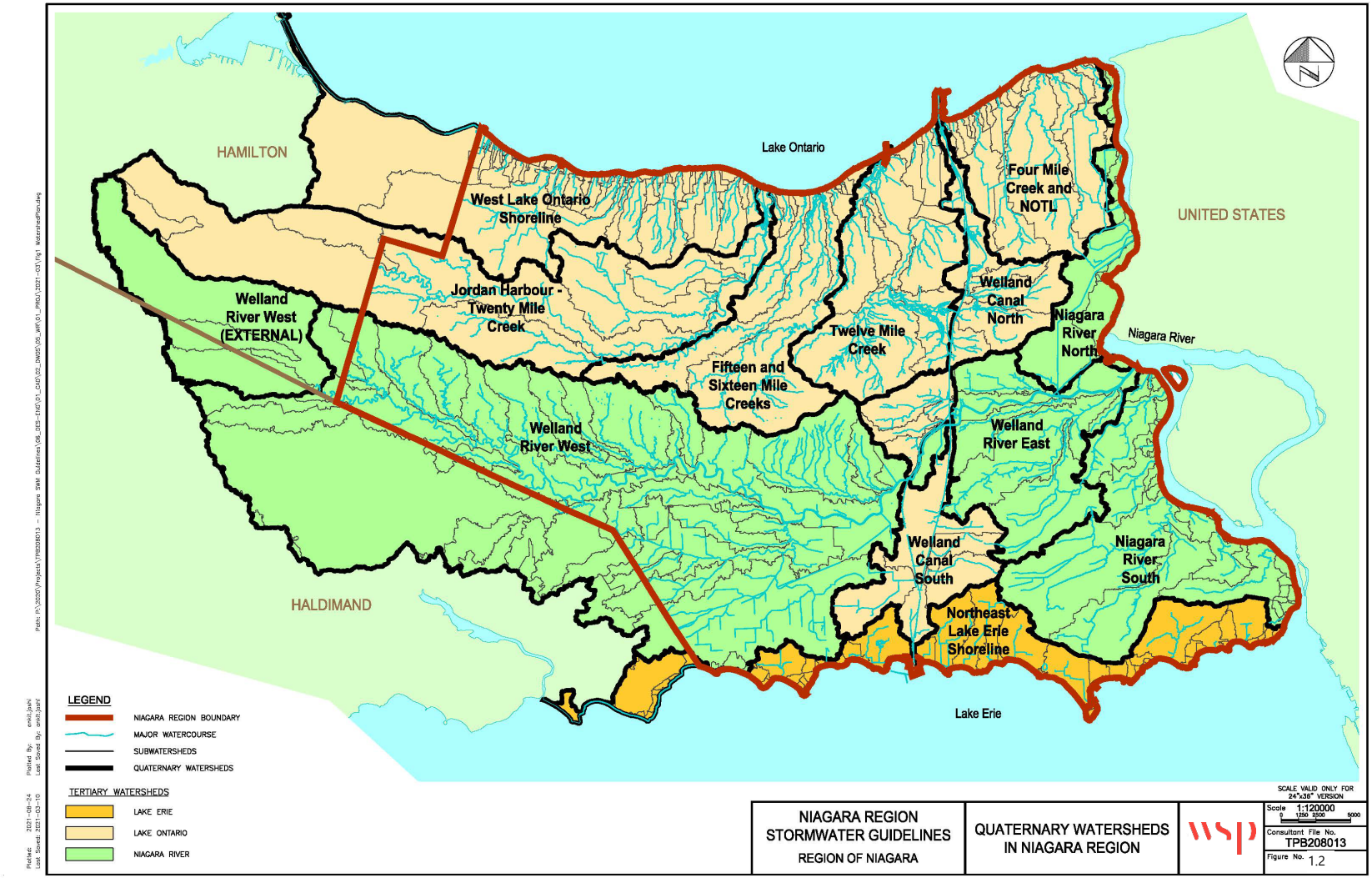



**Figure 1.2. Quaternary Watersheds in Niagara Region**

## Lake Ontario Tertiary Watershed

The contributing drainage areas and subwatersheds present within the Lake Ontario tertiary watershed have been summarized in Table 1.1 and on Figure 1.2.

**Table 1.1. Drainage Areas and Subwatersheds within the Lake Ontario Tertiary Watershed**

| # | Quaternary Watershed | Area ($km^2$) | % of Tertiary | Subwatershed # | Subwatershed Names |
|---|---|---|---|---|---|
| 1 | West Lake Ontario Shoreline | 300.1 | 25.33% | 38 | Bartlett, Beamsville Creek/Konkle Creek, Campden Creek, Forty Mile Creek, Jordan Harbour West, Lake Ontario (15A, 17-27, 29-33, 35-44, 44A), Prudhomme Creek, Thirty Mile Creek, Vineland Drain. |
| 2 | Jordan Harbour – Twenty Mile Creek | 303.5 | 25.62% | 6 | Gavora Ditch, North Creek, Sinkhole Creek, Spring Creek, Three Mile Creek, Twenty Mile Creek. |
| 3 | Fifteen and Sixteen Mile Creeks | 136.5 | 11.52% | 10 | Eighteen Mile Creek, Fifteen Mile Creek, Jordan Harbour East, Lake Ontario (11, 14, 14A, 15), Sixteen Mile Creek, Ontario (12, 13). |
| 4 | Twelve Mile Creek | 148.4 | 12.53% | 9 | Dicks Creek, Francis Creek, Lake Gibson System, Lower Twelve Mile Creek, Richardson Creek, Upper Twelve Mile Creek, Beamer Creek, Spring Garden Creek, Walker Creek. |
| 5 | Welland Canal North | 92.4 | 7.80% | 5 | Beaver Dams Creek, Shriners Creek, Ten Mile Creek, Welland Canal North, Towpath Drain. |
| 6 | Four Mile Creek and NOTL | 126.4 | 10.67% | 15 | Eight Mile Creek, Four Mile Creek, Four Mile Pond, Lake Ontario (1, 2, 4, 5, 6A, 8, 9, 10), One Mile Creek, Six Mile Creek, Two Mile Creek. |

| # | Quaternary Watershed | Area ($km^2$) | % of Tertiary | Subwatershed # | Subwatershed Names |
|---|---|---|---|---|---|
| 7 | Welland Canal South | 77.4 | 6.53% | 4 | Biederman Drain, Indian Creek, Lyons Creek Drain, Welland Canal South. |

**Niagara River Tertiary Watershed**

The contributing drainage areas and subwatersheds present within the Niagara River tertiary watershed have been summarized in Table 1.2 and on Figure 1.2.

**Table 1.2. Drainage Areas and Subwatershed within the Niagara River Tertiary Watershed**

| # | Quaternary Watershed | Area ($km^2$) | % of Tertiary | Subwatershed # | Subwatershed Names |
|---|---|---|---|---|---|
| 8 | Welland River West | 752.0 | 66.2% | 38 | Beaver Creek, Beezor Drain, Big Forks Creek, Black Ash Creek, Buckhorn Creek, Chick Hartner Drain, Coyle Creek, Draper Creek, East Kelly Drain, Ellsworth Drain, Elsie Creek, Eslie Creek, James Drain, Lake Erie (7-10, 8A, 9A), Little Forks Creek, Little Wolf Creek, Mill Creek, Mill Race Creek, Mitchener Drain, Moores Creek, North Forks Drain, Oswego Creek, Parker Creek, Sucker Creek, Sugar Creek Drain, Unnamed Creek (2), Welland River, Wilson Creek, Wolf Creek, Wolf Creek Drain East / West |
| 9 | Welland River East | 136.6 | 12.0% | 7 | Grassy Brook, Hunters Drain, Lyons Creek, Tee Creek, Thompson Creek, Welland River, Welland River between Canal. |
| 10 | Niagara River North | 62.2 | 5.5% | 8 | Andre's Drain, Chippawa Power Canal, Epp Drain, Niagara River (1, 3, 4, 6, 7). |

| # | Quaternary Watershed | Area ($km^2$) | % of Tertiary | Subwatershed # | Subwatershed Names |
|---|---|---|---|---|---|
| 11 | Niagara River South | 185.4 | 16.3% | 22 | Baker Creek, Bayers Creek, Beaver Creek, Black Creek, Frenchmans Creek, Miller Creek, Niagara River (9-11, 11A-C, 12-15, 17, 18, 18A-C), Usshers Creek. |

### Lake Erie Tertiary Watershed

The contributing drainage areas and subwatersheds present within the Lake Erie tertiary watershed have been summarized in Table 1.3 and on Figure 1.2.

**Table 1.3. Drainage Areas and Subwatershed within the Lake Erie Tertiary Watershed**

| # | Quaternary Watershed | Area ($km^2$) | % of Tertiary | Subwatershed # | Subwatershed Names |
|---|---|---|---|---|---|
| 12 | Northeast Lake Erie Shoreline | 137 | 100% | 38 | Bertie Bay Drain Area (1, 2A), Kraft Drain, Niagara River (18D-18H), Six Mile Creek (Lake Erie), Bay Beach Area Drain, Bearss Drain, Beaver Dam Drain, Casey Drain, Eagle Marsh Drain, Lake Erie (2, 2A, 2B, 3, 3A, 4, 5, 5A, 6, 6A-G, 10, 11), Low Banks Drain, Oil Mill Creek, Point Abino Drain, Wainfleet Marsh Drain, Wignell Drain |

Development within Niagara Region is focused primarily with the urban boundaries of the local municipalities. Developed areas generally consist of mixed-use land uses (i.e. residential, commercial, industrial). Between urban areas of local municipalities, Niagara Region is generally undeveloped, with most land uses consisting of agricultural and low density residential. There are numerous Provincial Policies and Designations on these lands (Niagara Escarpment Plan, Greenbelt Plan, Growth Plan, etc. ) which limit any such potential development.

The topography of the Niagara Region is a mix of generally flat sloping areas above and below the Niagara Escarpment, with steeper/extreme slopes found proximate to the Escarpment.

## 1.4 Integrated Approach

### 1.4.1 Overview

In recent years, there has been a clear and noticeable shift in the planning and design approach for new communities and their supporting infrastructure. Formerly, land use planners and engineers established land uses and servicing infrastructure largely independent of natural system protection and function. As such, the role of the drainage engineer was to design systems which would capture runoff as efficiently as possible and convey it to the nearest outlet. Current, more contemporary planning and design approaches have adopted a much more focused philosophy related to the natural and social environment, and many communities are now designed with an "environment-first" perspective.

This shift represents an ecosystem–based approach to stormwater management which integrates the concepts of community and development sustainability, with the requirements of the natural system. This overarching shift has inherently changed the way in which new communities are planned and operated, including changes to the way stormwater is managed and valued. An ecosystem approach to stormwater management adopts a broad definition of the environment including natural, physical, social, cultural and economic issues.

Water resources are a key element in the overall function of natural ecosystems sustaining their health and existence. The protection of the functions of water and stormwater resources, through proper and effective stormwater management is paramount to a sustainable community. In the context of the Niagara Region, the responsibility for the protection of these functions is divided between the Region, the local municipalities, and the NPCA. Generally, the Region's responsibility includes large scope studies. As such, the implementation of the ecosystem approach is being viewed from a "Big Picture" perspective. The Region is working together with their local municipal partners to promote the implementation of the ecosystem approach on a smaller scale as well.

### 1.4.2 Planning and Design Process

Planning and design processes affecting land use and infrastructure need to recognize the role of stormwater management related to the protection of ecological attributes and functions of the watershed. An integrated planning and design process requires that the constraints and opportunities afforded by the physiography (land-based approach,

including natural hazards) be considered concurrently with natural features and functions (ecological approach) in the planning and design of stormwater management systems. A multi-disciplinary team of specialists is required, including:

- Engineers (Water Resources, Civil, Geotechnical)
- Land Use Planners (Environmental, Policy);
- Terrestrial and Aquatic Ecologists;
- Geoscientists (Hydrogeologists and Fluvial Geomorphologists); and
- Landscape Architects/Urban Designers.

Contractors and End Users (municipal staff, the public) may also be included. Although the relative contribution of each discipline will vary throughout the planning and design processes depending on the setting, the continued involvement of the multi-disciplinary team from concept to implementation is critical, in order to ensure project objectives are addressed as the process moves forward. Where possible, the integrated planning for stormwater management practices should be conducted early in the planning process (i.e. Conceptual Master Plan or Secondary Plan level), in order to clearly establish stormwater management planning from an integrated and multi-disciplinary perspective.

### 1.4.3 The Ecosystem Approach

Like many municipalities in Ontario, Niagara Region has embraced environmental principles in its community and neighbourhood planning. The Niagara Official Plan (2022) includes principles for environmental conservation and a healthy landscape. Common objectives in an environmental planning approach include:

- Ecosystem Conservation, Protection and Restoration
- Watershed and Subwatershed Planning
- Groundwater and Surface Water Resources Management
- Implementing a Natural Heritage System
- Maintaining Ecological Function, Biodiversity, Connectivity, Linkages
- Stormwater Management
- Natural Hazards Management
- Emergency Preparedness

These principles are best addressed through an integrated land use and environmental planning process which involves the preparation of various plans at various stages of development. The following outlines the general relationship between land use and

environmental/stormwater plans, however depending on the location, features of interest and related issues, they may overlap between various study phases.

| Land Use Planning | Environmental & Stormwater Planning |
|---|---|
| Growth Management Strategy<br>Regional Official Plan | Tertiary Watershed Plan |
| Local Official Plan<br>Secondary Plan<br>Official Plan Amendment | Quarternary Watershed/<br>Subwatershed Plan |
| Envirionmental Assessment | Master Plans (Servicing, W&WW, SWM) |
| Draft Plan Approval<br>Site Plan Approval | Stormwater Management Plan<br>Environmental Impact Study<br>Stormwater Management Report |

Furthermore, the redevelopment of lands (infill/intensification), often takes guidance from more locally specific studies in conjunction with the above planning stages, scaled to the extent necessary to fully capture the factors influencing the environment and infrastructure.

Partnership with environmental regulatory agencies (specifically NPCA) during the preparation of planning documents, is integral to their development.

The preparation of the land use, environmental, and stormwater plans within the Niagara Region should be based on the ecosystem approach and must not only protect, but where possible enhance the natural environment. Refer to Section 4.1 for a list of objectives for the Region's Natural Environment System, from the Niagara Official Plan (2022).

# 2.0 Current Legislative Climate (Legislation, Regulations, Policies and Guidelines)

## 2.1 Federal

### 2.1.1 Canadian Environmental Protection Act

The Canadian Environmental Protection Act, 1999 was enacted for the purpose of "pollution prevention and the protection of the environment and human health in order to contribute to sustainable development". In 2001, Environment Canada determined that road salts were entering the environment in large amounts and posed a risk to plants, animals, birds, fish, lake and stream ecosystems and groundwater. The report recommended that salt be designated as toxic under the Act. Furthermore, Environment Canada assembled a working group that developed the "Code of Practice for the Environmental Management of Road Salts" released in 2004. This document recommends that road authorities prepare salt management plans that identify actions they will take to improve their practices in salt storage, general use on roads and snow disposal. In Niagara Region, the storm sewer systems are closely associated with the road network, and therefore salt management practices directly relate to the quality of stormwater runoff.

### 2.1.2 Canadian Fisheries Act

Subsection 36(3) of the Canadian Fisheries Act (R.S., 1985, c. F-14) prohibits the deposit of a deleterious substance into water frequented by fish. A deleterious substance includes harmful chemicals but also sediment and water at an increased temperature. This can have an impact on the design and management of stormwater facilities to ensure sediment removal efficiencies are maintained and outflow water temperature is not overly heated.

## 2.2 Provincial

### 2.2.1 Provincial Policy – Key Documents

#### 2.2.1.1 Provincial Policy Statement 2020

The Provincial Policy Statement (PPS) (2020) provides policy direction and sets the framework for regulating land use planning and development, in order to protect resources of provincial interest, public health and safety, and the quality of the natural and built environment. Municipal official plans shall develop policies that implement provincial interests and directions.

The PPS provides policy directions regarding the management of infrastructure, and that it should be provided efficiently, prepare for the impacts due to climate change, and

optimize existing infrastructure. The PPS identifies that planning authorities should promote green infrastructure to complement grey infrastructure.

The PPS identifies that planning for stormwater management shall:

a) be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term;

b) minimize, or, where possible, prevent increases in contaminant loads;

c) minimize erosion and changes in water balance, and prepare for the impacts of a changing climate through the effective management of stormwater, including the use of green infrastructure;

d) mitigate risks to human health, safety, property and the environment;

e) maximize the extent and function of vegetative and pervious surfaces; and

f) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development.

The PPS identifies actions that planning authorities must undertake in order to protect, improve or restore the quality and quantity of water, including planning at the watershed scale, preparing for climate change, restricting development as required, and minimizing stormwater volumes and contaminant loads. The PPS identifies restrictions on development and site alteration in areas of natural hazards. The PPS are foundational in establishing appropriate guidance for integrated stormwater and environmental systems management (Natural Heritage and Water Resources Systems).

#### 2.2.1.2 A Place to Grow: Growth Plan for the Greater Golden Horseshoe

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019) also referred to as the Growth Plan (2019), provides direction on growth and development within the Greater Golden Horseshoe, while supporting the economy, protecting the environment and improving quality of life. Municipal plans and policies must conform with the direction from provincial policies.

The Plan provides the following guidance on stormwater management:

Municipalities will develop stormwater master plans or equivalent for serviced settlement areas that:

a) are informed by watershed planning or equivalent;

b) protect the quality and quantity of water by assessing existing stormwater facilities and systems;

c) characterize existing environmental conditions;

d) examine the cumulative environmental impacts of stormwater from existing and planned development, including an assessment of how extreme weather events will exacerbate these impacts and the identification of appropriate adaptation strategies;

e) incorporate appropriate low impact development and green infrastructure;

f) identify the need for stormwater retrofits, where appropriate;

g) identify the full life cycle costs of the stormwater infrastructure, including maintenance costs, and develop options to pay for these costs over the long-term; and

h) include an implementation and maintenance plan.

Proposals for large-scale development proceeding by way of a secondary plan, plan of subdivision, vacant land plan of condominium or site plan will be supported by a stormwater management plan or equivalent, that:

a) is informed by a subwatershed plan or equivalent:

b) incorporates an integrated treatment approach to minimize stormwater flows and reliance on stormwater ponds, which includes appropriate low impact development and green infrastructure;

c) establishes planning, design, and construction practices to minimize vegetation removal, grading and soil compaction, sediment erosion, and impervious surfaces; and

d) aligns with the stormwater master plan or equivalent for the settlement area, where applicable.

#### 2.2.1.3 Greenbelt Plan

The Greenbelt Plan (2017) provides policy direction which aims to permanently protect against the loss and fragmentation of the agricultural land base around the Greater Golden Horseshoe area. In the context of this guideline document, the plan intends to provide protection for the water resource systems that sustain ecological and human health and that form the environmental framework around which major urbanization in south-central Ontario will be organized.

### 2.2.2 Additional Provincial Policy/Strategy Documents

#### 2.2.2.1 A-Made-in-Ontario Environment Plan

A-Made-in-Ontario Environment Plan (2018) is a document which outlines the province's strategy to protect air, land and water, address litter and waste, reduce greenhouse gas emissions and prepare for climate change. The Plan is guided by three main principles: Clear Rules and Strong Enforcement, Trust and Transparency and Resilient Community and Local Solutions. Municipal strategies should be in alignment with the direction from this plan, as well as the other relevant provincial policies.

The A-Made-in-Ontario Environment Plan's direction in relation to stormwater management and reporting is to:

1. Update stormwater policies to be written in plain language;
2. Update stormwater financing and investment policies to be more adaptable to new innovative technologies and practises; and
3. Review land use policies in order to update policies related to climate change.

The A-Made-in-Ontario Plan identifies investments of up to $7 billion in projects such as improving local stormwater systems at a federal, provincial and municipal governments over a ten-year span. The Plan also recommends working with conservation authorities to address flooding and other natural hazard issues.

#### 2.2.2.2 Niagara Escarpment Plan

The Niagara Escarpment Plan (2017) provides policy direction which aims to protect the geological feature of the Niagara Escarpment and the lands within its vicinity, and to ensure that development occurring within the vicinity of the Niagara Escarpment is compatible with the natural environment. The objectives of the Niagara Escarpment Plan are as follows:

1. To protect unique ecologic and historic areas;
2. To maintain and enhance the quality and character of natural streams and water supplies;
3. To provide adequate opportunities for outdoor recreation;
4. To maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery;
5. To ensure that all new development is compatible with the purpose of the Plan;

6. To provide for adequate public access to the Niagara Escarpment; and
7. To support municipalities within the Niagara Escarpment Plan Area in their exercise of the planning functions conferred upon them by the Planning Act.

The plan is divided into three (3) parts which outline land use policies and acceptable land use designations, development criteria, and policies specific to the Niagara Escarpment Parks and Open Space System.

### 2.2.3 Provincial Legislation/Acts

Stormwater regulations and design standards are continually evolving, resulting in many existing SWM systems and facilities that do not meet current federal or provincial requirements for the construction of new facilities and/or long-term maintenance. More stringent federal and provincial requirements for water quality and quantity control are also being proposed, further widening the gap to bring these publicly-owned systems into compliance.

To achieve regulatory compliance, the Region recognizes the need to increase the SWM related level of service and performance standards. Furthermore, increased levels of service are needed for SWM related Operation and Maintenance (O&M) activities, for both the activities and the frequency of each activity.

Traditionally, there have been limited regulatory requirements for the design of stormwater facilities and there are very few performance measures or “benchmarks” compared to water and sewage systems. Design criteria prior to the mid-1990s were focused on flood control objectives only. Water quality, erosion, and other environmental hazards have been addressed since the 1990s through new permitting and approvals processes.

The following summarizes the pertinent regulatory requirements from the various levels of government and other agencies.

#### 2.2.3.1 Ontario Water Resources Act

The Ontario Water Resources Act (OWRA, RSO 1900 and amendments) prohibits activities that introduce pollutants into natural waterbodies, such as creeks, rivers and lakes: “Every person that discharges or causes or permits the discharge of any material of any kind into or in any waters ... that may impair the quality of the water… is guilty of an offence” (Section 16.(1)).

The OWRA gives the Ontario Ministry of the Environment, Conservation and Parks (MECP) authority to regulate water supply, sewage disposal and to control sources of water pollution, which includes surface waters and groundwater in Ontario. The MECP issues Environmental Compliance Approvals under Section 53 of the OWRA for the

treatment and disposal of sewage by municipal and private systems, which includes SWM facilities. Stormwater is defined as “sewage” under the OWRA. Stormwater facilities constructed prior to the mid-1950s (when the OWRA was first applied) would not have received approval. A Director, as defined in the OWRA, has the power to order the owner of a sewage works (e.g., a municipality owning a SWM pond or a storm sewer system) that may discharge deleterious material into a watercourse to carry out works or activities to reduce or alleviate the water quality impairment. This power has not been applied to municipalities for normal operation of storm sewer and SWM systems, although it could be.

Current practices demonstrate that although regulatory agencies (e.g., MECP, MNRF, and Conservation Authorities) encourage retrofit controls, they have not enforced a formal requirement. However, a formal obligation for retrofit controls could be applied through the discretionary powers of MECP. The main impetus has been that municipal staff has accepted the premise that watercourses are part of the natural environment and must be protected and rehabilitated as part of their infrastructure management responsibility.

#### 2.2.3.2 Ontario Clean Water Act

The Ontario Clean Water Act (2006) ensures communities are able to protect their municipal drinking water supplies through developing collaborative, locally driven, science-based protection plans. Under this Act, communities are required to identify existing and potential threats to their water supplies and take action to reduce or eliminate the significant threats and risks. This will require municipalities to work in collaboration with the regional government and Conservation Authorities, which may lead to programs and criteria to be developed and incorporated into Region policies.

#### 2.2.3.3 Ontario Brownfields Act

The Ontario Brownfields Act (2004) addresses the clean-up process for proposed redevelopment in brownfields, which are abandoned, idle or underutilized commercial or industrial properties where past activities have caused known or suspected environmental contamination. The Brownfields Act incorporates a number of technical documents that specify soil and groundwater remediation criteria and laboratory analytical protocols. These protocols address landfilling operations for dredged sediment from SWM facilities, for which the Region would be responsible for sediment sample collection and lab chemical analysis costs.

#### 2.2.3.4 Ontario Emergency Management Act

The Ontario Emergency Management Act, revised and amended from the Emergency Plans Act through Bill 148 in 2002, legally mandates that municipalities implement risk-

based emergency management programs and as part of this, perform hazard and impact risk assessment, including assessment of weather-related risks, to critical infrastructure. These emergency management programs consist of emergency plans, training programs and exercises, public education and any other element prescribed by regulation. Municipalities are required to review and, if necessary, update these emergency management plans on an annual basis. This regulation has particular application to a municipality's SWM program given its role in drainage and mitigating the effects of weather-related flooding.

#### 2.2.3.5 Ontario Water Opportunities Act

The Ontario Water Opportunities Act (2010) is intended to guide clean water technology, services and conservation efforts, as well as promote innovative and cost-efficient solutions for drinking water, sewage and stormwater system challenges. Under this Act, municipalities and other water service providers are required to prepare municipal water sustainability plans. Grant funding programs have also been initiated to stimulate innovative municipal water sustainability research, planning and commercialization of new technologies, as well as support public education and awareness about water conservation.

#### 2.2.3.6 Ontario Drainage Act

The Ontario Drainage Act (1990) allows municipalities to collect funds to make minor improvements, deepening, widening or extending a drain to an outlet. Municipal drain assessments are only intended for water quantity works (i.e., to provide conveyance capacity to the drainage outlet) with costs apportioned based on drainage area and runoff. Water quality/source water improvement projects, planning studies, and other (typically) urban drainage issues generally fall under the OWRA rather than Drainage Act.

#### 2.2.3.7 Ontario Aggregate Resources Act

For mineral aggregate operation or an expansion to an existing operation, impacts on stormwater may potentially be adequately addressed through studies prepared to meet the requirements of the Aggregate Resources Act (1990). An application must also conform to the Niagara Official Plan (2022). According to the Niagara Official Plan (2022), Section 4.3.4, an application to permit a new mineral aggregate operation shall consider, amongst other issues:

- potential for negative impacts on the natural environment including natural heritage features and systems, surface water features, and groundwater resources (4.3.4.4);

- applications to permit a mineral aggregate operation shall demonstrate how potential negative impacts to ground and surface water resources will be minimized. Where extraction is proposed below the water table, applicants shall demonstrate how impacts on both water quality and quantity are avoided first and mitigated where avoidance is not possible (4.3.4.9)

### 2.2.4 Provincial Ministries and Conservation Authorities

#### 2.2.4.1 Ministry of the Environment, Conservation and Parks

Ministry of the Environment, Conservation and Parks (MECP) vision is an Ontario with clean and safe air, land and water that contributes to healthy communities, ecological protection, and environmentally sustainable development for present and future generations. The MECP develops and implements environmental legislation, regulations, standards, policies, guidelines and programs. The Ministry's research, monitoring, inspection, investigations and enforcement activities are integral to achieving Ontario's environmental goals. The Ministry's responsibility includes an oversight role for municipal stormwater management, through a number of acts and regulations, but primarily through the OWRA as noted above, and through the issuance of Environmental Compliance Approvals (ECAs) for stormwater management works.

#### 2.2.4.2 Ministry of Municipal Affairs and Housing (MMAH)

This provincial ministry sets out land use planning policies through the Provincial Policy Statement and acts as a one-window approval authority on such matters related to the Planning Act. The Places to Grow Act enables the government of Ontario, originally through the Ministry of Infrastructure, and now through the MMAH, to develop growth plans for any area in the province. As part of this Act, the Growth Plan identifies a number of policies related to stormwater management (e.g., municipalities are encouraged to implement and support innovative stormwater management actions as part of redevelopment and intensification). Stormwater management is an important consideration in the planning process as part of the Planning Act. In specific areas there may be additional planning requirements (e.g., Greenbelt Plan, Oak Ridges Moraine Conservation Plan and the Lake Simcoe Plan). MMAH has oversight responsibilities for municipal authority and activities, as well as the Building Code.

#### 2.2.4.3 Ministry of Natural Resources and Forestry (MNRF)

This provincial ministry's role for stormwater management is focused primarily on overseeing the response to floods and emergencies, with local implementation of emergency response plans. MNRF's role in planning is in association with MMAH to approve Special Policy Areas which are designed to regulate historic towns and residential areas that lie inside floodplain areas and act to restrict further intensification

of such areas. MNRF provides an oversight role for the Conservation Authorities Act and is also identified in an Order in Council 1492/1995 as the provincial lead ministry for flooding.

#### 2.2.4.4 Ministry of Infrastructure (MOI)

The MOI develops general infrastructure policy and advises on the government's investment priorities in public infrastructure under the Building Canada Fund. This includes stormwater management infrastructure. The MOI originally was responsible for the Places to Grow Act, subsequently moved to MMAH (2.2.4.2).

#### 2.2.4.5 Ministry of Transportation (MTO)

This provincial ministry functions both as an owner/developer and a regulator. As an owner/developer, MTO plans, builds and maintains highways including stormwater management facilities. As a regulator, MTO develops design standards, reviews and approves design reports, and issues permits. MTO's key statutes pertaining to stormwater are the Public Transportation and Highway Improvement Act, which manages highway drainage and provides authority for construction, alteration and maintenance.

#### 2.2.4.6 Ministry of Agriculture Food and Rural Affairs (OMAFRA)

This provincial agency directs the planning and maintenance of drainage works, as authorized through provincial statutes pertaining to stormwater is the Drainage Act.

#### 2.2.4.7 Ministry of Community Safety and Correctional Services (MCSCS)

Under the Emergency Management and Civil Protection Act, all provincial government ministries must set up an emergency management program. As a result, the MCSCS has developed an Emergency Response Plan and Business Continuity Plan, which includes a stormwater flood response.

#### 2.2.4.8 Conservation Authorities

These agencies were established under the Conservation Authorities Act to work collaboratively with the member municipalities to address a broad range of issues to jointly undertake water and natural resource management initiatives, and coordinate the preparation of environmental plans on a watershed or sub-watershed basis. Under the Conservation Authorities Act, authorities permit development within regulated floodplains, as well as review and provide advice to municipalities on development matters affecting water quantity and quality. Further, many Conservation Authorities maintain hydrologic and hydraulic models for the watershed, which can be used to develop stormwater master plans. Niagara Region is within the jurisdiction of the Niagara Peninsula Conservation Authority (NPCA). The planning and policy document

titled “NPCA Policy Document: Policies for the Administration of Ontario Regulation 155/06 and the Planning Act, dated May 21, 2020” provides additional information.

### 2.2.5 Provincial Agency Guidelines and Requirements

#### 2.2.5.1 Ministry of the Environment, Conservation and Parks (MECP)

The MECP has published numerous guidelines, and water management policies and directives including: Provincial Water Quality Objectives of the Ministry of the Environment (MOE, 1994), Guide for Applying for Approval of Municipal and Private Sewage Works (MOE, 2000), Stormwater Management Planning and Design Manual (MOE,2003), DRAFT Subwatershed Planning Guide (January-April 2022), and DRAFT Low Impact Development Stormwater Management Guidance Manual (January - April 2022), Design Criteria for Sanitary Sewers, Storm Sewers, and Forcemains for Alterations Authorized under Environmental Compliance Approval (April 2022), and Consolidated Linear Infrastructure ECA Application Template (May 2022).

The Provincial Water Quality Objectives (PWQO) are numerical and narrative criteria which serve as chemical and physical indicators representing a satisfactory level for Ontario’s surface and ground waters under the OWRA, based on public health and aesthetic considerations. The PWQO are intended to provide guidance in making water quality management decisions, and are often used as the starting point in deriving requirements included in Environmental Compliance Approvals. They are also used to assess ambient water quality conditions, infer use impairments, assist in assessing spills, and monitoring the effectiveness of remedial actions.

The other six guides are related to the design of stormwater management infrastructure and applying for the required Environmental Compliance Approval.

#### 2.2.5.2 Ministry of Natural Resources and Forestry (MNRF)

The MNRF has published the following documents which apply to development as it relates to watercourses and floodplains: Natural Channel Systems: Adaptive Management of Stream Corridors in Ontario (MNR, 2002) Natural Hazards: Technical Guides for Rivers and Stream Systems and Hazardous Sites. (MNR, 2002).

#### 2.2.5.3 Ministry of Transportation (MTO)

The MTO has published the following documents which apply to development, drainage, stormwater management and climate change: Drainage Management Manual (MTO, 1997) Stormwater Management Requirements for Land Development Proposals (MTO, 1999); Drainage Management Policy and Practice Directive (MTO 2007); Implementation of the Ministry’s Climate Change Consideration in the Design of

Highway Drainage Infrastructure (MTO, 2016); Implementation of Updated Intensity-Duration-Frequency (IDF) Curves Online Application V3 (2016).

#### 2.2.5.4 Conservation Authorities

Conservation Authorities provide guidance documents for the following: protection and management of wetlands; regulation of development within floodplains; fisheries management plans (with MNRF); special flood protection and erosion control projects; various water quality, water supply, geomorphic classifications, groundwater programs and watershed/subwatershed planning studies. The NPCA published Stormwater Management Guidelines (2010).

## 2.3 Niagara Region

### 2.3.1 Niagara Official Plan (2022)

On June 23, 2022, Regional Council approved By-law 2022-47 adopting the new Niagara Official Plan. The new plan has subsequently been approved and adopted by the Province, by the Ministry of Municipal Affairs and Housing, November 4, 2022.

As part of the Niagara Official Plan, the Region completed extensive background review, consultation, and supporting studies which resulted in policies and mapping that provide stronger protections for natural environment system as well as including additional information for discussion on stormwater management.

The following excerpts are included to summarize the policies which apply to stormwater management.

Copies of Chapter 3 of the Niagara Official Plan - Sustainable Region, and Chapter 5 – Connected Region, have been included in Appendix A.

The new Niagara Official Plan can be found on the Region website:

https://www.niagararegion.ca/official-plan/

**Excerpts from Niagara Official Plan, Chapters 3 & 5, as related to stormwater management**

Excerpt 1:

3.1 - The Natural Environment System

3.1.10 - Key Hydrologic Areas, Key Hydrologic Features, and other Important Water Resources

3.1.10.1 - Development or site alteration shall not be permitted unless it can be demonstrated that it will not have negative impacts on:

a) the quantity and quality of water in key hydrologic areas, key hydrologic features, sensitive surface water features, and sensitive ground water features;

b) the hydrologic functions of key hydrologic areas, key hydrologic features, sensitive surface water features, and sensitive ground water features;

c) the interaction and linkage between key hydrologic areas, key hydrologic features, sensitive surface water features, and sensitive ground water features and other components of the natural environment system;

d) the natural hydrologic characteristics of watercourses such as base flow, form and function, and headwater drainage areas;

d) natural drainage systems and shorelines areas; and

e) flooding or erosion.

3.1.10.2 - Mitigative measures and/or alternative development approaches may be required in order to protect, improve or enhance key hydrologic areas, key hydrologic features, sensitive surface water features, sensitive ground water features, and their hydrologic functions. The Region, Local Municipality, or Conservation Authority may require establishment of appropriate development conditions and monitoring programs through the development approval process.

3.1.10.3 - The Region encourages the restoration of natural stream form and flow characteristics through the development approval process where appropriate.

Excerpt 2:

3.1.16 - Enhancement Areas

3.1.16.2 - The presence of potential enhancement areas shall be screened for by a proponent when an environmental impact study and/or hydrologic evaluation is required to support a development and site alteration application both inside and outside of settlement areas or when a subwatershed study is being undertaken.

3.1.16.4 - In a case where an enhancement area is identified in accordance with Section 3.1.16.2, the lands within the enhancement area shall be planted and left as natural self-sustaining vegetation. The enhancement area may also be designed to include other compatible land uses such as stormwater management ponds if it can be demonstrated that the long-term ecological function of the enhancement area would be retained.

Excerpt 3:

3.1.32 - Factors to be Considered when Reviewing Site Plan or Community Planning Permits in the Natural Environment System

3.1.32.1 - Where site plan control or a community planning permit is required by the Local Municipality for development in the natural environment system, Local Municipalities are encouraged to address the following matters, as applicable:

f) implementation of stormwater management and construction mitigation techniques with an emphasis on lot level controls, low impact development practices and a treatment train approach to promote filtration, infiltration and detention, which may include proper re-contouring, discharging of roof-leaders, use of soak away pits, other measures to promote infiltration, and silt fencing for temporary sediment control

Excerpt 4:

3.2 - Watershed Planning

3.2.3 - Subwatershed Planning

3.2.3.2 - A subwatershed study should generally include but is not limited to:

j) the recommendation of appropriate stormwater management techniques in accordance with provincial, regional and local guidelines and industry best practices;

Excerpt 5:

3.2.3.3 - Proposed development in designated greenfield areas, including the associated water, wastewater and stormwater servicing, shall be planned to avoid, or if avoidance is not possible, minimize and mitigate any potential negative impacts on watershed conditions and the water resource system, including the quality and quantity of water.

Excerpt 6:

5.2 – Infrastructure

One of the objectives (f) of Section 5.2 is listed as follows:

ensure stormwater management and green infrastructure is integrated into the planning process

Excerpt 7:

5.2.1 - Infrastructure Planning, Development, and Asset Management

5.2.1.12 - Local municipalities should include policies in their official plans for the planning and construction of new infrastructure and related facilities that address the principles of environmental sustainability including but not limited to :

e) providing appropriate stormwater infiltration at the source

5.2.1.17 - The Region shall develop Stormwater Management Guidelines giving guidance on best practices and innovation for development applications and public works projects and to assist in addressing climate change impacts

5.2.1.18 - Planning for stormwater management shall:

a) conform with Section 3.2;

b) be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term;

c) minimize, or, where possible, prevent increases in contaminant loads;

d) minimize erosion and changes in water balance, and prepare for the impacts of climate change through the effective management of stormwater, including the use of green infrastructure;

e) mitigate risks to human health, safety, property, and the environment;

f) maximize the extent and function of vegetative and pervious surfaces;

g) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development; and

h) consider green infrastructure and other measures which address the impacts of climate change.

5.2.1.19 - Local municipalities shall develop stormwater master plans or equivalent for serviced settlement areas that:

a) are informed by watershed planning or equivalent;

b) protect the quality and quantity of water by assessing existing stormwater facilities and systems;

c) characterize existing environmental conditions;

d) examine the cumulative environmental impacts of stormwater from existing and planned development, including an assessment of how extreme weather events will exacerbate these impacts and the identification of appropriate adaptation strategies;

e) incorporate appropriate low impact development and green infrastructure;

f) identify the need for stormwater retrofits, where appropriate;

g) identify the full life-cycle costs of the stormwater infrastructure, including maintenance costs, and develop options to pay for these costs over the long-term; and

h) include an implementation and maintenance plan.

Excerpt 8:

5.2.5 - Stormwater Management and the Planning Process

5.2.5.1 - All new development and redevelopment in settlement areas must be provided with separate storm drainage systems or separate storm drainage connections.

5.2.5.2 - The Region will collaborate with the local municipalities for the provision of adequate storm drainage facilities.

5.2.5.3 - Local Area Municipalities shall implement sustainable stormwater management plans and strategies as part of development and redevelopment.

5.2.5.4 - Proposals for large-scale development proceeding by way of a secondary plan, plan of subdivision, vacant land plan of condominium or site plan will be supported by a stormwater management plan or equivalent, that:

a) conforms with Section 3.2;

b) is informed by a subwatershed plan or equivalent as completed by the local municipality;

c) ensures all proposals for development or redevelopment are designed based on an integrated treatment approach in order to address requirements for water quality, erosion control, flood control, thermal mitigation and water budget to minimize stormwater flows and reliance on stormwater ponds, which includes low impact development and green infrastructure, where appropriate;

d) establishes planning, design, and construction practices to minimize vegetation removal, grading and soil compaction, sediment erosion, and impervious surfaces;

e) ensures stormwater management facilities are designed to support key features and ecological functions in the Region's natural environment system, where possible; and

f) aligns with the stormwater master plan or equivalent for the settlement area, where applicable.

### 2.3.2 Niagara Watershed Plan (Equivalent)

In addition to the Niagara Official Plan (NOP), the Niagara Watershed Plan (Equivalent) was prepared to support the protection, enhancement and restoration of natural resources within Niagara Watersheds, with an emphasis on water resources. The NWP was approved by the Region in May, 2022. Watershed planning informs land use planning, including decisions relating to growth and infrastructure, and planning for climate change.

The Niagara Watershed Plan (Equivalent) (NWP (E)) was prepared as a watershed planning equivalency document in accordance with provincial direction in the Growth Plan which allows for the use of legacy data in watershed planning. The document outlines the status of watershed-oriented data across Niagara, specific to mapping, data and reporting. The NWP (E) built on the available data, recognized data gaps, and used the available information, in order to better characterize the resources in the areas being planned for growth, and to inform the new NOP on constraints and opportunities, where the information is sufficient. Where there are information gaps, the NWP (E) outlined those gaps and provided high-level scope for execution at the subsequent planning stages (i.e., Quaternary Watershed Plan or local OP). The NWP (E) did not fill any data gaps, through confirmatory field work, nor did it involve any analytical modelling of water systems (hydrology, hydraulics, hydrogeology); again, this effort is considered more appropriate at the subsequent planning stages.

The NWP (E) provides descriptions of the processes for the varying levels of planning and studies, and these have been summarized in Section 3.1

### 2.3.3 Niagara Region Public Works

The Niagara Region Public Works engineering section developed a policy for storm drainage systems - cost sharing in 1979. The policy was updated in 1998. The Region enters into cost-sharing agreements with local area municipalities for the construction of storm sewers which convey drainage from Regional roads or facilities. The sharing is based on area and runoff coefficients, agreed upon with the Region and local area municipality. This policy supports the responsibility of the Region and local area municipality as detailed in Section 3.2.2. It supports the position that drainage from the Region road ROW is the Region's responsibility and that the responsibility for external drainage outside of the Region road ROW rests with the local municipality. The full policy is available from the Region.

## 2.4 Other Guidelines and Plans

### 2.4.1 Source Protection Plan

The Source Protection Plan for the Niagara Peninsula Source Protection Area, was led by the NPCA, acting as the Niagara Peninsula Source Protection Authority, along with rest of the members of the Niagara Peninsula Source Protection Committee, including the Niagara Region, the local municipalities, Ministry of Environment, Conservation and Parks, federal representatives, advisors, and residents. The Source Protection Plan was approved by the Minister of the Environment in October, 2014. The results of the Source Protection Plan have been reflected in the Niagara Official Plan (2022) and Local Zoning By-Laws as appropriate.

### 2.4.2 Guidelines for Private Waterbodies

There are instances where a private waterbody may have guidelines associated with discharge of runoff to the waterbody. These guidelines would be in addition to those outlined in the Drainage Act. One example is the Lake Gibson Reservoir, located in Thorold, which is owned by Hydro One. Hydro One currently reviews development applications within the City of Thorold which drain directly to Lake Gibson. The City of Thorold and Hydro One have initiated discussions for the development of specific criteria and guidelines for stormwater management, as related to Lake Gibson.

# 3.0 Development Application Process, Roles and Responsibilities

## 3.1 Planning and Servicing Studies

### 3.1.1 General Process

Stormwater management planning and design generally occurs through a multi-phase process which is completed in conjunction with the land use planning process. Figure 3.1 illustrates the relationship between environmental planning studies and the municipal planning process, together with the corresponding approval agencies for new greenfield development. The figure is based on the chart in the MOE SWM Planning and Design Manual (2003), and adapted for the Region process. Specific stormwater management considerations at various stages of the land use planning processes are presented in Table 3.1. It should be noted that Figure 3.1 is primarily intended for greenfield development, however portions of the information also apply for discussion for planning and review of infill/intensification and re-development projects.

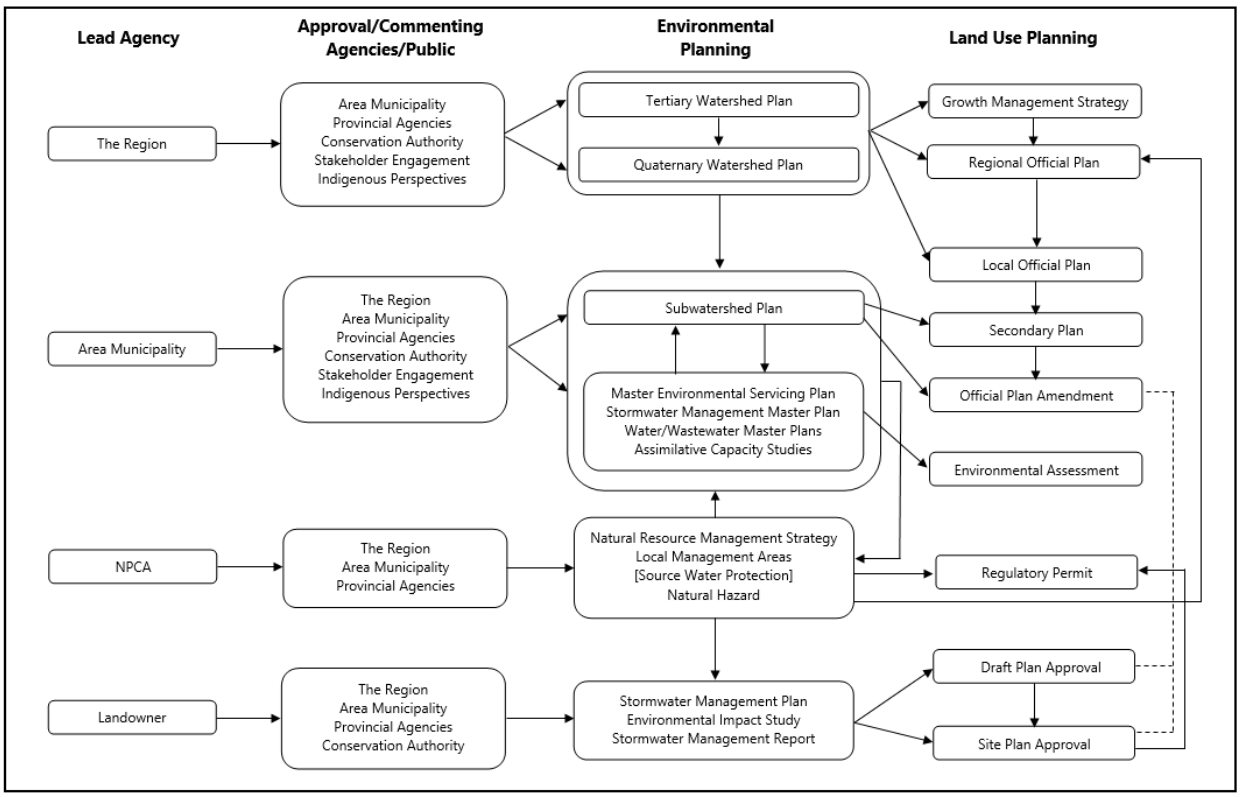



**Figure 3.1. Watershed and Municipal Planning Sequence**

**Table 3.1. SWM Considerations at Various Stages of the Land Use Planning Process**

| Planning Stage | Description |
|---|---|
| **Regional Official Plan (OP)** | OP identifies land use type, density, and mitigation requirements to meet watershed objectives, including protection of sensitive features through land use designations. Applicable Watershed Plans represent resource documents for development of Official Plans.. It is at this stage where a natural heritage system (NHS) and water resource system (WRS) is established. |
| **Local Official Plan/Secondary Plan/Official Plan Amendment (OPA)** | Full range of opportunities to achieve stormwater management and environmental objectives are identified, establishing a template for the more detailed resolution of the site-specific design of stormwater management facilities at subsequent stages in the planning and design process. The NHS and WRS is refined and the limits of specific features are established. |
| **Environmental Assessment/ Draft Plan Approval** | The location of lots, roads, parks and open space blocks, natural heritage features and buffers and stormwater management facilities are defined. The approach to achieve stormwater management objectives and how these objectives influence the location and configuration of each of the components listed above must be defined. |
| **Site Plan Approval** | Opportunities are presented to integrate stormwater management facilities into all of the components of a development including landscaped areas, parking lots, roof tops and subsurface infrastructure. Solutions must be considered in the context of the overall stormwater management strategy for the block or secondary plan area to ensure that functional requirements are achieved. |

The preceding considerations focus upon greenfield developments (the conversion of rural, undeveloped land). Infill and intensification also requires consideration, given the expectation that this form of development will become more predominant as available greenfield land is developed.). Land use and environmental planning studies are also necessary for these types of development.

Studies such as Subwatershed Studies (SWS), Master Servicing Plans (MSPs), Functional Servicing Reports (FSRs) and Stormwater Management (SWM) Reports are prepared in support of municipal land use studies and plans at various stages of the

development process, to help guide land use decisions and ensure that practical and effective plans are prepared which manage impacts to natural resources. Depending on the stage of development, the study and documentation process will effectively need to address the needs of the respective plan requirements. The basic objectives and deliverables for each of these various studies are discussed in the Niagara Official Plan, and the following sub-sections.

### 3.1.2 Tertiary Watershed Plans

Watershed studies or plans are higher level documents providing guidance on resource management at a broad scale. The Region is responsible for preparing Tertiary Watershed Plans (ref. Section 3.2.2.2 Region Official Plan, June 2022). Reference is made to Section 1.3, for a list of the watersheds within the Niagara Region. A map of the Niagara Tertiary Watersheds has been included in Appendix A.

A watershed study area consists of the natural drainage boundary of the watercourse and all of their tributaries. A watershed plan typically establishes environmental resource management at an Official Plan scale and is used as a guide for managing human activities that affect water, land/water interactions, and terrestrial and aquatic resources. The watershed plan outlines areas for protection, enhancement, and rehabilitation and high-level direction and policy, such that the health of the watershed's ecosystem can be protected, as land uses and management practices change.

The Tertiary Watershed Plan is over-arching in that it provides direction for subsequent more detailed and localized quaternary watershed plans and local subwatershed studies. It establishes high-level environmental goals and objectives and identifies the actions required to meet those goals. A Tertiary Watershed Plan is typically developed co-operatively between government agencies, conservation authorities and stakeholders, particularly since watersheds are often multi-jurisdictional.

### 3.1.3 Quaternary Watershed/ Subwatershed Studies

**Niagara Official Plan**

As noted in Section 3.2.2.3 of the Region's Official Plan (Nov 2022), the Region is responsible for preparing quaternary watershed plans. "Quaternary watershed plans are prepared as needed and may be prepared when there is benefit from watershed planning beyond a subwatershed scale. Quaternary watershed plans may be prepared based on development pressure, ecosystem degradation, resource management requirements, and fiscal constraints. Quaternary watershed plans will be prepared or updated in accordance with currently accepted practices and Provincial guidance as appropriate" (Niagara Official Plan, November 2022).

As noted in Section 3.2.2.5 of the Region's Official Plan, "Local Area Municipalities are responsible for the preparation of subwatershed studies. The Region may prepare guidelines to assist Local Area Municipalities with the preparation of subwatershed studies. Subwatershed studies may proceed in advance of the completion of a quaternary watershed plan" (Niagara Official Plan, November 2022).

Several other related policies in the Niagara Official Plan, November 2022 include:

"3.2.2.4 – the priorities, phasing and process for undertaking and updating quaternary watershed plans shall be determined by the Region in consultation with the affected Local Area Municipalities and the Conservation Authority.

3.2.2.7 – the Region, in cooperation with the Local Area Municipalities shall ensure that the appropriate policies to implement individual watershed plans and subwatershed studies are incorporated into this Plan and Local official plans as appropriate.

3.2.2.8 – Local Area Municipalities, in co-operation with the Region and Conservation Authority, shall implement the recommendations of watershed plans and subwatershed studies as part of the development review process."

**Niagara Watershed Plan - Equivalent**

Environmental planning studies completed on a quaternary watershed scale are expected and recommended to be the major priority for study across the Niagara Region following the current Niagara Watershed Plan – Equivalent (NWP (E)). The future quaternary watershed studies are to be completed, in order to support the planning of new development areas for the Region and help to further inform the subwatershed scale studies to support local development. While the preferred study hierarchy is for quaternary watershed plans to be completed first, followed by local subwatershed studies, it is recognized that it will take the Region and its stakeholders a considerable amount of time to complete watershed studies for the respective twelve (12) quaternary watersheds (ref. Figure 1.2). As such, it is possible for local subwatershed studies to be initiated in advance of the respective quaternary watershed plan, should there be local drivers (i.e. secondary plans, major development proposals, etc.) indicating the need for advanced subwatershed studies.

Quaternary Watershed/Subwatershed studies essentially implement the high-level recommendations from Tertiary Watershed Plans and related policies which would ultimately provide environmental and water resources input into the Local Official Plans, Secondary Plans and Official Plan Amendments process for local communities. Quaternary Watershed studies are proposed to be led by the Region, and Subwatershed studies are most often driven by urban development and thereby led by local area municipalities; both the Quaternary Watershed and Subwatershed studies are to be completed collaboratively with direct involvement from the Region, Local Area

Municipalities, NPCA, proponent landowners, and other stakeholders. The following sections outline the components and/or phases of both Quaternary Watershed studies and Subwatershed Studies.

### Quaternary Watershed Studies

As indicated in the previous section, Quaternary Watershed studies are proposed to be led by the Niagara Region, with direct involvement from the Local Area Municipalities, NPCA, and other stakeholders. Quaternary Watershed studies are intended to refine and enhance the high-level recommendations from the Tertiary Watershed plans (i.e. the current NWP (E)), and the Niagara Official Plan (November 2022) and continue to build upon and refine the data sets and assessments through more localized study scale. Quaternary Watershed studies are largely intended to follow the provincial (MECP 2018) Draft Watershed Planning Guidance framework, as outlined in Figure 3.2.

| | | |
|---|---|---|
| Phase 1<br>Existing Conditions | Watershed Delineation & Characterization | Delineation, Identification of WRS, Existing Conditions Characterization |
| Phase 1<br>Existing Conditions | Setting the Vision, Goals, Objectives & Targets | Aligned with Provincial Policies, Plans and reflects Local Conditions |
| Phase 2<br>Impacts, Scenarios and Directions | Watershed Planning Elements & Best Practices | Includes Water Quantity, Water Quality, Natural Hazards, Climate Change, Connections to Natural Systems, Cumulative Impacts, Assessment of Land Use Scenarios & Management |
| Phase 3<br>Watershed Plan Implementation | Implementation | Plan Development, Informing Land Use Planning (Water, Wastewater, Stormwater) |
| Phase 3<br>Watershed Plan Implementation | Monitoring & Adaptive Management | Environmental Monitoring, Performance Monitoring, Update/Adapt Plans and Management |

**Figure 3.2. Quaternary Watershed Study Framework**

- **Phase 1 "Existing Conditions".** This phase is intended to build upon and refine the data gathering and characterization completed as part of previous watershed plans (i.e. current NWP (E)) and other relevant environmental planning studies; refinement can be accomplished through additional field work, mapping and water based modelling to outline the characteristics of current/existing land uses, as well as the location, extent, sensitivity and significance of all components of the natural systems, including land/water features, linkages and processes. Characterization of existing conditions can help to identify significant factors and influences on the components of the environment, and therefore identify opportunities for protection, enhancement, rehabilitation and development as part of quaternary scale watershed goals, objectives and targets.
- **Phase 2 "Impacts, Scenarios and Directions".** This phase will undertake an evaluation and assessment of the quaternary watershed conditions in accordance with the requirements outlined in the Niagara Official Plan, Growth Plan, Greenbelt Plan, and the Niagara Escarpment Plan. This will involve additional hydrologic/hydraulic modelling (developed through Phase 1) to evaluate and develop a watershed understanding of sensitivities to land use changes across the watershed, and evaluate management opportunities which consider the following elements:
    - Water Quantity, Water Budget & Water Conservation Plans
    - Water Quality & Nutrient Load Assessment
    - Natural Hazards in Watershed Planning & Subwatershed Plans
    - Climate Change & Watershed Management
    - Connections to Natural Systems
    - Cumulative Effects Assessment
    - Assessment of NOP Land Use & Management Scenarios
- **Phase 3 "Watershed Plan Implementation".** This phase will develop a management plan based upon the findings from Phase 2, by identifying proposed development areas (types/intensities), best management practices and design requirements for quantity and quality of both surface water and groundwater, servicing requirements (water, wastewater, stormwater), land and water management practices and performance measures (targets) and areas to be protected, enhanced and rehabilitated across the quaternary watershed. Direction for implementation relating to timing, responsibilities, and requirements for future studies (Subwatershed) and monitoring will also be developed. The findings from each of these phases will be used to inform land use planning (future Secondary plans) and subsequent watershed planning studies at the local scale (i.e. Subwatershed studies).

## Subwatershed Studies

As indicated in the previous sections, Subwatershed studies are ideally completed subsequent to Quaternary Watershed studies and are most often driven by urban development, as companions to local OPA (Secondary Plans); they are thereby led by Local Area Municipalities, with direct involvement from the Region, NPCA, proponent landowners, and other stakeholders.

As noted in the Niagara Official Plan, Section 3.2.3.4, “the Local Area Municipality, in consultation with the Region, the Conservation Authority and affected landowners if appropriate, shall determine the terms of reference for the subwatershed study” (November 2022).

An example of such a process and collaboration is the current Smithville Community Subwatershed Study, which was initiated in 2020 in the Township of West Lincoln. The Subwatershed study process generally consists of the four phases as shown in Figure 3.3.

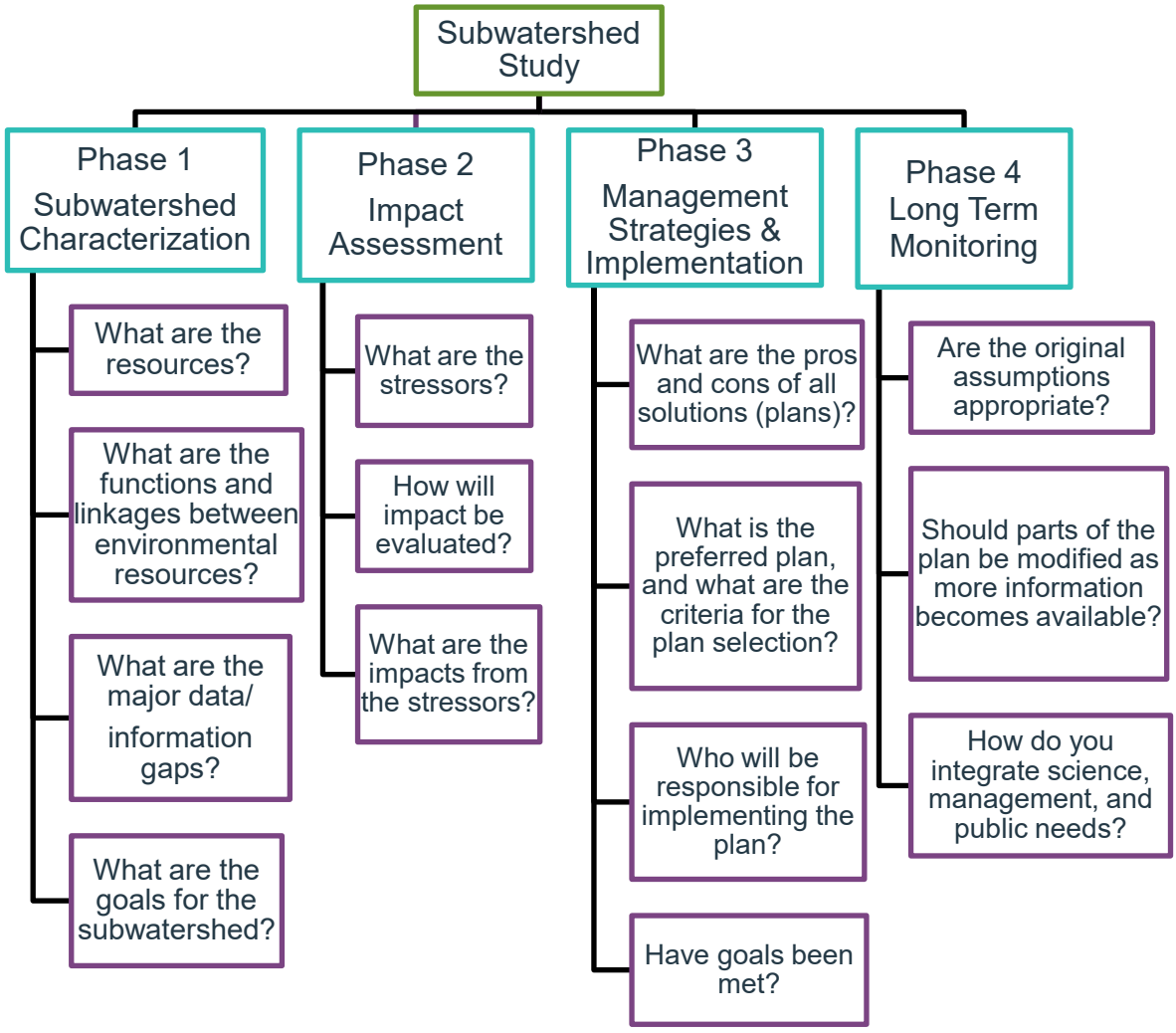



**Figure 3.3. Subwatershed Study Process**

- **Phase 1 "Subwatershed Characterization."** This phase involves an integrated assessment of the resources of the subwatershed by various study disciplines including hydrology and hydraulics, hydrogeology, water quality, stream morphology, aquatic and terrestrial ecology. Background and supplemental field data are collected for each discipline and then considered across disciplines in an integrated manner to establish an understanding of the form, function, and linkages of the environmental resources. Notably, at the subwatershed study level, a comprehensive suite of natural heritage surveys are undertaken to confirm the natural features and areas of the Natural Heritage System (NHS), including those not mapped in the Official Plan (e.g., Significant Wildlife Habitat). It is important that this is done at this stage so that planning, design and management can take the system, and its sensitivities into consideration. During this phase, preliminary "working" goals and objectives are developed to guide future development and management in the subwatershed.

- **Phase 2 "Impact Assessment."** In this phase, the future impacts of various potential future land use scenarios are determined and assessed related to multiple subwatershed scale parameters. It is during this phase that the assessment considers a range of appropriate avoidance, minimization and mitigation strategies to meet the preliminary working goals and objectives established during Phase 1.
- **Phase 3 "Management Strategies & Implementation".** This phase finalizes the alternative mitigation strategies and establishes the preferred management strategy by taking direction from Phase 2. By considering the potential impacts and predicted effectiveness of various management strategies and based on a finalized form of land use, a set of management strategies is established to achieve the identified goals and objectives. The implementation plan for the subwatershed study and its associated recommendations provides input on:
  - buffers, linkages and enhancement areas for the NHS;
  - priorities;
  - performance targets for overall system function (e.g. high level SWM objectives, NHS targets);
  - staging/phasing;
  - monitoring; and
  - future study requirements.
- **Phase 4 "Long Term Monitoring".** This phase of the Subwatershed Study follows substantial implementation of the development and associated management; this phase is traditionally executed by the Local Municipality or local Conservation Authority or a partnership and funded by development. The purpose of the monitoring is to evaluate the effectiveness of the Proposed Management Strategy over time (both locally and holistically) and adjust or adapt the plan as possible and as required.

As part of the above study phases, the impacts and effects of climate change are to be considered as part of subsequent watershed planning initiatives; the provincial Watershed Planning Guidance (Draft, 2018) outlines the following steps for consideration:

- Step 1: Consider the Potential Effects of Climate Change on Existing and Proposed Land Uses, Infrastructure and Developments
- Step 2: Consider the Effects of Existing and Proposed Land Uses and Water/Wastewater/Stormwater Management Infrastructure on Exacerbating Climate Change Impacts
- Step 3: Determine Impacts of Alternative Land Use and Management Scenarios Under Various Climate Models

- Step 4: Document Climate Effects on Water Use and Management within the Watershed or Subwatershed Plan

### 3.1.4 Master Servicing Plans/ Assimilative Capacity Studies

Master Servicing Plans (MSPs) and Assimilative Capacity Studies (ACS) are completed in support of Environmental Assessments and cover Servicing and Settlement, Water and Wastewater, and Stormwater Management. Servicing and Settlement and Stormwater Management Master Plans are typically completed by local municipalities, and are done concurrently with, or in lieu of, a subwatershed study. The Region and Local Municipalities would collaborate for the preparation of Water and Wastewater Master Plans. A MSP and ACS includes supporting technical analyses including hydrology, hydraulics, hydrogeology, geotechnical investigations, and fluvial geomorphology. A MSP and ACS is conducted at a higher level of resolution and typically would involve a neighbourhood or block plan scale, not necessarily co-incident with the subwatershed(s). The purpose of the MSP and ACS is to provide an integrated and more detailed analysis of management requirements with the benefit of more detailed and refined land use information than was available to the Tertiary and Quaternary Watershed Study. The MSP and ACS highlights the key recommendations and requirements to be addressed through the future draft plans of subdivision and/or site plans. In general, the MSP and ACS involves the following steps:

- **Review Existing Information**
  - Review Subwatershed Study data, analyses and recommendations, where applicable and appropriate, in conjunction with other companion studies, to identify any information gaps relating to the conservation of natural heritage areas, features and functions.
- **Refine data for Existing Environmental Conditions**
  - Based on the review of the existing information, carry out the necessary studies to fill local scale data gaps with respect to natural features and systems.
- **Update Constraint/Opportunity Mapping**
  - Based on the refined land use plan and using existing information as a base (‘starting point’) conduct a functional analysis of the ecologically-sensitive lands constituting the natural heritage system, including natural hazards, and thereby prepare an updated detailed constraint and opportunity map.
- **Assess Detailed Land Use Impacts to Establish Preferred Environmental and Stormwater Management Strategy**
  - Refine the land use plan(s) so that it best addresses the environmental and stormwater management requirements and practices identified by the higher-level studies (as appropriate), reflecting the detailed constraint and opportunity

mapping. The impact assessment of the proposed land use should be updated and refined to determine if alternative environmental and stormwater management strategies may be necessary, considering other economic and social issues such as interim servicing, cost sharing, development timing etc.

### 3.1.5 Functional Servicing Report

Functional Servicing Reports (FSRs) provide details specific to the functional serviceability for a proposed development related to the water, wastewater, and stormwater network ensuring that it can function to Municipal, Regional, and Provincial criteria. The FSR describes the location and nature of existing municipal water, wastewater, and stormwater infrastructure that may be available to provide servicing for the proposed development. It should outline in detail the proposed servicing requirements for the development and indicate the capacity of the existing infrastructure to support the development. It should also identify the necessity to dedicate lands to proposed stormwater infrastructure, and the extents/area of land required for this purpose, as appropriate.

FSRs are prepared in support of development/re-zoning and intensification projects to identify how servicing will be provided while meeting approved environmental targets from preceding studies (i.e. MSP). For large developments with significant environmental considerations, a three-step process may be appropriate, requiring an MSP followed by underlying FSRs and Functional Stormwater Management Reports for individual subdivisions and servicing facilities, respectively. In some instances where the extent of land use change is limited, it may be appropriate to complete only an FSR and single Stormwater Management Report. If the proposed development does not include a stormwater management facility, then a separate Stormwater Management Report may not be required, although the FSR will be required to document the stormwater management strategy for the site (e.g. stormwater management within an off-site facility). However, if a stormwater management facility is proposed for the development, then a Preliminary Stormwater Management Report shall be submitted.

### 3.1.6 Stormwater Management Report

Detailed SWM reports need to be prepared to support detailed site design. As such, they are required in order to meet the conditions set at the Draft Plan of the subdivision stage, Draft Plan of condominium stage, or as part of a Site Plan approval process. The preparation, review and approval of the SWM Report should be the final step in the approval of the proposed SWM plan. The SWM Report must provide the required design and detailed supporting calculations for all component elements of the proposed stormwater management system. The SWM Report should contain the detailed design of stormwater controls, delineation/confirmation of constraint boundaries, and hydraulic

and hydrologic analyses. The report should include and/or reference supporting geotechnical/ hydrogeological studies, environmental restoration reports, preservation and restoration/ remediation plans, sediment/erosion control plans, monitoring plans, and long term operation and maintenance. The components of the SWM Report may vary depending upon whether a Master Servicing Plan and/or Subwatershed Study have been completed.

## 3.2 Roles and Responsibilities

Successful execution of the development process requires a coordinated approach between all impacted approval and commenting authorities, including the Local Municipalities (LM), Region, NPCA, and the MECP. The following is intended as an overview of the various roles and responsibilities for stormwater management review. The primary responsibility for review and approval will be with the Local Municipalities who remain the ultimate approval authority. However, the parallel roles for review will depend on the proposed development and proposed stormwater management works.

In general, the Region's stormwater management role is to provide stormwater management comments to the Local Municipalities on all development applications, which the municipality coordinates and adds to the municipal conditions of approval. The Region remains responsible for providing clearance on each of the Region conditions. The Region focuses more on review for compliance with a regional watershed/ecosystem approach and Local Municipalities focus on engineering details, such as major/minor system, drainage easements, outlet structure and maintenance.

### 3.2.1 Region Stormwater Management Approvals Process

The Region stormwater management approval process will be carried out as a sub-component of the Region Planning approvals for development, with submissions for either Draft Plan of Subdivision, Draft Plan of Condominium or for Site Plan applications being made under the Planning Act. The stormwater management report is a standard requirement for most applications and would be submitted and directed to Region and Local Municipality Development Engineering for review. The primary steps for the Region Planning application process are as follows:

a) Pre-submission consultation thru the pre-consultation process at the Local Municipality

b) The Pre-consultation process will provide the applicant with the required submission requirements, studies, drawings and documents. This would include a SWM report along with determination of the need for controls and agencies that will be reviewing the SWM requirements

c) The review of a SWM plan/report is through the Application submission process. This will provide the applicant with comments with respect to report content, calculation, modelling, drawings and any supporting documents would be required at pre-consultation process.

An overview of the respective roles for review are discussed further in Section 3.2.2.

### 3.2.2 Roles and Responsibilities for Review

**Table 3.2** provides an overview of the minimum requirements that will be required for the SWM plan and the reviewing agency:

**Table 3.2. Roles for Review of SWM Applications**

| Storm Water Receiver | Review Agency and Responsibility - Water Quality | Review Agency and Responsibility – Water Quantity[8] | Review Agency and Responsibility - Stream Erosion Control | Review Agency and Responsibility – LID Requirement | Review Agency and Responsibility - Construction Erosion and Sediment Control | Review Agency and Responsibility - Subdivision SWM Facility Operation and Maintenance | Review Agency and Responsibility - NPCA[3] | Review Agency and Responsibility - MECP[4] |
|---|---|---|---|---|---|---|---|---|
| **Regional Road (roadside ditch/crossing culvert)** | Region | Region | Region | Region | Region | Region/ Local Municipality | | ECA approval [4] |
| **Regional Storm Sewer (overland flow on Regional Road)** | Region | Region | Region | Region | Region | Region/ Local Municipality | | ECA approval [4] |
| **Municipal Road (roadside ditch/crossing culvert)** | Region/ Local Municipality[1] | Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | | ECA approval [4] |
| **Municipal Storm Sewer Drain or Easement** | Region/ Local Municipality[1] | Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | | ECA approval [4] |
| **Unregulated Feature [6]** | Region/ Local Municipality | Local Municipality/ Region | Local Municipality/ Region | Local Municipality/ Region | Local Municipality/ Region | Local Municipality | | ECA approval [4] |
| **Regulated Feature[2,3, 5,7]** | Region/ Local Municipality | Region/ Local Municipality | Region/ Local Municipality | Region/ Local Municipality | NPCA | Local Municipality | Review of outlet and may require Work Permit | ECA approval [4] |

**1** Coordination of review to be discussed at pre-consultation;

**2** Outlet to a Provincially Significant Wetland (PSW), water balance may be required and would be a coordinated review by NPCA and Region;

**3** The NPCA will review any outlets to regulated feature and may require review of stormwater management report as part of the development application;

**4** ECA approval needed for Municipal Storm Sewer and SWM Facilities. ECA approval needed for SWM facilities on Industrial Lands or for facilities that provide SWM for more than one site. MECP will supply final certificate outlining the maintenance requirements for the owner.

**5** See Table 3.3 for area of interest

**6** An unregulated feature is one not regulated by the NPCA. Region/Municipality comment on impacts offsite e.g. downstream on adjacent properties.

7 Municipal Drains are regulated by the Drainage Act and Conservation Authorities Act – consent given by landowners as part of establishing Municipal Drains

8 Select sites within MTO corridor control will be required to be reviewed by the MTO for quantity control in addition to the other agencies/ parties

**Table 3.3** outlines the stakeholder responsibilities for SWM review with respect to the development process and is adapted from the 2018 Region Protocol for Planning Services between the Niagara Region and the Niagara Peninsula Conservation Authority (ref. Appendix A). Through the 2018 Protocol, the Region and NPCA established an updated framework within which the NPCA will provide specific review services to the Region.

**Table 3.3. SWM Considerations at Various Stages of the Land Use Planning Process**

| Area of Interest | Local Municipality | Region | NPCA | MECP |
|---|---|---|---|---|
| Determination of need for Stormwater Report | ☑ | ☑ | | |
| Review of Stormwater Report | ☑ | ☑ | | ☑ |
| Location of Facility with Respect to Vision of Area | ☑ | | | |
| Location of Facility with Respect to Natural Hazards | | | ☑ | |
| Location of Facility with Respect to Functionality | ☑ | ☑* | | |
| Confirmation of Drainage Area | ☑ | ☑* | | |
| Sizing of Facility with Respect to Quality, Erosion and Quantity Controls, including Release Rates and Settling Calculations | ☑ | ☑ | | |
| Other Potential Impacts on Receiving Watercourse (e.g. themal, water balance, etc.) | | ☑ | | |
| Outlet Structure and Spillway Design | ☑ | ☑ | | ☑ |
| Outlet to Watercourse (if necessary) | | | ☑ | ☑ |
| Safety – Side Slopes, Grating, Grading, Emergency Access | ☑ | ☑ | | |
| Landscaping/Re-vegetation | ☑ | | | |
| Long Term Maintenance | ☑ | | | ☑ |
| Major and Minor Flow Conveyance (internal to subdivision) | ☑ | | | |
| Hydraulic Gradeline Analysis of Storm Sewer and Outlet | ☑ | | | |

*The Region will be involved in instances where the drainage of a Regional Road may be impacted.

The following is a list of the subject matter on which the reviews, comments, and plan conditions of the various parties are to be derived, starting with the Local Municipality, in which the development application will have originated:

**Local Municipality Stormwater Management Review**

Each Local Municipality will require a stormwater management report be prepared for all development applications, including those that drain to the municipal road right-of-way, or into a municipal storm sewer, or municipal watercourse. Subject to pre-consultation, the municipality may require a scoped stormwater management report rather than a full report, in accordance with the complexity and characteristics of the site and development. In addition to the stormwater management facility/infrastructure reviewed by the Region, the Local Municipality will also review:

- Individual lot grading and drainage plans
- Major and minor drainage within the development
- Detailed Storm sewer calculations, hydraulic grade line calculations
- Drainage easements
- Location of SWM facilities and quantity/quality/erosion controls as necessary SWM infrastructure/facility maintenance
- Other potential municipal planning studies and criteria for the specific development which may impact stormwater management facility design and location
- Adjacent properties so that they would not be negatively impacted

**Region Stormwater Management Review**

The Region will review and comment on the stormwater management report (full or scoped) prepared for development applications (including site plan applications and development plan applications), including those that drain to a Municipal or Regional road right-of-way, or into a Municipal or Region storm sewer, or watercourse. The following is a list of subjects to be included in the SWM report for review:

- Determination of the need for controls
- Review for compliance with Region watershed /ecosystem approach
- Evaluation and selection of appropriate stormwater management controls
- Location and sizing of facility with respect to quality, erosion and quantity controls, including drainage area, hydrology, release rates and settling calculations

- For Regional road reconstruction, include external contributing drainage areas, existing and proposed land use, local controls, potential agreements with the local municipality
- Design of facility outlet structure, spillway, grading, side slopes, grating, emergency access
- Other potential impacts on receiving watercourse (e.g. thermal, water balance)

**Exceptions**

- The Region may determine that a site application may only require a stormwater management design brief, and would express the select requirements for the site. This may occur for small sites and infills.
- The Region may also determine on a site-by-site basis that stormwater quality or quantity controls may not necessarily be required. For example, a parking lot converted to a building may have a net reduction in impervious area and a reduced potential for sediment loading, hence no quality control would be required. A site may be close to the watershed outlet, with a large upstream watershed, such that quantity controls may not be required at the risk of setting up a peak flow timing effect which increases peaks downstream. The waiving of quantity controls is dependant on the receiving watercourse not being negatively impacted for erosion as well. Some sites may be small enough that there are no storm sewers, and only runoff overland, which may make peak flow controls less feasible.
- There are also other works such as those proposed under the Drainage Act (e.g. municipal drains) for which the Region would not be required to provide stormwater management comments or approvals.
- The Local Municipality may waive the requirement for a stormwater management report for its purposes, however this is separate from the Region requirement.
- With regard to small sites, there is a potential that the Region may make an exception and no stormwater management report/brief would be required for review by the Region, should the following criteria be met at the pre-consultation stage:
    - No Regional infrastructure
    - Discharges to local municipal storm sewer, not connected to or leading to Region infrastructure downstream
    - Local Municipality is applying its criteria and/or Provincial MECP criteria for quantity and quality controls

## Planning Context

The Region stormwater management review and approvals process is carried out as a sub-component of the Region Planning approvals for development, with submissions for either Draft Plan of Subdivision or for Site Plan applications being made under the Planning Act to the Local Municipality. The stormwater management report is a standard requirement for most applications and would be submitted and directed to the Region for review. The primary steps for the Planning application process are as follows:

a) Pre-submission consultation with the Region, the Local Municipality and NPCA

b) Ascertain list of required studies such as but not limited to:

- Planning, Environmental Impact Study and/or hydrologic evaluation Geotechnical, Servicing (preliminary), Watermain, Stormwater Management, Hydrogeology, Urban Design, Traffic, Environmental Site Assessment, Tree Inventory, Archaeology, Cultural Heritage, Noise

c) Engineering Submission (First and subsequent)

- Drawings
- Calculations
- Supporting reports including Stormwater Management Report

## NPCA Stormwater Management Review

The NPCA will conduct a review of any outlet (new or altered existing) proposed to a regulated area (i.e. wetland, watercourse, valley lands, and any Provincially Significant Wetland). NPCA will review any development within or adjacent to an area regulated by the NPCA. In terms of any proposed new outlet to a watercourse, the NPCA will review the proposed location, and the Region and Local Municipality review the stormwater management report, as it relates to the quantity, quality and erosion control proposed as part of the development application. NPCA will also comment on proposed alterations to an existing outlet to a regulated watercourse, to confirm that it can be done without impacts.

With respect to development adjacent to a wetland or PSW, the NPCA will review the SWM report to ensure that the feature is not hydrologically impacted. This may require supporting water balance calculations. It is recommended that the NPCA be contacted early in the design process to determine the scope of the SWM report.

**Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Review**

The MECP authorizes Municipal and Region stormwater management infrastructure, and requires design calculations and drawings, and if a SWM report has been prepared, a copy of the report in support of the deign of stormwater management infrastructure. The MECP will supply operating and maintenance conditions for the Owner, typically the Local Municipality. The Region and MECP currently have an agreement for Transfer of Review, such that the Region is responsible for review of storm sewer systems, and for SWM applications that provide Enhanced level treatment. The MECP review SWM applications for less than Enhanced treatment, and review all applications for industrial developments. A different branch of the MECP reviews the storm sewers.

Note that in 2020 the MECP initiated the Consolidated Linear Infrastructure (CLI) process for application by Municipalities to manage and review low-risk infrastructure on behalf of the Province, and to establish/maintain/hold a single consolidated Environmental Compliance Approval (ECA) for the Municipal assets. Refer to Section 3.2.4 for a discussion on the evolution of the CLI-ECA, which is still an ongoing process.

Note that the MECP continue to review applications for industrial sewage works.

Note that there may be occasions when the responsibilities of the Region, Local Municipalities, and the NPCA overlap. As noted in the 2018 Region Protocol for Planning Services between the Niagara Region and the Niagara Peninsula Conservation Authority (ref. Appendix A) all parties should work together and dialogue openly to provide consistent and sound comments.

### 3.2.3 List of Potential Scenarios and Coordinated Review

The following is intended to be a list of the potential development scenarios for which a combination of stormwater management reviews will be required from the Region, Local Municipalities, NPCA and MECP.

**Development Outlets to a Regulated or Non-regulated Feature**

Scenario 1.1 – outlet to a NPCA regulated feature (e.g. watercourse or wetland)

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018)
- NPCA will conduct a technical review of the outlet location and proposed discharge characteristics to ensure that the feature is not hydrologically impacted - this may require supporting water balance calculations

- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, Hydraulic Grade Line (HGL), major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system

Scenario 1.2 – outlet to a non-regulated feature (e.g. watercourse or wetland)

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018)
- NPCA would not review the outlet
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system

Scenario 1.3 – outlet to a non- regulated Municipal Drain

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018)
- NPCA would not review the outlet
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system, or if a new outlet

Scenario 1.4 – outlet to a specific non-regulated feature or private waterbody such as the Lower Twelve Mile Creek, Queenston-Chippewa Power Canal, Welland Canal and Lake Gibson

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018)
- NPCA would not review the outlet to a non-NPCA-regulated feature
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system, or if a new outlet
- May require review by the owner of private waterbody

Scenario 1.5 – outlet to Great Lakes

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA)
- NPCA will conduct a technical review of the outlet location and proposed discharge characteristics
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system, or if a new outlet

**Development Outlets to a Road or Sewer**

Scenario 2.1 – site outlets to a local municipal road – to a local municipal pipe/roadside ditch

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018)
- NPCA would not review (non-regulated feature)
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system

Scenario 2.2 – site outlets to a local municipal sewer under a Regional road

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018), and impacts to Regional Road, major overland flow conveyance
- NPCA would not review (non-regulated feature)
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements, major overland flow conveyance
- May require MECP ECA if none exists for this storm sewer system

Scenario 2.3 – site outlets to a Region sewer under a Regional road

- Region is reviewing the sizing of facility and quality control sizing (previously completed by NPCA prior to 2018), and impacts to Regional Road
- NPCA would not review (non-regulated feature)

- Municipality would review site grading and on-site SWM, and review to ensure the site itself and any abutting properties are not negatively affected
- May require MECP ECA if none exists for this storm sewer system

**Region Sewer Outlet Scenarios**

Scenario 3.1 – Region sewer outlets to a local municipal sewer (includes upstream development)

- Region is reviewing the sizing of the sewer, sizing of facility and quality control sizing (previously completed by NPCA prior to 2018), and impacts to Regional Road
- NPCA would not review (non-regulated feature)
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system

Scenario 3.2 – Region sewer outlets to a local municipal watercourse (includes upstream development)

- Region is reviewing the sizing of the sewer, SWM requirements for any Region property involved
- NPCA reviews the outlet location (suggest that a technical review is also required)
- Municipality is reviewing location of facility, sizing for quantity and quality control, storm sewers, HGL, major/minor drainage, easements
- May require MECP ECA if none exists for this storm sewer system

Scenario 3.3 – Region sewer outlets to a local municipal sewer (no upstream development Region only)

- Region is reviewing the sizing of the sewer, stormwater management requirement for any Region property involved
- NPCA would not review (non-regulated feature)
- Municipality is reviewing stormwater management requirement for any Municipal property involved
- May require MECP ECA if none exists for this storm sewer system

Scenario 3.4 – Region sewer outlets to a local municipal watercourse (no upstream development/Region only)

- Region is reviewing the sizing of the sewer, stormwater management requirement for any Region property involved
- NPCA reviews the outlet location (suggest that a technical review is also required)
- Municipality is reviewing stormwater management requirement for any Municipal property involved
- May require MECP ECA if none exists for this storm sewer system

### 3.2.4 MECP Review and Consolidated Linear Infrastructure ECA

The responsibility of the MECP for the review and oversight of Environmental Compliance Approvals (ECAs) is changing. The MECP announced in 2020 that it is adopting a Consolidated Linear Infrastructure Permissions Approach (CLI) for low risk projects related to sewage collection and stormwater management. This is proposed to streamline the approvals process. The MECP notes that "these pre-authorizations will allow municipalities to proceed without first having to obtain an individual ministry permission. In certain circumstances, and with municipal approval, developers who are constructing infrastructure on behalf of municipalities can receive pre-authorization if work is being carried out in accordance with the requirements of the municipality's consolidated linear infrastructure Environmental Compliance Approval (CLI-ECA), including meeting ministry design standards".

At the time of publication, the MECP continues to be in the process of collecting the applications, data and approvals for municipalities and linear infrastructure. Municipalities may apply to register for the CLI-ECA program, and the original deadline for registration was January 2022.

It is recommended to check with the MECP for updates on the CLI-ECA program and whether the Local Municipality is participating.

The MECP note: "with the implementation and transition to CLI across the province, the ministry anticipates the gradual wind down of the Transfer of Review program as it will no longer be needed". The Region will continue with Transfer of Review (TOR) until the MECP advises of a different system.  Not all municipalities have the CLI-ECA process in place, so the TOR will continue for the near future.

Triggers for planning processes and coordination of review should be reviewed and confirmed upon further understanding of the new consolidated linear infrastructure system ECAs.

The MECP held a workshop in June 2022 and released the two following documents:

Design Criteria for Sanitary Sewers, Storm Sewers, and Forcemains for Alterations Authorized under Environmental Compliance Approval (April 2022), and CLI-ECA Application Template (May 2022).

### 3.3 Relevant Stormwater Drainage Documents and Studies

The Region, the Local Municipalities, and NPCA have prepared several documents to support the planning, design and implementation of stormwater management systems within the Region's watersheds. Practitioners and regulators should be familiar with this information, as the recommendations contained within these documents include specific requirements for the Region's watersheds. Relevant guidelines and studies specific to individual watersheds are listed below.

Practitioners should note that findings/recommendations from these documents may be refined further through subsequent studies/reports. It is important that practitioners are aware of the most current information through consultation with the Region and other relevant agencies.

**Local Municipality SWM Criteria**

- City of Niagara Falls Engineering Design Guidelines (2017)
- City of St. Catharines Storm Drainage Manual (1992, 2015 – part of Engineering Design Manual)
- City of St. Catharines Engineering Design Manual, Transportation & Environmental Services (2015 As amended)
- City of Welland Municipal Standards (2013)
- Town of Fort Erie Subdivision Control Guideline (2014)
- Town of Grimsby Storm Drainage Criteria (1989)
- Town of Lincoln Standards (2012, 2017)
- Town of Niagara-on-the-Lake Engineering Standards (2007)
- Town of Pelham Official Plan (2012), Standards (2020)
- Township of West Lincoln Storm Drainage Policies and Criteria (1990)
- Township of West Lincoln Municipal Engineering Standards

**NPCA**

- Niagara Peninsula Conservation Authority Stormwater Management Guidelines (AECOM, 2010)

**MECP**

- Stormwater Management Planning and Design Manual (2003)
- DRAFT Subwatershed Planning Guide (2022)
- DRAFT Low Impact Development Stormwater Management Guidance Manual (2022)
- Design Criteria for Sanitary Sewers, Storm Sewers, and Forcemains for Alterations Authorized under Environmental Compliance Approval (April 2022)
- MECP CLI-ECA Application Template (May 2022)

**Lake Ontario**

- Shoreline Management Plan 2010 (NPCA)

**Lake Erie**

- Shoreline Management Plan 2010 (NPCA)

**Niagara River**

- Niagara River Remedial Action Plan (1987-present)

**Watershed Specific Studies**

- Niagara Watershed Plan (Equivalency) (2022)

**Watershed Plans**

- 15-16-18 Mile Creeks Watershed Plan (NPCA, 2008)
- Beaverdams and Shriners Creek Watershed Plan Phase One (NPCA, 2011)
- Central Welland River Watershed Plan (NPCA, 2010)
- Fort Erie Creeks - Watershed Plan (Philips Engineering, 2008)
- Lake Erie North Shore Watershed Management Plan (NPCA, 2010)
- Lower Welland River Characterization Report (May, 2011)
- Niagara-on-the-Lakes Creeks Watershed Plan (Aquafor Beech, 2008)
- South Niagara Falls Watershed Report (NPCA, 2008)
- Twelve Mile Creek Watershed Plan (NPCA, 2006)
- Twenty Mile Creek Watershed Plan (NPCA, 2006)

**Regional Level Reports**

- Niagara Source Protection Plan & Assessment Report (2013 update) (NPCA, 2013)
- Watershed Report Cards (NPCA, 2012)
- Watershed Report Cards (NPCA, 2018)
- Water Availability Study (WAS) (Aqua Resource Inc 2009)
- NPCA Groundwater Study Final Report (Waterloo Hydrogeologic Inc., 2005)
- Niagara Water Quality Protection Strategy Report Phase 1-4 (NPCA, 2003)
- Niagara Peninsula Tier 1 Water Budget and Water Quantity Stress Assessment (NPCA, 2010)
- Adapting to Climate Change: Challenges for Niagara (Penney, 2012)
- NPCA Water Quality Monitoring Program Annual Report. (NPCA, 2019)
- Climate Change Discussion Paper (Niagara Region, 2019)
- Climate Projections for Niagara Region (TRCA, February 2022)

In addition to the reports outlined above, supplemental mapping and data are available to characterize the Niagara Region watershed system, which outline potential constraints to development and identify future data needs for subsequent studies and watershed planning. In addition to the base mapping data, the following is available in the characterization of Niagara's watershed system:

- Tertiary Watershed Boundaries
- Quaternary Watershed Boundaries
- Subwatershed Boundaries
- Municipalities Boundaries
- Future Land Uses in Niagara Official Plan
- OMAFRA Soil Mapping
- Ontario Integrated Hydrology Data – Hydrology Enforced Digital Elevation Model (DEM) (2019)
- NPCA Monitoring Network (climate stations, streamflow stations, water quality locations)
- Provincial Groundwater Monitoring Network (PGMN), MECP
- Intake Protection Zones, NPCA
- Significant Groundwater Recharge Areas, NPCA

# 4.0 Stormwater Management Goals, Requirements and Technical Guidelines

## 4.1 Goals/Objectives

The primary objective of this study is to develop guidelines which are to provide the Region with a consistent Stormwater Management approach for the entire Region, and technical guidance for reviewing stormwater management and engineering reports in support of development applications.

From a technical standpoint, the Region has established the following preliminary list of goals related to stormwater management outcomes for this document:

- Mitigate development impacts to the quality of surface water and groundwater
- Mitigate development impacts to conveyance and flooding
- Minimize development impacts to erosion within watercourses
- Replicate existing hydrologic regime (water balance, infiltration, runoff)
- Specify requirements for development draining directly to Regional Roads
- Outline requirements for climate change adaptation
- Mitigate other water quality impacts such as phosphorus, chlorides, temperature

Several of these goals and objectives, or variations thereof, can be found in the Provincial Policy Statement (2020), in the Niagara Official Plan (2022), in the Growth Plan (2019), and in the Greenbelt Plan (2017) as outlined in the following.

**Provincial Policy Statement (2020)**

The PPS identifies that planning for stormwater management shall:

a) be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term;

b) minimize, or, where possible, prevent increases in contaminant loads;

c) minimize erosion and changes in water balance, and prepare for the impacts of a changing climate through the effective management of stormwater, including the use of green infrastructure;

d) mitigate risks to human health, safety, property and the environment;

e) maximize the extent and function of vegetative and pervious surfaces; and

f) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development.

**Niagara Official Plan (2022)**

The objectives for the Niagara Official Plan regarding the Natural Environment System are as follows (Note that a subset of objectives were listed in Section 1.4.3 Ecosystem Approach for environmental planning):

a) Identify and protect a natural heritage system and water resource system which will form the Region's natural environment system;

b) maintain, restore, and enhance the biodiversity and connectivity of natural features and their associated ecological and hydrological functions;

c) recognize the important role the natural environment system plays in mitigating the impacts of climate change by protecting and enhancing natural features;

d) implement the Natural Heritage System for the Growth Plan and Greenbelt Plan Natural Heritage System in accordance with the direction of the Province;

e) identify and maintain hydrologic functions and connections among groundwater features, natural features, and surface water features including shoreline areas;

f) maintain wetland area and the hydrological and ecological functions they provide. To enhance wetland cover where possible;

g) protect woodlands and their biodiversity, restore ecological functions, and enhance woodland cover through reforestation and restoration;

h) protect provincially and regionally significant earth and life science areas of natural and scientific interest;

i) identify and protect other woodlands as a way to maintain treed area in the region;

j) screen for, and evaluate enhancement areas as well as supporting features and areas to support the long-term ecological integrity of the natural environment system;

k) identify linkages to protect ecological connectivity in the region;

l) maintain protection for woodlands that have been disturbed in an effort to maintain tree cover in the region;

m) protect fish habitat, and the habitat of endangered species and threatened species in accordance with Provincial and Federal legislation;

n) maintain and restore natural vegetation along shoreline areas;

o) protect and enhance water resources through proactive watershed and subwatershed planning;

p) protect and restore the ecological health of the Great lakes, consistent with the provisions of the Great Lakes Strategy, the targets and goals of the Great Lakes Protection Act, 2015, and any applicable Great Lakes agreements as part of watershed planning and coastal or waterfront planning initiatives;

q) minimize risks to human health and safety and property associated with natural hazards;

r) minimize the impacts of invasive species through the proper management and control, and the promotion of native species plantings in the region;

s) recognize the role and value of compatible and complementary agricultural and rural uses in and adjacent to the natural environment system;

t) consider cumulative impacts through watershed planning and the development application process;

u) recognize that flexible approaches to existing uses in the natural environment system are required; and

v) outline the process for environmental impact studies and hydrologic evaluations where they are required to support development applications.

**Growth Plan (2019)**

The Plan provides the following policies/objectives on stormwater management:

Municipalities will develop stormwater master plans or equivalent for serviced settlement areas that:

a) are informed by watershed planning or equivalent;

b) protect the quality and quantity of water by assessing existing stormwater facilities and systems;

c) characterize existing environmental conditions;

d) examine the cumulative environmental impacts of stormwater from existing and planned development, including an assessment of how extreme weather events will exacerbate these impacts and the identification of appropriate adaptation strategies;

e) incorporate appropriate low impact development and green infrastructure;

f) identify the need for stormwater retrofits, where appropriate;

g) identify the full life cycle costs of the stormwater infrastructure, including maintenance costs, and develop options to pay for these costs over the long-term; and

h) include an implementation and maintenance plan.

Proposals for large-scale development proceeding by way of a secondary plan, plan of subdivision, vacant land plan of condominium or site plan will be supported by a stormwater management plan or equivalent, that:

a) is informed by a subwatershed plan or equivalent:

b) incorporates an integrated treatment approach to minimize stormwater flows and reliance on stormwater ponds, which includes appropriate low impact development and green infrastructure;

c) establishes planning, design, and construction practices to minimize vegetation removal, grading and soil compaction, sediment erosion, and impervious surfaces; and

d) aligns with the stormwater master plan or equivalent for the settlement area, where applicable.

**Greenbelt Plan (2017)**

The Greenbelt plan has goals in support of the vision of a broad band of permanently protected land. The goals cover the following topics: agricultural viability and protection; environmental protection; culture, recreation and tourism; settlement areas; infrastructure and natural resources, climate change, and urban river valley goals.

In terms of stormwater management, these goals include: the protection, maintenance and enhancement of natural heritage, hydrologic and landform features and functions; protection, improvement or restoration of the quality and quantity of ground and surface water and the hydrological integrity of watersheds; and integrating climate change in to planning and managing the water resources system.

## 4.2 Key Issues and Results of Survey

### 4.2.1 Stormwater and Environmental Management

The following provides a list of key issues identified over the course of the development of the Region Stormwater Management Guidelines, based on feedback from the Technical Steering Committee, which is comprised of representatives from: Niagara Region infrastructure planning and development engineering, transportation engineering and planning departments; Niagara Peninsula Conservation Authority; and each of the Local Municipalities. Further, the Technical Steering Committee (TSC) was also circulated with a questionnaire regarding several key issues and proposed approaches

for addressing the issues as part of the Region's guidelines for stormwater management.

- Management of runoff
- Design standards and criteria
- Stormwater Management Facilities – ponds & oil and grit separators
- Stormwater Management Facilities – operation and maintenance
- Low impact Development and Green Infrastructure*
- Major Overland Systems and Emergency Routes
- Climate Change*
- Water Quality – enhanced treatment*
- Water Balance/Budget – 5 mm runoff volume reduction*
- Soils and water table
- Phosphorus and chlorides*
- Risk management*
- SWM facility design*

*- indicates topics included in the short questionnaire

A summary of the TSC survey is included in Appendix B.

The members of the TSC that represented the local area municipalities were generally in support of considering aspects of the foregoing issues in the guidelines, with the exception of phosphorus and chloride controls, which are largely considered to require emerging technologies, hence caution is warranted in setting standards and guidelines around each of these contaminants. The acknowledgement and support of establishing guidance associated with these issues varies by communities. Notably, there are local considerations to consider, often specific to the municipality, such as varying soil types, urban versus rural drainage standards, and redevelopment policies. The survey revealed that there were several points which clearly indicate that a single Region-wide standard or guideline may not always be possible to resolve an issue, given the variability amongst the different municipalities.

#### 4.2.1.1 Chlorides, Phosphorus, and Water Budget

The following sections provide a brief summary of background information on several of the key issues, with further details found in Appendix F.

## Introduction

Stormwater management (SWM) includes elements of quantity, quality and erosion control in order to preserve and maintain the safety, ecological integrity and function of local watersheds. A vital component of maintaining water quality, relates to the management and control of urban stormwater runoff and the associated contaminants, including chlorides (i.e. winter road salt) and phosphorous. These contaminants are known to be a threat to aquatic ecosystems and can also degrade drinking water sources.

In order to better understand how these contaminants can be managed and controlled, a background review of existing policy and guidelines within Southern Ontario has been completed, which has included a review of municipal and conservation authority SWM guidelines, with a focus on defined contaminant management strategies and targets (chlorides and phosphorous).

## Chlorides Overview

Specific chloride management policy and guidelines have not yet been developed for Southern Ontario, other than general management policies for the limiting of use of chlorides on roads. With respect to chloride management, there is currently no viable option for removing chloride once it has been dissolved into stormwater. The preferred approach to managing chloride concentrations in local water resources, is through reduced usage, prevention via design (i.e. roadways and parking lots requiring less salt use) and best management practices for salt use.

SWM facilities can provide benefits by diluting chlorine concentrations discharging to receiving watercourses and can be designed to limit the release of chloride-laden water strategically, typically found at the bottom of a facility.

## Phosphorus Overview

Phosphorous reduction policies are prevalent within many watersheds for which lake eutrophication is a primary concern, which includes the regions of Lake Simcoe and Lake Erie, and hence may be related to part of the Niagara Region (Lake Erie Tertiary Watershed). As noted in the introduction, the TSC members were not in support of developing guidelines for phosphorus given the emerging technologies and uncertainty on the success of such technologies.  It is generally acknowledged that some measure of reduction of phosphorus can be achieved through wastewater treatment, Low Impact Development (LID) source controls, and potentially SWM facility retrofits.

During the pre-consultation phase, proponents should confirm with the Region and the NPCA whether phosphorus impacts have been documented for the subject development area, and if specialized management practices are recommended.

The Lake Simcoe Region Conservation Authority (LSRCA) has set a requirement for 100% control of phosphorous leaving a site in order to achieve a net zero target, which may be supplemented through development fees to provide phosphorous control elsewhere in the watershed (i.e. through offsetting). The level of control provided by the designs in that watershed is required to be documented and supported through all SWM submissions. In addition to the phosphorous SWM criteria, the LSRCA also requires a 25 mm runoff volume capture, retention and treatment on-site for all new developments. Accommodations can be made to the required volume depending on the site conditions, however, these must be documented, supported and approved for the exemption.

**Water Budget Summary**

Stormwater volume reduction techniques may include infiltration, reuse and rainwater harvesting, canopy interception, evapotranspiration and/or additional techniques. Higher priority shall be given to LID Best Management Practices (BMPs) that promote volume reduction. Secondary preference is to employ filtration techniques, followed by rate control BMPs. The recommendations of hydro-geotechnical reports and environmental impact studies need to be considered as part of any design.

It is also noted that the MECP recently released the "DRAFT Low Impact Development Stormwater Management Guidance Manual" for review in January - April 2022, which contains more documentation on approaches and targets for the management of chlorides, phosphorus and meeting water budgets. This document once finalized should be considered in developing any SWM plan.

### 4.2.2 Climate Change

#### 4.2.2.1 Region Climate Change Documents

**New Niagara Official Plan Climate Change Discussion Paper (November 2019)**

As part of the new Niagara Official Plan development, a discussion paper on climate change was prepared which included the potential impacts on water resources. Changes in weather, lake levels, stream flow and hydrologic parameters and their functions may impact floodplains, or drought may impact the water balance and hydrologic cycle, which is connected to other features. Risks of flooding could negatively impact communities as well. The paper recommended watershed and subwatershed planning, and greater management of natural hazards, and highlighted the role that land use planning should play in managing the natural hazards.

**Climate Projections for Niagara Region (February 2022)**

As part of the Climate Change Work Program update in early 2021, the Region identified the need to develop regional climate projections. A climate change modelling and projections project was initiated by the Region, using the updated method provided

by the Toronto Region Conservation Authority (TRCA) and the Ontario Climate Consortium (OCC), to support the implementation of climate adaptation initiatives in the Region. The report was completed in February 2022 and the work was based on the latest climate science and information, following the best practices approach for climate change analysis outlined in the "*Guide to Conducting a Climate Change Analysis: Lessons Learned from Durham Region*" as completed for the Region of Durham, by TRCA and OCC in 2020.

Data for the following four parameters or climate variables were collected from the North American Coordinated Regional Climate Downscaling Experiment database: daily average, daily maximum, and daily minimum near-surface air temperature, and total precipitation. Three time periods were assessed: Baseline (1971-2000), Short Term (2021-2050) and Long Term (2051-2080). Two different socio-economic scenarios of greenhouse gas emissions were assessed: RCP 8.5 (high emissions pathway which projects continued increases beyond the end of the century) and RCP 4.5 (projected emissions to decline by mid-century and stabilize by 2100.

The analysis allowed for climate data summary tables to be produced for each of the agreed climate parameters, for historical, as well as short and long-term future time periods. The results produced a Region-wide climate summary, as well as two (2) additional climate summaries to further distinguish climate trends for Niagara Region north, and south of the escarpment.

The full report is available from the Region. The following is a brief summary of the projections relating to precipitation for both the short-term and long-term based on high emissions (RCP 8.5) scenario:

Short-Term (2021-2050)

Total annual precipitation is projected to increase across all four seasons by 5 % to 1135 mm.

The 1-day maximum precipitation is projected to increase on average by 2 mm.

The 3-day maximum precipitation is projected to decrease by 3.1 mm.

The mean precipitation on wet days (Simple Daily Intensity Index - SDII) increases by 3.8 %.

The fall and winter SDII increases were 5.7 % and 4.7 %.

The annual number of days with greater than 25 mm of precipitation increases from 4.8 days to 5.8 days.

Long-Term (2051-2080)

Average annual precipitation volume is projected to increase by 10 %, to 1192 mm.

The 1-day maximum precipitation is projected to increase on average by 7 % / 7.4 mm.

The 3-day maximum precipitation is projected to decrease by 9 % / 7.1 mm.

The mean precipitation on wet days (Simple Daily Intensity Index) increases by 9.6 %.

The fall and winter SDII increases were 9.4 % and 11.9 %.

The annual number of days with greater than 25 mm of precipitation increases from 4.8 days to 7.1 days.

The results of this analysis provide the Region with historical and future data on how the area climate is projected to change specific to the Niagara Region geography. This can help support the development and implementation of climate change adaptation initiatives, vulnerability assessments and will be instrumental in informing future quaternary watershed and/or subwatershed plans by identifying climate-based adjustments and Intensity-Duration-Frequency (IDF) relationships which can be used as inputs for modelling initiatives to determine watershed stressors for flow rates and seasonal hydrologic impacts, including extremes such as floods and droughts. These data have been made accessible to the NPCA and local area municipalities for expanded use and inclusion in additional studies.

**Adapting to Climate Change: Challenges for Niagara (Brock University 2012)**

This paper, written by Brock University, with participation from the Region, included a section on potential impacts on stormwater management, noting that prolonged and/or more intense rainfall can overwhelm sewer systems and cause backups, especially in combined sewers. Increased basement flooding has been linked to intense rainfall. Intense rainfall or melting snowpacks can saturate soils and exceed the capacity of stormwater systems and cause flooding. Efforts should continue to be made by the Region and Municipalities to increase capacity and improve stormwater systems to reduce basement flooding, reduce overland flooding, and to reduce spills and release of excess stormwater and contaminants into the watercourses.

#### 4.2.2.2 Climate Change Approaches in Other Municipalities

**Assessment of a Shift in the Current Municipal Design Criteria**

A review of readily available literature indicates that municipalities are updating their IDF relationships in a number of ways and primarily ensuring that all available data are used, and that the most recent data are included in curve development.

In review of the various design standards for southern Ontario municipalities, it was determined that some have requirements whereby the maximum conveyance capacity in a storm sewer is determined as a percentage of full pipe flow. This value was generally 95% and, in some jurisdictions, lower. Restricting maximum allowable pipe flow to a percentage of full pipe flow represents another manner of providing a safety factor/resilience in storm sewer design.

When making decisions that will be affected by a shift in climate, it is important to consider that the understanding of climate and climate change will increase with time, so a decision that can be delayed may benefit from newer and better information. As such, the IDF relationships upon which storm sewer rainfall design standards are based should be periodically reviewed. The review of various municipal design standards indicated that many municipalities review their IDF relationships on a 5-year cycle.

The general expectation of extreme rainfall in southern Ontario, as influenced by climate change, suggests less days with rain but larger (higher volume and intensity) rainfall events when they do occur. This has been confirmed in the TRCA document: Climate Projections for Niagara Region (February 2022), and summarized in Section 4.2.2.1.

Some research also suggests the return period associated with specific rainfall events will be halved; that is, the current 100 year rain will become the future 50 year rain; the current 10 year rain will become the future 5 year rain, and so on. In light of this, a change to a less frequent return period design rainfall may be considered good engineering judgment and a means of ensuring adequate performance of newly designed stormwater infrastructure.

In terms of some local examples, Welland, Oakville and Niagara Falls have recently assessed their IDF information.

**City of Welland**

The City of Welland has been investigating the effects of climate change on their sewer systems since 2010. Staff engaged Wood (formerly Amec) to assess the City's stormwater and wastewater systems vulnerability to climate change. This was completed with the application of the Engineers Canada / PIEVC climate change vulnerability assessment protocol. The study included the update of the City of Welland's 1960's vintage IDF rainfall data and development of projected IDF curves. The objective of the projected IDF work effort was to develop IDF curves reflective of the changes in the characteristics of precipitation that might be caused by projected changes in climate. IDF relationships were obtained/developed for the then current 2000 Environment Canada IDF relationship for the weather station at Port Colborne and two future time frames, namely 2020 and 2050. This study, completed in 2012, produced new IDF rainfall data, which is used for storm sewer design and

included more than forty (40) recommendations for the City, two of which were to update the City's Municipal Design Guidelines standards and utilization of a new IDF curve.

**Town of Oakville**

A component of the Town of Oakville's Stormwater Master Plan (2020) project included review of the potential impacts of climate change influenced rainfall on minor and major system performance and alternative assessment for measures that could "absorb" the incremental increases in rainfall expected in the future. A review of possible future rainfall scenarios was required to better understand the range and uncertainty associated with estimates from various available tools. Several tools are available for Ontario municipalities to obtain current and future IDF relationships for various timescales and locations, however, no approach has been deemed to be better than the others. The municipality consulted Wood's climate resilience and climatology expertise to recommend the best approach to incorporate future IDF relationships and commissioned this inter-comparison project. The analysis was centred on two locations, namely: the Town of Oakville and the location of the Toronto City Environment and Climate Change Canada Station. The Toronto City station is used by Oakville currently to define its IDF relationships outlined in its engineering guidelines. Data portals which analyze historical rainfall and use interpolation methods to provide IDF values at any location in Ontario, as well as portals that make use of global climate model outputs, were used as sources of future IDF relationships. Five different sources of IDF relationships were used, accounting for four different emission scenarios (RCP 8.5, RCP 4.5, RCP2.6, and SRES A1B) as well as the exacerbation of historical IDF relationships (e.g., historical IDF +15%, historical IDF +20%). More than fifty (50+) scenarios were obtained and compared to help inform the Town of Oakville of possible future rainfall scenarios, as well as the limitations of the data, and of the limitations of directly comparing these tool's outputs. All processes and methodologies were documented in detail for quality purposes and to contribute to the development of the Stormwater Master Plan and other Town initiatives potentially impacted by changing future rainfall.

**City of Niagara Falls**

It is also noteworthy that a local study has been referenced in the MECP Draft LID Stormwater Management Guidance Manual, 2022, pg. 166:

"Many Ontario municipalities have conducted climate change and/or IDF analysis studies to provide direction for municipal infrastructure planners in light of climate change risks. Of note is the City of Niagara Falls which conducted an IDF curve update and climate change analysis as part of their 2015 Master Drainage Plan Update Study. Updated IDFs for four of the five climate stations within the City were found to

generate rainfall volumes and intensities that were slightly lower than those generated by the previous IDF curves (Hatch Mott MacDonald, 2015). Additional analysis conducted for Niagara Falls found that the “average annual rainfall volumes for the past 15 years (2000 to 2014) were actually 5.5% lower than the long term average, and significantly lower (by 12.6%) than the average annual rainfalls in the 1970’s, 80’s and 90’s; and the frequency of the larger rainfall events (> 25 mm) that cause most of the stormwater management and combined sewer overflows problems were all significantly lower than the long term average (by 15-25%)” (Hatch Mott MacDonald, 2015). Even with these findings, it was recommended that the City use the more conservative (higher intensity) IDF’s and apply a 5 % increase to provide a safety factor in the design of future stormwater infrastructure (and upgrades) to account for possible future climate change impacts."

The Niagara Region recommends planning for an impact of climate change and for designing accordingly. This is consistent with the direction from the MECP, in the 2022 Draft LID SWM Guidance Manual, Section 6, in which the MECP note that “tools, guides, protocols and processes are available to Ontario stormwater practitioners to conduct assessments of future climate change, account for uncertainties in the predictions, and develop adaptive strategies that would be resilient to a wide range of climate change outcomes”.

## 4.3 Technical Guidelines

**Please note that the following technical guidelines are not intended to replace the technical guidelines of local area municipalities. Proponents, when developing SWM plans for development applications, must adhere to the technical guidelines of the local area municipality in which the development is located. These technical guidelines are intended to apply in instances where local area municipality guidelines do not exist, or where the proponent is developing a SWM plan that impacts Region owned infrastructure.**

### 4.3.1 Stormwater Management

The following guidelines are intended to apply to larger plans of subdivisions, smaller individual sites (including private sites), and roadway reconstructions.

#### 4.3.1.1 Flood Control

Proponents are required to provide flood control, where it has been demonstrated to be required/appropriate, and in accordance with the specified level of control outlined within a governing Subwatershed Study (SWS), Master Drainage Plan (MDP), or Master Environmental Servicing Plan (MESP) that encompasses the proponent’s site.

Where a SWS, MDP, or MESP does not exist, the following flood control is typically required as a minimum:

- Where a site discharges to a watercourse system: post-development to pre-development peak flow control for the 2 through 100-year return period events; It is possible that quantity control may not be required, provided local and downstream conditions and constraints have been reviewed and the municipality consulted. Peak flow timing effects with the surrounding watershed must also be taken into account.
- Where a site discharges to a storm sewer: 100-year return period post-development runoff shall be controlled to the allotted capacity of the storm sewer;
    - Where the allotted capacity of storm sewer is unknown: 100-year return period post-development to 5-year return period pre-development peak flow control (where pre-development conditions are as per the definition in this section).
- For sites with split minor/major drainage, the minor and major systems are to be assessed separately for the need for quantity controls. There is a potential that one may require control while the other does not.
- Where a site discharges to a Region road right-of-way (ROW), it must be demonstrated that there is no negative impact to Region transportation infrastructure. Refer to section 4.3.3.2 for guidelines for major runoff conveyance and allowable depth of overtopping of the crown of the road, which is a function of the classification of the road. Overland flow within the ROW, parallel to the road, is typically required to be no deeper than 300 mm.
- Dual-drainage system modelling may be required, on a site-by-site basis.
- For sites with multiple outlets, all of the outlets are to be assessed for the need for quantity controls
- Regulatory 100-year event controls or Regional Storm controls (i.e. Hurricane Hazel) will not be required by Niagara Region, as control of the regulatory event is inherently provided through management of the 100-year event, in accordance with the NPCA guidelines and Regulations (the only exceptions to the 100-year event being the Regulatory event are for Shriner's Creek, Ten Mile Creek and Beaverdams Creek, which apply the Regional Storm – Hurricane Hazel as the Regulatory event)

Proponents are required to consult with the Region, Local Municipality and Agencies (including NPCA) regarding the acceptable level of flood controls to be applied to the proponent's site, including special cases (receivers with limited capacity, lack of overland flow route, etc.).

Note: Where site SWM controls are proposed on private lands, the Niagara Region or the local municipality may require an easement to allow for periodic access to confirm the SWM controls are being operated and maintained by the owner. The requirement for an easement may be considered during pre-consultation, and on a site-by-site basis where appropriate. SWM controls on private lands are preferred to be in proximity to the property line to facilitate such access. Ultimately, operation and maintenance of all private SWM controls are the responsibility of the private property owner.

#### 4.3.1.1.1 Parking Lot and Surface Storage

SWM storage in parking lots and vegetated areas of the site are acceptable for use in the Niagara Region for commercial and industrial sites only; surface storage is not acceptable for residential sites given safety concerns. Parking lot storage shall not be used for storm events with a 5-year return period or less to prevent nuisance flooding, and the depth of ponding shall be limited to a maximum of 300 mm during the 100-year storm event. Overflow relief shall be provided, consisting of a surface overflow path sited and sized to convey the uncontrolled flow for the 100-year storm in the event that the controls become clogged or inoperable, typically with a maximum depth of 300 mm.

Underground parking ramps shall be designed to ensure a minimum of 0.3 m freeboard between the maximum ponding elevation during a 100 year event and the spill point elevation, to limit the potential for overflow flooding.

#### 4.3.1.1.2 Rooftop Storage

Rooftop storage for SWM flood control/peak flow reduction is generally not acceptable for use in the Niagara Region, given the inability to prevent private modification to rooftop controls post-construction. The Niagara Region may consider the acceptability of rooftop storage where the proposed approach would involve "blue roofs" (rooftop storage via separate modular trays attached to the roof). Typical "green roofs" (rooftops which incorporate a membrane, drainage/filter layer and a layer with planting medium and plants) do not incorporate sufficient storage volume in the drainage layer to achieve any significant attenuation of peak flows.

The Region will also approve rooftop controls provided they include a fixed or unalterable control through system design. It is noted that the MTO also does not approve rooftop storage within their jurisdiction, and only accepts underground storage if the control outlet control is unalterable.

Rooftop detention must be designed to meet the requirements of the Ontario Building Code (OBC). Structural design calculations, signed and stamped by a qualified professional Structural Engineer, shall be provided to confirm the loading capacity.

Rooftop drain controls shall be designed in such a manner to prevent removal or tampering with the controls, such as restrictive downspouts or sub-surface orifice tubes. The Niagara Region, in its sole discretion, may require that the controls be listed on the title of the property, as well as a long-term agreement with respect to operation and maintenance.

#### 4.3.1.1.3 Sub-Surface Storage

Subsurface stormwater quantity control facilities, consisting of pre-manufactured units or cast-in-place structures, can reduce peak flow rates by providing storage of stormwater underground. Generally, underground storage facilities are used for smaller development sites or areas of intensified urban development which lack enough space to construct typical surface-based stormwater detention facilities.

Acceptable on-site locations for using subsurface stormwater storage facilities are to be established in consultation with the Municipality (and Region staff, should the development drain to Region infrastructure) and be justified to the satisfaction of the Municipality and/or Region. Consideration for surficial soils (types and layers of soils, depth to bedrock), depth to groundwater, locations of sub-surface utilities, and future maintenance access shall be considered in the selection of the on-site location.

Subsurface stormwater quantity control facilities shall be designed in accordance with manufacturer's specifications and supporting documentation from the manufacturer shall be included as part of the Stormwater Management Design Brief.

The Niagara Region generally recommends that water quality controls and pre-treatment measures be located upstream of the quantity control storage, to prevent clogging and sedimentation. However, the Region will also accept water quality controls located downstream of the quantity control storage, subject to consideration of potential for fouling of the underground tank or system, backwater effects, and other maintenance concerns.

Underground storage systems shall include an emergency overflow system consisting of a surface overflow/relief path sited and sized to convey the uncontrolled flow for the 100-year storm in the event that the subsurface storage facility becomes clogged or inoperable, typically with a maximum flow depth of 300 mm. The proponent needs to show that, if the tank is pugged/blocked/full, there is a suitable bypass incorporated in the design, so the runoff being directed to it can be safely conveyed either around the tank or in the event of surcharge, then overland without causing adverse flooding impacts. The proponent should consider measures to address these considerations as

part of the design process, as well as undertake regular inspections of system post-construction to minimize the risk of clogging or blockage. Notwithstanding the preceding, the storage system shall be designed to ensure that flows from the 100-year storm event and below can be safely directed to the storage system for capture and treatment.

#### 4.3.1.1.4 Peak Flow Controls

Stormwater quantity controls require the implementation of peak flow controls. The Niagara Region approves the use of orifice plates and weir structures for infrastructure owned and operated by the Niagara Region. For private sites, the Niagara Region requires proponents to implement devices that are permanently fixed, in order to eliminate the possibility of the control device being physically removed. This includes orifice tubes, permanently fixed orifice plates, and permanently fixed weir structures, as these systems cannot be readily removed or altered or tampered with. Exchangeable ICD inserts are acceptable, provided they cannot be readily removed/altered.

Where the required diameter of an orifice is determined to be too small (i.e. less than the MECP 2003 recommended minimum of 75 mm diameter) and could result in debris blockage, other devices may be considered at the discretion of the Region. Smaller diameter orifices may be used if the proponent can demonstrate that there is a low risk of debris or clogging, or measures put in place to prevent blockage.

### 4.3.1.2 Erosion Control

Proponents are required to provide erosion control in accordance with the specified level of control outlined within a Subwatershed Study (SWS), Master Drainage Plan (MDP), or Master Environmental Servicing Plan (MESP) that encompasses the proponent's site. Proponents are required to specify erosion protection measures, where necessary, to resist the erosive forces of stormwater flows.

Where a SWS, MDP, or MESP does not exist, and proponents are proposing a wet or dry SWM facility to service their development, proponents should provide extended detention control (detention of the runoff generated from the developed site for a 4-hour, 25 mm storm event over at least 24 hours, with a preference for 48 hours). Where a SWS, MDP, or MESP does not exist, and proponents are not proposing a wet or dry SWM facility to service their development, and the development discharges to a receiver that is sensitive to erosive flows, proponents should provide erosion control in the form of retention of the geographically specific 90$^{th}$ percentile precipitation storm event. Note that this is also referred to as the Runoff Volume Control Target, in the MECP DRAFT LID Stormwater Management Guidance Manual (2022).

Proponents are required to consult with the Region and Agencies (including NPCA) regarding the acceptable level of erosion controls to be applied to the proponent's site prior to initiating the requisite studies and design. The applicable level of erosion controls may be based on the conditions of the receiving channel (as established through field observations and monitoring programs). In some instances, in order to establish suitable erosion control criteria, proponents may be required to undertake an erosion investigation.

#### 4.3.1.3 Water Budget

A water budget is a general accounting for the amount of rainfall or snowmelt input which becomes runoff, is infiltrated, or is lost through evapotranspiration for a subject area. A water budget analysis ensures that peak flows and runoff volumes are considered as part of a stormwater management (SWM) system, in particular maintaining pre-development infiltration and runoff volumes.

Proponents are required to maintain a water budget based on the use of either infiltration, evapo-transpiration or reuse, in accordance with the specified level of control outlined within a SWS, MDP, or MSP that encompasses the proponent's site.

Where a SWS, MDP, or MESP does not exist, proponents are required to ensure that pre-development infiltration, or evapo-transpiration volumes calculated on a site basis are maintained under post-development conditions. Niagara Region supports the application of Green Infrastructure (GI) and Low Impact Development Best Management Practices (LID BMPs) to achieve these requirements, however it does not credit its benefit with respect to quantity control requirements.

At a minimum, Niagara Region requires that the proponent ensure that the first 5 mm of rainfall which lands on the site is retained, reused, evapo-transpirated and/or infiltrated on site (i.e. zero runoff for the first 5 mm of rainfall).

The water budget target of 5 mm is based on a review of current policies in both local and Greater Golder Horseshoe Area municipalities. Note that the Region and the NPCA have quaternary watershed plans in development which may provide refined local guidance. The 5 mm is to be applied as a minimum in advance of the completion of those plans. It is also noted that the MECP recently released the "DRAFT Low Impact Development Stormwater Management Guidance Manual" for review in January - April 2022, which recommends a number of stormwater management measures be applied to development sites in order to achieve a target water balance retention amount based on the 90$^{th}$ percentile of rainfall (in the order of 27 mm to 28 mm within the region).

Additional guidance can be found in CVC/TRCA LID Manual documents, and at the Sustainable Technologies Evaluation Program website, a conservation authority-led initiative (ref. Section 4.3.1.5 for links).

Where site constraints limit the ability to achieve the required water budget criteria, proponents must document the site constraints, and take a best efforts approach to achieving the required criteria. In this instance, the Region may negotiate alternative solutions for the proponents to provide supplemental watershed benefits at offsite locations.

Note that the requirement for water budget/balance and water quality control can be met through a combination of infiltration, evaporation, evapotranspiration and reuse.

#### 4.3.1.4 Quality Control

The Region's required water quality target for the entire Region is 80% average annual removal of Total Suspended Solids (TSS) removal, equivalent to the MECP "Enhanced" criteria. One historic exception is noted that, within Niagara Falls, the criteria for sites draining to the Hydro Canal is 70% TSS removal (i.e. MECP "Normal" criteria). The Region requires the MECP Enhanced level (80% TSS removal) of control on all Region projects and where Region infrastructure is involved; the Region recommends Enhanced control on the balance of local municipal projects where no Region infrastructure is involved.

The Niagara Region, consistent with the Province of Ontario, requires the application of the "treatment train" approach for water quality treatment. Examples of suitable applications of the treatment train include a LID BMP in series with an oil/grit separator unit, or catchbasin inserts (e.g. CB shield) in series with a LID BMP. The proponent is to provide TSS removal calculations for each proposed form of water quality treatment, as well as the combined removal in order to verify that this minimum requirement is met. Note that current MECP guidelines (May 2022) for applying for consolidated linear Infrastructure ECAs, states that when proposing two or more mechanical treatment devices in series, that credit for TSS removal will be limited to the largest unit.

Treatment from engineered systems such as oil/grit separators shall be credited in accordance with the manufacturer's documentation of the specific Environmental Technology Verification (ETV) approval for each unit (ref. Section 4.3.1.4.1), and based on the results from the ETV Canada verifications (ISO 14034) based on independent testing (i.e. like the 2014 TRCA oil grit separator protocol).

More stringent criteria may be applied in special cases, or where an existing higher-level study (i.e. SWS, MDP or MESP) or other applicable studies (Environmental Impact Statement Environmental Impact Assessment) have been completed. This may include (but is not limited to) areas of known concern with respect to salt, phosphorus, nitrates,

and/or thermal impacts. The proponent is to consult with the Niagara Region and other Agencies accordingly.

For re-development applications, the Niagara Region will review on a site-by-site basis to, as a minimum, provide water quality treatment for the re-development portion, or, opportunistically and ideally, for the entire site. The proponent will need to demonstrate that the proposed net impact on water quality will be positive. Water quality control would normally be required if a new storm sewer is proposed, or if a new outlet to a receiving watercourse is proposed.

Rooftop areas may be considered as “clean” impervious areas for the purposes of calculating water quality treatment requirements (and thereby removed from the calculations), provided the flows are separated from runoff from other non-roof areas.

In all cases, as part of the supporting design material for the proposed stormwater quality control measures, consideration of long-term operation and maintenance requirements, including clean-out frequency and associated methods, shall be clearly outlined in an “Operation and Maintenance Manual”. Where the proposed quality control measures are to be privately held, an agreement with the Niagara Region or the Local Municipality is a potential mechanism to ensure that the proponent continues to adequately maintain and operate the quality control facilities.

#### 4.3.1.4.1 Oil/Grit Separators

Oil/Grit Separators (OGS) may be implemented as part of the treatment train for stormwater quality control in urban areas where land use constraints prohibit the use of other BMPs. They are typically used for small sites (typically 5 ha or less), where a water quality control pond/wetland is not feasible. OGS units can also be used for spill control or as a pre-treatment device, as part of a multi-component system (treatment train) to achieve the requisite water quality control criteria. Based on current studies, OGS units have minimal benefits in reducing/managing nutrients and organic matters and do not effectively remove dissolved or emulsified oils and pollutants like a traditional SWM facility. Where an OGS is proposed, as part of the treatment train approach, it is generally recommended that the OGS unit be placed upstream of another water quality treatment methodology more suited to removing other types of pollutants, particularly filtration-based approaches. Owners are requested to provide maintenance, inspection and clean-out logs annually.

OGS units shall be approved as per the CA-ETV program (http://etvcanada.ca/home/verify-your-technology/current-verified-technologies/). Treatment from oil/grit separators shall be credited in accordance with the manufacturer’s documentation of the specific ETV approval for each unit. Note that current draft MECP guidelines for applying for ECAs, states that when proposing two or

more mechanical treatment devices in series, that credit for TSS removal will be limited to the largest unit (MECP May 2022).

In accordance with the MECP SWM Manual (2003), for Enhanced level water quality protection (80% TSS removal), OGS units shall be sized to capture and treat a minimum of 90% of the runoff volume that occurs for a site on a long-term average basis.

Backwater effects must always be accounted for in design of OGS units.

The Region will be consistent with the Provincial guidelines, and notes that the MECP has guidelines in support of ECA applications for stormwater management infrastructure, for manufactured treatment device (MTD) including OGS units (ref. MECP CLI-ECA guidance documents April 2022, and May 2022).

#### 4.3.1.4.2 Catchbasin and Maintenance Hole Inserts

Manufactured catchbasin devices are designed to promote retention to avoid re-suspension of captured sediments in catchbasin sumps. Maintenance hole inserts are perforated barriers installed perpendicular to the direction of flow in combination with a deeper sump. They promote settling of suspended solids.

These devices are acceptable to the Niagara Region as part of the treatment train approach and should only be employed as a pre-treatment to another downstream system, given their typical focus on larger suspended solid particles. Where available, the treatment capacity of these systems shall be determined as per the manufacturer's sizing program, using the Canadian Environmental Technology Verification (ETV) particle size distribution (PSD).

#### 4.3.1.4.3 Filtration Based Technologies

Filtration based technologies refer to proprietary manufactured technologies which rely on filtration of stormwater to remove pollutants, rather than sedimentation or hydrodynamic separation of suspended particulate matter only. Filtration typically removes a larger proportion of contaminants and provides removal of additional parameters (such as nutrients) which are not addressed by other approaches. Niagara Region supports filtration-based technologies as part of the treatment train approach; it is suggested that methodologies which remove coarser suspended material be placed upstream of filtration-based technologies to prevent or reduce the potential for clogging.

Filtration units shall be sized using the Canadian Environmental Technology Verification (ETV) particle size distribution (PSD) to determine the manufacturer determined TSS removal rate. Filtration units shall be approved as per the CA-ETV program (http://etvcanada.ca/home/verify-your-technology/current-verified-technologies/).

#### 4.3.1.4.4 Assessment of New Technologies

To foster innovation in stormwater management, Niagara Region encourages proponents to propose the use of new products and emerging technologies. For new products that have received New Jersey Department of Environmental Protection (NJDEP) and/or Canadian Environmental Technology Verification (CA-ETV) approval, a formal assessment is not required, however Niagara Region may request the proponent to provide background information for the subject product. Note that this assessment process is intended be conducted in cooperation with the local municipalities, with results shared with all municipalities within the Region.

For products and technologies that have not received NJDEP and/or CA-ETV certification, or if the certification is pending, new technologies will be assessed based on the following process and requirements:

1. A thorough review of existing background information by a third-party reviewer, as selected by Niagara Region and paid for by the landowner/developer or technology manufacturer/ provider.
2. A pilot study to test the technology under laboratory conditions performed by, or at a minimum verified by, a third party. Current existing pilot studies deemed acceptable by Niagara Region may eliminate this requirement. Pilot studies are to be paid for by the landowner/developer or technology manufacturer/provider.
3. A full-scale field demonstration test to obtain performance data. The demonstration is to be performed by, or at a minimum verified by, a third party. The results of any and all field tests are to be reviewed by Niagara Region as per requirement 1. Field demonstration tests are to be paid for by the landowner/developer or technology manufacturer/provider.
4. Performance verification tests of the technology's ability to meet performance standards at the site where it will be deployed. Only existing start-up/compliance tests that are within a reasonable proximity to the eventual site where it will ultimately be deployed will be accepted. 'Reasonable proximity' is at the discretion of Niagara Region. Start-up/compliance tests are to be paid for by the landowner/developer or technology manufacturer/provider.

Note that process steps 3 and 4 can be combined based on the location selected.

The results from all the preceding process requirements will be examined by a peer-review committee selected by Niagara Region and based on recommendations from the peer-review, Niagara Region may accept the product for application within the Region. Costs associated with the peer-review process are to be paid by the landowner/developer or technology manufacturer/provider.

#### 4.3.1.5 Low Impact Development Best Management Practices (LID BMPs)

Niagara Region encourages proponents to implement LID BMPs wherever practical to address the requisite water quality control criteria for their site, as well as complementary benefits for water balance and erosion control. Potential LID BMPs which are supported by the Region include (but are not limited to):

- Bioretention areas and bioswales,
- Vegetated filter strips,
- Enhanced grassed swales,
- Permeable pavements (asphalt, concrete, and paving stones),
- Soakaway pits and infiltration chambers,
- Exfiltration pipes,
- Pre-fabricated modules (including soil retention cells) and tree pits, and
- Green Roofs.

Designers should reference available resources through the Credit Valley Conservation (CVC) and Toronto Region Conservation Authority (TRCA), Ministry of Environment Conservation and Parks, and others, including:

- CVC Low Impact Development Guidance Documents (https://cvc.ca/low-impact-development/low-impact-development-support/stormwater-management-lid-guidance-documents/)
- Low Impact Development Stormwater Management Planning and Design Guide Wiki (https://wiki.sustainabletechnologies.ca/wiki/Main_Page)

It is noted that the MECP has issued the "DRAFT Low Impact Development Stormwater Management Guidance Manual" for review in January - April 2022. These can be found at the following link, for information purposes, until the document is finalized: (https://ero.ontario.ca/notice/019-4971).

Local area municipalities may also develop LID BMP guidelines, which would need to be followed in conjunction with the Region and Provincial guidelines.

The selection and design of LID BMPs must consider site characteristics, including but not limited to:

- Local groundwater table elevation (seasonal maximum),
- Subsurface soil type(s) and associated permeability/infiltration capacity (MECP recommended minimum soil infiltration rate of 15 mm/hr, ref. MOE 2003, MECP 2022 Draft),

- Depth to bedrock,
- Sub-surface utility conflicts,
- Existing zoning and land use, including legacy contamination sites,
- Existing groundwater use including downgradient groundwater receptors (e.g. private wells, wetlands, sourcewater protection areas, etc.), and
- Long term operation and maintenance requirements.

This guideline applies to the entire Region, and local soils need to be considered on a site-by-site basis. If the local soils do not have the suggested minimum capacity of 15 mm/hr, then this will need to be considered in the design, as will factors such as the restrictions related to available land, if a greater contact surface area is required.

The Region acknowledges that each site is different, and the development is expected to provide controls, or fully justify why controls are infeasible.

LID BMPs are also supported by the Niagara Region to address erosion control and water balance retention requirements. Acceptable on-site locations for LID BMPs are to be established in consultation with the Local Municipal staff and/or Region staff (if the site drains to Region infrastructure) based on the preceding site characteristics and justified to the satisfaction of the Municipality and/or Region. Where sub-surface LID BMPs are proposed, it is recommended that an additional water quality treatment measure be placed upstream, to prevent and/or reduce the potential for clogging and improve long term functionality.

Note that the requirement for water budget/balance and water quality control can be met through a combination of filtration, infiltration, evaporation, evapotranspiration and reuse.

#### 4.3.1.6 Site Grading

In general, site grading shall be completed to safely direct surface water flows towards suitable outlets. Suitable outlets may consist of surface drainage features (i.e. overland flow routes, storm sewers, etc.) or creek systems.

Lot grading for development sites shall be self-contained and prevent spills onto adjacent properties, while also blending into existing topography and grades surrounding the site. Where external areas drain through a subject property, the proponent shall be required to design the site grading and drainage systems to safely convey these flows (up to the 100-year post-development condition) and prevent ponding or negative impacts to adjacent properties.

Upon completion of the development works, the owner shall supply the Region and the local area municipality with an as-built grading plan, stamped by a qualified Professional Civil Engineer licenced to practice in the Province of Ontario (P. Eng.), certifying that the grading conforms to the approved grading plans and that there are no adverse impacts on neighbouring properties.

#### 4.3.1.7 Roof Leaders

Niagara Region may request roof leaders to be disconnected, such that they do not directly discharge onto impervious surfaces or be directly connected to the storm sewer system. Niagara Region recommends that roof leaders/downspouts be directed to splash pads, and then to pervious grassed or landscaped areas for filtration and infiltration, or to a storage system for on site re-use.

It is noted that directing roof runoff to splash pads is not always feasible, especially with intensified developments. Therefore, subject to demonstration of the local constraint, the Region will allow roof leaders to be connected.

A local municipality may accept roof flows to the municipal storm sewer via a direct storm lateral connection if there is an on-site detention system incorporated within the site design for quantity control. With respect to on-site controls, the use of over-control on one portion of the site may then potentially allow roof drainage to be released without control. This would be subject to modelling and review of the proposed site controls.

#### 4.3.1.8 Stormwater Management Facilities (Ponds)

End of pipe Stormwater Management Facilities (SWMFs) refers to those systems with areas used for quantity, erosion and/or quality control storage to mitigate the impacts of development. An end of pipe SWMF may refer to a dry pond, wet pond, wetland, or hybrid design type. Each SWMF type is described as follows:

**Dry Pond** – a SWMF consisting of an active storage component to provide extended detention and/or flood control, with no permanent pool.

**Wet Pond** – a SWMF consisting of a permanent pool providing water quality control, and an active storage component providing extended detention and/or flood control. Wet ponds have a greater percentage of the volume in deep water zones. Aquatic plants are provided in the shallow zones, sometimes benched, around the perimeter of the permanent pool, and typically constituting 20 % of the area (ref. MECP 2003).

**Wetland** – a SWMF consisting of a permanent pool providing water quality control, and an active storage component providing extended detention and/or flood control. Wetlands have a greater percentage of the total volume, and aquatic plantings, in shallow zones, typically 70 % of the area (ref. MECP 2003).

**Hybrid** – a hybrid wet pond-wetland system combines the two types in series, with a minimum of 50 % of the volume being provided in deep water areas (ref. MECP 2003).

End of pipe SWMFs are typically only applicable for drainage areas of 5 ha or greater in order to support a permanent pool component.

Where a SWMF is required and proposed by the proponent, it shall be designed in accordance with the design guidelines of the local area municipality, and the MECP 2003 Stormwater Management Planning and Design Manual, or any subsequent updated versions.

Siting of SWMFs shall be established in consultation with local municipalities, account for other Agency requirements, and be justified to the satisfaction of the local municipality. Siting shall be based on site specific conditions and an appropriate analysis of environmental, technical (safety, maintenance and operations), economic and social considerations.

Consideration shall be explicitly given in the supporting design materials to long term operation and maintenance requirements for the proposed SWMF, with particular attention to the required frequency of inspection and monitoring, as well as the design of operation and maintenance amenities (such as sediment decanting zones, access roadways and safety considerations), and the expected frequency of sediment removal in the case of wet ponds, wetlands, and hybrid systems.

Landscaping plans shall be developed in accordance with the design guidelines of the local area municipality, as well as other Agency requirements. Landscaping plans shall be submitted to Local Municipality and/or Niagara Region for review.

In instances where wet ponds are designed with an enlarged permanent pool to provide water supply for local fire flow demands, consideration should be given to potential water quality issues resulting from stagnant water.

#### 4.3.1.9 Requirements Prior to Assumption

SWM Facilities (SWMF) to be assumed by Niagara Region and/or Local Municipality are to be designed and constructed to the satisfaction of Region and/or Municipality staff, and ownership shall be conveyed to the Region or Local Municipality free of charge and encumbrance. Private SWMFs will require a long-term agreement be put in place with the Region, prior to approval, with respect to inspections, operation, and maintenance, to ensure that the SWMFs continue to function and operate as originally designed and approved. All public SWMFs should include a designated access roadway to provide safe and direct access to public roadways.

Requirements for the developer prior to Region assumption of the SWMF include:

- Facility clean-out completed to design elevations and grades; a bathymetric survey registered to an approved benchmark shall be provided to confirm that the facility has been cleaned and graded to the required elevations (except for dry ponds, where there is no permanent pool component and hence no bathymetric survey is required). The bathymetric survey is to be combined with the topographic survey of the facility.
- The as-constructed drawing set is to be based on a current topographic survey, and is to confirm that key elevations of inlets, outlets, spillways and other features have been constructed to the design elevations.
- An engineering certification letter from the proponent confirming that all components of the SWMF have been inspected and are in good repair (i.e. in working condition) and constructed to design values. A summary table comparing design values to constructed values shall be provided, including an updated and confirmed stage-storage-discharge relationship for the SWMF. This is to also include a map (drainage plan) depicting the contributing drainage area. Any discrepancies shall be noted and assessed for significance.
- A detailed performance monitoring and evaluation program be conducted, and report submitted to the Region and/or Local Municipality, demonstrating that the facility is functioning as designed to the satisfaction of the Niagara Region and/or Local Municipality. Monitoring requirements to be scoped by location, during pre-consultation. Note that any Ministry of the Environment, Conservation and Parks monitoring conditions issued with an Environmental Compliance Approval are separate, and also required by the Region for review.
- A copy of the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA), as well as any other related permits or approvals.
- All plantings, landscaping features, and restoration works completed as per approved SWMF design.
- An Operation and Maintenance Manual.

All the preceding materials shall be signed and stamped by a qualified Professional Engineer licensed to practice in the Province of Ontario (P.Eng.), except landscaping plans which shall be signed and stamped by a qualified Landscape Architect licensed with the O.A.L.A. The preceding items may be required earlier in the process, potentially at the subdivision registration stage. The specific requirements should be discussed with the Niagara Region and/or Local Municipality.

### 4.3.2 Analytical Methodology

Hydrologic and hydraulic analyses are necessary in order to reasonably assess and design stormwater management infrastructure. This section is intended to outline the requirements and standards of Niagara Region in this regard. The selection of an appropriate analytical method depends on several different criteria:

- **The type of project** – greenfield development, urban development/re-development, stream rehabilitation/erosion works, SWM retrofit designs, road reconstructions and other types of projects will all have different objectives and modelling requirements.
- **The associated planning stage** – the level of detail required at the various planning stages would be different given the various spatial scales.
- **The complexity of the analysis** – design of storm sewer systems is typically undertaken using standardized desktop methods (e.g., Rational Method peak flow analysis for single design events, and Manning's Equation uniform flow hydraulics), whereas analysis of stream erosion or groundwater recharge conditions requires more complex techniques (e.g., continuous period hydrologic modelling, and three-dimensional groundwater system modelling).

This section is intended to provide guidance to practitioners on Niagara Region's recommended analytical methodologies, and the specific criteria and parameters associated with the application of specific methodologies. Notwithstanding, it should be acknowledged that analytical methods and modelling tools will continue to evolve over time. Therefore, discussions with Niagara Region and other review agencies (e.g. Local Area Municipalities, NPCA, and others) are recommended to confirm the appropriateness of applying alternative analytical methods or models, and to ensure compatibility with broader scale analyses and studies where relevant.

#### 4.3.2.1 Hydrology

Hydrology refers to the study of the movement of water. With respect to stormwater management, hydrology, and hydrologic engineering/modelling generally refers to the estimation of the response of various surface water drainage systems to varying rainfall and snowmelt inputs, with a typical focus on the generation of runoff. Numerous hydrologic modelling tools are available for this purpose. Acceptable methods within Niagara Region, and guidelines with respect to the application and limitation of each method are discussed further within this section.

##### 4.3.2.1.1 Rainfall Intensity-Duration-Frequency (IDF) Relationships

Niagara Region does not have unique in-house IDF curves. Practitioners designing Region owned infrastructure should use the IDF curves of the local area municipality in which the infrastructure will be located. This will ensure consistency with other

infrastructure implemented within the respective local area municipality, and compliance with downstream infrastructure.

In the instance where a development project crosses the boundary of two or more local area municipalities, proponents are required to apply the most conservative of the respective IDF curves when designing the storm drainage system.

Where local area municipality IDF curves do not exist, proponents are recommended to obtain IDF curve data from the current MTO online IDF curve lookup tool. The equation to be used to calculate average rainfall intensity for a given duration is as follows:

$$I = A / (t_d + B)^C$$

Where:

- I is rainfall intensity, defined in mm/hr
- $t_d$ is the time duration, defined in minutes

A, B, and C are empirical curve fitting parameters derived from the various return period storm event curves.

#### 4.3.2.1.2 Climate Change

Niagara Region acknowledges the potential impact that ongoing climate change is expected to have on rainfall patterns. With respect to surface water hydrology, climate change is expected to result in more intense and severe rainfall events, occurring on a more frequent basis. The findings of the TRCA report "Climate Projections for Niagara Region (February 2022)" support this assertion, as documented in Section 4.2.2.1,

Climate change science is however acknowledged to not have advanced sufficiently to provide a singular definitive recommendation with respect to the application of rainfall data adjustments. A range of potential future rainfall trends is possible, depending on numerous different factors. Notwithstanding, predictive tools are available which provide a range of potential future outcomes to practitioners. Currently, there are three (3) primary online tools available to obtain climate change influenced IDF data, which are as follows:

- **University of Western Ontario IDFCC Tool**

The University of Western Ontario has developed a "Computerized Tool for the Development of Intensity-Duration-Frequency Curves under a Changing Climate" (available at http://www.idf-cc-uwo.ca/). This web-based IDF tool integrates a user interface with a Geographic Information System (GIS). By creating or selecting a station the user is able to carry out statistical analysis on historical data, as well as generate and verify possible future change based on a methodology using a combination of global climate modelling outputs and locally observed weather data.

There are currently a total of twenty-four (24) different Global Circulation Models (GCM's) available in the tool. The RCP's (as defined in the Fifth Assessment Report (AR5, IPCC, 2013)), represent various future emission scenarios. Three (3) different RCP scenarios are available in the tool. RCP 2.6 represents a low greenhouse gas concentration scenario, followed by RCP 4.5 as an intermediate scenario and RCP 8.5 as a high concentration scenario.

- **Ontario Climate Change Data Portal (OCCDP) IDF Rainfall Tool**

The Ontario Climate Change Data Portal (Ontario CCDP - http://www.ontarioccdp.ca/) has incorporated the high-resolution (25 km x 25 km) climate projections developed by the Institute for Energy, Environment and Sustainable Communities (IEESC) at the University of Regina using the PRECIS model (under the A1B emissions scenario) and the RegCM model (under RCP 8.5 emissions scenario). Presently, projected IDF data are only available based on climate projections under the A1B emissions scenario. The A1B scenario aligns generally with the RCP 4.5 scenario.

- **MTO IDF Curve Lookup Tool**

The IDF Curve Lookup (http://www.mto.gov.on.ca/IDF_Curves) is a web-based application provided by the Ontario Ministry of Transportation (MTO) for the purpose of retrieving Intensity-Duration-Frequency (IDF) curves. The time trend analysis was completed using observations from 1960 to 2016. A linear trend was observed and extrapolated from this period to 2060. Significantly less sources were available for data after 2010, so 2010 is the reference year used in this tool. IDF curve projections are extrapolated from the 2010 base year.

Each tool allows users to obtain forecasted IDF information within the Province of Ontario. As evident, based upon the number of different climate models and emission scenarios, impacts are typically presented as a range, from low to high impacts.

- **Alternative Method**

Alternatively, infrastructure managers can apply a "stress test" scenario to their systems, whereby they increase the design rainfall by a percentage amount (typically 15% - 20%) and assess the impacts. Note that other agencies such as Metrolinx, increase the design peak flows by 25%, as opposed to the rainfall. Results of the stress test scenario can indicate where future problems are likely to occur should rainfall intensities increase. This information can then be used by infrastructure managers to determine if infrastructure should be upsized in advance.

Ultimately the owning municipality must determine an acceptable level of uncertainty and risk based on the range of potential impacts due to climate change. Where Niagara Region deems that an analysis of the hydrologic impacts of climate change is

warranted, the proponent shall consult with the Region and Local Municipality to determine the preferred methodology and approach prior to undertaking such analyses. The analysis results should be included in the stormwater management report.

#### 4.3.2.1.3 Rational Method

Niagara Region approves the use of the Rational Method for use in specific drainage system analyses. Where local area municipality guidance does not exist, return period storm event flows shall be established using the following equation:

**Q = K * C * I * A**

Where:

- Q = Return Period Storm Event Flow ($m^3/s$)
- K = Conversion Factor (0.00278)
- C = Runoff Coefficient
- I = Rainfall Intensity (mm/hr), to be calculated as per the approved IDF equation
- A = Contributing Drainage Area (hectare)

Proponents should recognize the limitations of the Rational Method (lumped/simplified nature of the approach, inability to account for time varying rainfall and associated flow response, etc.) and the availability of more modern and robust hydrologic modelling tools.

The Rational Method should be limited to the design of flow conveyance features, such as storm sewers and associated overland flow conveyance. Further, the application of the Rational Method is suggested to be limited to a maximum drainage area of 5 ha due to its production of conservatively higher estimated peak flows. Notwithstanding, conservatively estimated peak flows produces a built-in buffer for system design and resilience to other stressor such as climate change and land use intensification.

Storm sewers sized using the Rational Method shall be sized to accommodate the return period storm event specified by the local area municipality. Where local area municipality guidance does not exist, storm sewers shall be sized to accommodate the 5-year return period storm event. Storm sewer design sheets shall be used. Design calculations are required for stormwater systems, whether spreadsheets or model input and output. Practitioners sizing Region owned storm sewers shall use the currently approved Rational Method Runoff Coefficients presented in **Table 4.1**.

**Table 4.1. Runoff Coefficients**

| Area Type | Runoff Coefficient (C) |
|---|---|
| **Where Impervious/Pervious Areas are directly measured from a plan:** | |
| Impervious Areas (Asphalt, Concrete, Rooftop, and Water Surfaces) | 0.95 |
| Gravel Surfaces | 0.80 |
| Permeable Pavement | 0.30 - 0.80[1] |
| Pervious Areas (Grass, Meadow, Forest) | 0.25 |
| **For Use in Design Without Detailed Site Plans/Plot Plans:** | |
| Parks | 0.35 |
| Commercial | 0.90 |
| Industrial | 0.90 |
| Institutional (Schools and Churches) | 0.75 |
| Greenfield Residential: | |
| Single Family (under 30 ft width) | 0.65 |
| Single Family (between 30 and 50 ft width) | 0.60 |
| Single Family (greater than 50 ft width) | Consult Region staff |
| Semi-Detached | 0.70 |
| Row Housing, Town Houses | 0.75 |
| Apartments | 0.85 |

1. Varies depending on product and type of application; to be reviewed and confirmed with Niagara Region.

Where impervious and pervious areas are directly measured, the proponent must also account for proposed hard surface amenity areas if not indicated on the drawing (i.e. areas beyond the rooftop, such as driveways, walkways, patios, etc.). For detached and semi-detached residential properties (including row houses and townhouses), if no additional information is available, amenity areas shall be calculated as 90% of the rooftop area (including the driveway). The revised combined Runoff Coefficient should however not exceed 0.9. Proponents should also consider accounting for hardened amenity areas that could be implemented by homeowners (i.e. pools, hardscaping, etc.).

These Runoff Coefficient values apply for storms up to and including the 10-year event. For storms greater than this return period, an adjustment factor shall be applied to account for expected soil saturation. Runoff Coefficients shall be multiplied by factors of 1.1, 1.2 and 1.25 for the 25, 50- and 100-year return periods respectively, to a maximum runoff coefficient of 1.0.

At the detailed design stage, storm sewer sizing and stormwater management calculations should not be completed using generic runoff coefficients. Rather, weighted runoff coefficients must be calculated based on the proposed pervious and impervious surfaces. Supporting calculations demonstrating the calculated imperviousness ratio must be provided for all developments. Impervious areas should include all proposed impervious surfaces (e.g. rooftops, driveways, walkways, etc.), and an allowance for potential future impervious surfaces that could be implemented in the future (e.g. hard-surfaced patios), all to the satisfaction of the Region.

The proponent shall provide calculations to demonstrate the expected time of concentration ($t_c$ or $t_d$) applied for the Rational Method and associated calculation of peak rainfall intensity. A minimum time of concentration of 10 minutes should be applied. The actual expected time of concentration is however to be calculated based on contributing drainage area to the point of interest. An appropriate empirical equation shall be applied, or the value shall be calculated based on the length of storm sewer to the point of interest and an assumed average velocity of 2 m/s, plus an additional inlet time of 10 minutes. Alternate methods for estimating the velocity, applying the actual topography or average road slope are acceptable, and recommended instead of using of the conservative assumed 2.0 m/s, when data are available.

#### 4.3.2.1.4 Modified Rational Method

Niagara Region approves the use of the Modified Rational Method to size volumetric controls for sites up to 1 hectare in drainage area. For larger areas, hydrologic models are required to account for timing effects. An example spreadsheet of the Modified Rational Method calculations is provided in Appendix E. Practitioners sizing Region owned volumetric controls shall use the currently approved Rational Method Runoff Coefficients presented in Table 4.1, as well as the guidance provided on calculating runoff coefficients under the section on Rational Method.

#### 4.3.2.1.5 Event-Based Modelling

Event-based (single storm – typically synthetic design storm) hydrologic modelling is applicable for a range of different drainage area scales. Event-based hydrologic models are considered more robust than the Rational Method (particularly in assessing temporal variability of hydrographs and associated volumetric storage requirements), however there are limitations in the accuracy of event-based models due to the synthetic nature of design storms and single event modelling basis.

The Region's approved imperviousness values are presented in **Table 4.2** (generally consistent with Rational Method Coefficients as per **Table 4.1**). Imperviousness values for sites should be directly measured wherever possible to most accurately estimate coverages.

**Table 4.2. Imperviousness Values**

| Area Type | Imperviousness (%) |
|---|---|
| **Where Impervious/Pervious Areas are directly measured from a plan:** | |
| Impervious Areas (Asphalt, Concrete, Rooftop, and Water Surfaces) | 100 |
| Gravel Surfaces | 80 |
| Permeable Pavement | 5 - 80[1] |
| Pervious Areas (Grass, Meadow, Forest) | 0 |
| **For Use in Design Without Detailed Site Plans/Plot Plans:** | |
| Parks | 15 |
| Commercial | 95 |
| Industrial | 95 |
| Institutional (Schools and Churches) | 70 |
| Greenfield Residential: | |
| Single Family (under 30 ft width) | 55 |
| Single Family (between 30 and 50 ft width) | 50 |
| Single Family (greater than 50 ft width) | Consult Region Staff |
| Semi-Detached | 65 |
| Row Housing, Town Houses | 70 |
| Apartments | 85 |

1. Varies depending on product and type of application; to be reviewed and confirmed with Niagara Region.

Where impervious and pervious areas are directly measured, the proponent must also account for proposed hardened amenity areas if not indicated on the drawing (i.e. areas beyond the rooftop – driveway, walkways, patios, etc.). For detached residential properties, if no additional information is available, hardened amenity areas shall be calculated as 90% of the rooftop area (including the driveway). The revised combined imperviousness should however not exceed 90%. Infiltration modelling should consider the local surficial soils (based on available on-site geotechnical and/or hydrogeological data) and select appropriate parameters which represent these conditions.

Where available, proponents should select rainfall (design storm) distributions for event-based hydrologic modelling to be compatible and consistent with those which were applied in a SWS, MDP or MESP study encompassing their development site. Where such studies do not exist, proponents must complete a sensitivity analysis to determine the most appropriate rainfall distribution. Acceptable distributions for Niagara Region include:

- Chicago Design Storm (3, 6, 12, and 24 hour durations)
- SCS Type II Design Storm (6, 12, and 24 hour durations)

The same rainfall distribution should be used for both pre- and post-construction conditions.

In all cases, the above-noted rainfall distributions should apply the local area municipality's rainfall IDF parameters, where available. Where local area municipality rainfall IDF parameters do not exist, proponents may obtain IDF curve data from the online MTO IDF curve lookup tool.

For the simulation of erosion control, where there is an absence of a higher level study, a 4-hour Chicago Design storm distribution, with a total rainfall of 25 mm is to be applied.

Where an event-based model has been applied to calculate volumetric storage requirements, a 24-hour duration storm event shall be included as part of the verification process.

#### 4.3.2.1.6 Continuous Simulation Modelling

Continuous simulation is preferred particularly for broader based system analyses, due to its use of actual observed rainfall data. Continuous modelling applies a long-term time series of historical meteorological data instead of a single synthetic design storm. Continuous models are typically more complex than event-based models, as they generally consider more processes of the hydrologic cycle including soil water movement (infiltration), snowpack accumulation and melt, evapotranspiration, groundwater recharge and groundwater discharge to local watercourses.

Continuous simulation modelling also provides useful data with respect to the planning and design of SWM for water balance/budget, erosion (through the use of critical duration analysis), drawdown time for storage facilities (including LID BMPs) and the impact of "back to back" storms, baseflow information, and other useful information. Notwithstanding, continuous simulation modelling requires much more data and effort to apply. Continuous simulation modelling is considered more suitable for larger scale watershed and subwatershed assessments and more natural, rural systems than locally-based site assessments unless sensitive features are involved.

Proponents are required to use continuous simulation modelling for SWSs. The Niagara Region and/or Local Municipality may, with input from NPCA as required, also require proponents to use continuous simulation modelling for MDPs and MESPs. It is expected that such requirements will be determined as part of the establishment of Terms of Reference at the outset of the subject study.

Continuous simulation modelling should apply an available long-term precipitation dataset from rain gauge stations local to the study area. The selected dataset should have a minimum of twenty (20) years of historical data.

#### 4.3.2.1.7 Approved Hydrologic Models

Hydrologic models which are currently accepted by Niagara Region for event-based and/or continuous simulation modelling are listed in **Table 4.3**.

**Table 4.3. Currently Approved Hydrologic Models**

| Model | Application(s) |
|---|---|
| SWMHYMO | Single Event |
| VISUAL OTTHYMO | Single Event |
| MIKE | Single Event or Continuous |
| INFOWORKS | Single Event or Continuous |
| GAWSER[1] | Single Event or Continuous |
| HSP-F | Single Event or Continuous |
| HEC-HMS | Single Event or Continuous |
| EPA-SWMM | Single Event or Continuous |
| PCSWMM | Single Event or Continuous |
| XP-SWMM | Single Event |
| MIDUSS[1] | Single Event |

1. Generally discouraged for new assessments given the model vintage and limited supportability.

Where defined, hydrologic analyses should apply the currently approved hydrologic model for the study area, as developed from higher level or parent studies. The models should be refined as required to reflect the study area. Where no higher-level hydrologic model is defined or available, proponents should determine the most appropriate modelling platform based on the list of currently approved hydrologic models in discussion with Niagara Region and other review agencies (such as local area municipalities and NPCA), in order to confirm the most appropriate model.

Notwithstanding the preceding, should proponents propose the use of an alternative hydrologic model (not listed in Table 4.3), Niagara Region may consider the request, subject to the provision of a suitable technical justification and documentation of the proposed alternative modelling platform.

#### 4.3.2.1.8 Hydrologic Modelling Standards

Sound modelling standards of practice should be followed in developing hydrologic models. The following standards of practice are recommended by Niagara Region for use in municipal studies:

1. All assumptions should be provided with rationale for their selection;
2. Provide the purpose for developing the hydrologic model, such as determining flow rates, runoff volumes, flow routing effects for proposed development, and existing land use conditions;
3. Provide the study objectives and how they relate to the hydrologic modelling;
4. Provide the model selection criteria and how the model fulfills the criteria;
5. Provide drainage area plans outlining both internal and external catchments, modelling schematics, and tables providing drainage area parameters;
6. Background information on the selection of the drainage area parameters should be provided to assist the reviewer in understanding the assumptions leading to the drainage area parameters;
7. Background data on overland (major) and minor storm systems should be provided with plans clearly presenting and labeling both systems;
8. Data should be provided on routing through natural and man-made storage systems, with detailed plans and calculations outlining how the stage/discharge relationship has been developed;
9. For complex models (i.e. models with several subcatchment parameters, integrated models, complex routing routines) and major studies, a sensitivity analysis should be conducted on key parameters;
10. For complex models and major studies, verification or validation of results should be provided through various methods such as calibration to recorded stream flows, observed water levels, unit flow rates and runoff volume comparison using a technique such as the MTO index method or equivalent. The application of the validation technique (number and type) will depend on the availability of data and the sensitivity of the analysis;
11. All input and output details should be provided in a logical manner, with an explanation for potential errors;
12. A schematic flow diagram of the model must be included. The schematic and information must be consistent with other minor and major system diagrams/drawings provided in the documentation.
13. A digital copy of all models should be provided, with model version clearly identified.

Low Impact Development Best Management Practices (LID BMPs) require special consideration in the selection of analytical methods. In early planning stages, the criteria for these measures (e.g., infiltration, erosion, etc.) should be determined, including the

most appropriate hydrologic modelling methodology, considering assessment of the performance of the facilities (such as inter-event drawdown time), as well as the ultimate drainage system receivers (e.g. water balance/budget, erosion impacts, etc.).

#### 4.3.2.2 Hydraulics

##### 4.3.2.2.1 Manning's Equation

The Manning's Equation may be used in conjunction with the Rational Method to determine design capacity for simplified conveyance systems, such as storm sewers and open channels, within the limitations of the Rational Method noted in Section 4.3.2.1.3 (5.0 hectares drainage area or less). Niagara Region's approved Manning's Roughness Coefficients are provided in **Table 4.4**.

**Table 4.4. Roughness Coefficients**

| Material/surface Type | Manning's 'n' |
|---|---|
| Concrete Pipe | 0.013 |
| Corrugated Metal Pipe | 0.024 |
| PVC Pipe | 0.013 |
| Roads and Gutters (concrete or asphalt) | 0.013 |
| Concrete Channel | 0.013 |
| Rip Rap and River Stone | 0.035 – 0.045 |
| Maintained Channels | 0.03 – 0.08 |
| Unmaintained Channels | 0.05 – 0.14 |
| Naturalized Overbank Areas | 0.08 |

Design capacity requirements for various conveyance systems are outlined in Section 4.3.3.2.

##### 4.3.2.2.2 1-Dimensional Hydraulic Modelling - General

For larger, or more complex hydraulic conveyance elements, 1-dimensional (1D) hydraulic modelling should be applied. 1D hydraulic modelling presumes that flow is conveyed in the same direction as the defined hydraulic element (open channel or closed conduit). Where the flow route is ill-defined and flows spill outside of the primary channel, then 2-dimensional (2D) hydraulic modelling is considered to be more appropriate.

Specific guidance and standards for the design of 1D hydraulic elements using hydraulic models is provided in Section 4.3.2.2.6.

Numerous 1D hydraulic models are available (refer to Section 4.3.2.2.5 for approved hydraulic models); the selection of an appropriate model will depend on the type of

system being analyzed and purpose of the analysis. Where 1D models are applied, roughness coefficients and other parameters, shall be selected based upon the guidance provided in the User's Manual for the corresponding design conditions. Further guidance may also be found in the MTO Drainage Manual (MTO, 1997), the Highway Drainage Design Standards (MTO, January 2008), and the HEC-RAS Hydraulic Reference Manual (USACE, January 2010).

#### 4.3.2.2.3 1-Dimensional Hydraulic Modelling – Dual Drainage Modelling

For the assessment of urban drainage systems (sewers, roadways, etcetera), Niagara Region supports the application of dual drainage models. Dual drainage models typically include separate 1D representations of both the minor system (storm sewer) and major system (roadway/overland flow route), although combined 1D-2D dual drainage models are also possible. Dual drainage models provide greater insight into urban drainage system performance, by modelling the linkage and interaction between the minor and major drainage systems. An accurate representation of inlet capacity is a key consideration in estimating overland flow depths, including the differences in inlet capacity of at-grade and sag point catchbasins.

Dual drainage models are useful in estimating the hydraulic grade line (HGL) for storm sewers. Proponents may be required to undertake dual drainage modelling in areas where foundation drains are known to be connected to the storm sewer system, in order to ensure no negative impacts to adjacent areas. A simplified approach (such as an HGL spreadsheet/manual backwater calculation) may be acceptable in smaller areas (up to 2 lots), at the discretion of Niagara Region and/or Local Municipality.

#### 4.3.2.2.4 2-Dimensional Hydraulic Modelling

Niagara Region supports the use of 2-dimensional (2D) hydraulic modelling for the assessment of spills and surface flooding impacts in both riverine and urban drainage systems. 2D modelling should be considered in areas where overland flow routes are poorly defined or restricted or the minor drainage system has known capacity constraints, particularly older development areas which predate requirements for overland flow route designs. The necessity and requirements (Terms of Reference) for 2D hydraulic modelling should be discussed with Niagara Region and local area municipalities, and in riverine settings with NPCA.

#### 4.3.2.2.5 Approved Hydraulic Models

Hydraulic models which are currently accepted by the Niagara Region for different hydraulic applications are listed in **Table 4.5** .

**Table 4.5. Currently Approved Hydraulic Models**

| Model | Application(s) |
|---|---|
| CULVERT MASTER | Culvert Structures |
| FLOWMASTER | Open Channel, Culvert, Pipe |
| HEC-RAS | Open Channel, Culvert / Bridge Structures / 2D |
| MIKE | Open Channel, Culvert, and Urban Storm Drainage System Analysis |
| INFOWORKS | Open Channel, Culvert, and Urban Storm Drainage System Analysis |
| EPA-SWMM | Open Channel, Culvert, and Urban Storm Drainage System Analysis |
| PCSWMM | Open Channel, Culvert, and Urban Storm Drainage System Analysis / 2D |
| XP-SWMM | Urban Storm Drainage System Analysis / 2D |

Where feasible and appropriate, the hydraulic modelling analyses should apply the currently approved hydraulic model, as developed from higher level studies. The models should be refined as required to reflect the study area. Where no higher-level hydraulic model is defined or available, proponents should determine the most appropriate modelling platform based on the list of currently approved hydraulic models and discussion with Niagara Region and other review agencies (such as local area municipalities and NPCA).

Notwithstanding the preceding, should proponents propose the use of an alternative hydraulic model not listed in **Table 4.5**, Niagara Region may consider the request, subject to the provision of a suitable technical justification and documentation of the proposed alternative modelling platform. Note that should the local municipality be involved for review and approval, as a function of the development scenario and roles and responsibilities outlined in Chapter 3, the local municipality, as the ultimate authority would also need to approve the model.

#### 4.3.2.2.6 Hydraulic Modelling Standards

Sound hydraulic modelling standards of practice should be followed in developing a hydraulic model. The following standards of practice are recommended for Niagara Region:

1. All assumptions should be provided with rationale for their selection;
2. Provide the purpose for developing the hydraulic model;
3. Provide the study objectives and how they relate to the hydraulic modelling;
4. Provide the model selection criteria and how the model meets the criteria. This should also include a summary of any and all model limitations;
5. Provide plans clearly presenting the closed and/or open hydraulic system;
6. For open systems – clearly present the cross sections, study limits, land use, crossing details, spill areas, ineffective flow areas, and flooding limits and elevations for the appropriate design event(s). Preparation of the model should be such that it fully contains the modelled flows without exceeding the hydraulic cross-section. Should it not be possible to contain the flows within the defined geometry of the open storm system, the proponent should provide details on the spill characteristics. In the event of a spill, rationale should be provided on whether or not to include a flow loss in the calculation (flow losses are typically not supported for flood hazard mapping preparation);
7. For closed systems (i.e., storm sewers) - clearly present the storm sewer network details including manhole numbers, pipe size, length, study limits, land use, slope, and sewer and ground elevations;
8. For combined hydrologic/hydraulic models - provide plans that not only describe the closed system but also the contributing drainage areas and overland flow system;
9. For all hydraulic models - provide the downstream and, if applicable, the upstream boundary conditions for each storm modelled and the assumptions used to define the boundary conditions. Document the parameters established for hydraulic losses, such as Manning's 'n', inlet and outlet losses and other appropriate losses;
10. Summarize the selection of procedures for determining the computed hydraulic energy grade line and water surface elevations;
11. Document the hydraulic results in summary form for the relevant storm events;
12. Document potential impacts on existing infrastructure and possible mitigation measures;
13. For complex models and major studies, a sensitivity analysis should be conducted on key parameters;
14. If possible, verify hydraulic results for an existing closed/open storm system by documenting historical flood elevations for specific storm events and comparing

the hydraulic modelling results to the historic data; calibration of losses should be included, if sufficient data exist;

15. Provide the input and output data in a logical manner with an explanation of the potential errors;
16. A schematic flow diagram of the model must be included. The schematic and information must be consistent with other minor and major system diagrams/drawings provided in the report.
17. A digital copy of all models should be provided, with model version clearly identified.

### 4.3.3 Conveyance Systems

#### 4.3.3.1 Storm Sewers

##### 4.3.3.1.1 Design Principles

Storm sewers shall be designed to convey the return period storm event specified by the local area municipality. In the instance where a development project crosses the boundary of two or more local area municipalities, proponents are required to apply the most conservative of the respective IDF curves when designing the storm drainage system. In the instance where proposed storm sewers are being connected to existing storm sewers, practitioners shall be aware of the available conveyance capacity of the receiving existing storm sewer.

Where Local Municipal guidance does not exist, storm sewers shall be sized to accommodate the 5-year return period storm event. Storm sewers shall be sized using approved analytical methods, as per Section 4.3.2, and stormwater management guidance as per Section 4.3.1. Inlet control devices (ICDs) may be required to limit storm sewer inflows, in conjunction with the required assessment of the capacity of the major overland flow system, as per Section 4.3.3.2.

Region owned storm sewer systems shall be designed to limit surcharging during the 100-year storm event to below ground surface. Note that pressure flow should still be considered when determining the full capacity of the minor system. An exception may be granted for rear-yard catchbasins, provided that a Hydraulic Grade Line (HGL) analysis is completed (as per Section 4.3.2.2.3) and it demonstrates no adverse effects to adjacent properties.

For a scenario where a Municipal-owned storm sewer is within a Region-owned road, the Municipal sewer design will follow Municipal criteria, however overland flow needs to be reviewed by the Region.

Foundation drains cannot be directly connected to Region owned storm sewer systems. Foundation drainage shall be discharged at surface grade via the use of sump pumps and concrete splash pads.

The minimum mean flow velocity within a storm sewer flowing full shall be 0.75 m/s (MECP 2022) to ensure that the sewers are self cleaning, and the maximum velocity shall be 6.0 m/s to ensure that scouring of the pipe does not occur (ref. 2008 MECP guidelines for sewer design). The pipe slope shall be selected to accommodate design requirements. Niagara Region generally discourages pipe slopes less than 0.5%, unless it can be demonstrated that a slope of 0.5% or greater cannot practically be achieved. Niagara Region considers an absolute minimum pipe slope of 0.25%. The Region may consider an alternative design with, for example, a submerged outlet, if grading at 0.25% is shown to be infeasible.

#### 4.3.3.1.2 Size and Material

The minimum diameter of a storm sewer shall be 250 mm. Where changes in pipe size are required to accommodate design flows, obverts of the upstream and downstream storm sewer pipes shall match. Decreases in pipe size from upstream to downstream are not permitted, except under circumstances where approved SWM controls permit. Proponents will be required to demonstrate that a decrease in pipe size is acceptable in such cases, to the satisfaction of Niagara Region, with detailed hydraulic calculations.

For storm sewer sizes 450 mm in diameter or greater, pipes shall be concrete. Niagara Region may, in its sole discretion, consider the application of alternative pipe materials (such as HDPE or large diameter PVC) on a case by case basis.

For storm sewers less than 675 mm in diameter, the recommended maximum permissible change in direction through a single maintenance hole is 90 degrees. For storm sewers 675 mm diameter or greater, the recommended maximum permissible change in direction through a single maintenance hole is 45 degrees. Additional maintenance holes will be required to reduce the pipe angles where the overall direction changes by more than 45 degrees. Note: the criteria are for design of Regional infrastructure, and local infrastructure is to follow the local municipal guidelines.

Bedding and cover materials shall comply with OPSS 1010.05.03.

#### 4.3.3.1.3 Depth and Location

The depth of cover for storm sewers is dependent on the storm sewer outlet elevation. Unless otherwise specified in an approved SWM Report or Functional Servicing Report (FSR), the minimum depth of cover shall be 1.2 m. Reduced depth of cover may be allowed where no other option exists, provided this is demonstrated in a SWM report or FSR.

In areas where it can be demonstrated that greater depths cannot be reasonably achieved, a minimum permissible depth of cover for storm sewers is 1.2 m in order to account for loading and frost protection. In all cases, depth of cover is to be measured from the top of the pipe (outside of pipe) to the ground surface. Maximum depth of cover shall be in accordance with OPSD 806.060, 807.010 and 807.030.

Storm sewers shall be aligned in a straight direction between manholes. Niagara Region may, accept radius pipe in special circumstances if the proponent can reasonably demonstrate that it is required.

The minimum horizontal and vertical separation between storm sewers and other underground services/utilities is 0.5 m measured from the outside of the storm sewer pipe to the outside the conduit of the respective service/utility.

#### 4.3.3.1.4 Maintenance Holes

Maintenance holes shall be constructed along the storm sewer system at the downstream and upstream ends, as well as at a maximum spacing as per **Table 4.6**.

**Table 4.6. Maximum Maintenance Hole Spacing**

| Sewer Diameter | Distance |
|---|---|
| Up to 600 mm | 100 m |
| Greater than 600 mm | 150 m |

Maintenance holes are to be constructed to facilitate changes in sewer direction, sewer elevation, pipe size, and sewer grade. Sizes shall be selected to accommodate the storm sewer pipe size(s). Maintenance holes may be pre-cast or cast-in place and shall correspond with applicable OPSD details.

Maintenance holes exceeding 5.0 m in depth shall include safety platforms in accordance with OPSD 404.020 or 404.022.

Maintenance hole frames and grates shall correspond with OPSD 401.010. Where Type B (Open Cover) is proposed, the proponent must account for the additional inlet capacity as part of the assessment of the minor and major systems.

Maintenance hole adjustment units shall correspond with OPSD 704.010.

Maintenance hole benching shall correspond with OPSD 701.021. Benching details for non-standard maintenance holes shall be provided on Engineering Drawings.

Calculations of energy losses resulting from drops across maintenance holes shall be provided with storm sewer design calculations. Sufficient drops shall be provided across maintenance holes to offset the energy losses, to the extent possible. Drops across maintenance holes shall be measured from the invert of the upstream pipe to the invert of the downstream pipe. If energy losses are not calculated, the allowance for hydraulic

losses shall be based on the best design practices of the industry and subject to the approval of Niagara Region. For drops of 1.2 m or greater, drop structures shall be provided in accordance with OPSD 1003.020.

#### 4.3.3.1.5 Inlets and Catchbasins

Catchbasins shall be constructed along the storm sewer system to capture surface drainage. Catchbasins shall be provided within roadways having urban cross-sections, located at the curb and gutter. The minimum spacing of catchbasins shall be confirmed by the designer as required to capture the design flow. The maximum catchbasin spacing shall be as per Table 4.7.

**Table 4.7. Maximum Catchbasin Spacing**

| Road Grade | Distance - Two Lane | Distance - Four Lane |
|---|---|---|
| 0.5% to 3% | 100 m | 70 m |
| 3% to 5% | 70 m | 40 m |

Catchbasins should not be located within 1.0 m of intersections, pedestrian crossings, and driveways/entrances. Double catchbasins are required at all low (sag) points within urban cross-sections. All catchbasins should incorporate a minimum 0.6 m sump. Goss traps or inserts may be required to be incorporated into the catchbasin design, at the discretion of Niagara Region and/or Local Municipality.

Catchbasin shall be precast with sumps and correspond with OPSD 705.010 (single) and 705.020 (double). Catchbasin adjustment units shall correspond with OPSD 704.010. Catchbasin frames and grates shall correspond with OPSD 400.090 (herring bone style). For landscaped areas, a “beehive” type frame and cover shall be used.

Side inlet catchbasins on roadways may be considered for construction by Niagara Region, subject to suitable justification.

Ditch inlets shall be implemented along the storm sewer system to capture surface drainage within ditches. Ditch inlets shall be provided within roadways having rural and semi-urban cross-sections, located at the downstream end of a given ditch, and elsewhere as required. Ditch inlets shall correspond with OPSD 705.030 and 705.040. Ditch inlet frames and grates shall correspond with OPSD 403.010. Ditch inlet adjustment units shall correspond with OPSD 704.010.

Catchbasin and ditch inlet leads shall be designed based on expected flow rates (typically the same storm event used to size the storm sewer). The minimum size and slope of catchbasin and ditch inlet leads shall be as follows (Note: exceptions would be granted if the minimum slope can be shown to not be achievable for the connections):

**Table 4.8. Catchbasin Lead Sizes and Slopes**

| Catchbasin Type | Minimum Lead Diameter | Minimum Slope |
|---|---|---|
| Single | 250 mm | 1.0% |
| Twin-Inlet | 300 mm | 1.0% |
| Rear-Yard | 250 mm | 0.5% |
| Ditch-Inlet | 375 mm | 1.0% |

In order to reduce surcharging of the storm sewers or to control sewer flows for Stormwater Management (SWM) purposes, inlet control devices (ICD) may be installed in catchbasins (CB), building drain pipes, storm sewers or SWMF outlets. Niagara Region approves the use of orifice pipes for this purpose to eliminate the possibility of the ICD being physically removed. Where the diameter of the orifice pipe is determined to be too small (less than the MECP recommended minimum of 75 mm diameter, SWM Manual 2003) and could result in debris blockage, other devices may be considered at the discretion of the Region and/or Local Municipality. ICDs should incorporate a “sump draw” or “bottom draw” design (inlet below water level) to prevent debris blockage and promote retention of floatables and oils. If an ICD is used, the preference is that the outlet from the CB/inlet to the ICD be located at an elevation within the sump, so the water from the CB shall be drawn from a point within the sump, as opposed to from the upper portion of the CB. This is recommended such that under storm conditions the floating debris will be less likely to block the ICD (also referred to as a “bottom-draw” system).

For the purposes of calculating required surface inlet capacity, all surface inlets located at depressions and sag points shall be assessed assuming 50% blocked conditions.

#### 4.3.3.1.6 Storm Sewer Outfalls

Storm sewer outfalls are locations where storm sewers discharge to open watercourses or waterbodies. When designing a storm sewer outfall, it is important to consider the potential for erosion due to the concentrated discharge and the flow characteristics of an urbanized system (steeper slopes, smooth surfaces, rapidly peaked flows/velocities, etc.).

Storm sewer outfalls (including SWM outlets) should be designed to mitigate impacts accordingly. Practitioners should confirm the expected velocity of flows at outfalls and ensure appropriate mitigation measures to slow (disperse) the velocity to avoid negative impacts to the receiving channel. This could include chute blocks, aggregate or vegetative protection, etc. in the vicinity of the outfall but outside of the normal high-water level of the channel or waterbody. The alignment of proposed outfalls should also consider the primary direction of flows and attempt to match the direction of flow accordingly to the extent possible. The erodibility of the existing watercourse or

waterbody should be considered accordingly, including input from a qualified fluvial geomorphologist where warranted.

#### 4.3.3.1.7 Requirements Prior to Assumption

Prior to transferring ownership of storm sewers to Niagara Region and/or Local Municipality, the requirements for assumption shall be addressed in accordance with Niagara Region and/or Local Municipality assumption requirements. Elements to be addressed in assumption requirements include:

1. CCTV Inspection (a full CCTV inspection is to be provided to Niagara Region or Local Municipality to confirm that no defects exist).
2. Mandrel testing/pipe deflection (a mandrel shall be pulled for all flexible (PVC and HDPE) piping as per OPSS 410; deflections shall not exceed a maximum of 5% of the pipe diameter).
3. As-built drawings signed and stamped by a qualified Professional Civil Engineer licenced in the Province of Ontario (P.Eng.).

Following receipt of the above-noted information, the storm sewer infrastructure is placed on a one (1) year maintenance period. Following the one (1) year maintenance period, a second round of CCTV inspection and mandrel testing is required. Following Region acceptance of these works, the storm sewer infrastructure shall be removed from the maintenance period, and appropriate securities released to the owner. If the preceding are not acceptable, the owner is responsible to correct any identified defects at their sole expense.

### 4.3.3.2 Major Systems

#### 4.3.3.2.1 Roadway Conveyance

Roadways shall be designed to accommodate the major system flow. Major system flow shall be determined in accordance with the local area municipality guidance. Where local area municipality guidance does not exist, major system flow shall be taken as the difference between the storm sewer capacity and the 100-year storm event. Roadway conveyance capacity shall be determined using the approved methods presented in Section 4.2.2.3. Analyses must consider both the minor and major system, and the interaction between the two (e.g. factors such as inlet capacity, and pressure flow).

Depth of flooding within roadways shall be limited in order to provide public safety and protect adjacent properties. Depth of flooding within Niagara Region roadways shall be as follows with respect to urban (pluvial) flooding conditions:

**Table 4.9. Maximum Depth of Flooding for Roadways**

| Road Classification | Maximum Depth of Flooding |
|---|---|
| Urban Arterial, Emergency Routes | One lane open in either direction (0 mm at crown) |
| Rural Arterial, Collector | One lane open (0 mm at crown) |
| Local | 150 mm above crown and<br>300 mm at the edge of pavement |

Depth of flooding within roadways shall also be limited to the of the right-of-way limits so as not to impact adjacent properties. Roadways shall be positively graded to continuously convey overland flow to suitable outlets or other overland flow routes.

The requirements outlined herein shall apply both to roadways with urban servicing (curb and gutter) and rural servicing (ditches).

Flooding depths on roadways due to riverine (fluvial) conditions for the Regulatory Event (100 year) should also be determined based on providing access and egress in accordance with the Ontario Ministry of Natural Resources River and Stream Systems: Flooding Hazard Limit Technical Guidelines (2002 or latest revision).

#### 4.3.3.2.2 Overland Flow Routes

Overland flow routes are commonly used to provide a linkage of overland flow conveyance between roadways and SWM facilities, channels/watercourses, or other suitable storm drainage outlets. Overland flow routes shall be appropriately sized to convey the peak flows which they capture and intercept, up to and including the 100-year storm event (and the Regional Storm, in those locations where the Regulatory Storm may exceed the 100-year storm event). Depth of flooding within overland flow routes shall be limited to 300 mm to protect public safety. The need for erosion protection of overland flow routes shall also be incorporated in the design.

### 4.3.3.3 Watercourses and Watercourse Crossings

Proposed works in the vicinity of watercourses, wetlands, valleys, and shorelines may lie within areas regulated by NPCA. The proponent is required to assess approval requirements based on consultation with NPCA, which will use their current regulation mapping. Additional requirements may also apply from other agencies, including, but not limited to the Ministry of the Environment, Conservation and Parks (MECP), the Ministry of Natural Resources and Forestry (MNRF), the Department of Fisheries and Oceans (DFO), the Niagara Escarpment Commission (NEC), and the Ontario Ministry of Tourism, Culture and Recreation where heritage features may be present.

Roadway crossings shall be sized in accordance with MTO Directive B-100, at a minimum. Consideration for Regulatory event (100 year storm or Regional Storm - Hurricane Hazel in some locations) conveyance shall be given, and if feasible, shall be the target for the design conveyance capacity. Freeboard and clearance measurements for crossings shall meet the requirements of the MTO Highway Drainage Design Standards (MTO, 2008). These policies shall also be applied for railway crossings. Refer to the following MTO website for details:

http://www.mto.gov.on.ca/english/publications/drainage/hydrology/section11.shtml
The MTO notes that “Highway drainage system design criteria are outlined in PHY Directive B100, or the "Drainage Management Manual" (MTO 1997). Refer to these documents for complete details.

Corrugated steel pipe (CSP) is not acceptable to the Niagara Region for culverts less than 1200 mm in diameter (including roadway and driveway crossings), unless suitable additional measures are implemented to prevent crushing, including (but not limited to) headwall/endwall treatment. Additional measures may also be required to prevent corrosion, including aluminized steel or polymer-laminate coatings. Acceptable alternative pipe materials include concrete and HDPE.

For larger watercourse systems (contributing drainage areas generally > 50 ha), Niagara Region supports the use of naturalized substrate within bridges/culverts to support aquatic habitat. Open bottom structures with natural substrate should be implemented where feasible. Pre-cast and manufactured culvert units with bottom members should be embedded, and end baffles should be constructed to contain substrate material without impeding fish passage. Substrate material should be sized based on conveyance and erosion requirements. In all cases, the hydraulic design of the culvert opening should consider the presence of the proposed substrate.

Where channel reconstruction is identified, channel works must consider erosion requirements to ensure the long-term stability of the channel. Velocity and shear stress calculations should be undertaken to determine suitable materials for channel bed and banks to minimize future erosion, while also considering requirements for natural channel design and associated ecological function and aesthetics. Discussion with the Niagara Region, Local Municipalities and NPCA is recommended in such cases to determine the most appropriate measures.

### 4.3.4 Erosion & Sediment Control (ESC)

#### 4.3.4.1 General

ESC Plans shall be prepared to show a plan view of the construction site and/or construction phase. Plans must be drawn at a minimum scale of 1:500. Lines and symbols shall be used to represent ESC measures.

ESC Plans shall include details demonstrating/indicating how ESC measures are to be constructed and maintained. Details shall be sufficient so the ESC measure can be properly installed. Plan enlargements may be required to show additional details in sensitive and/or special site areas.

Notes shall be included to outline site monitoring/remediation requirements for ESC measures, construction staging procedures, construction timing windows and restrictions, and any other key information.

Disturbance to site areas should be minimized, where possible, to reduce the potential for erosion and sediment transport. Proponents should consider a staged approach to construction works, such that disturbance to site areas occurs only as necessary for construction activities.

ESCs may require modification throughout the construction phase to address changing site conditions. Proponents should consider the necessity for multiple ESC plans.

ESC controls (and all accumulated sediment) should be removed off-site once site conditions have suitably stabilized.

#### 4.3.4.2 Construction Phase

ESC Plans shall be prepared to address all phases of construction. Phases of construction are dependent on the nature of the construction activity; however typical phases of construction are as follows:

- Demolition;
- Topsoil Stripping/Site Clearing;
- Earthworks/Rough grading;
- Site Servicing and Road Construction;
- House/Building Construction; and
- Landscaping

Proponents are required to tailor the ESC measures to their construction site, based on the requirements of the site characteristics and anticipated staging. Depending on the complexity of the construction activities, multiple ESC Plans may be required to address the various construction phases.

All ESC measures are to be inspected by the Design Engineer or a CISEC (Certified Inspector of Sediment and Erosion Controls) Certified Inspector a minimum of once per week during the active construction period and after significant rainfall events (>10 mm) to ensure ESC measures remain in good working condition. An inspection report is to be prepared by the site inspector immediately following each inspection. Inspection

reports must outline the conditions of the ESC measures, including any deficiencies noted and a timeline to address such deficiencies. Reference is made to the “Erosion and Sediment Control Inspection Guide” (Greater Golden Horseshoe Area Conservation Authorities, 2008). Niagara Region and/or Local Municipality is to be provided a copy of each inspection report in a timely manner following each inspection (i.e. within 1 week).

Independent inspections may be completed by Niagara Region and/or Local Municipality staff in order to verify that the ESC measures implemented on the site follow the approved plan and are in working order. Written notice will be provided as required, outlining any deficiencies noted and providing a timeline to address.

The proponent is responsible for addressing any deficiencies noted in the erosion and sediment controls implemented on the site. If the deficiencies are not addressed within the specified timeframe, the local area municipality may use the Letter of Credit to finance any required remedial works.

#### 4.3.4.3 Permissible ESC Measures

##### 4.3.4.3.1 Erosion Controls

Permissible erosion controls for site alterations include, but are not limited to, the following practices.

**Surface Roughening (Scarification)**

Scarification is a process of roughening exposed slopes perpendicular to the slope/drainage direction. Typically, scarification can be useful for sites with steep slopes up to 2H:1V. Scarification reduces drainage velocity, quantity and erosion potential.

**Seeding**

Vegetative cover is established by seeding a disturbed area. Typically, seeding of disturbed areas is conducted following final grading or for site areas where no further construction is scheduled for 30 days. Seed application typically occurs with straw mulching, hydraulic mulching and erosion control blankets. Seeding using hydroseeding or terra-seeding techniques is encouraged to support the more rapid growth of vegetation. Sodding may be required in site areas where instant ground cover is required or where seed is difficult to establish (e.g. swale inverts due to concentrated flows).

**Mulching**

Freshly seeded soils can be protected by applying man-made or natural materials such as mulching. Mulching reduces drainage velocity and therefore the erosion potential of seeded soils. Manufacturer’s specifications should be followed for mulch application.

### Polymers and Tackifiers

Polymers and tackifiers are substances which can be used in conjunction with seeding and mulching activities to bind material together (increase cohesion) to limit erosion. Such materials must be confirmed to be environmentally benign. Supporting material is required where such substances are proposed prior to approval and application.

### Erosion Control Blankets, Netting and Matting

Erosion control blankets, netting and matting should be fully biodegradable materials which are placed on relatively steep surfaces to prevent erosion and promote seed growth. This type of mechanical stabilization is also required in areas of exposed soils if construction is proceeding outside the growing season (i.e. late October to early April). Manufacturer's guidelines should be followed in the use of erosion control blankets.

### Vegetative Buffer Strips

Erosion control can be provided through the use of existing or proposed vegetation adjacent to the feature to be protected.

#### 4.3.4.3.2 Sediment Controls

Permissible sediment controls for proposed developments or site alterations include but are not limited to the following practices. In all cases, Niagara Region encourages re-vegetation of exposed surfaces as quickly as possible following grading works.

### Vehicle Tracking Control

Niagara Region requires that a vehicle tracking control mat (i.e. "mud mat") be implemented where vehicles access and leave a construction site via a municipal road. A mud mat is comprised of both 150 mm diameter aggregate (first 10 m) and 50 mm diameter aggregate (last 10 m) placed on a geotextile, 300 mm deep, with a minimum width of 5 m and a minimum total length of 20 m. Mud mats should be located at each site entrance/exit. Mud mats require regular maintenance to ensure sustained performance. Where the mud mats fail to perform, and where sediment is conveyed to the road, the proponent will be required to clean the road at its sole expense. Should Niagara Region and/or Local Municipality inspect the road and determine that maintenance is not adequate, the proponent shall be responsible to address the identified deficiencies. Other less common forms of vehicle tracking control, such as wash-pads, are also acceptable for use. There may be instances where the Region and/or Local Municipality requires proponents to implement multiple forms of vehicle tracking control.

### Dust Management

Dust management is a key consideration during dryer periods (summer, etc.) and is most notable whilst soils are not yet stabilized on site. Efforts must be made to ensure appropriate mitigation measures are available and in place on site, such that concerns can be avoided and/or otherwise managed within a timely manner should they arise.

Sediment transport via wind can be reduced by implementing dust control measures on site. Dust control measures can include but are not limited to: soil wetting via water truck, placement of calcium chloride, anionic polymers, and vegetation of disturbed areas.

### Temporary Grading Diversions

Diversion of drainage from steep slopes and disturbed areas through the use of diversion swales should be considered depending on site conditions. Drainage should be directed to appropriate sediment control measures.

### Check Dams

Check dams (most typically rock check dams, however other types of materials are available) involve the placement of granular material either in a swale, ditch or watercourse to facilitate settling of sediment. Site specific design of check dams shall consider the depth of the swale (i.e. the height of check dams shall be smaller than the depth of the swale). Check dams shall be constructed such that flows do not by-pass the check dam.

### Temporary Slope Drains

To prevent slope erosion, concentrated drainage may be conveyed down a slope via a temporary slope drain comprising a flexible conduit or ditch liner. Slope drains should employ adequate inlet and outlet protection and should not discharge directly to creeks.

### Sediment Control Fences

Sediment control fences act as a barrier to sediment migration and drainage, creating ponding and therefore settling of sediment, rather than relying on filtering of the runoff. In order to function properly and effectively, sediment control fence must be properly installed and maintained, including ensuring an appropriate depth of burying/anchoring. In areas of environmental concerns, or sensitive discharge locations, a double row of silt fence may be required. Sediment control fence should not be used in areas of concentrated flows; other more appropriate measures should be used in those areas, including check dams and compost berms.

### Compost Berms

Compost berms may in some locations be used in place of sediment control fences. The compost berms should be designed according to manufacturer's guidelines. Unlike sediment control fence, compost berms are able to filter sediment from drainage and do not obstruct flow paths. Compost berms are easily spread out on-site after construction completion instead of being required to be removed like sediment control fence.

### Compost Socks

Compost socks provide a similar function to compost berms, however on steep or paved surfaces, manufacturer's guidelines should be used in both design and placement of the compost sock. Compost socks can also be used in place of rock check dams and catchbasin sediment traps.

### Sediment Traps

The design and construction of sediment traps should incorporate guidelines outlined in the Greater Golden Horseshoe Conservation Authorities Erosion and Sediment Control Guidelines (GGHCA ESC Guidelines, 2006). Typically, drainage areas to sediment traps are less than 2 ha. The location of sediment traps should be outside of regulated floodplain limits whenever possible.

### Sediment Control Ponds/Basins

Similar to sediment traps, sediment control ponds/basins should incorporate guidelines outlined in the Greater Golden Horseshoe Conservation Authority ESC Guidelines. Typically, sediment control ponds/basins are sized to provide a permanent pool volume, as well as an active storage volume with a minimum drawdown time for drainage areas of 2 ha or greater. Sediment control ponds/basins should be located outside of areas regulated by NPCA unless approved through their permitting process.

### Catchbasin Sediment Traps

Catchbasin sediment traps are devices positioned inside catchbasins and are intended to prevent sediment build-up and clogging of the storm sewers by trapping sediment laden runoff. Catchbasin sediment traps are required on all catchbasins potentially subject to sediment laden runoff, including those outside of the construction site. Catchbasin sediment traps should be cleaned as per manufacturers specifications.

### Polymer Flocculation

Anionic polymers can be used in combination with many of the sediment control measures noted previously to create larger particles which more easily settle out. Polymers can be used for dewatering and bypass applications, including creating

treatment ditches or pipes that contain polymer blocks or contact surfaces to promote flocculation and minimize sediment loading to downstream receivers.

#### 4.3.4.3.3 Drainage Protection

Permissible drainage protection for site alterations include, but are not limited to, the following practices.

**Temporary Creek Crossings**

Temporary creek crossings typically span a watercourse feature for the purpose of construction access. For regulated watercourses, NPCA, MNRF, and possibly DFO will have individual requirements that should be fulfilled related to location, capacity and form.

Where watercourses are not regulated by other agencies, concrete or corrugated metal pipes may be used to provide temporary crossings during construction. Notionally, the crossings would be required to convey a frequent event (i.e. 2-year storm event +/-) design flow, depending upon the duration of crossing, time of year, and any site-specific constraint; the capacity is to be established in consultation with Niagara Region and relevant Agencies.

**Temporary Drainage Diversions**

Temporary diversions of non-regulated drainage features should be conducted only when necessary to reduce impacts on the social or natural environment and are supported by a comprehensive evaluation of potential impacts. Diversions should be designed according to drainage function and form and may require natural channel design principles. Watercourse diversions must account for other Agency requirements.

**Temporary Storm Drain Inlet Protection**

Storm drain inlet protection may consist of a sediment control barrier, granular material, geotextile and/or ponding area. Specific applications will require different inlet protection designs.

**Temporary Storm Drain Outfall Protection**

Outfall protection should be designed according to both the outfall flow velocities and the receiving watercourse flow dynamics.

**Temporary Flow Bypass and Dewatering**

Temporary cofferdams are used to allow dewatering of a construction area to permit work in dry conditions. Sediment laden water should be pumped to a sediment bag (or equivalent) within a vegetated area a minimum of 30 m away from features to be

protected. Design considerations and installation and maintenance considerations are provided within the GGHCA ESC Guidelines.

#### 4.3.4.3.4 Soil and Fill Management

**General References**

Fill management and excess soil management should follow applicable guidelines, including the Province of Ontario's "Management of Excess Soil – a Guide for Best Management Practices". The Provincial Excess Soil Reuse Planning Requirements under Ontario Regulation 406/19: On-Site and Excess Soil must also be followed (ref. https://www.ontario.ca/page/handling-excess-soil). It is noted that the requirements came into effect on January 1, 2022, however the Province has temporarily suspended the requirements until January 2023.

**Fill and Topsoil Stockpiles**

Fill and Topsoil stockpiles shall be limited to a height of 3 m and must have side slopes not exceeding 3H:1V. Sediment fences are to be installed around the perimeter of the stockpile to control sediment laden runoff. For larger material stockpiles (>100$m^3$) an additional setback at the toe of the stockpile (not less than 2 m) shall be included. Stockpiles to be undisturbed for 30 days or more must be vegetated to prevent sediment transport, typically by seeding.

# 5.0 Operation, Maintenance and Local Performance Monitoring of Stormwater Management Infrastructure

## 5.1 Operation and Maintenance

The ongoing operation and maintenance of all stormwater management and drainage infrastructure is important toward ensuring its long-term performance. The Region will require an operation and maintenance (O&M) report from both public and privately owned proposed stormwater management facilities. The local municipality may also require the O&M report.

### 5.1.1 Public

General guidance regarding operation and maintenance requirements for commonly used stormwater management facilities (SWMFs) and systems is provided in the Stormwater Management Planning and Design Manual, MECP (2003), and guidance regarding the operation and maintenance requirements for LID BMPs is provided in the Low Impact Development Stormwater Management Planning and Design Guide, Version 1.0, (TRCA/CVC, 2010).

Given that the facilities will require an ECA from the MECP, should the Region be the ultimate owner, post-assumption, the Region will need to follow the MECP guidelines and general conditions for operation of a stormwater management facility. This will apply to Municipal facilities as well, where the Municipality is the ultimate owner. Prior to assumption, the developer will be required to follow both the MECP and the Region guidelines, and provide the Region with the required documentation prior to transfer/assumption.

Standard O&M practice includes preparing an Operation and Maintenance Manual, in which routine inspections, and a monitoring program will need to be documented (typically required within 12 months of issue of an ECA).

The O&M Manual will document an inspection program, including the frequency of inspection, and the methods or tests employed to detect when maintenance is necessary (ref. Appendix A: Draft ECA Application Guidelines, March 2022, Schedule E – Operating Conditions).

It is noted that the MECP has issued the “DRAFT Low Impact Development Stormwater Management Guidance Manual” for review in January - April 2022. These can be found at the following link, for information purposes, until the document is finalized. (https://ero.ontario.ca/notice/019-4971)

As part of engineering submissions for the detailed design of SWMFs, proponents are required to include an operation and maintenance program for proposed SWMFs and LID BMPs. The O&M requirements may be submitted independently or as a section of

the stormwater management report. The following information shall be specified related to the required maintenance activities:

- Summary of SWMFs and design parameters,
- Description of required maintenance activities,
- Frequency of the various activities, and
- Estimated cost of each maintenance activity, including equipment and human resource needs.

This information shall be established with particular consideration for the stormwater management practice proposed, as well as the conditions of the contributing drainage area and the receiving system. The maintenance activities are to be identified as either "Routine Maintenance Activities" (which may be completed on an annual/semi-annual basis) or "Capital Works Projects" (which would be completed less frequently and require separate funding, financing, and approval, as well as relevant investigations to support the proposed works and develop more refined and detailed cost estimates for implementation). The operation and maintenance requirements shall include supporting calculations (e.g. forebay and facility cleanout frequency for wet ponds).

The operation and maintenance program shall include any supplemental investigations which may be required to better refine the maintenance requirements. This may include any requirements for sediment sampling and analysis for sediment quality, in order to determine opportunities and requirements for disposal. The cost estimates shall include allowance items for these activities, and shall specify any assumptions made in developing the cost estimates.

The operation and maintenance programs shall be outlined in an Operation and Maintenance Manual, which may be a standalone submission or be included as part of the stormwater management report at the detailed design stage, and shall be signed and stamped by a qualified Civil Engineer licenced to practice in the Province of Ontario (P. Eng.).

### 5.1.2 Private

An operation and maintenance program must be created for proposed SWMFs servicing private developments that drain into Region owned infrastructure. The Operation and Maintenance Report/Manual must be submitted to Niagara Region for review and approval with the detailed design SWM report. Requirements for the operation and maintenance program are the same as the requirements for a public program, with the exception of estimated costs. Costs associated with the operation and maintenance of private SWMFs are to be paid for by the private owner.

Niagara Region, in its sole discretion, may require the operation and maintenance program to be listed on the title of the private property.

## 5.2 Local Monitoring Requirements

SWM facility monitoring, and watercourse monitoring are required by Niagara Region for all new developments where the Region will be assuming ownership of a SWMF or watercourse, or where private SWM infrastructure drains into Region owned infrastructure. Under the Region's Stormwater Management Facility Assumption Requirements (Section 4.3.1.9), all proponents are required to submit a detailed monitoring and evaluation program, demonstrating that the facility or watercourse is functioning as designed to the satisfaction of the Niagara Region. The following sections provide additional details regarding the watercourse and stormwater management monitoring programs.

It is noted that the NPCA undertakes and oversees monitoring at a watershed-scale, which is a separate monitoring program to this local monitoring for Region SWMF infrastructure.

The Region, through the Niagara Watershed Plan (Equivalent) (2022), will potentially identify the need for monitoring at a Quaternary Watershed level, which should also be coordinated with the NPCA.

### 5.2.1 Public

#### 5.2.1.1 Watercourse Local Monitoring Program

Monitoring of watercourses may be required as a condition of approval for new development, at the discretion of the Region. While the scope, methodology, frequency, and duration of the monitoring program are to be established based upon recommendations provided in higher level studies and permitting, the following general guidance is provided for conducting monitoring programs of the Region's watercourses in the absence of direction from higher level studies.

The locations for conducting the watercourse monitoring program should be established in order to provide an assessment of instream water quality at the upstream and downstream limits of the proposed development. The sites for collecting water quality samples should be established to allow safe access to the watercourse to collect water quality samples during wet weather and dry weather conditions, as well as during and outside of business hours.

All water quality samples should be obtained in accordance with the Protocols Manual for Water Quality Sampling in Canada (CCME, 2011). The method for collecting the samples (i.e. grab sampling, composite sampling, continuous monitoring) should be established based upon the contaminants to be monitored, and required analyses. The monitoring program is required to be implemented for a minimum of two (2) years and may be extended depending upon the conclusions and recommendations advanced in the final report as well as additional monitoring requirements advanced in applicable higher level studies. The water quality monitoring should distinguish between wet weather and dry weather conditions, and should provide a characterization of the seasonal variations and trends in surface water quality (i.e. spring, summer and fall).

The scope, methodology, frequency, and duration of the monitoring program for watercourse monitoring should be scoped by location, to ensure that they are not over- or under-scoped, i.e. are right-sized for the site, and determined through pre-consultation. The following general guidance regarding the water quality parameters to be monitored is provided for consideration only, and is to be refined through pre-consultation with the Region and relevant Agencies, and may include the following general parameters:

- Oil and Grease
- Total Phosphorus
- Anions (Nitrate, Nitrite, Phosphate, Chloride)
- Ammonia
- Total Kjeldahl Nitrogen (TKN)
- Conductivity
- Total Solids (TS)
- Total Suspended Solids (TSS)
- BOD5
- Dissolved Oxygen
- pH/alkalinity
- Salinity
- Total Coliforms/Fecal Coliforms/E. Coli
- PAH
- Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn, Zr)

- Hardness as CaCO3
- Turbidity
- Temperature

The approved monitoring program is to be implemented and annual reports prepared and submitted to Niagara Region.

#### 5.2.1.2 Stormwater Management Facility Local Monitoring

Niagara Region's Stormwater Management Facility Assumption Requirements include monitoring stormwater management facilities to demonstrate that the facility is functioning as designed. The scope, methodology, frequency, and duration of the monitoring program for stormwater management facility performance should be scoped by location, to ensure that they are not over- or under-scoped, i.e. are right-sized for the site, and determined through pre-consultation. The MECP should be consulted, as well as identifying any requirements provided by approval agencies (i.e. MECP, MNRF, NPCA) as conditions of approval. Should one exist, an EIS should also be consulted. Typically, the Local Municipality and NPCA will also review the monitoring requirements.

Note that the NPCA also takes a watershed-based approach to monitoring. The focus of this section is local performance-based monitoring of SWM infrastructure.

The following general guidance is provided for consideration only and is to be refined through pre-consultation.

The duration of the monitoring program to verify stormwater management facility performance is to be established in consultation with Region and/or Local Municipality staff and based upon the conditions of approval from other agencies. In the absence of this direction, the monitoring program to verify stormwater management facility performance is required to be implemented for 2 years, in keeping with the standard warranty period prior to assumption, and may be extended depending upon the conclusions and recommendations advanced in the final report as well as additional monitoring requirements advanced in applicable higher-level studies.

##### 5.2.1.2.1 Stormwater Quantity Control

Stormwater quantity monitoring to verify stormwater management facility performance shall be completed as required by the Local Municipality and/or Region. Depth probes shall be installed at the inlet and outlet of the stormwater management facility to determine the operating water surface elevations within the facility during storm events. The water surface elevations shall be correlated to storage and discharge rates based upon the stormwater management facility rating curve as determined by the as-built

survey of the facility after cleanout and prior to assumption by the Local Municipality or Region.

Available rainfall data shall be used to determine the corresponding return period of the storm event, for comparison and verification of the operating water levels within the facility. Where required by the Municipality and/or Region, the approved hydrologic models shall be updated to represent the as-built condition of the stormwater management facility and contributing drainage area, and hydrologic analyses completed to verify the stormwater management facility performance.

Where feasible and appropriate, the monitoring for stormwater quantity control performance shall be coordinated with holistic monitoring programs to collect flow data along the receiving watercourses. Opportunities to integrate the stormwater quantity control requirements for stormwater management facilities within holistic monitoring programs shall be at the discretion of the Region and relevant Agencies.

#### 5.2.1.2.2 Stormwater Quality Control

Water quality monitoring to verify stormwater management facility performance should verify that the stormwater management facility is providing the requisite stormwater quality treatment as per the applicable standards, and should afford a characterization of the treated effluent from the stormwater management facility compared to the water quality within the receiving watercourse. As such, water quality monitoring to verify stormwater management facility performance should be completed at the inlet to the stormwater management facility, at the outlet of the stormwater management facility downstream of the control structure (i.e. not within the water column of the stormwater management facility), as well as instream along the receiving watercourse upstream and downstream of the stormwater management facility. The locations for obtaining water quality samples within the receiving watercourse should be established to allow safe access to the watercourse to collect water quality samples during wet weather and dry weather conditions, as well as during and outside of business hours.

All water quality samples should be obtained in accordance with the Protocols Manual for Water Quality Sampling in Canada (CCME, 2011). The method for collecting the samples (i.e. grab sampling, composite sampling, continuous monitoring) should be established based upon the contaminants to be monitored, and required analyses.

Water quality monitoring to verify stormwater management facility performance is to be completed for two (2) storm events per year, and should attempt to capture event from two of the different seasons monitored (i.e. spring, summer, or fall).

The water quality parameters to be monitored are to be established in consultation with the Region and relevant Agencies, and may include the following general parameters:

- Oil and Grease
- Total Phosphorus
- Anions (Nitrate, Nitrite, Phosphate, Chloride)
- Ammonia
- Total Kjeldahl Nitrogen (TKN)
- Conductivity
- Total Solids (TS)
- Total Suspended Solids (TSS)
- BOD5
- Dissolved Oxygen
- pH/alkalinity
- Salinity
- Total Coliforms/Fecal Coliforms/E. Coli
- PAH
- Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Si, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn, Zr)
- Hardness as CaCO3
- Turbidity
- Temperature

The approved monitoring program is to be implemented and annual reports prepared and submitted to the Region and/or Local Municipality. If the results of the monitoring program are deemed unsatisfactory by the Region and relevant Agencies, additional investigation shall be completed to identify opportunities to address any deficiencies in the performance of the stormwater management system. The preferred approach to address any deficiencies shall be established in consultation with the Region and relevant Agencies.

### 5.2.2 Private

Monitoring must be completed for watercourses and SWMFs servicing private developments that drain into Region owned infrastructure. Requirements for a private monitoring program are the same as the requirements for a public program, with the exception of estimated costs. Costs associated with the operation and maintenance of private SWMFs are to be paid for by the private owner.

# APPENDIX

# A BACKGROUND DOCUMENTS

# APPENDIX

## *A-1 MAP OF REGION TERTIARY WATERSHEDS (2022)*

# NIAGARA REGION TERTIARY WATERSHED AREAS

Major Watercourses
Major Waterbodies
Municipal Boundary
Niagara Region Boundary

**Tertiary Watershed**

Lake Erie
Lake Ontario
Niagara River

N

0 2.5 5 10 Kilometers

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Lake Ontario
Hamilton
Grimsby
Lincoln
St. Catharines
Niagara-on-the-Lake
Niagara Falls
Niagara River
West Lincoln
Pelham
Thorold
Haldimand
Welland
United States of America
Wainfleet
Port Colborne
Fort Erie
Lake Erie

# APPENDIX

## *A-2 NIAGARA OFFICIAL PLAN (2022) CHAPTER 3 – SUSTAINABLE REGION*

SUSTAINABLE REGION

# Chapter 3 – Sustainable Region

## 3.1. The Natural Environment System

This section outlines the objectives and policies for a Regional *natural heritage system* and *water resource system.*

The *natural heritage system* is made up of features such as *wetlands, woodlands, valleylands*, and *wildlife habitat*, as well as components such as *linkages, buffers, supporting features and areas,* and *enhancement areas*. The intent of the *natural heritage system* is to preserve and enhance the biodiversity, *connectivity,* and long-term *ecological function* of the natural systems in the region.

The *water resource system* is made up of both *groundwater* and *surface water* features and areas. The intent of the *water resource system* is to protect the *ecological* and *hydrological integrity* of water resources and the various *watersheds* in the region.

The *natural heritage* and *water resource systems* are ecologically linked, rely on and support each other, and have many overlapping components. The establishment of these natural systems is required by Provincial policy. These systems have been integrated in this Plan and are known together as the Region's *natural environment system.*

The objectives of this section are as follows:

a) identify and protect a *natural heritage system* and *water resource system* which will form the *natural environment system*;

b) maintain, restore, and enhance the biodiversity and *connectivity* of natural features and their associated *ecological* and *hydrological functions*;

c) recognize the important role the *natural environment system* plays in mitigating the impacts of *climate change* by protecting and enhancing natural features;

d) implement the *Natural Heritage System for the Growth Plan* and *Greenbelt Plan Natural Heritage System* in accordance with the direction of the Province;

e) identify and maintain *hydrologic functions* and connections among *groundwater features*, natural features, and *surface water features* including *shoreline areas*;

f) maintain *wetland* area and the *hydrological* and *ecological functions* they provide, and to enhance *wetland* cover where possible;

g) protect *woodlands* and their biodiversity, restore *ecological functions*, and enhance *woodland* cover through reforestation and restoration;

h) protect *provincially and regionally significant earth science and life science areas* of *natural and scientific interest*;

i) identify and protect *other woodlands* as a way to maintain treed area in the region;

j) screen for, and evaluate *enhancement areas* as well as *supporting features and areas* to support the long-term *ecological integrity* of the *natural environment system*;

k) identify *linkages* to protect ecological *connectivity* in the region;

l) maintain protection for *woodlands* that have been disturbed in an effort to maintain tree cover in the region;

m) protect *fish habitat* and the *habitat of endangered species and threatened species* in accordance with Provincial and Federal legislation;

n) maintain and restore natural vegetation along *shoreline areas*;

o) protect and enhance water resources through proactive *watershed and subwatershed planning*;

p) protect and restore the ecological health of the Great Lakes, consistent with the provisions of the Great Lakes Strategy, the targets and goals of the Great Lakes Protection Act, 2015, and any applicable Great Lakes agreements as part of *watershed planning* and coastal or waterfront planning initiatives;

q) minimize risks to human health and safety and property associated with natural hazards;

r) minimize the impacts of invasive species through the proper management and control, and the promotion of native species plantings in the region;

s) recognize the role and value of compatible and complementary agricultural and rural uses within and adjacent to the *natural environment system*;

t) consider cumulative impacts through *watershed planning* and the development application process;

u) recognize that flexible approaches to existing uses in the *natural environment system* are required; and

v) outline the process for *environmental impact studies* and *hydrologic evaluations* where they are required to support applications for *development* or *site alteration*.

**There are Different Geographic Areas included in the Region's Natural Environment System**

The Region's *natural environment system* includes the *Natural Heritage System for the Growth Plan* and *Greenbelt Plan Natural Heritage System* as components of the system. These two provincially mapped systems have been combined in this Plan and are referred to as the *Provincial natural heritage system*. The mapping and policies of the *Provincial natural heritage system* apply outside of settlement areas only in accordance with Provincial policy.

The Region's *natural environment system* however extends beyond the *Provincial natural heritage system* - into the Niagara Escarpment Plan area, rural areas that are not within the *Provincial natural heritage system*, and the Region's *settlement areas* (i.e. urban areas and hamlets).

Included within, and outside of the *Provincial natural heritage system* are many individual natural features and other components - which are identified by the Region based on the criteria included in this Plan.

Although the Region's *natural environment system* is an integrated and region-wide system, different policies apply in different geographic areas of the region. The first step in applying the policies of this section of the Plan is to determine which geographic area of the region the site or property is in.

### 3.1.1. The Natural Environment System

3.1.1.1. The features and components of the *natural environment system* are listed in Schedule L. Schedule L also includes the definitions and criteria for each of the features and components.

3.1.1.2. In addition to the features and components listed in Schedule L, the following features and areas are also required components of the *natural environment system*:

a) *groundwater features*;

i) recharge/discharge areas;

ii) water tables; and

iii) aquifers and unsaturated zones.

b) *surface water features*; and

i) headwater drainage features;

ii) recharge/discharge areas; and

iii) associated riparian lands that can be defined by their soil moisture, soil type, vegetation or topographic characteristics.

c) other *hydrologic functions*.

3.1.1.3. The features and areas identified in Policy 3.1.1.2 should be screened for during the completion of a *watershed plan* or *subwatershed study*. If identified, appropriate land use planning policies or other natural resource management tools should be put in place for their protection, enhancement, or restoration, as appropriate.

3.1.1.4. The mapped features and components of the *natural environment system* are shown as a single overlay on Schedule C1 to this Plan. *Key hydrologic areas*, which are also a component of the *natural environment system,* are mapped separately as an overlay on Schedule C3. The purpose of Schedule C1 and C3 is to allow for preliminary screening, and to determine if the policies of the *natural environment system* may apply. Schedule C1 also includes the limits of the *Provincial natural heritage system.*

### 3.1.2. Individual Features and Components of the Natural Environment System

3.1.2.1. Individual *natural heritage features and areas*, *key natural heritage features, key hydrological features,* and other individual components which are considered mapped features of the *natural environment system* are shown as an overlay on Schedule C2.

3.1.2.2. The individual features and components of the *natural environment system* that are mapped on Schedule C2 include:

a) *significant woodlands*;

b) *other woodlands*;

c) *provincially significant wetlands;*

d) *other wetlands* and non-provincially significant wetlands;

e) *life science areas of natural and scientific interest*;

f) *earth science areas of natural and scientific interest*;

g) *permanent and intermittent streams*;

h) *inland lakes*; and

i) *linkages*.

### 3.1.3. Only Certain Features and Components are Mapped

3.1.3.1. Not all of the features and components that make up the *natural environment system* can, or have been mapped as part of the schedules to this Plan. Where features or components of the *natural environment system* listed in Schedule L are not mapped, detailed area-specific or site-specific studies such as an *environmental impact study*, *hydrologic evaluation*, or *subwatershed study* are required for their identification.

3.1.3.2. Where through the review of an application for *development* or *site alteration,* or through the completion of a *subwatershed study,* it is found that there are features or components of the *natural environment system* or related *ecological* and/or *hydrologic functions* that have not been adequately mapped, evaluated, or protected, the applicant shall have an evaluation prepared by a qualified professional in consultation with the Region, the Local Area Municipality and, where appropriate, the Conservation Authority. If the evaluation finds one or more *natural heritage features and areas*, *key natural heritage features*, or *key hydrological features*, the policies of this Plan will be applied to the lands under application as appropriate.

3.1.3.3. Where lands are mapped or identified as two or more features or components of the *natural environment system*, the policies which provide the highest level of environmental protection shall apply in the event of any conflict.

### 3.1.4. Refinements to the Limits of the Natural Environment System

3.1.4.1. Changes to the limits or classification of individual features or components of the *natural environment system* identified through Regional criteria may be considered through the submission of an *environmental impact study* and/or *hydrologic evaluation* based on a terms of reference approved by the Region, in accordance with the policies of this Plan, and in consultation with the Conservation Authority as appropriate.

3.1.4.2. If the change to the limit or classification of an individual feature or component of the *natural environment system* identified through Regional criteria can be justified to the satisfaction of the Region, an amendment to this Plan shall not be required. Further details on the scope of the study required to support a change to the limit or classification of the *natural environment system* will be included in

the Region's Environmental Impact Study Guidelines and/or Hydrologic Evaluation Guidelines.

3.1.4.3. Changes to the limit or classification of individual features or components of the *natural environment system* identified through Regional criteria may also be considered through the findings of a *subwatershed study* completed to the satisfaction of the Region, in consultation with the Conservation Authority as appropriate. If the change to the limit or classification of an individual feature or component of the *natural environment system* can be justified to the satisfaction of the Region, an amendment to this Plan shall not be required.

3.1.4.4. Changes to the limit or classification of individual features of the *natural environment system* identified through Provincial criteria requires approval from the Province. If the change to the limit or classification of an individual feature has been approved by the Province, an amendment to this Plan shall not be required.

3.1.4.5. Notwithstanding Policy 3.1.4.1 to Policy 3.1.4.4, the limits of the *Provincial natural heritage system* can only be refined through the completion of a *municipal comprehensive review.*

3.1.4.6. Where the limits of a feature or component of the *natural environment system* have been refined through an approved *environmental impact study*, *hydrologic evaluation*, or *subwatershed study*, the lands that are no longer included as part of the *natural environment system* overlay shall continue to be designated based on the underlying land use, unless otherwise determined through a Planning Act application.

3.1.4.7. Updates to the appropriate schedules to this Plan shall be made on a regular basis by the Region to incorporate any approved refinements to the *natural environment system*.

3.1.4.8. Where *development* or *site alteration* is proposed within or adjacent to the *natural environment system*, new lots shall not be created which would fragment a *natural heritage feature or area*, *key natural heritage feature*, or *key hydrologic feature*. The lands to be retained in the *natural environment system* shall remain in a natural state. The natural feature and any required *buffer* or *vegetation protection zone* shall be maintained in a single block and zoned to protect the natural features and its *ecological functions*. The Region encourages the Local Area Municipalities, the Conservation Authority, and other

appropriate public and private conservation organizations to assume ownership of these lands.

3.1.4.9. Applications for a lot boundary adjustment shall avoid the fragmentation of *provincially significant wetlands* and *significant woodlands*.

3.1.4.10. Applications for lot boundary adjustment should avoid the fragmentation of other *natural heritage features and areas*, *key natural heritage features* or *key hydrologic features* wherever possible and practical.

### 3.1.5. Lands within the Provincial Natural Heritage System

3.1.5.1. The policies of Section 3.1.5 apply to lands within the mapped *Provincial natural heritage system*.

3.1.5.2. Notwithstanding Policy 3.1.5.1, the policies of Section 3.1.5 that apply to *key hydrological features* apply in all areas of the region outside of *settlement areas* whether or not they are in the mapped *Provincial natural heritage system* in accordance with Provincial policy.

3.1.5.3. Required within the *Provincial natural heritage system* is a 30 metre wide *vegetation protection zone* adjacent to *significant woodlands*, *wetlands*, as well as *permanent* and *intermittent streams* and *inland lakes*.

3.1.5.4. Notwithstanding Policy 3.1.5.3, a 15 metre wide *vegetation protection zone* applies to certain *key hydrologic features* in parts of the Greenbelt Plan area in accordance with the policies of the Greenbelt Plan.

**There are Different Natural Environment System Policies in Different Geographic Areas of the Region**

The intent of the *natural environment system* policies that apply across the region are similar. However, unique policies and terminology are used in different geographic areas of the region:

- Section 3.1.5 applies to lands outside of *settlement areas* that are subject to the *Growth Plan Natural Heritage System* and the *Greenbelt Plan Natural Heritage System* (collectively referred to in this Plan as the *Provincial natural heritage system*);
- Section 3.1.8 applies to lands that are the subject of the Niagara Escarpment Plan; and
- Section 3.1.9 applies to lands in *settlement areas* (i.e. *urban areas* and hamlets) and other lands that are outside of *settlement areas* that are not subject to the policies of the *Provincial natural heritage system.*

3.1.5.5. *Development* or *site alteration* shall not be permitted in *key natural heritage features* that are within the *Provincial natural heritage system* or in any *key hydrologic features* outside of *settlement areas* except for:

a) forest, fish, and wildlife management;

b) conservation and flood or erosion control projects, subject to demonstrating the project is necessary in the public interest and after all alternatives have been considered;

c) activities that create or maintain infrastructure authorized under an environmental assessment, including a Class Environmental Assessment, completed in accordance with the *Environmental Assessment Act*;

d) all existing uses in the Greenbelt Plan Area;

e) single dwellings on existing lots of record in the Greenbelt Plan area, provided they were zoned for such as of the date the Greenbelt Plan initially came into effect;

f) *mineral aggregate operations* and *wayside pits and quarries except* in accordance with Provincial policy and Section 4.3 of this Plan;

g) recreational uses in the *Greenbelt Plan Natural Heritage System* in accordance with Section 3.1.7 of this Plan;

h) expansions to existing buildings and structures, accessory structures and uses, and conversions of legally existing uses that have less of an environmental impact, subject to demonstration that the use does not expand into the *key hydrologic feature* or *key natural heritage feature* or *vegetation protection zone* unless there is no other alternative, in which case any expansion will be limited in scope and kept within close geographical proximity to the existing structure;

i) expansions or alterations to existing buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified*

**Vegetation Protection Zone**

The term *vegetation protection zone* applies to *key natural heritage features* in a *Provincial natural heritage system* and to any *key hydrologic feature* outside of a *settlement area*. Elsewhere in the region the term *buffer* is used.

uses and expansions to existing residential dwellings if it is demonstrated that:

i) there is no alternative, and the expansion or alteration in the feature is minimized and, in the *vegetation protection zone*, is directed away from the feature to the maximum extent possible; and

ii) the impact of the expansion or alteration on the feature and its functions is minimized and mitigated to the maximum extent possible; and

j) small-scale structures for recreational uses, including but not limited to, boardwalks, footbridges, fences, docks, and picnic facilities, if measures are taken to minimize the number of such structures and their *negative impacts***.**

3.1.5.6. Nothing in this Plan is intended to limit the ability of existing *agricultural uses* to continue on a site that has a *key natural heritage feature* or *key hydrologic feature*.

3.1.5.7. **Development and Site Alteration in Adjacent Lands within a Provincial Natural Heritage System**

3.1.5.7.1 A proposal for *new development* or *site alteration* within 120 metres of any *key natural heritage* feature within a *Provincial natural heritage system* or *any key hydrologic feature* outside of *settlement areas* will require an *environmental impact study* and/or *hydrologic evaluation* that identifies a *vegetation protection zone*, which:

a) protects the *key natural heritage feature* or *key hydrologic feature* and its functions from the impacts of the proposed change;

b) is established to achieve and be maintained as *natural self-sustaining vegetation*; and

c) for *wetlands*, *seepage areas and springs*, *fish habitat*, *permanent and intermittent streams*, *inland lakes* and *significant woodlands*, is no less than 30 metres measured from the outside boundary of the feature.

3.1.5.7.2 Studies and evaluations undertaken in accordance with Policy 3.1.5.7.1 will also identify any additional restrictions to be applied before, during, and after development to protect the *hydrologic functions* and *ecological functions* of the feature.

3.1.5.7.3 *Development* or *site alteration* shall not be permitted in the *vegetation protection zone*, with the exception of that described in Policy 3.1.5.5, shoreline development as permitted in accordance with Policy 4.1.10.4, or infrastructure serving the agricultural sector.

3.1.5.7.4 Notwithstanding Policies 3.1.5.7.1 and 3.1.5.7.3, an *environmental impact study* will not be required for a proposal for *development* or *site alteration* on a site where the only *key natural heritage feature* is the *habitat of endangered species and threatened species*.

3.1.5.7.5 Notwithstanding Policies 3.1.5.7.1 and 3.1.5.7.3 new buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified uses* shall not be required to undertake an *environmental impact study* and/or *hydrologic evaluation* if a minimum 30 metre *vegetation protection zone* is provided from a *key natural heritage feature* or *key hydrologic feature*.

3.1.5.7.6 Uses permitted in accordance with Policy 3.1.5.7.5:

a) are exempt from the requirement of establishing a condition of *natural self-sustaining vegetation* if the land is, and will continue to be, used for agricultural purposes; and

b) will pursue best management practices to protect and restore *key natural heritage features*, *key hydrologic features*, and their functions.

3.1.5.7.7 Notwithstanding Policy 3.1.5.7.3, the following types of minor construction is permitted within a *vegetation protection zone* provided there is no alternative without an *environmental impact study* and/or *hydrologic evaluation*:

a) new buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified uses* below 200 $m^2$;

b) expansions to existing buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified uses* below 50% of the size of the original building, provided the expansion is less than 200 $m^2$;

c) new accessory buildings to a residential use (garage, workshop, etc.) below 50 $m^2$;

d) expansions to existing accessory buildings to a residential use below 50% of the size of the original building;

e) expansions to existing residential buildings below 50% of the size of the original building; and

f) reconstruction of an existing residential dwelling of the same size at the same location.

### 3.1.5.8. Development and Site Alteration within a Provincial Natural Heritage System

3.1.5.8.1 If a site is within the mapped *Provincial natural heritage system*, and if an application for *development* or *site alteration* is to be made, the policies of Section 3.1.5.8 apply, regardless if the site is in a *key natural heritage feature*, *key hydrologic feature*, *vegetation protection zone*, or in *adjacent lands*.

3.1.5.8.2 New *development* or *site alteration* within a *Provincial natural heritage system* shall demonstrate that:

a) there are no negative impacts on *key natural heritage features* or *key hydrologic features* or their functions;

b) connectivity along the system and between *key natural heritage features and key hydrologic features* located within 240 metres of each other will be maintained or, where possible, enhanced for the movement of native plants and animals across the landscape;

c) the removal of other natural features not identified as *key natural heritage features* and *key hydrologic features* is avoided, where possible. Such features should be incorporated into the planning and design of the proposed use wherever possible;

d) except for uses described in and governed by the policies in Section 4.3.4 dealing with *mineral aggregate resources*, the disturbed area, including any buildings and structures, will not exceed 25 per cent of the *total developable area*, and the impervious surface will not exceed 10 per cent of the *total developable area*;

e) with respect to golf courses, the disturbed area will not exceed 40 per cent of the *total developable area*; and

f) at least 30 per cent of the *total developable area* will remain or be returned to *natural self-sustaining vegetation*, except where

specified in accordance with the policies in Section 4.3.4 dealing with *mineral aggregate resources*.

3.1.5.8.3 Notwithstanding Policy 3.1.5.8.2 the full range of existing and new *agricultural uses*, *agriculture-related uses*, *on-farm diversified uses*, and *normal farm practices* are permitted. New buildings or structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified* uses are not subject to Policy 3.1.5.8 but are subject to the policies in Sections 3.1.5.5 and 3.1.5.7.

3.1.5.8.4 Notwithstanding Policy 3.1.5.8.2 the following types of minor construction is permitted within the *Provincial natural heritage system* provided there is no alternative, outside of a *key natural heritage feature* or *key hydrologic feature*, without an *environmental impact study* and/or *hydrologic evaluation*:

a) new accessory buildings to a residential use (garage, workshop, etc.) below 50 $m^2$;

b) expansions to existing accessory buildings to a residential use below 50% of the size of the original building;

c) expansions to existing residential buildings below 50% of the size of the original building; and

d) reconstruction of an existing residential dwelling of the same size in the same location.

### 3.1.6. Special Policy for Niagara Peninsula Tender Fruit and Grape Area in the Greenbelt Plan

3.1.6.1. Notwithstanding any other policies in this Plan, within the Niagara Peninsula Tender Fruit and Grape Area, new buildings or structures for *agricultural, agriculture-related* and *on-farm diversified uses* are permitted within 30 metres of *permanent* and *intermittent streams*, where:

a) the *permanent or intermittent stream* also functions as an agricultural swale, roadside ditch or municipal drain as determined through provincially approved mapping;

b) a minimum 15 metre *vegetation protection zone* is established between the building or structure and the *permanent or intermittent stream*; however, this *vegetation protection zone is* not required to be maintained as *natural self-sustaining*

*vegetation* if the land is and will continue to be used for agricultural purposes;

c) there is no alternative location for the building or structure on the property without impacting lands that are designated *specialty crop area*;

d) a new or replacement individual on-site sewage system will not be located within 30 metres of the stream; and

e) *agricultural uses*, *agriculture-related uses* and *on-farm diversified uses* shall pursue best management practices to protect or restore *key hydrologic features* and functions.

### 3.1.7. Special Policy for Recreational Uses on Lands Subject to Greenbelt Plan

3.1.7.1. Residential dwelling units, other than for an employee, shall not be permitted in association with recreational uses.

3.1.7.2. An application to establish or expand *a major recreational use* in the *Greenbelt Plan Natural Heritage System* shall be accompanied by a vegetation enhancement plan that incorporates planning, design, landscaping and construction measures that:

a) maintain or, where possible, enhance the amount of *natural self-sustaining vegetation* on the site and the *connectivity* between adjacent *key natural heritage features* or *key hydrologic features*;

b) wherever possible, keep *intermittent stream* channels and drainage swales in a free-to-grow, low-maintenance condition;

c) minimize the application and use of pesticides and fertilizers; and

d) locate new *natural self-sustaining vegetation* in areas that maximize the *ecological functions* and *ecological value* of the area.

3.1.7.3. An application to expand or establish a *major recreational use* shall be accompanied by a conservation plan demonstrating how water, nutrient, and biocide use shall be kept to a minimum, including through the establishment and monitoring of targets.

3.1.7.4. Small-scale structures for recreational uses, including but not limited to, boardwalks, footbridges, fences, docks and picnic facilities are permitted within *key natural heritage features* and *key hydrologic features*; however, the number of such structures and the *negative impacts* on these features should be minimized. In order to determine potential impacts, the Region may require that an *environmental impact study and/or hydrologic evaluation* be prepared.

### 3.1.8. Lands in the Niagara Escarpment Plan Area

3.1.8.1. *Development* and *site alteration* within and adjacent to *key natural heritage features* and *key hydrological features* in the Niagara Escarpment Plan Area is subject to the policies of the Niagara Escarpment Plan.

3.1.8.2. Notwithstanding Policy 3.1.8.1, Policy 3.1.5.7.7 applies in the Niagara Escarpment Plan Area.

3.1.8.3. Notwithstanding Policy 3.1.8.1, Section 3.1.11 applies to *other woodlands* in the Niagara Escarpment Plan Area.

### 3.1.9. Lands Outside of a Provincial Natural Heritage System and Outside of the Niagara Escarpment Plan Area

3.1.9.1. The policies of Section 3.1.9 apply to lands in *settlement areas* (i.e. *urban areas* and hamlets) and other lands that are outside of a *Provincial natural heritage system* and outside the Niagara Escarpment Plan Area.

3.1.9.2. Required outside of a *Provincial natural heritage system* and outside of *settlement areas* is a 30 metre wide *vegetation protection zone* adjacent to all *wetlands, permanent* and *intermittent streams,* and *inland lakes* and *their littoral zones* which are *key hydrologic features*.

3.1.9.3. Notwithstanding Policy 3.1.9.2, a 15 metre wide *vegetation protection zone* applies to certain *key hydrologic features* in parts of the Greenbelt Plan area accordance with the policies of the Greenbelt Plan.

3.1.9.4. *Key hydrological features* are subject to Policies 3.1.9.2 and 3.1.9.3. The balance of Section 3.1.9 does not apply to *key hydrological features*.

### 3.1.9.5. Development and Site Alteration in Natural Heritage Features and Areas outside of a Provincial Natural Heritage System

3.1.9.5.1 *Development* and *site alteration* shall not be permitted in the following *natural heritage features and areas*:

a) *provincially significant wetlands*;

b) *significant coastal wetlands*; and

c) *significant woodlands*.

3.1.9.5.2 *Development* and *site alteration* shall not be permitted in the following *natural heritage features and areas* unless it has been demonstrated through the preparation of an *environmental impact study* that there will be no *negative impacts* on the natural features or their *ecological functions*:

a) *other woodlands*;

b) *significant valleylands*;

c) *significant wildlife habitat*; and

d) *areas of natural and scientific interest*.

**The Difference between Key Natural Heritage Features and Natural Heritage Features and Areas**

The policies of the Plan refer to groupings of natural features as *key natural heritage features* and *natural heritage features and areas.* Although these terms have many common components, the terms cannot be used interchangeably.

*Key natural heritage features* are located within a *Provincial natural heritage system*, it is a defined term within the Provincial plans, and there are specific policies associated with these features. Outside of a *Provincial natural heritage system* the terminology *natural heritage feature and area* is used, consistent with the terminology used in the Provincial Policy Statement.

3.1.9.5.3 Notwithstanding Policies 3.1.9.5.1 and 3.1.9.5.2 permitted uses in a *natural heritage feature and area* are limited to:

a) forest, fish, and wildlife management;

b) conservation and flood or erosion control projects, subject to demonstrating the project is necessary in the public interest and after all alternatives have been considered;

c) activities that create or maintain *infrastructure* authorized under an environmental assessment, including a Class Environmental

Assessment, completed in accordance with the Environmental Assessment Act*;*

d) expansions to existing buildings and structures, accessory structures and uses, and conversions of legally existing uses that have less of an environmental impact subject to demonstration that the use does not expand into a *natural heritage feature or area* unless there is no other alternative, in which case any expansion will be limited in scope and kept within close geographical proximity to the existing structure;

e) expansions or alterations to existing buildings and structures for *agricultural uses, agriculture-related uses***,** or *on-farm diversified uses* and expansions to existing residential dwellings if it is demonstrated that:

   i) there is no alternative, and the expansion or alteration in the feature is minimized and, in the *vegetation protection zone*, is directed away from the feature to the maximum extent possible; and

   ii) the impact of the expansion or alteration on the feature and its *ecological functions* is minimized and mitigated to the maximum extent possible; and

f) small-scale structures for recreational uses, including, but not limited to boardwalks, footbridges, fences, docks, and picnic facilities, subject to measures are taken to minimize the number of such structures and their *negative impacts***.**

3.1.9.5.4 Notwithstanding any other policies of this Plan*, development and site alteration* in, and adjacent to *watercourses*, *provincially significant wetlands*, and *other wetlands* that are regulated by the Conservation Authority, may also be subject to the regulations and land use planning policies of the Conservation Authority. When *development* or *site alteration* is proposed in or adjacent to any *watercourse*, *provincially significant wetland*, *significant valleyland*, or *other wetland* the applicant shall contact the Conservation Authority, at which time Conservation Authority staff will advise the applicant and the Region of the land use or regulatory policies that will apply.

3.1.9.5.5 Notwithstanding Policy 3.1.9.5.4, while the Niagara Peninsula Conservation Authority may permit offsetting of *wetlands* under its

policies and in accordance with its regulatory role, the use of offsetting for any *natural heritage feature and areas*, *key natural heritage features*, or *key hydrologic features* is not supported by the policies of this Plan.

3.1.9.5.6 Where an *other wetland* in a *settlement area* has been identified, and it is determined that it is not regulated by the Conservation Authority:

a) The Region shall require that an evaluation be undertaken through an *environmental impact study, and if required, a* wetland evaluation using the Ontario Wetland Evaluation System, and/or *hydrologic evaluation* as part of an application for *development* or *site alteration*, or through a *subwatershed study* to determine the appropriate classification and protection or management of the feature.

**Other Wetlands**

The Provincial Policy Statement and Growth Plan require *wetlands* to be identified as part of a *water resource system* (which has been integrated with the *natural heritage system* to form the *natural environment system*). *Other wetlands* in *settlement areas* which are not regulated by the Conservation Authority require further evaluation to determine the appropriate protection or management of the feature. In accordance with the polices of the Growth Plan, all *wetlands* outside of *settlement areas* are by definition *key hydrologic features* and are protected in accordance with the policies of that Plan.

b) Outcomes of the evaluation completed with Policy 3.1.9.5.6 a) could include the in-situ protection with appropriate *buffers* or incorporation of the *hydrologic function* into the design of the development in accordance with the following:

i) if the *other wetland* is a treed community with a canopy coverage greater than 25%, and the other criteria for *other woodlands* are met, the *other woodland* policies of this Plan shall apply;

ii) if the *other wetland* is a treed community with a canopy coverage greater than 60%, and the other criteria for *significant woodlands* are met, the *significant woodland* policies of this Plan shall apply;

iii) no *negative impact* on the *ecological function* of the *other wetland*; and

iv) maintain the *hydrologic function* of the other wetland.

c) If the evaluation finds one or more other *natural heritage features and areas,* the appropriate other policies of the Plan shall be applied to the lands and natural features that are subject to the application to *development or site alteration*.

3.1.9.6. Nothing in this Plan is intended to limit the ability of existing *agricultural uses* to continue in areas that are the site of a *natural heritage feature or area*.

3.1.9.7. **Development and Site Alteration in Adjacent Lands outside of a Provincial Natural Heritage System**

3.1.9.7.1 A proposal for new *development* or *site alteration* outside of a *Provincial natural heritage system* which is adjacent to *a natural heritage feature or area* shall require an *environmental impact study* and/or *hydrologic evaluation* to determine that there will be no *negative impacts* on the feature, *ecological function*, or *hydrologic function* in accordance with the *adjacent lands* distances outlined in Table 3.1.

**Lands Adjacent to Key Hydrologic Features**

The policies of Section 3.1.9.7 do not apply to *key hydrologic features* outside of *settlement areas* - which include *wetlands, inland lakes* and their littoral zones and *permanent* and *intermittent streams*. Lands adjacent to *key hydrologic features* are addressed in the policies related to the *Provincial natural heritage system*.

**Table 3-1: Adjacent Lands for Natural Heritage Features and Areas Outside of a Provincial Natural Heritage System**

| ***Natural Heritage Feature and Area*** | ***Adjacent Lands*** |
|---|---|
| *Provincially Significant Wetland* | 120 metres |
| *Significant Costal Wetland* | 120 metres |
| *Significant Woodland* | 120 metres |
| *Other Woodland* | 50 metres |

| ***Natural Heritage Feature and Area*** | ***Adjacent Lands*** |
|---|---|
| *Significant Valleyland* | 50 metres |
| *Significant Wildlife Habitat* | 50 metres |
| *Habitat of Endangered Species and Threatened Species* | 50 metres |
| *Life Science Areas of Natural and Scientific Interest* | 50 metres |

*3.1.9.7.2* Notwithstanding Table 3-1, the requirement for an *environmental impact study* and/or *hydrologic evaluation* may be waived if the proposed *development* or *site alteration* is minor and is not anticipated to have a *negative impact* on the *natural environment system* in accordance with the waiving requirements outlined in the Environmental Impact Study and/or Hydrologic Evaluation Guidelines.

3.1.9.7.3 Notwithstanding Policy 3.1.9.7.1, an *environmental impact study* will not be required for a proposal for *development* or *site alteration* on a site where the only *natural heritage feature and area* is the *habitat of endangered species* and *threatened species*.

3.1.9.7.4 Notwithstanding Policy 3.1.9.7.1, new buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified uses* will not be required to undertake an *environmental impact study and/or hydrologic evaluation* if a minimum 30 metre *buffer* is provided from a *natural heritage feature and area*.

3.1.9.8. **Buffers Outside of Settlement Areas and Outside of a Provincial Natural Heritage System**

3.1.9.8.1 Outside of *settlement areas* a minimum *buffer* on all *natural heritage features and areas* is required, as set out in Table 3-2.

3.1.9.8.2 Given the variability in the type, form, and function of *significant wildlife habitat* existing on the landscape, the width of the required minimum *buffer* is to be established through the completion of an *environmental impact study* or *subwatershed study*.

**Table 3-2: Minimum Prescribed Buffer to a Natural Heritage Feature and Area outside of Settlement Areas and Outside a Provincial Natural Heritage System**

| ***Natural Heritage Feature and Area*** | **Minimum *Buffer*** |
|---|---|
| *Provincially Significant Wetland* | 30 metres |
| *Significant Woodland* | 20 metres |
| *Other Woodland* | 10 metres |
| *Significant Valleyland* | 15 metres |
| *Life Science Areas of Natural and Scientific Interest* | 20 metres |

3.1.9.8.3 *Development* or *site alteration* shall not be permitted in the minimum *buffer* set out in Table 3-2, with the exception of that described in Policy 3.1.9.5.3 or infrastructure serving the agricultural sector, unless it has been demonstrated through the preparation of an *environmental impact study* that there will be no *negative impacts* and the buffer will continue to provide the *ecological function* for which it was intended.

3.1.9.8.4 Notwithstanding Policies 3.1.9.7.1 and 3.1.9.8.3, the following types of minor construction is permitted within *adjacent lands* set out in Table 3-1 and minimum *buffers* set out in Table 3-2 provided there is no alternative, without an *environmental impact study* and/or *hydrologic evaluation*:

a) new buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified uses* below 200 $m^2$;

b) expansions to existing buildings and structures for *agricultural uses*, *agriculture-related uses*, or *on-farm diversified uses* below 50% of the size of the original building, provided the expansion is less than 200 $m^2$;

c) new accessory buildings to a residential use (garage, workshop, etc.) below 50 $m^2$;

d) expansions to existing accessory buildings for a residential use below 50% of the size of the original building;

e) expansions to existing residential buildings below 50% of the

size of the original building; and

f) reconstruction of an existing residential dwelling of the same size in the same location.

3.1.9.8.5 Notwithstanding Policy 3.1.9.8.3, outside of *settlement areas*, consideration can be given to including passive recreational uses such as trails in buffers if it has been demonstrated that the buffer will continue to provide the *ecological function* for which it was intended.

### 3.1.9.9. Buffers in Settlement Areas

3.1.9.9.1 Within *settlement areas*, mandatory *buffers* from *natural heritage features and areas* are required. The width of an ecologically appropriate *buffer* would be determined through an *environmental impact study* and/or *hydrologic evaluation* at the time an application for *development* or *site alteration* is made, or through the completion of a *subwatershed study* in support of a secondary plan or other large scale development. The width of the *buffer* would be based on the sensitivity of the *ecological functions* from the proposed *development* or *site alteration*, and the potential for impacts to the feature and *ecological functions* as a result of the proposed change in land use.

**Minimum Buffer and Mandatory Buffers**

For a minimum *buffer*, the policies of this Plan state what minimum *buffer* is required. The *buffer* width cannot be less than the required minimum, but may be larger as determined through an *environmental impact study, hydrologic evaluation,* or *subwatershed study.*

For a mandatory *buffer*, the policies of this Plan state that a *buffer* is required, but would not state any minimum for the *buffer* width. That determination would be made through an *environmental impact study, hydrologic evaluation,* or *subwatershed study.*

3.1.9.9.2 *Development or site alteration* shall not be permitted in the mandatory *buffer*, with the exception of that described in Policy 3.1.9.5.3 or infrastructure serving the agricultural sector unless it has been demonstrated through the preparation of an *environmental impact study* that there will be no *negative impacts* and the buffer will continue to provide the *ecological function* for which it was intended.

3.1.9.9.3 Notwithstanding any other policy in this Plan, the Conservation Authority has its own buffer requirements for watercourses which shall apply. Reductions in any buffer required by the Conservation Authority may be considered in *settlement areas* where supported by a site-specific study that is approved by the Local Area Municipality, the Region, and the Conservation Authority.

3.1.9.9.4 Notwithstanding Policy 3.1.9.9.2, within *settlement areas*, consideration can be given to including passive recreational uses such as trails in *buffers,* provided an appropriate *buffer* width is maintained, as determined through the *environmental impact study* and/or *hydrologic evaluation*.

### 3.1.10. Key Hydrologic Areas, Key Hydrologic Features, and Other Important Water Resources

3.1.10.1. *Development* or *site alteration* shall not be permitted unless it can demonstrated that it will not have *negative impacts* on:

a) the quantity and quality of water in *key hydrologic areas*, *key hydrologic features*, *sensitive surface water features*, and *sensitive ground water features*;

b) the *hydrologic functions* of *key hydrologic areas*, *key hydrologic features*, *sensitive surface water features*, and *sensitive ground water features*;

c) the interaction and linkage between *key hydrologic areas*, *key hydrologic features*, *sensitive surface water features*, and *sensitive ground water features* and other components of the *natural environment system*;

d) the natural hydrologic characteristics of watercourses such as base flow, form and function, and *headwater drainage areas*;

e) natural drainage systems and *shorelines areas*; and

f) flooding or erosion.

3.1.10.2. Mitigative measures and/or alternative development approaches may be required in order to protect, improve, or enhance *key hydrologic areas*, *key hydrologic features*, *sensitive surface water features*, *sensitive ground water features*, and their *hydrologic functions*. The Region, Local Area Municipality, or the Conservation Authority may

require establishment of appropriate development conditions and monitoring programs through the development approval process.

3.1.10.3. The Region encourages the restoration of natural stream form and flow characteristics through the development approval process where appropriate.

**Role of Vegetated Shorelines**

Naturally vegetated shorelines play an important role buffering waterbodies from erosion, siltation, and nutrient migration and are critical to the protection of water quality in the region.

3.1.10.4. As much of the area adjacent to the shorelines of *watercourses* and Lakes Erie and Ontario as possible shall be maintained as a naturally vegetated shoreline where new lots are being created, where vacant lots are being developed, and when redevelopment on existing lots is proposed. Specifically:

a) the vegetated shoreline should span the entire water frontage and be at least 15 metres in depth from the normal high water mark;

b) where *redevelopment* is proposed, the vegetated shoreline should be achieved through ecological enhancements and the regeneration of natural features to the extent feasible; and

c) on waterfront lots, outside of the vegetated shoreline area, every effort shall be made to retain existing native vegetation where possible and to augment existing vegetation where needed.

3.1.10.5. *Groundwater* across the region is an important resource to all Niagara residents and specifically a source of potable drinking water to many rural residents.

A specific example is the South Niagara Aquifer, which is considered to be a *highly vulnerable aquifer*. It is an important, vital source of water to rural residents in Niagara from Wainfleet, through Port Colborne to Fort Erie.

3.1.10.6. *Key hydrologic areas* are part of the *natural environment system* and are mapped as a separate overlay on Schedule C3.

3.1.10.7. *Development* or *site alteration* shall not have *negative impacts* on *key hydrologic areas* or their *hydrologic functions*. In areas where *development* and *site alteration* could have *negative impacts* on

ground water quality or quantity the Region or Local Area Municipality shall require further review of potential impacts through the completion of a *subwatershed study* or through the completion of a *hydrologic evaluation* during the review of an application for *development* or *site alteration*.

3.1.10.8. Outside of *settlement areas*, proposals for large-scale *development* proceeding by way of secondary plan, plan of subdivision, vacant land plan of condominium or site plan may be permitted within a *key hydrologic area* where it is demonstrated through a *hydrologic evaluation* that the *hydrologic functions*, including the *quality* and *quantity of water*, of these areas will be protected and, where possible, enhanced or restored through:

a) the identification of planning, design, and construction practices and techniques;

b) meeting other criteria and direction set out in a *watershed plan or subwatershed studies* if applicable; and

c) meeting any applicable Provincial standards, guidelines, and procedures.

3.1.10.9. Policy 3.1.10.8 does not apply to *major development* in the Greenbelt Plan area that is a new or expanding building or structure for *agricultural uses, agriculture-related uses* or *on-farm diversified uses* where the total impervious surface does not exceed 10 per cent of the lot.

3.1.10.10. The Region encourages Local Area Municipalities to require site plan approval on all lots within *key hydrologic areas* where *individual on-site sewage services* are proposed.

### 3.1.11. Other Woodlands

3.1.11.1. *Other woodlands* are identified, and considered a *natural heritage feature and area* in all geographic areas of the region. The location of known *other woodlands* is shown on Schedule C2.

3.1.11.2. *Development* or *site alteration* shall not be permitted in *other woodlands* unless it has been demonstrated through the preparation of an *environmental impact study* that there will be no *negative impacts* on the *other woodland* or its *ecological functions*.

3.1.11.3. Outside of *settlement areas* *other woodlands* are subject to a 10 metre minimum *buffer* in accordance with Policy 3.1.9.8.1.

3.1.11.4. Inside of *settlement areas* *other woodlands* are subject to an ecologically appropriate *buffer* to be determined at the time an application is made for *development* or *site alteration* in accordance with Policy 3.1.9.9.1.

3.1.11.5. Notwithstanding Policies 3.1.11.1 to 3.1.11.4, policies related to *other woodlands* do not apply to new or expanding *mineral aggregate operations*.

3.1.11.6. Notwithstanding Policies 3.1.11.1 to 3.1.11.4, policies related to *other woodlands* do not apply to new or expanding buildings or structures for *agricultural uses*, *agriculture-related uses* and *on-farm diversified uses* if they are located, designed, and constructed to minimize impacts on the *natural environment system.*

**Woodland By-Law**

In addition to policies of this Plan, the Region also maintains and enforces a Woodland Conservation By-law (No. 2020-79) which governs the protection and preservation of woodlands in Niagara. The by-law was enacted in accordance with applicable Provincial legislation. The Woodland Conservation By-law applies to:

- woodlands that are 1.0 hectare or more in size;
- woodlands having an area of less than 1.0 hectare upon delegation of such authority to the Region by a Local Area Municipality in Niagara; and
- heritage and significant community trees identified and designated by the Council of a Local Area Municipality, but only upon delegation of such authority to the Region.

### 3.1.12. Fish Habitat

3.1.12.1. *Development* or *site alteration* shall not be permitted in *fish habitat* except in accordance with *Federal and Provincial requirements*. In order to determine whether *fish habitat* is present, proponents of *development* or *site alteration* shall be required to screen for the presence of *fish habitat* to the satisfaction of the Region.

3.1.12.2. If *fish habitat* is determined to be present, a fish habitat assessment undertaken by a qualified professional shall be required for *development* or *site alteration* within or adjacent to *fish habitat. Development* or *site alteration* may be exempt from this requirement provided that:

a) the *development* satisfies *Federal and Provincial requirements*

or has been specifically authorized by the appropriate approval authority; and

b) the regulated setback, vegetated shoreline, stormwater management, and slope related policies of this Plan are met and the proposal is not for major *development*.

### 3.1.13. Habitat of Endangered Species and Threatened Species

3.1.13.1. *Development* or *site alteration* shall not be permitted in *habitat* of *endangered species and threatened species*, except in accordance with *Provincial and Federal requirements*.

3.1.13.2. Where the potential for the *habitat of endangered species and threatened species* is identified, the Provincial Ministry with jurisdiction shall be contacted by the proponent for technical advice and to delineate and confirm the presence of habitat.

3.1.13.3. In order to determine the presence of, and to assess the impacts that proposed development and activities may have on the *habitat of endangered species* and *threatened species*, a site assessment by a qualified professional is generally required to be completed using accepted protocols. The assessment shall identify whether the habitat is present and whether the proposed activities will have any impact on endangered species and threatened species or their habitat. The site assessment may be combined with a broader *environmental impact study*. The Province should be contacted for further direction regarding site-specific proposals.

**Habitat of Endangered Species and Threatened Species**

The *habitat of endangered species and threatened species* is subject to the Endangered Species Act, 2007 (ESA). It is the responsibility of the Province to implement this Act. The protection of *habitat of endangered species and threatened species* is necessary to minimize and prevent their loss from Ontario and to preserve biodiversity. The *habitat of endangered species and threatened species* is an important component of the Region's *natural environment system* but is not a mapped feature. It is identified through the completion of either a *subwatershed study* or *environmental impact study* at the time there is an application for *development* or *site alteration*.

3.1.13.4. It is the responsibility of a proponent to work directly with the Province to determine that the Endangered Species Act has been, or

will be, complied with as a condition of any permit received from the Provincial Ministry with jurisdiction.

### 3.1.14. Provincially and Regionally Significant Earth Science Areas of Natural and Scientific Interest

3.1.14.1. *Development* and *site alteration* shall not be permitted within a *provincially* or *regionally significant earth science area of natural and scientific interest* or within 50 metres of the feature unless it can be demonstrated that there will be no *negative impacts* on the geologically significant features, or the interpretative and scientific value for which the *earth science area of natural* and *scientific interest* was identified. Applications for *development* and *site alteration* which have the potential for *negative impacts* shall be accompanied by an earth science heritage evaluation which shall be reviewed in consultation with the Provincial Ministry with jurisdiction. The earth science heritage evaluation shall:

a) identify planning, design and construction practices that will ensure protection of the geological or geomorphological attributes for which the earth science *area of natural and scientific interest* was identified; and

b) determine whether a *buffer* is required, and if so, specify the width of that *buffer.*

3.1.14.2. Notwithstanding Policy 3.1.14.1, policies related to *regionally significant earth science areas of natural and scientific interest* do not apply to new or expanding *mineral aggregate operations*.

### 3.1.15. Supporting Features and Areas

3.1.15.1. *Supporting features and areas* are lands that have been restored or have the potential of being restored, and include:

a) grasslands, thickets, and meadows that support the *ecological functions* of adjacent *key natural heritage features*, *key hydrological features*, and/or *natural heritage features and areas*;

b) *valleylands*, which includes lands that may have *ecological* and/or *hydrological functions*, that are not *significant valleylands*, and are not the site of a *permanent or intermittent stream* that is regulated by the Conservation Authority;

c) *wildlife habitat* that is not considered to be *significant wildlife habitat*; and

d) *enhancement areas*, which are the subject of Section 3.1.16 of this Plan.

3.1.15.2. The presence of *supporting features and areas* shall be screened for by a proponent when an *environmental impact study* and/or *hydrologic evaluation* is required to support a *development* or *site alteration* application both inside and outside of *settlement areas* or when an *subwatershed study* is being undertaken.

3.1.15.3. If *supporting features and areas* are identified through an *environmental impact study*, *hydrologic evaluation,* or *subwatershed study* an evaluation shall determine:

a) the extent of the *supporting feature o*r *area* along with its *ecological functions* and relationship to nearby *key natural heritage features*, *key hydrological features* and/or *natural heritage features and areas***;**

b) whether the *supporting feature or area* should be protected because it supports the *ecological* and/or *hydrological functions* of nearby *key natural heritage features***,** *key hydrological features* and/or *natural heritage features and areas*; and

c) conditions to be attached to the approval of the proposed *development* or *site alteration*.

### 3.1.16. Enhancement Areas

3.1.16.1. *Enhancement areas* are intended to consist of *natural self-sustaining vegetation* that increase the ecological *resilience* and function of individual *key natural heritage features, key hydrological features* and/or *natural features and areas,* or groups of such features, by:

a) increasing the size of *key natural heritage features*, *key hydrological features* and/or *natural heritage features and areas*;

b) connecting *key natural heritage features*, *key hydrological features* and/or *natural heritage features and areas* to create larger contiguous natural areas;

c) improving the shape of *key natural heritage features*, *key hydrological features* and/or *natural features and areas* to increase interior habitat conditions; or

d) including critical function zones and important catchment areas for sustaining *ecological functions*.

3.1.16.2. The presence of potential *enhancement areas* shall be screened for by a proponent when an *environmental impact study* and/or *hydrologic evaluation* is required to support an application for *development* and *site alteration* both inside and outside of *settlement areas* or when a *subwatershed study* is being undertaken.

3.1.16.3. When carrying out an *environmental impact study*, *hydrologic evaluation,* or *subwatershed study* to determine whether *enhancement areas* should be identified within or adjacent to a feature, an evaluation shall be completed that:

a) assesses the potential ecological benefit of an *enhancement area* to the nearby *key natural heritage feature***,** *key hydrological feature* and/or *natural heritage feature and area.* An example, would be an enhancement area to fill in a gap, close in an indent, or connect two separate features.

b) considers the most appropriate shape/extent of an *enhancement area* so that the *ecological functions* of the nearby *key natural heritage feature, key hydrological feature* and/or *natural heritage feature and area* are enhanced;

c) considers how the function and spatial extent of an *enhancement area* can be incorporated into the design and layout of the proposed *development*; and

d) assesses the potential for compatible uses such as *stormwater management facilities* within the *enhancement area* to ensure that the intended *ecological function* of the *enhancement area* is achieved.

3.1.16.4. In a case where an *enhancement area* is identified in accordance with Policy 3.1.16.2, the lands within the *enhancement area* shall be planted and left as *natural self-sustaining vegetation*. The *enhancement area* may also be designed to include other compatible land uses and infrastructure, such as stormwater management ponds, if it can be demonstrated that the long-term *ecological function* of the *enhancement area* would be retained.

### 3.1.17. Linkages

3.1.17.1. Large, medium, and small *linkages* outside of *settlement areas* and outside of the *Provincial natural heritage system* and small *linkages* inside of *settlement areas* which are identified between *natural heritage features and areas, key natural heritage features,* and *key hydrologic features* are shown on Schedule C2.

3.1.17.2. Only *linkages* which have been mapped as part of the *natural environment system* are shown on Schedule C2. Opportunities for additional, ecologically appropriate, *linkages* shall be screened for when a *subwatershed study* is being completed in support of a secondary plan.

3.1.17.3. When a *subwatershed study* is being undertaken, or when *development* or *site alteration* is proposed in, or within 30 metres of a *linkage* shown on Schedule C2, an evaluation shall be completed that:

a) assesses the ecological features and functions of a *linkage*, including its vegetative, wildlife, and/or landscape features or functions;

b) identifies appropriate boundaries/widths that permit the movement of wildlife between nearby *key natural heritage features*, *key hydrological features,* and/or *natural heritage feature and areas*;

c) describes the *ecological functions* the *linkage* is intended to provide and identifies how these *ecological functions* can be maintained or enhanced within a development proposal;

d) assesses the potential for compatible uses including, but not limited to, stormwater management ponds, passive recreational uses, and trails within the *linkage* to determine how the intended *ecological functions* of the *linkage* can be maintained or enhanced;

e) assesses potential impacts on the *linkage* as a result of the *development*; and

f) makes recommendations on how to protect, enhance, or mitigate impacts on the *linkage* and its *ecological functions* through avoidance and planning, design, and construction practices.

3.1.17.4. Possible outcomes of an evaluation carried out in accordance with Policy 3.1.17.3 include:

a) the incorporation of the *linkage* into the *development*, such that *development* would not occur on those lands;

b) the incorporation of the *linkage* into the *development*, with linear *infrastructure,* and other *infrastructure* and associated small scale structures permitted in the *linkage* in such a manner that

protects the long-term *ecological function* of the *linkage*;

c) the refinement of the location, form, size, shape, or *ecological function* of the *linkage*; or

d) the elimination of the *linkage* based on area or site-specific analysis. If a *linkage* is proposed to be eliminated it must be demonstrated to the satisfaction of the Region that:

i) maintaining a *linkage* is not necessary for ecological reasons;

ii) the loss of the *linkage* will not decrease the overall ecological *connectivity* in the area; and

iii) the *linkage* is not required to support the long-term sustainability of the overall *natural environment system*.

3.1.17.5. In a case where all or part of a *linkage* area is retained in accordance with Policy 3.1.17.4 a), b), or c), the lands within the *linkage* area shall be planted and left as *natural self-sustaining vegetation* (except for those lands used for *infrastructure* - if permitted) or remain in agricultural use. The *linkage* may also be designed to permit compatible uses as evaluated in Policy 3.1.17.3 so long as the *ecological function* of the *linkage* is maintained.

3.1.17.6. Notwithstanding Policy 3.1.17.3 the full range of existing and new *agricultural uses*, *agriculture-related uses*, *on-farm diversified uses*, and *normal farm practices* are permitted within a mapped *linkage* shown on Schedule C2.

3.1.17.7. Notwithstanding Policy 3.1.17.3, the following types of minor construction is permitted within a *linkage* shown on Schedule C2, provided there is no alternative, without a requiring an evaluation:

a) new accessory buildings to a residential use (garage, workshop, etc.) below 50 $m^2$;

b) expansions to existing accessory buildings to a residential use below 50% of the size of the original building;

c) expansions to existing residential buildings below 50% of the size of the original building; and

d) reconstruction of an existing residential dwelling of the same size in the same location.

3.1.17.8. Notwithstanding the above, the policies of Section 3.1.17 do not apply to new or expanding *mineral aggregate operations*

### 3.1.18. Natural Features that have been Disturbed

3.1.18.1. Where a feature was identified as a *significant woodland* or *other woodland* as of the date of approval of this Plan, and no longer meets the definition of *significant woodland* or *other woodland* because of either a natural or anthropogenic disturbance, the feature shall retain its status as either a *significant woodland* or *other woodland* and the policies of this plan shall continue to apply.

3.1.18.2. Where a *natural heritage feature and area, key natural heritage feature,* or *key hydrologic feature* has been removed without authorization in advance of making, or prior to approval of, an application for *development* or *site alteration*, Regional, Local, and/or Conservation Authority staff shall use all available information to determine the limit and classification of the feature that existed, and restoration of the feature shall be required through the approval of the application for *development* or *site alteration*.

### 3.1.19. Cultural and Regenerating Woodlands

3.1.19.1. The *ecological functions* of some *significant woodlands* or other *woodlands* in *settlement areas* may be substantially compromised as a result of prior land use activity and as a result would be difficult to restore and/or manage as a native *woodland* in an urban setting. In these circumstances, consideration can be given to reclassifying all or a portion of such a *significant woodland* or *other woodland* as a *cultural and regenerating woodland*.

3.1.19.2. If it has been determined, through the completion of an *environmental impact study*, that a *woodland* has met all of the criteria outlined in Schedule L to be reclassified as a *cultural* and *regenerating woodland* to the satisfaction of the Region, the removal of the treed area, or a portion thereof, may be permitted subject to preparing a *woodland enhancement plan* that demonstrates an enhancement in *woodland* area is achieved, either on the same property or in a reasonable proximity..

3.1.19.3. *Woodlands* (including plantations) established and/or managed for the purpose of restoring a native tree community cannot be classified as *cultural* and *regenerating woodlands*.

### 3.1.20. Enhancements to the Natural Environment

3.1.20.1. The Region supports enhancements to the *natural environment system* to support *ecological functions* and improve *ecological integrity* of the *natural environment system*. Enhancements can be as

a result of a range of specific actions being undertaken by a landowner, developer, or public agency.

3.1.20.2. Where the preparation of a *subwatershed study* or an *environmental impact study* is required, the study shall demonstrate how enhancements to *ecological function*, *ecological integrity*, or biodiversity of the *natural environment system* can be achieved, and will be implemented, through for example:

a) increases in the spatial extent of a feature or features;

b) increases in biological and habitat diversity;

c) enhancement of ecological system function;

d) enhancement of *wildlife habitat*;

e) enhancement or creation of *wetlands*, water systems or *woodlands*;

f) enhancement of riparian corridors;

g) enhancement of ecological services;

h) enhancement of *groundwater* recharge areas; and

i) establishment or enhancement of *linkages* or connectivity between *key natural heritage features*, and/or *natural heritage features and areas*.

### 3.1.21. Aquatic Species at Risk

**Aquatic Species at Risk**

*Key natural heritage features, key hydrological features,* and *natural heritage features and areas* include waters supporting aquatic species at risk and their residences and critical habitats.

3.1.21.1. In accordance with Federal requirements, where *development or site alteration* is proposed that could have an impact on aquatic species at risk an *environmental impact study* shall be required to demonstrate that:

a) all reasonable alternatives have been considered to reduce and minimize impacts to natural features and *ecological functions*, and the best solution has been adopted; and

b) the proposed *development* or *site alteration* activities will not jeopardize the survival, recovery and conservation of species at risk protected in Schedule 1 of the Species at Risk Act, including their residences and critical habitat.

### 3.1.22. Cumulative Impacts

3.1.22.1. The consideration of cumulative impacts shall be required when an *environmental impact study*, *hydrologic evaluation*, or *subwatershed study* is undertaken.

3.1.22.2. Where cumulative impacts are being considered, the proponent shall be required to provide an overview of previous studies as provided by the Region, Local Area Municipality, or the Conservation Authority (if available), related to development impacts on the same or adjacent feature as it relates to impacts on the *natural environment system*.

**Considering Cumulative Impacts**

Multiple environmental stressors can impact environmental, social and economic systems (i.e., *climate change*, invasive species, habitat fragmentation, etc.) and are often dynamic and varying. Cumulative impacts of development can combine with other stressors to have significant negative consequences for ecosystems and environmental resilience, noise, air quality and social and economic systems over time.

Considering cumulative impacts from development is critical for ensuring long-term environmental health and resiliency and more broadly speaking on the capacity of the *natural environment system* to accommodate development from both an environmental and social perspective.

### 3.1.23. Natural Hazards

3.1.23.1. *Development* shall generally be directed, in accordance with guidance developed by the Province (as amended from time to time), to areas outside of:

a) *hazardous lands* adjacent to the shorelines of Lake Erie and Lake Ontario which are impacted by *flooding hazards, erosion hazards* and/or *dynamic beach hazards*;

b) hazardous lands adjacent to river, stream, and small inland lake systems which are impacted by flooding hazards and/or erosion

hazards, and

c) hazardous sites.

3.1.23.2. *Development* or *site alteration* shall not be permitted within:

a) the dynamic beach hazard;

b) defined portions of the flooding hazards along the Niagara River;

c) areas that would be rendered inaccessible to people and vehicles during times of *flooding hazards*, erosion hazards and/or *dynamic beach hazards*, unless it has been demonstrated that the site has safe access appropriate for the nature of the *development* and the natural hazard; and,

d) a *floodway* regardless of whether the area of inundation contains high points of land not subject to flooding.

**Primary Mandate for Natural Hazards**

The Niagara Peninsula Conservation Authority is responsible for regulating *development* and *site alteration* in natural hazards, excluding within *hazardous forest types for wildland fire*. *Development* or *site alteration* proposed within or adjacent to a natural hazard (whether it requires Planning Act approval or not) requires approval of the Niagara Peninsula Conservation Authority.

3.1.23.3. Notwithstanding Policy 3.1.23.2, *development* or *site alteration* may be permitted in certain areas associated with the flooding hazard along *river, stream* and *small inland lake systems*:

a) in those exceptional situations where *a Special Policy Area* has been approved. The designation of a *Special Policy Area*, and any change or modification to the official plan policies, land use designations or boundaries applying to *Special Policy Area* lands, must be approved by the Ministers of the Provincial Ministries with jurisdiction prior to the approval authority approving such changes or modifications; or

b) where the *development* is limited to uses that by their nature must locate within the *floodway*, including flood and/or erosion control works or minor additions or passive non-structural uses that do not affect flood flows.

3.1.23.4. *Development* shall not be permitted in *hazardous lands* and *hazardous sites* where the use is:

a) an *institutional use* including hospitals, long-term care homes,

retirement homes, pre-schools, school nurseries, day cares, and schools;

b) an *essential emergency service* such as that provided by fire, police, and ambulance stations and electrical substations; or

c) uses associated with the disposal, manufacture, treatment, or storage of *hazardous substances*.

3.1.23.5. Where a two-zone concept for *flood plains* is applied, *development* and *site alteration* may be permitted in the *flood fringe*, subject to appropriate flood proofing to the *flooding hazard* elevation or another *flooding hazard* standard approved by the Provincial Ministry with jurisdiction.

3.1.23.6. Further to Policy 3.1.23.5, and except where prohibited in Policy 3.1.23.2 and 3.1.23.4, *development* and *site alteration* may be permitted in those portions of *hazardous lands* and *hazardous sites* where the effects and risk to public safety are minor and could be mitigated in accordance with Provincial standards, the following criteria will be demonstrated:

a) *development* and *site alteration* are carried out in accordance with flood proofing, protection works, and access standards;

b) vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion, and other emergencies;

c) new hazards are not created and existing hazards are not aggravated; and

d) no adverse environmental impacts will result.

3.1.23.7. *Hazardous lands* shall be identified in mapping in Local official plans and included in appropriate zones in Local zoning by-laws to protect public health and safety in accordance with Provincial direction and the policies of this Plan. The extent of natural hazards may be refined by Local Area Municipality on their own initiative or in response to *development* applications, as appropriate, and as approved by the Conservation Authority.

### 3.1.24. Wildland Fires

3.1.24.1. *Developmen*t shall generally be directed to areas outside of lands that are unsafe for *development* due to the presence of *hazardous forest types for wildland fire*.

3.1.24.2. *Development* may be permitted in lands with *hazardous forests types for wildland fire* where the risk is mitigated in accordance with *wildland fire* assessment and mitigation standards.

3.1.24.3. The Region and/or Local Area Municipalities may request an assessment undertaken by a qualified professional during the appropriate time of year and using accepted protocols to determine the wildland fire risk and required mitigation measures where *development* is proposed. The Region may prepare a map to identify areas of potential wildfire risk.

3.1.24.4. Mitigation measures required as per Policy 3.1.24.2 to support development in areas shall not negatively impact *key natural heritage features*, *key hydrologic features* and/or *natural heritage features and areas*.

### 3.1.25. Woodland Cover

3.1.25.1. *Woodland* cover shall be maintained or enhanced in the region by 2051.

3.1.25.2. The Region supports opportunities for enhancement of *woodland* cover, which may be achieved through a number of means including, but not limited to:

a) the development and implementation of a Regional Greening Initiative;

b) Regional and Local Area Municipal efforts of tree planting, as well as tree planting programs of the Conservation Authority and other public or private organizations;

c) private land stewardship that includes protection of existing tree cover and tree planting efforts;

d) land acquisition or dedication of private land to the Region, Local Area Municipalities, Conservation Authority, or other public or private organizations for tree planting and reforestation efforts;

e) identification of *woodland* enhancement areas through the completion of *watershed plans*, *subwatershed studies,* or similar plans;

f) required tree and *woodland* protection and planting through the application process for *development* or *site alteration*; and

g) the development of a region-wide strategy for land protection,

preservation and securement.

### 3.1.26. Wetland Cover

3.1.26.1. *Wetland* cover shall be maintained or enhanced in the region by 2051.

3.1.26.2. The Region supports opportunities to maintain and restore *wetland* functions at a *watershed* and *subwatershed* scale based on historic reference conditions.

### 3.1.27. Riparian Vegetation Cover

3.1.27.1. Naturally vegetated riparian areas adjacent to *permanent* and *intermittent streams*, *wetlands*, and other waterbodies shall be maintained or enhanced in the region to support the protection and maintenance of aquatic functions.

3.1.27.2. The Region supports opportunities for enhancement of riparian vegetation cover which may be achieved through a number of means including:

a) requiring a naturally vegetated shorelines along *permanent* and *intermittent streams* and adjacent to *wetlands* and waterbodies as part of an application for *development* or *site alteration*;

b) working with private landowners and the agricultural community to support stewardship efforts such as planting and maintaining riparian vegetation adjacent to watercourses;

c) land acquisition or dedication of private land to the Region, Local Area Municipalities, Conservation Authority, or other public or private organizations for planting and restoration efforts; and

d) the development of a Region-wide strategy for land protection, preservation and securement.

**Addressing the Desire to Protect and Enhance Woodland Wetland, and, Riparian Cover in the Region**

Official plans are intended to be aspirational in their scope. The policies in this section establish protections and enhancements for *woodland, wetland* and riparian vegetation cover in the region. Implementation of these goals is primarily achieved through a range of programs that fall outside the Niagara Official Plan, such as a Regional Greening Initiative, and through private landowner stewardship.

Official plans contribute to protection and enhancement by informing the preparation of studies for new *development* and *site alteration* and providing policies for how existing natural areas must be protected through the development approval process.

### 3.1.28. Native and Non-Native Species

3.1.28.1. The Region requires individuals and agencies to use native species appropriate to the locality when planting within the *natural environment system* or contiguous to elements of the *natural environment system.* To provide guidance, the Region may prepare a list of non-native species considered invasive and unsuitable for such use and/or a list of adequate native species.

3.1.28.2. Local Area Municipalities are encouraged to require the planting of appropriate native species as conditions of all other *development* and *site alteration* applications.

3.1.28.3. The Region encourages the use of native species plantings at Regional and Local Municipal facilities and along transportation and utility corridors which fall outside the development approval process.

### 3.1.29. Invasive Species

3.1.29.1. The Region acknowledges and supports the role of the Local Area Municipalities, Conservation Authorities, the Niagara Parks Commission, other Provincial agencies, and conservation organizations in carrying out invasive species management.

**Invasive Species**

A major issue facing management of the natural environment within the region is the threat of non-native species invading *woodlands*, *wetlands* and other natural areas. If left unmanaged, invasive species pose a risk to the *ecological integrity* of the region's natural areas through the displacement of native species and the subsequent alteration to the genetic diversity and structure of local native species populations.

3.1.29.2. The Region also supports and encourages the Local Area Municipalities in consultation with the Conservation Authority to develop policies and programs that require or promote measures to eliminate and/or manage invasive species and discourage the use of non-native invasive species plantings in new developments adjacent to the *natural environment system*.

3.1.29.3. The Region may endeavour to prepare an Invasive Species Strategy in conjunction with the Local Area Municipalities, Conservation Authorities, the Niagara Parks Commission, other Provincial agencies, and conservation organizations which would identify goals, objectives and a strategic direction to support the implementation of invasive species management throughout the Region.

### 3.1.30. Transition and Implementation

3.1.30.1. Once the policies in this Plan on the *natural environment system* have been approved in accordance with the Planning Act, all subsequent Planning Act decisions shall conform to this Plan, unless this Plan explicitly states otherwise.

3.1.30.2. Where a site plan pursuant to Section 41 of the Planning Act has been approved, that approval can be implemented in accordance with the Local, Regional, and Provincial polices that existed when the site plan was approved.

3.1.30.3. **Approved Studies and Existing Development Approvals**

3.1.30.3.1 Where a formal pre-consultation meeting has been completed within 1 year prior to the approval of this Plan, and where the requirements for an *environmental impact study* or similar study has been established through a signed pre-consultation agreement that has not expired, the *environmental impact study* may be completed and evaluated in accordance with the Local, Regional, and Provincial polices that existed at the time pre-consultation meeting was completed, provided a complete application is submitted within 2 years of the approval of this plan.

3.1.30.3.2 Where an *environmental impact study* or similar study has been formally accepted by Local or Regional planning staff, but the application for *development* or *site alteration* has yet to be approved, the application may be approved in accordance with the approved study as long as the study remains valid in accordance with the Region's Environmental Impact Study Guidelines.

3.1.30.3.3 Where lands have been draft approved for development by way of plan of subdivision or plan of condominium in a *settlement area*, that approval can be implemented in accordance with the Local, Regional, and Provincial polices that existed when the lands were draft approved and any conditions that were established at the time of approval.

3.1.30.3.4 If a draft plan approval is proposed to be extended, the Region may review the findings and recommendations made in the studies that supported the initial draft plan approval and may request that the studies be updated to determine if changes to the layout of the draft plan and/or any of the conditions need to be made before the extension request is granted.

3.1.30.3.5 The Region encourages the Local Area Municipalities to review older, existing draft plan approvals to determine if updates are required.

3.1.30.3.6 If a draft plan approval lapses or is withdrawn, any subsequent application shall conform to this Plan.

3.1.30.3.7 Where major modifications to a draft plan are proposed, the revised draft plan shall be designed to reduce impacts on the *natural environment system.*

3.1.30.4. **Ongoing and Approved Secondary Plans**

3.1.30.4.1 Where a secondary plan has been approved after July 1, 2012, those portions that are not subject to a draft approved plan of subdivision or plan of condominium shall be approved in accordance with the approved mapping and policies of the secondary plan.

3.1.30.4.2 Where a secondary plan was approved prior to July 1, 2012, those portions that are not subject to a draft approved plan of subdivision or plan of condominium shall be subject to the mapping and policies of this plan. Conformance with the mapping and policies of this Plan be done through an update to the secondary plan or through the approval of individual plans of subdivision or plans of condominium, as determined appropriate by the Local Area Municipality.

3.1.30.4.3 For secondary plans in process, the mapping and policies of this Plan shall be considered in the work program and Local official plan amendment, to the satisfaction of the Region.

3.1.30.5. **Previous Site-Specific Approvals in the Greenbelt Plan Area**

3.1.30.5.1 Where the Regional Official Plan or a Local official plan was amended prior to December 16, 2004 to specifically designate land use(s), this approval may continue to be recognized through any further applications required under the Planning Act or the Condominium Act, 1998 to implement the official plan approval, and provided these additional approvals are required to implement the initial decision, these further approvals are not required to conform with the Greenbelt Plan.

3.1.30.5.2 Where a zoning by-law was amended prior to December 16, 2004 to specifically permit land use(s), this approval may continue to be recognized through any further applications required under the

Planning Act or the Condominium Act, 1998 to implement the use permitted by the zoning by-law are not required to conform to the Greenbelt Plan.

3.1.30.6. **Incorporating the Natural Environment System at the time of Local Official Plan Conformity**

3.1.30.6.1 Local Area Municipalities shall incorporate the mapping and policies of the *natural environment system* into their Local official plans in a manner that implements this Plan.

3.1.30.6.2 While the limits of the *Provincial natural heritage system* shown on Schedule C1 to this Plan can only be modified through a *municipal comprehensive review*, through the process of conformity Local Area Municipalities may refine the limits of other features and components of the *natural environment system* within Regional jurisdiction in their Local official plans on the basis of updated information and/or detailed studies in consultation with the Region.

3.1.30.7. **Incorporating the Natural Environment System into Local Zoning By-Laws**

3.1.30.7.1 Local Area Municipalities shall incorporate the mapping and policies of the *natural environment system*, as determined through the Local official plan conformity in Section 3.1.30.6, into their Local zoning by-laws, in a manner that implements this Plan.

3.1.30.7.2 Where an individual feature or component of the *natural environment system* includes a *vegetation protection zone* or a minimum *buffe*r, both shall also be zoned in a manner that implements this Plan.

3.1.30.7.3 Where a minimum *buffer* has not been prescribed in accordance with this Plan, a *buffer* is not required to be zoned in a Local zoning by-law at the time of initial implementation, and instead should be zoned at the time a site-specific zoning by-law amendment is proposed.

### 3.1.31. Land Securement Strategy

3.1.31.1. The Region may work with the Local Area Municipalities and other public agencies and/or non-profit land trust organizations to develop and implement a land securement strategy that would result in the transfer of private lands with natural heritage attributes into public ownership. This policy does not imply that *key natural heritage features*, *key hydrologic features* or *natural heritage features* and

*areas* or other components of the *natural environment system* will be purchased by the Region or other public or non-profit agencies. In the event that lands are not transferred to public ownership, then the lands should remain under a single private ownership.

3.1.31.2. The Region and the Local Area Municipalities shall consider opportunities to obtain, through dedication, lands with natural heritage attributes through the development approval process.

3.1.31.3. Arrangements for the conveyance of components of the *natural environment system* into public ownership shall be undertaken before or concurrent with the approval of development applications through the development approval process.

### 3.1.32. Factors to be Considered when Reviewing Site Plan or Community Planning Permits in the Natural Environment System

3.1.32.1. Where site plan control or a community planning permit is required by the Local Area Municipality for *development* in the *natural environment system,* Local Area Municipalities are encouraged to address the following matters, as applicable:

a) appropriate location of buildings, structures and sewage disposal systems;

b) retention or restoration of a natural vegetative buffer to prevent erosion, siltation and nutrient migration;

c) maintenance or establishment of native tree cover and vegetation on the lot as terrain and soil conditions permit;

d) appropriate location and construction of roads, driveways and pathways, including the use of permeable materials;

e) the use of appropriate soils for on-site sewage systems;

f) implementation of stormwater management and construction mitigation techniques with an emphasis on lot level controls, *low impact development* practices and a treatment train approach to promote filtration, infiltration and detention, which may include proper re-contouring, discharging of roof leaders, use of soak away pits, other measures to promote infiltration, and silt fencing for temporary sediment control;

g) the establishment of dark sky compliant lighting from all structures with full cut-off fixtures being required in order to minimize light spillage into the surrounding environs, while maintaining safety; and

h) securities and processes to ensure implementation and long-term monitoring and compliance with site plan agreements and/or other agreements if required.

### 3.1.33. Environmental Impact Studies and Hydrologic Evaluations

3.1.33.1. An *environmental impact study* and/*or hydrologic evaluation* required under the policies of this Plan shall be submitted with the application for *development* or *site alteration*, and shall be prepared and signed by a qualified professional in accordance with the Region's Environmental Impact Study Guidelines and/or Hydrologic Evaluation Guidelines in addition to the relevant policies of this Plan.

3.1.33.2. The *environmental impact study* and/or *hydrologic evaluation* shall be prepared to the satisfaction of the appropriate approval authority in accordance with the following:

a) within *settlement areas* it is the responsibility of the Local Area Municipality to ensure that:

i) *an environmental impact study* and/or *hydrologic evaluation* is prepared in accordance with an approved terms of reference and the policies of this Plan; and

ii) the conclusions of the *environmental impact study* and/or *hydrologic evaluation* are considered through the development approval process and appropriate conditions are established to implement the recommendations of the study and/or evaluation.

In carrying out this responsibility, the Local Area Municipality shall work in consultation with the Region and the Conservation Authority. The Region shall provide technical support as required.

b) outside of *settlement areas,* regardless of who is the approval authority for an application for *development*, it is the responsibility of the Region to ensure that:

**Studies Required as Part of a Development Application**

As the region continues to grow, *development* may be proposed that may have an impact on the *natural environment system.* The intent of this section is to set out the Region's requirements for *environmental impact studies* and *hydrologic evaluations* which may be requested in support of development applications in accordance with the policies of the Plan.

i) an *environmental impact study* and/or *hydrologic evaluation* is prepared in accordance with an approved terms of reference and the policies of this Plan; and

ii) the conclusions of the *environmental impact study and/or hydrologic evaluation* are considered through the development approval process and appropriate conditions are established to implement the recommendations of the study and/or evaluation.

In carrying out this responsibility, the Region shall work in consultation with the Local Area Municipality and the Conservation Authority.

3.1.33.3. **Waiving and Scoping of an Environmental Impact Study and/or Hydrologic Evaluation**

3.1.33.3.1 The Region, in consultation with the other commenting bodies, shall review the proposed development in accordance with policies of this Plan, Provincial policies, and the waiving requirements of the Environmental Impact Study Guidelines and/or Hydrologic Evaluation Guidelines to determine whether an *environmental impact study* and/or *hydrologic evaluation* is required or whether requirements can be waived.

3.1.33.3.2 Waving the requirement for an *environmental impact study* and/or *hydrologic evaluation* may be subject to conditions.

3.1.33.3.3 The Region, in consultation with the other commenting bodies, shall scope the contents of the *environmental impact study* and/or *hydrologic evaluation* in accordance with the Environmental Impact Study Guidelines and/or Hydrologic Evaluation Guidelines.

3.1.33.3.4 The Region, at its discretion, may delegate the waiving and/or scoping of an *environmental impact study* and/or *hydrologic evaluation* to the Local Area Municipality if the proposed *development* or *site alteration* is minor, and if the lands affected are within a *settlement area*.

3.1.33.3.5 An *environmental impact study* and/or *hydrologic evaluation* is not required for uses authorized under an environmental assessment process, including Class Environmental Assessment, carried out in accordance with Provincial or Federal legislation.

3.1.33.4. **Terms of Reference for an Environmental Impact Study and/or Hydrologic Evaluation**

3.1.33.4.1 A draft terms of reference for the *environmental impact study* and/or *hydrologic evaluation* shall be prepared in accordance the Environmental Impact Study Guidelines and/or Hydrologic Evaluation Guidelines.

3.1.33.4.2 The terms of reference shall be prepared by a qualified professional retained by the proponent and reviewed by the approval authority and other commenting bodies. It shall be the responsibility of the Region to approve the terms of reference.

3.1.33.4.3 The approval authority shall not accept an *environmental impact study* and/or *hydrologic evaluation* unless the terms of reference has been approved.

3.1.33.5. The approval authority may require an independent peer review of an *environmental impact study* and/or *hydrologic evaluation*, with the costs to be borne by the applicant.

## 3.2. Watershed Planning

The Region recognizes the *watershed* as the ecologically meaningful scale for integrated and long-term planning. *Watershed planning* is a proactive process for assessing and documenting existing conditions, and establishing values, objectives, and targets to support the protection, enhancement, or restoration of the natural resources within a *watershed,* with an emphasis on water resources. Carrying out *watershed planning* involves a cross-jurisdictional coordination of efforts in order to best assess cumulative and cross-watershed impacts. Essential to the entire process are the principles of monitoring and adaptive management.

In general the *watershed planning* framework is a phased process that is typically undertaken to:

- inform land use, growth, and infrastructure planning;
- provide direction for resource planning;
- prepare management plans and policies; and
- assist in the protection of water quantity and quality.

Within Provincial planning documents, there is an increased emphasis on the need for *watershed planning* to inform land-use planning. There are Provincial policies and policies of this Plan that require that certain land use planning decisions be informed by *watershed* or *subwatershed planning*. *Watershed planning* is also required to inform municipal decisions regarding growth and *infrastructure*.

The term 'informed by' means that planning must be guided by the findings and recommendations of the *watershed plan* or *subwatershed study*. The *watershed plan* or *subwatershed study* shall be used as the basis of planning decisions as it relates to protecting, improving, or restoring water quality and quantity, and other resource management activities.

Additionally, through the *watershed planning* process, several Provincial obligations are fulfilled including assisting in addressing water quality in the Great Lakes, *climate change* planning, as well as the need to consider cumulative impacts.

The objectives of this section are as follows:

a) ensure *watershed planning* is informing land-use planning is accordance with Provincial direction;

b) establish a program to ensure *watershed planning* is carried out at the scale suitable for decision making;

c) clarify the roles and responsibilities in *watershed planning* in the Region; and

d) provide direction to Local Area Municipalities for undertaking *subwatershed planning*.

### 3.2.1. Informing Land Use Planning

3.2.1.1. *Watershed planning*, *subwatershed planning*, or their equivalent shall inform:

a) the identification and refinement of the *natural environment system* through the preparation of *subwatershed studies*;

b) the protection, enhancement, or restoration of the quality and quantity of water by making careful decisions on where *development* should be located;

c) the consideration of cross-jurisdictional and cross-watershed impacts;

d) decisions on allocation of growth to ensure that large-scale *development* is directed to the most appropriate locations;

e) the location and feasibility of *settlement area* boundary expansions;

f) proposals for large-scale *development*; and

g) planning for water, wastewater, and stormwater *infrastructure* to ensure that decisions on *infrastructure* are integrated with decisions that are designed to protect the *natural environment system*.

### 3.2.2. Roles and Responsibilities

3.2.2.1. *Tertiary watersheds* and *quaternary watersheds* are shown on Schedule D to this Plan.

3.2.2.2. The Region is responsible for preparing tertiary watershed plans. Tertiary watershed plans are required to support new Regional Official Plans and may be required to support other regional-scale planning initiatives. Tertiary watershed plans shall be prepared or updated in accordance with currently accepted practices and Provincial guidance as appropriate. Tertiary watershed plans will provide guidance for the preparation of more detailed quaternary watershed plans.

3.2.2.3. The Region is responsible for preparing quaternary watershed plans. Quaternary watershed plans are prepared as needed, and may be prepared when there is benefit from *watershed planning* beyond a *subwatershed* scale. Quaternary watershed plans may be prepared based on development pressure, ecosystem degradation, resource management requirements, and fiscal constraints. Quaternary

watershed plans will be prepared or updated in accordance with currently accepted practices and Provincial guidance as appropriate.

3.2.2.4. The priorities, phasing, and process for undertaking and updating quaternary watershed plans shall be determined by the Region in consultation with the affected Local Area Municipalities and the Conservation Authority.

3.2.2.5. Local Area Municipalities are responsible for the preparation of *subwatershed studies*. The Region may prepare guidelines to assist Local Area Municipalities with the preparation of *subwatershed studies*. *Subwatershed studies* may proceed in advance of the completion of a quaternary watershed plan.

3.2.2.6. Tertiary watershed plans, quaternary watershed plans, and *subwatershed studies* shall be scoped in accordance with the purpose and scale in which they are being completed.

3.2.2.7. The Region, in co-operation with the Local Area Municipalities, shall ensure that the appropriate policies to implement individual watershed plans and *subwatershed studies* are incorporated into this Plan and Local official plans as appropriate.

3.2.2.8. Local Area Municipalities, in co-operation with the Region and Conservation Authority, shall implement the recommendations of *watershed plans* and *subwatershed studies* as part of the development review process.

### 3.2.3. Subwatershed Planning

3.2.3.1. A *subwatershed study* is required to inform the identification and refinement of the *natural environment system* and the development of policies to protect the *natural environment system* when secondary plans are prepared for *designated greenfield areas* and other large undeveloped areas in accordance with Section 6.1.4.

3.2.3.2. A *subwatershed study* should generally include, but is not limited to:

a) an inventory of existing ecological and hydrological data and conditions;

b) the identification of existing and proposed land uses, and the modelling of potential development impacts;

c) water quality targets in accordance with the *watershed plan*, Provincial guidelines, or other industry standards and best practices;

d) procedures for monitoring water quality and quantity before, during, and after *development*;

e) completion of a water balance;

f) consideration of all elements of the *natural environment system* as described in Section 3.1 of this Plan;

g) refinement to the boundaries of the *natural environment system*;

h) identification of opportunities for, and constraints to *development*;

i) guidelines and best management practices for development design, environmental design, construction management, etc.;

j) the recommendation of appropriate stormwater management techniques in accordance with Provincial, Regional and Local guidelines and industry best practices;

k) an analysis the cumulative impact of *development*; and

l) implementation and adaptive monitoring plans.

3.2.3.3. Proposed *development* in *designated greenfield areas*, including the associated water, wastewater and stormwater servicing, shall be planned to avoid, or if avoidance is not possible, minimize and mitigate any potential *negative impacts* on *watershed* conditions and the *water resource system*, including the quality and quantity of water.

3.2.3.4. The Local Area Municipality, in consultation with the Region, the Conservation Authority, and affected landowners if appropriate, shall determine the terms of reference for the *subwatershed study*.

## 3.3. Source Water Protection

The *Source Protection Plan* for the Niagara Peninsula Source Protection Area protects existing and future sources of drinking water in Niagara by ensuring activities identified as drinking water threats under the Clean Water Act and associated regulations either never become a *significant threat*, or cease to be a *significant threat* to drinking water. The *Source Protection Plan* evaluated six water treatment plants and determined there are *significant threats* related to land uses associated with the DeCew Falls water treatment plant in the City of Thorold, Port Colborne water treatment plant in the City of Port Colborne, and the Niagara Falls water treatment plant in the City of Niagara Falls.

The following *source water* protection policies are organized according to the water treatment plant *intake protection zones* for which *significant drinking water threats* have been identified in the *Source Protection Plan*. These water treatment plants and associated *intake protection zones* are identified as an overlay on Schedule E to this Plan. The underlying land use designations on Schedule E continue to apply.

The policies of Section 3.3 must be read with this Plan in its entirety and in conjunction with the Niagara Peninsula Source Protection Plan, the Niagara Peninsula Source Protection Area Assessment Report and the Explanatory Document which provides the context and rationale for the land use policies and in identifying *significant threats* and eliminating these drinking water threats for the DeCew Falls, Port Colborne and Niagara Falls water treatment plant *intake protection zones*. The policies of this section must also be read in conjunction with other applicable plans and legislation.

The objectives of this section are as follows:

a) protect the water source for the Decew Falls Water Treatment Plant;

b) protect the water source for the Port Colborne Water Treatment Plant; and

c) protect the water source for the Niagara Falls Water Treatment Plant.

### 3.3.1. Decew Falls Water Treatment Plant

3.3.1.1. New *waste disposal sites* for the application of untreated septage to land shall not be permitted within the DeCew Falls Intake Protection Zone 1 as shown on Schedule E.

3.3.1.2. New industrial or commercial land uses where the storm sewer drainage area is at least 100 ha in size, are not permitted within the DeCew Falls Intake Protection Zone 1 as shown on Schedule E. For the purposes of this policy, new industrial or commercial land uses include industrial or commercial uses which are not currently designated as such in the Local municipal official plan.

3.3.1.3. New *combined sewers*, *wastewater treatment facilities*, and industrial effluent systems, as defined in Appendix C of the Niagara Peninsula Source Protection Area Assessment Report (2013), are not permitted where they would be a *significant threat* within the DeCew Falls Intake Protection Zone 1 as shown on Schedule E.

3.3.1.4. Any planning or building application made for a land use other than Residential in the DeCew Falls Intake Protection Zone 1, as shown on Schedule E, may require a Section 59 notice from the Risk Management Official. The requirements of the notice will be determined through the application screening process.

### 3.3.2. Port Colborne Water Treatment Plant

3.3.2.1. New *waste disposal sites* for the application of untreated septage to land shall not be permitted within the Port Colborne Intake Protection Zone 1 and Intake Protection Zone 2 as shown on Schedule E.

3.3.2.2. Any planning or building application made for a land use other than Residential in the Port Colborne Intake Protection Zone 1 and 2, as shown on Schedule E, may require a Section 59 notice from the Risk Management Official. The requirements of the notice will be determined through the application screening process.

3.3.2.3. Future open storage of road salt greater than 5,000 tonnes is not permitted within the Port Colborne Intake Protection Zone 1 as shown on Schedule E.

3.3.2.4. Future storage of snow greater than 1 hectare in area is not permitted within the Port Colborne Intake Protection Zone 1 as shown on Schedule E.

3.3.2.5. New *combined sewers*, *wastewater treatment facilities*, and industrial effluent systems, as defined in Appendix C of the Niagara Peninsula

Source Protection Area Assessment Report (2013), are not permitted where they would be a *significant threat* within the Port Colborne Intake Protection Zone 1 and Intake Protection Zone 2 which are shown on Schedule E.

3.3.2.6. An application for, or expansion, extension or alteration of commercial or industrial *development* or storm water management facilities, may be deemed to pose a significant threat to municipal drinking water, within the Port Colborne Intake Protection Zone 1 and Intake Protection Zone 2, as shown on Schedule E, by the Risk Management Official and Region's Commissioner of Planning and Development. In such cases the development application shall be accompanied by a stormwater management plan that demonstrates the *development* does not pose a *significant threat* to municipal drinking water to the satisfaction of the Region's Commissioner of Planning and Development Services and City of Port Colborne in consultation with the Risk Management Official.

3.3.2.7. The storage, and application to land of agricultural source material, and the lands used for, are considered *significant threats* in the Port Colborne Intake Protection Zone 1 and Intake Protection Zone 2. New agricultural land uses, such as livestock grazing/pasturing, farm animal yards and outdoor confinement areas, are not permitted within the Port Colborne Intake Protection Zone 1 and Intake Protection Zone 2 which are shown on Schedule E.

### 3.3.3. Niagara Falls Water Treatment Plant

3.3.3.1. New *waste disposal sites* for the application of untreated septage to land shall not be permitted within the Niagara Falls Intake Protection Zone 1 as shown on Schedule E.

3.3.3.2. New industrial or commercial land uses where the storm sewer drainage area is at least 100 ha in size, are not permitted within the Niagara Falls Intake Protection Zone 1 as shown on Schedule E. For the purposes of this policy, new industrial or commercial land uses only includes industrial or commercial uses which are not currently designated as such in the Local municipal official plan.

3.3.3.3. New *combined sewers*, *wastewater treatment facilities*, and industrial effluent systems, as defined in Appendix C of the Niagara Peninsula Source Protection Area Assessment Report (2013), are not permitted where they would be a *significant threat* within the Niagara Falls Intake Protection Zone 1 as shown on Schedule E.

3.3.3.4. The storage, handling, and application to land of agricultural source material, and the lands used for livestock grazing/pasturing, farm animal yards and outdoor confinement areas, are considered *significant threats* in the Niagara Falls Intake Protection Zone 1. New agricultural land uses are not permitted within the Niagara Falls Intake Protection Zone 1 as shown on Schedule E.

### 3.3.4. Monitoring Significant Threats

3.3.4.1. The Region will monitor and report on the measures taken to implement the *significant threat* policies annually in accordance with the Niagara Peninsula Source Protection Plan, which shall address the following:

a) total number and type of development applications in Intake Protection Zones;

b) pre-consultation meetings related to the Niagara Peninsula Source Protection Plan;

c) number of Risk Management Plans reviewed and approved;

d) the number and type of development applications in Intake Protection Zones with the potential for the creation or modification of a transport pathway; and

e) steps taken to improve education and research.

## 3.4. Stewardship

This Region recognizes that private landowners have a detailed understanding of their properties and play a key role in restoration and promoting biodiversity in the region. Private landowner stewardship is about individuals and organizations caring for their land in a way that preserves its environmental, economic and cultural values, keeping it healthy for generations to come.

The Region encourages private landowner stewardship at all times, and not just when there is an application for *development* or site *alteration*.

The objectives of this section are as follows:

a) encourage landowners to practice good stewardship; and

b) support donation or transfer of lands in the *natural environment system*.

### 3.4.1. Stewardship Policies

3.4.1.1. The Region encourages landowners to maintain, enhance or, wherever feasible, restore natural features on their property through a range of measures including, but not limited to, plantings, riparian restoration, conservation easements, vegetative buffers, invasive species identification and removal, citizen science projects, and wherever appropriate, fencing.

3.4.1.2. The Region, in collaboration with the Province, Local Area Municipalities, the Conservation Authority, and organized interest groups, will provide advice and information on other land stewardship programs to landowners wishing to exercise good stewardship of lands within the *natural environment system.*

3.4.1.3. In addition to the above, the Region supports community outreach programs related to natural environment enhancement and *climate change* initiatives.

3.4.1.4. The Region promotes, in conjunction with other public agencies and through stewardship programs, the donation of privately owned lands in the *natural environment system* to public agencies or charitable organizations, or the transfer of the protection of the *ecological functions* and features on such lands to a public agency or charitable organization through a conservation easement agreement.

## 3.5. Climate Change

Niagara is projected to become warmer and wetter with more extreme weather events, such as extreme heat days and precipitation events due to *climate change*. Rising temperatures and extreme weather events have significant human and environmental costs, which disproportionately impact vulnerable populations, and increase financial risks to households, businesses and governments.

Land use planning is an important driver for mitigating and adapting to *climate change* to reduce human, environmental and financial risks. Mitigation refers to reducing sources of greenhouse gas emissions, such as burning fossil fuels for electricity, or enhancing carbon 'sinks' that store these gases. Adaptation refers to preparing for the impacts of *climate change* to reduce vulnerability, and building resiliency to recover from extreme weather events. Addressing *climate change* requires actions from all levels of government, the business community, households and individuals.

This section includes specific actions the Region will take on *climate change* which impact community sectors, as well as opportunities for the Region to lead by example through its corporate operations in support of broader community-wide efforts. This section also recognizes how policy direction across this Plan supports the transition to *net-zero*, climate-resilient communities that mitigate and adapt to *climate change* and recover from extreme weather events. The consolidated policy direction in this section must be read together with other policies of this Plan, which establish direction that is more detailed.

The objectives of this section are as follows:

a) commit to establishing targets and strategies to reduce greenhouse gas emissions and monitor progress towards the achievement of targets;

b) reduce emissions from the Region's corporate operations to lead by example and support achievement of community-wide efforts;

c) develop *climate change* adaptation strategies to reduce vulnerabilities and improve *resilience* to extreme weather events and increased climate variability; and

d) identify land use planning policy direction that support the transition to *net-zero*, climate-resilient communities.

**Climate Projections for Niagara Region under a Business-as-Usual Scenario**

| Climate Parameter | 2020 | 2050 | 2080 | Difference from Baseline to Long Term |
|---|---|---|---|---|
| Mean Annual Temperature (°C) | 8.7 | 10.7 | 12.3 | +3.6 |
| Days Above 30°C | 10.4 | 23.9 | 39.4 | +29.0 |
| Total Annual Precipitation (mm) | 1080.6 | 1135.0 | 1192.0 | +111.4 |

### 3.5.1. Emissions Reduction and Resilience Planning

3.5.1.1. The Region will maintain its community-wide greenhouse gas inventory to monitor progress in emissions reduction planning.

3.5.1.2. The Region will establish new community-wide greenhouse gas reduction targets to work toward the long-term goal of *net-zero* emissions.

3.5.1.3. The Region will develop a municipal energy plan in consultation with the Local Area Municipalities, *utility* companies and organized interest groups to reduce energy consumption and greenhouse gas emissions, complement land use and *infrastructure* master planning, and support economic development opportunities in the region.

3.5.1.4. The Region, in consultation with the Conservation Authority, Local Area Municipalities, First Nations, Indigenous communities and other partners and organized interest groups, will develop and implement a Regional Greening Initiative to restore and enhance vegetative cover that sequesters carbon to mitigate *climate change*.

3.5.1.5. The Region, in collaboration with the Local Area Municipalities, building and development industry, *utility* companies and organized interest groups will explore opportunities to elevate standards of green building development across the region.

3.5.1.6. Opportunities will be considered to include electric vehicle charging infrastructure in new *development*, parking areas for public use, on-street parking, workplaces and multi-unit residential buildings to promote uptake of zero emissions vehicles, including battery-electric, plug-in hybrid electric, and hydrogen fuel cell vehicles.

3.5.1.7. The Region will explore additional opportunities to support emissions reduction planning in collaboration with the Local Area Municipalities,

Conservation Authority, First Nations, Indigenous communities and other partners and organized interest groups.

3.5.1.8. Climate modeling and projections will be maintained by the Region to inform *climate change* adaptation initiatives using the best available science.

3.5.1.9. The Region will assess anticipated *climate change* risks and vulnerabilities across systems, and develop and implement a Climate Change Adaptation Strategy, informed by Regional climate projections, to prepare for the impacts of *climate change*.

3.5.1.10. Climate projections will be considered by the Region and Local Area Municipalities in land use policies, strategies and guidance.

3.5.1.11. Local Area Municipalities are encouraged to:

a) develop and maintain greenhouse gas inventories, establish emissions reduction targets, develop strategies to reduce emissions and monitor progress; and

b) assess local *climate change* risks and vulnerabilities and develop climate change adaptation strategies, informed by Regional or Local climate projections.

### 3.5.2. Corporate Climate Change Measures

3.5.2.1. Energy conservation measures will be applied to the Region's corporate facilities and operations in accordance with the Region's Energy Conservation and Demand Management Plan, as amended.

3.5.2.2. New Regional *corporate facilities* will achieve minimum Silver Level certification in the Leadership in Energy and Environmental Design (LEED) green building rating system.

3.5.2.3. Public charging infrastructure should be provided at Regional and Local municipal facilities, where feasible, to promote uptake of zero emissions vehicles.

3.5.2.4. The Region will explore opportunities to transition to a zero-emissions vehicle fleet.

### 3.5.3. Support the Transition to *Net-Zero* Communities

3.5.3.1. This section consolidates policy direction integrated throughout this Plan that supports the transition to *net-zero* communities that mitigate *climate change*.

The Region will endeavor to:

a) support *built form* and land use patterns that use land efficiently and reduce transportation emissions by:

   i. requiring *compact built form* to minimize land consumption and increase the densities required to support transit ridership;

   ii. promoting a mix of land uses to shorten commute journeys and support the creation of *complete communities*;

   iii. planning to achieve minimum *intensification* and density targets which meet or exceed provincial requirements;

   iv. prioritizing *strategic growth areas*, including *protected major transit station areas*, for accommodating *intensification* and higher-density, mixed-use, *transit-supportive* development;

   v. planning for employment uses to facilitate efficient goods movement and reduce transportation congestion;

   vi. prioritizing transit and supporting *active transportation* to reduce single-occupant vehicle trips; and

   vii. supporting transportation demand management measures to influence travel behaviour.

b) support conservation and energy reduction by:

   i. designing *infrastructure* and *public works projects* to reduce energy consumption and use recycled construction materials, where feasible;

   ii. promoting opportunities for district energy, *renewable energy systems* and *alternative energy systems* in accordance with the municipal energy plan in Policy 3.5.1.3;

   iii. encouraging design and orientation to optimize passive solar energy gains;

   iv. encouraging opportunities for conservation, energy efficiency and demand management within existing and planned *development*;

   v. encouraging water conservation techniques, including water-efficient landscaping and collection and reuse of clean water and stormwater; and

   vi. promoting reduction, reuse and recycling objectives, diversion techniques, including reuse and recycling of

construction materials, and opportunities for energy generation from waste.

c) enhance carbon sinks that store and sequester carbon by:

i. protecting and enhancing the *ecological integrity* and biodiversity of the *natural environment system*;

ii. maximizing vegetation and promoting tree planting to improve air quality, provide shade, and store carbon;

iii. integrating *climate change* considerations into planning for parks, open space and trails, including opportunities for tree planting and *low impact development*;

iv. protecting the agricultural land base, including orchards and vineyards that provide long-term benefits of carbon storage; and

v. encouraging local food, food security and soil management practices that sustain and enhance soil health, including no-till or reduced tillage practices, diverse crop rotation and planting cover crops.

### 3.5.4. Support the Transition to Climate-Resilient Communities

3.5.4.1. This section consolidates policy direction integrated throughout this Plan that supports the transition to climate-resilient communities that adapt to, and recover from, the impacts of *climate change*.

The Region will endeavor to:

a) enhance the adaptive capacity of *infrastructure* by:

i. ensuring that *watershed planning* informs the protection of *water resource systems* and decisions relating to planning for growth;

ii. assessing *infrastructure* risks and vulnerabilities caused by *climate change* at the *watershed* scale, and identifying actions and investments to address these challenges;

iii. requiring new urban *development* to be designed with separate storm drainage systems or connections to reduce wet weather overflows;

iv. requiring the separation of existing municipal *combined sewers*, where feasible;

v. promoting stormwater attenuation and reuse, water conservation and efficiency and *low impact development*, where possible;

vi. integrating *green infrastructure* and *low-impact development* such as green roofs and permeable surfaces into the design of *infrastructure*, *public works projects*, *public service facilities* and private *development*, where possible;

vii. encouraging the burial of overhead *utilities* for improved protection against extreme weather events; and

viii. encouraging the continued operation and expansion of agricultural infrastructure, including irrigation systems, to adapt to *climate change* impacts.

b) mitigate hazards and coordinate with emergency management by:

i. directing *development* away from lands impacted by natural hazards and applying mitigation techniques to reduce risks;

ii. preventing and managing activities identified as *significant drinking water threats* including impacts from *climate change*; and

iii. encouraging the strategic location of *infrastructure* and *public service facilities* to support the delivery of emergency management services.

## 3.6. Niagara Escarpment Plan Area

In Niagara, the Niagara Escarpment traverses the municipalities of Niagara Falls, St. Catharines, Thorold, Niagara-on-the-Lake, Pelham, Lincoln and Grimsby. This impressive geologic formation has waterfalls, fossil-filled rock dating back 450 million years and forest areas. The Escarpment is a key component to the Niagara micro-climate for growing grapes and tender fruit.

The Niagara Escarpment Commission is an agency of the Government of Ontario. It is responsible for administering the Niagara Escarpment Plan, a Provincial land use plan which includes evaluating applications to amend the Niagara Escarpment Plan and applications for development permits within the Area of Development Control.

The Niagara Escarpment Plan, as amended from time to time, prescribes designations, policies and development criteria to regulate the use of land within the Niagara Escarpment Plan Area within the Region of Niagara.

**The Niagara Escarpment Biosphere Reserve**

The Niagara Escarpment Biosphere Reserve is a United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve located in Ontario, Canada. The reserve stretches 725 kilometres along the Niagara Escarpment from Lake Ontario to the tip of the Bruce Peninsula.

Pursuant to the Niagara Escarpment Planning and Development Act, the Niagara Escarpment Plan prevails over any Local official plan or zoning by-law where conflicts occur between them. Policies that are more rigorous or restrictive than the Niagara Escarpment Plan policies are not interpreted to be in conflict with the Niagara Escarpment Plan based on this circumstance alone.

The objectives of this section are as follows:

a) provide for the maintenance of the Niagara Escarpment as a continuous natural environment; and

b) ensure that all new *development* is compatible with the natural environment.

### 3.6.1. The Niagara Escarpment as a Continuous Natural Environment

3.6.1.1. The outer boundary of the Niagara Escarpment Plan Area (NEPA) is fixed and inflexible and shall only be changed by an amendment to the Niagara Escarpment Plan. The outer boundary of the NEPA within the Region of Niagara is shown on Schedules A – K of this Plan. Should the NEPA be amended by the Niagara Escarpment Commission, the NEPA on said schedules of this Plan shall be revised to comply without an amendment to this Plan.

3.6.1.2. Within the Niagara Escarpment Plan Area, development includes a change in the use of any land, building or structure.

3.6.1.3. When commenting on a Development Permit Application for a proposed development, the Region shall apply the policies of the Niagara Escarpment Plan except for when there are more specific or restrictive policies in this Plan that do not conflict with the Niagara Escarpment Plan; in which case staff will request the Niagara Escarpment Commission to apply the more specific or restrictive policies when rendering a decision on an application, specifically respecting: agricultural policies; *infrastructure* policies regarding servicing outside of *settlement areas*; archaeological policies; and *natural environment system* policies where noted below.

### 3.6.2. Compatibility of New Development with the Natural Environment

3.6.2.1. Section 3.1 and Schedule L of this Plan identifies natural features within the *natural environment system* that are included within the Niagara Escarpment Plan Area.

3.6.2.2. The Niagara Escarpment Plan Area is identified on Schedule C1 to C3 of this Plan for reference.

3.6.2.3. The policies of this Plan defer to the Niagara Escarpment Plan, which contains its own policy framework. The only exceptions to this are the permissions in Section 3.1 for minor construction within and adjacent to key features and the restrictions on *development* and *site alteration* within and adjacent to *other woodlands*.

3.6.2.4. Policies in Section 3.1 of this Plan provide guidance on when an *environmental impact study* and/or *hydrologic evaluation* is required to evaluate the potential the impact of a proposed *development* or *site alteration* the *natural environment system.* The Region's technical review of a required *environmental impact study* and/or *hydrological evaluation* may be used by the Commission in rendering a decision on a Development Permit Application.

## 3.7. Excess Soil Management

The proper management of *excess soil* is critical to protect human health and the environment as our communities continue to grow. *Excess soil* is soil that is not required at a construction or *development* site and must be moved to a new location. In some cases, *excess soil* may be temporarily stored at another location before being brought to a final receiving site. The Provincial policy framework for excess soil management provides a life-cycle management approach, which includes placing greater responsibility on source sites where soil is excavated, and recognizing opportunities for *excess soil* re-use.

The manner for which excess soil is managed and disposed of has implications for greenhouse gas emissions, with trucks moving *excess soil* across communities. Other issues include the quality of *excess soil*, and the need to protect the environment, water, and agriculture. The beneficial re-use of *excess soil* locally can contribute to *climate change* mitigation goals and overall sustainability of soil.

The policies of Section 3.7 are intended to implement best management practices of *excess soil* for a beneficial re-use purpose where appropriate.

The objective of this section is to:

a) recognize and manage *excess soil* for new *development*, *site alteration* and *infrastructure*.

### 3.7.1. Recognize and Manage Excess Soil

3.7.1.1. *Excess soil* shall be managed in accordance with Ontario Regulation 406/19 under the Environmental Protection Act.

3.7.1.2. Best management practices for *excess soil* generated and fill received during *development*, *site alteration*, including *infrastructure* development, shall be implemented to ensure that:

a) *excess soil* generated is to be reused on-site or locally to the maximum extent possible;

b) temporary storage sites are encouraged to be permitted close to soil reuse sites to reduce transportation and environmental impacts such as greenhouse gas emissions; and

c) *excess soil* placement at receiving sites are required to demonstrate that the activity will not have a negative impact on existing land uses, the natural environment, surrounding land uses and *cultural heritage resources*.

3.7.1.3. A *soil management plan*, meeting Provincial best practices is to be prepared as part of the Planning Act application process for new *development*.

3.7.1.4. Local Area Municipalities shall incorporate best management practices for the management of *excess soil* generated and fill received during *development* or *site alteration*, including *infrastructure* development, to ensure that:

a) Local official plans and zoning by-laws identify appropriate sites for excess soil storage and processing; and

b) site plan approval is utilized for new or expanding soil storage or processing sites.

3.7.1.5. Local Area Municipalities are encouraged to develop or update site alteration and fill by-laws in accordance with the Municipal Act.

# APPENDIX

## *A-3 NIAGARA OFFICIAL PLAN (2022) CHAPTER 5 – CONNECTED REGION*




CONNECTED REGION

# Chapter 5 – Connected Region

## 5.1 Multimodal Transportation System

The Region is responsible for planning and implementing a sustainable *transportation system* that accommodates forecasted population and employment growth.

The Region will work with Local Area Municipalities, partnering agencies, and other public entities to provide for a *multimodal transportation system* that allows all users to travel in a safe, accessible, convenient, and affordable manner regardless of their chosen method of transportation.

The policies in this section reflect the direction and recommendations outlined within the Region's Transportation Master Plan, which is committed to improving social equity, access, and Niagara's short- and long-term economic competitiveness.

This section also recognizes that the creation of an attractive *multimodal transportation system* that includes a comprehensive *active transportation* network, an interconnected public transit system, and an efficient *goods movement* network, is a critical component of reducing greenhouse gas emissions and addressing the impacts of *climate change*.

The objectives of this section are as follows:

a) coordinate *transportation systems* planning, land use planning, and strategic investments in *infrastructure*;

b) support a connected and convenient public transit network throughout the region through the establishment of a Regional Transit Commission;

c) enhance transit services to provide increased connectivity throughout the region;

d) create and enhance interconnected *active transportation* systems;

e) support the implementation of *complete streets*, with consideration for varying priorities and objectives at Regional and Local levels;

f) ensure Regional Roads accommodate future growth and support diverse forms of transportation; and

g) provide the safe and efficient movement of goods to support the regional economy.

### 5.1.1 Transportation Systems Planning, Land Use Planning, and Infrastructure

5.1.1.1 The Region's *transportation system* will be implemented as per the recommended actions and schedules of the Region's Transportation Master Plan.

5.1.1.2 Suitable transportation *infrastructure* will be provided to support the forecasted growth listed in Table 2-1 and to help mitigate and adapt to the impacts of *climate change*.

**Transportation Master Plan**

The Region's Transportation Master Plan (TMP) is a comprehensive strategic document that defines policies, programs and infrastructure improvements required to address short-term and long-term transportation needs.

The TMP informs and is informed by the policies and forecasts of the Niagara Official Plan, and is regularly reviewed and updated.

5.1.1.3 The Region will coordinate with the Province, Local Area Municipalities, and other agencies to plan for, improve, and protect the *planned corridors* and facilities shown on Schedule J1, including the Niagara-Hamilton Trade Corridor and North-South Niagara Escarpment Crossing, subject to applicable legislation.

5.1.1.4 Local Area Municipalities shall consult with the Region and/or the Province to ensure decisions on *development* applications will not preclude or negatively affect the use of *planned corridors* for the purpose(s) for which it was identified.

5.1.1.5 The Region will coordinate with the Federal government, the Province, Local Area Municipalities, Metrolinx and organized interest groups to improve linkages between Niagara's public transit system and GO Transit.

5.1.1.6 The Region will coordinate with the Federal government, the Province, and Local Area Municipalities to help strengthen the provision of an efficient and safe Provincial Highway System throughout the region.

5.1.1.7 Transportation *infrastructure* within the boundaries of the Niagara Escarpment Plan will be subject to the requirements of the Niagara Escarpment Plan and will be designed and located to minimize impacts to the Escarpment.

5.1.1.8 The Region will work with the Niagara Parks Commission to improve linkages between the Region's *transportation system* and the Niagara Park Commission's *transportation system*.

### 5.1.2 A Connected Public Transit Network

5.1.2.1 Public transit will be a priority for transportation planning and investments to:

a) address the impacts of *climate change*;

b) assist in achieving social equity;

c) provide *multimodal* access to *major transit station areas* and other major trip generators identified in Policy 5.1.2.2. c); and

d) reduce dependence on the automobile.

5.1.2.2 The expansion of public transit across the region will be supported by:

a) prioritizing transit *infrastructure* investments to, from and within *strategic growth areas* to increase the viability of existing and planned transit service levels;

b) providing public transit to areas that have achieved, or will be planned to achieve *transit-supportive* residential, commercial, institutional and employment densities;

c) considering the use of *transit priority corridors* within *urban areas*, including to and from *strategic growth areas*, *employment areas,* and other locations with *transit-supportive* densities;

d) improving linkages from nearby neighbourhoods to *major trip generators*, such as *strategic growth areas*, *employment areas, local growth centres*, *employment lands*, tourism destinations, *public service facilities*, and post-secondary institutions;

e) establishing *transit service integration* between municipal transit agencies via the establishment of a Regional Transit Commission, in collaboration with all transit operators including the Province and Metrolinx, where applicable;

f) permitting *infrastructure* on lands near *settlement areas* for uses principle or ancillary to *transit-supportive* uses that abut *higher order transit* facilities;

g) providing public transit connections within and between *settlement areas*;

h) improving accessibility to public transit, including to and from *active transportation* networks;

i) providing park-and-ride facilities near public transit stops and stations that offer linkages to pedestrian routes, *bicycle infrastructure*, and priority spaces for carpool and car-share vehicles; and

j) considering the role of public transit in contributing towards the Provincial and Regional greenhouse gas emissions reduction targets.

5.1.2.3 The Regional Transit Commission shall be consulted on development applications, secondary plans and other land use plans to ensure integration of land use planning and public transit.

5.1.2.4 The provision of *demand-responsive transit service* will be encouraged in Local Area Municipalities to serve low-density areas, where feasible.

5.1.2.5 Lands near existing or planned *frequent transit service* or *higher order transit* facilities, including facilities within the Greenbelt Plan that have been approved through a Municipal Class Environmental Assessment, and where such lands are located within *settlement areas,* will be planned to:

a) provide *transit-supportive* uses that enable opportunities for improved *transit service integration*;

b) facilitate *multimodal* connections that encourage a more evenly distributed modal share; and

c) support *active transportation*.

5.1.2.6 *Higher order transit* connections to the Greater Toronto Hamilton Area, will be prioritized and expedited, where possible, to promote *intensification* and new and enhanced employment markets.

5.1.2.7 The Region will examine the feasibility of establishing a West Niagara Transit Terminal in order to facilitate *multimodal* connections within the region and to the Greater Toronto Hamilton Area.

5.1.2.8 The Region will work with the Province, Local Area Municipalities, and Metrolinx, where applicable, to support the integration of *active transportation* and public transit, such as: permitting bicycles on transit vehicles, providing bicycle racks on buses, and providing

*bicycle infrastructure* at and to transit facilities, public and institutional areas, and *employment lands*.

### 5.1.3 Interconnected Active Transportation System

5.1.3.1 Comprehensive *active transportation* networks will be integrated into the *transportation system* to:

a) enable safe and convenient inter-municipal and intra-municipal travel for *active transportation* users; and

b) provide continuous linkages from neighbourhoods to *strategic growth areas*, *major trip generators*, *employment land*, tourism destinations, *public service facilities*, post-secondary institutions and transit stations, including sidewalks and dedicated lane space for cyclists on the major street network, or other safe and convenient alternatives.

5.1.3.2 Implementation of the Strategic Cycling Network as identified in the Region's Transportation Master Plan will be prioritized to advance the implementation of the Niagara Bikeways Master Plan as shown in Schedule J2.

5.1.3.3 The Region will support Local Area Municipalities in implementing sections of the Strategic Cycling Network that are within their jurisdiction.

5.1.3.4 Local Area Municipalities are encouraged to support the use of *bicycle infrastructure* to ensure a connected and extended bicycle network within the region.

5.1.3.5 The Region will coordinate with the Ministry of Transportation and organized interest groups to provide *active transportation* infrastructure across highways, including the Queen Elizabeth Way highway and 400 Series highways.

5.1.3.6 The Region will encourage and work with the Niagara Parks Commission to improve the cycling network within their jurisdiction.

5.1.3.7 The Region's Wayfinding Signage for Cyclists Guidelines will provide direction on the design, refurbishment or reconstruction of Regional Roads.

5.1.3.8 Guidelines will be developed to inform Local official plans and zoning by-laws in consultation with Local Area Municipalities that outline minimum provisions for accommodating *active transportation* friendly facilities, including *bicycle infrastructure*, in new *development*, *redevelopment*, and *public work projects*.

### 5.1.4 Complete Streets at Regional and Local Levels

5.1.4.1 The Niagara Region's Complete Streets Design Manual and Guidelines shall be used in the design, refurbishment and reconstruction of the Region's *transportation system* to ensure the needs and safety of all road users are considered and appropriately accommodated.

5.1.4.2 Local Area Municipalities will adopt a *complete streets* approach in the design or reconstruction of the planned or existing Local street network.

5.1.4.3 In the absence of Local *complete streets* guidelines or equivalent, Local Area Municipalities should refer to the Region's Complete Streets Design Manual and Guidelines for the design, refurbishment or reconstruction of their existing and planned Local street network.

5.1.4.4 The Niagara Region's Complete Streets Design Manual and Guidelines shall be included as a reference document within the Request for Proposal (RFP) process for Municipal Class Environmental Assessments and detailed design projects.

5.1.4.5 *Complete streets* elements within Local jurisdiction shall be maintained by the Local Area Municipalities.

### 5.1.5 Ensure Regional Roads Accommodate Future Growth and Support Diverse Forms of Transportation

5.1.5.1 As conditions of the approval of a development application under the Planning Act:

a) the Region may acquire land from the landowner required for the road allowance as identified in Schedule M, at no cost to the Region and free of all encumbrance, encroachments, and improvements unless otherwise agreed to by the Region; and

b) the Region shall be provided with a certificate of an Ontario Land Surveyor noting that all legal survey documentation on the widened road allowance is in place.

5.1.5.2 The conveyance of land shall be required at no cost to the Region as a condition of the approval of a development application, beyond the designated road allowance widths identified in Schedule M, to accommodate items such as sight triangles, turning lanes, channelization, grade separations, traffic control devices, rapid transit, public transit facilities and rights-of-way, *active transportation*, cuts, fills and storm drainage requirements, as required to meet

accepted engineering design standards. These do not require an amendment to this Plan.

5.1.5.3 Additional land that exceeds the road allowance widths identified in Schedule M or Policy 5.1.5.2 may be acquired by the Region at its own expense, without an amendment to this Plan.

5.1.5.4 Land for Regional Road widenings will be required equally from both sides of the centreline of the designated Regional Road unless existing land uses, topographic features or other physical or environmental constraints necessitate taking greater widening on one side than the other.

5.1.5.5 As part of the development application process, a road allowance not yet owned by the Region and identified in the Region's Transportation Master Plan should be protected in the following cases:

a) a Local street that could be ultimately assumed by the Region; and

b) plans for the extension of an existing road allowance.

5.1.5.6 Where new *development* for a sensitive land use is adjacent to a Regional Road, the Region will consider the need for a noise study or noise control measures to address traffic noise as per Provincial guidelines.

5.1.5.7 The policies in Section 6.2, the Region's Model Urban Design Guidelines, the Complete Streets Design Manual and Guidelines, and Wayfinding Signage for Cyclists Guidelines will be used when providing comments on development applications located along Regional Roads.

5.1.5.8 The rights-of-way for the Region's *transportation system*, *major goods movement facilities and corridors*, *active transportation* and public transit facilities will be planned and protected to meet current and projected needs, while ensuring that *development* is not permitted in *planned corridors* that could preclude or negatively affect the purposes of the corridor.

5.1.5.9 The co-location of linear *infrastructure,* such as *utilities* and *municipal water and wastewater systems/services,* along Regional Roads is encouraged.

5.1.5.10 As part of the construction, optimization, or expansion of transportation *infrastructure* within the Region's agricultural area and integrated *natural environment system*, the Region will require, where applicable:

a) the preparation of an *agricultural impact assessment*, or equivalent analysis as part of a Municipal Class Environmental Assessment, that demonstrates that any impacts on the *agricultural system* have been avoided or, if avoidance is not possible, minimized, and, to the extent feasible, mitigated; and/or

b) the preparation of an *environmental impact study*, or equivalent analysis as part of a Municipal Class Environmental Assessment, that demonstrates that any impacts on the *natural heritage system*, *key natural heritage features*, *key hydrologic features* and *key hydrologic areas* have been avoided or, if avoidance is not possible, minimized, and to the extent feasible, mitigated; and

c) the preparation of an assessment on the impact on archeology and/or cultural heritage in accordance with the policies in Sections 6.4 and 6.5 respectively.

### 5.1.6 Movement of Goods to Support the Regional Economy

5.1.6.1 The Region, in partnership with Local Area Municipalities, will develop and implement a Goods Movement Study that is consistent with the recommendations of the Region's Transportation Master Plan and the Province's Freight-Supportive Guidelines.

5.1.6.2 The Goods Movement Study will identify priority routes for goods movement, where feasible, take advantage of cross-border trade opportunities, including the Foreign Free Trade Zone, maximize the use of the *Niagara Economic Zone* and *Niagara Economic Centre*, and facilitate the movement of goods into and out of *employment areas*.

5.1.6.3 Once identified through the Goods Movement Study, lands adjacent to or near *major goods movement facilities and corridors* will be protected for the expansion of *infrastructure* and uses ancillary to that of the principal *major goods movement facility and corridor.* The impact of the expansion will be minimized by:

a) requiring a Municipal Class Environmental Assessment to demonstrate the need and alternative options for the *infrastructure* required for the expansion;

b) avoiding *specialty crop areas*, and other *prime agricultural areas* in that order of priority, unless need has been demonstrated and it has been established that there is no reasonable alternative for the location of the *infrastructure* as determined through the applicable Municipal Class Environment Assessment;

c) avoiding, or where avoidance is not possible, minimizing and mitigating adverse impacts to the *agricultural system* or other *sensitive land uses* vulnerable to encroachment;

d) requiring an *agricultural impact assessment* during instances where *infrastructure* or uses are proposed within, adjacent to, or near the Greenbelt Area or *agricultural system*; and

e) requiring an assessment of the impacts on archaeology and cultural heritage in accordance with policies in Sections 6.4 and 6.5 respectively.

5.1.6.4 The *development* of lands adjacent to or near *major goods movement facilities and corridors* will be compatible with the goods movement function of those facilities and be designed to avoid, mitigate or minimize negative impacts on and from the facilities and corridors.

5.1.6.5 The Region will coordinate with the Province, Local Area Municipalities, agencies, and transportation service providers to implement a *transportation system* which is able to accommodate agricultural vehicles and equipment, where appropriate.

5.1.6.6 The Region will advocate for highway capacity improvements to address inter-regional and international trade related demands for the purposes of *goods movement*.

## 5.2 Infrastructure

Well-planned and managed *infrastructure* is fundamental to attaining the Region's vision for thriving and resilient communities, and key to achieving the growth forecasts of this Plan.

The *infrastructure* policies that follow will ensure that the region's existing and future *development* is supported by *infrastructure* that is planned, constructed, and managed in an integrated, efficient, and environmentally *sustainable* manner.

The Region will continue to prepare, update, and rely upon on long-term *infrastructure* master plans to ensure optimization and strategic timing of sound investments.

The policies in this section address the region's existing and future *infrastructure* needs relating to drinking water, wastewater, stormwater management, waste, energy, *utility* services, and pipeline infrastructure.

The planning and development of *infrastructure* must be integrated with *climate change* resiliency. The Growth Plan directs that the Region develop policies to identify actions that will reduce greenhouse gas emissions, assess *infrastructure* risks and vulnerabilities, and identify actions to address these growing challenges.

The objectives of this section are as follows:

a) undertake *infrastructure* planning, development, and asset management;

b) ensure municipal services are provided in an efficient manner;

c) supply *municipal water and wastewater systems/servicing* within *urban areas*;

d) restrict *municipal water and wastewater systems/servicing* outside *urban areas*;

e) provide municipal *waste management* services;

f) ensure stormwater management and *green infrastructure* is integrated into the planning process;

g) ensure *utilities* are provided in an efficient and compatible manner; and

h) support the development of green energy infrastructure.

**Roles in the Delivery of Services**

The Region provides *water services* and *wastewater services* to its *urban areas*. The Region is responsible for water treatment, transmission mains, storage facilities, major booster pumping stations, wastewater treatment, trunk sewers and sewage pumping stations. The Local Area Municipalities are responsible for local water distribution networks and local sewer collection systems.

The Region and Local Area Municipalities share a role in stormwater management.

The Region is exclusively responsible for *waste management*.

### 5.2.1 Infrastructure Planning, Development, and Asset Management

5.2.1.1 *Infrastructure* planning, development, and asset management shall be undertaken in support of the growth management policies of this Plan to promote sustainability and the achievement of *complete communities*.

5.2.1.2 A coordinated, integrated, and comprehensive approach using the minimum *intensification* and density targets of this Plan, should be used for the planning, development, and management of *infrastructure* within municipalities, across lower-tier and upper-tier municipal boundaries, and with other orders of government, agencies, and boards.

5.2.1.3 *Infrastructure* planning shall be aligned with land use planning, *infrastructure* investment and *watershed planning*.

5.2.1.4 *Infrastructure* investment shall be leveraged to direct and support growth and *development* within *strategic growth areas* as well as to achieve the minimum *intensification* and density targets identified in this Plan.

5.2.1.5 Before consideration is given to developing new *infrastructure*, the Region and Local Area Municipalities shall optimize the use of existing *infrastructure*, and plan and direct growth in a manner that promotes efficient use of existing services.

5.2.1.6 The Region shall provide *infrastructure* and services within its jurisdiction to accommodate existing *development* and anticipated growth within the financial capability of the Region.

5.2.1.7 The Region will identify the full life-cycle costs of *infrastructure* and provide long-range, holistic, integrated and financially sustainable *infrastructure* planning based on the understanding of the co-relation between long-term *infrastructure* investment and long-term funding plans.

5.2.1.8 *Infrastructure* will be planned through the appropriate environmental assessment process, ensuring full regard for the *natural environment system*, *cultural heritage resources* and natural hazard areas of the region.

5.2.1.9 The location, design, construction, and operation of *infrastructure* will be sustainable, strategic, and cost-efficient, and minimize adverse impacts on the *natural environment system*, agricultural lands, and existing landscape.

5.2.1.10 The Region and Local Area Municipalities shall assess *infrastructure* risks and vulnerabilities, including those caused by the impacts of *climate change*, and identify actions and investments to address these challenges, which could be identified as part of municipal asset management planning.

5.2.1.11 The Region will promote the use of *green infrastructure* and *low impact development* by considering *green infrastructure* in public works projects and encouraging its use through review of development applications.

5.2.1.12 Local Area Municipalities should include policies in their official plans for the planning and construction of new *infrastructure* and related facilities that address the principles of environmental sustainability including but not limited to:

a) reducing energy demands;

b) promoting design and orientation to optimize passive solar energy gains;

c) providing for on-site, renewable energy generation and co-generation and district energy systems;

d) maximizing water conservation, including water efficient landscaping and collection and reuse of clean water;

e) providing appropriate stormwater infiltration at the source;

f) integrating green roofs into energy and water conservation strategies;

g) providing for collection and storage of recyclable and organic wastes on site;

h) integrating *active transportation* and transit into development plans; and

i) maintaining and enhancing hydrological and *natural heritage features* and functions.

5.2.1.13 Construction of new, or expansion of existing municipal water, wastewater and stormwater *infrastructure* should only be considered where the following conditions are met:

a) strategies for water conservation and other water demand management initiatives are being implemented in the existing service area;

b) plans for expansion or for new services shall serve growth that achieves the growth management targets and policies for *intensification* and density in this Plan; and

c) plans have been considered in the context of applicable inter-provincial, national, bi-national, or state-provincial Great Lakes Basin agreements and are in compliance with the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement.

5.2.1.14 Updates to the Regional Water and Wastewater Master Servicing Plan may be implemented through amendments to the Niagara Official Plan as required.

**Updates to the Regional Water and Wastewater Master Servicing Plan**

Updates to the Water and Wastewater Master Servicing Plan determine infrastructure needs for development over a 30-year or greater period. Updates include identifying full life cycle costs of the system and options to pay for these costs over the long-term. This informs the Region's Budget and Development Charges to sustainably finance growth.

5.2.1.15 New and expanding Regional *infrastructure* and facilities may be reviewed by the Region's Urban Design Section in consultation with relevant Regional divisions and Local Area Municipalities.

5.2.1.16 The Region shall give priority for the provision of new municipal water and sewage services within *urban areas* to:

a) areas where growth aligns with the Region's Water and Wastewater Master Servicing Plan;

b) existing *development* on *individual on-site sewage services* and/or *individual on-site water services* within the *urban areas*;

c) existing *development* having deficiencies in existing *municipal water and wastewater systems/services* to meet minimum water quality objectives and minimum pollution abatement objectives, as established by the Region in consultation with appropriate Provincial and Federal Ministries;

d) industrial *development* creating employment opportunities, which shall be assigned a higher priority than new residential *development*;

e) *development* and *redevelopment* within *strategic growth areas* which produce an intensive and compact form of development; and

f) support areas with district plans and secondary plans.

5.2.1.17 The Region shall develop Stormwater Management Guidelines giving guidance on best practices and innovation for development applications and *public works projects* and to assist in addressing *climate change* impacts.

5.2.1.18 Planning for stormwater management shall:

a) conform with Section 3.2;

b) be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term;

c) minimize, or, where possible, prevent increases in contaminant loads;

d) minimize erosion and changes in water balance, and prepare for the impacts of *climate change* through the effective management of stormwater, including the use of *green infrastructure*;

e) mitigate risks to human health, safety, property, and the environment;

f) maximize the extent and function of vegetative and pervious surfaces;

g) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and *low impact development*; and

h) consider *green infrastructure* and other measures which address the impacts of *climate change*.

5.2.1.19 Local Area Municipalities will develop *stormwater master plans* or equivalent for serviced *settlement areas* that:

a) are informed by *watershed planning* or equivalent;

b) protect the *quality and quantity of water* by assessing existing stormwater facilities and systems;

c) characterize existing environmental conditions;

d) examine the cumulative environmental impacts of stormwater from existing and planned *development*, including an assessment of how extreme weather events will exacerbate these impacts and the identification of appropriate adaptation strategies;

e) incorporate appropriate *low impact development* and *green infrastructure*;

f) identify the need for stormwater retrofits, where appropriate;

g) identify the full life-cycle costs of the stormwater *infrastructure*, including maintenance costs, and develop options to pay for these costs over the long-term; and

h) include an implementation and maintenance plan.

5.2.1.20 The Region will develop a Long-Term Waste Management Strategic Plan in consultation with the Local Area Municipalities. Policy direction will be implemented through an amendment to this Plan.

**Waste Management Strategic Plan**

The Long-term Waste Management Strategic Plan will guide the operation of the Region's day-to-day *waste management* programs including reduction, reuse, recycling, composting, diversion, and disposal of residual waste. The Plan will reduce greenhouse gas emissions, address Provincial climate change adaptation goals, and identify opportunities for energy from waste and source reduction. A component of the Plan will be long-term financial sustainability.

5.2.1.21 The Region will design, operate, and monitor *waste management* facilities in such a manner as to promote sustainability and public health and, wherever feasible, provide for future adaptive re-use opportunities in accordance with applicable Local official plan policies and Provincial requirements.

5.2.1.22 *Waste management* systems shall be located and designed in accordance with Provincial legislation and standards.

### 5.2.2 Municipal Water and Wastewater Servicing within Urban Areas

5.2.2.1 Adequate water supply and sewage collection shall be provided to meet the existing and future *development* needs in alignment with the growth management policies of this Plan, the Water and Wastewater Master Servicing Plan and the Region's capital budget process.

5.2.2.2 *Municipal water and wastewater systems/services* are the required form of servicing for *development* in *urban areas*.

5.2.2.3 Local Area Municipalities, in coordination with the Region, will comprehensively approach and integrate growth allocated by the Region with required *infrastructure* and establish priority and phasing policies for water and wastewater services.

5.2.2.4 Prior to approval of *development*, the municipality shall ensure that required water and wastewater services and servicing capacity is available to support the *development*.

5.2.2.5 Private lateral connections to Regional water or wastewater mains are discouraged.

5.2.2.6 The Region will endeavour to:

a) maintain sufficient reserve capacity in its water and wastewater *infrastructure* and facilities to provide operational flexibility and meet potential changes in servicing conditions;

b) ensure new *development* will not put the Region out of compliance with regulations and the Region will consider opportunities to maintain or reduce wet weather overflow occurrence; and,

c) provide reliability, redundancy and security in its water and wastewater systems with attention to high risk and critical areas.

5.2.2.7 Existing municipal *combined sewer* and storm drainage systems shall be separated, where technically and financially feasible

5.2.2.8 All new *development* which is proposed to be connected to existing *combined sewer* facilities shall be served with separated systems within the property limits of the *development*. The connection to the *combined sewer* will only be considered once a new separated storm outlet has been determined to be unachievable and the available capacity within the existing *combined sewer* services has been confirmed.

5.2.2.9 The potential impact of *climate change* on the planning and sizing of water and wastewater infrastructure shall be considered.

5.2.2.10 Water and wastewater facilities shall be designed with consideration to reducing energy use and greenhouse gas emissions.

5.2.2.11 The Region will review a combination of servicing strategies including *infrastructure* and non-infrastructure solutions to meet wet weather

level of service and provide sufficient wastewater capacity. The Region will work collaboratively with the Local Area Municipalities to reduce wet weather flows in the sanitary system.

5.2.2.12 Within urban *settlement areas* full municipal services are the preferred form of servicing. Partial services shall only be permitted in the following circumstances:

a) where they are necessary to address failed *individual on-site sewage services* and *individual on-site water services* in existing *development*; or,

b) to allow for infilling and minor rounding out of existing *development* on partial services provided site conditions are suitable for the long-term provision of such services with no negative impacts.

5.2.2.13 Any extensions of the existing water supply or sewage disposal systems must have approval through the current water licenses and sewage disposal system approvals from both the Local Area Municipality and Region.

5.2.2.14 Where *developmen*t is proposed on lands adjacent to an existing or proposed sewage treatment facility, the location of *development* shall be determined by appropriate noise and odour studies that identify suitable separation distances and mitigation measures.

### 5.2.3 Municipal Water and Wastewater Servicing Outside of Urban Areas

5.2.3.1 *Lateral connections* to Regional water or wastewater mains are not permitted outside the *urban areas* boundaries.

5.2.3.2 Municipal water supply mains or municipal sewers shall not be extended outside the *urban areas* except:

a) where necessary to correct an existing health problem as determined by the Medical Officer of Health or where there is a clean-up order from the Ministry of the Environment, Conservation and Parks, and provided all alternatives to municipal mains for resolving health concerns have been considered; and

b) where extensions of the water supply system are for necessary operating purposes, such as the looping of existing mains, the replacement of existing mains, and the interconnection of *urban areas*.

5.2.3.3 All *development* outside the *urban areas* shall be serviced by sustainable *individual on-site water* and *individual on-site sewer services*, except an existing lot of record outside the *urban areas* may be permitted to connect to existing municipal services subject to the following*:*

a) where municipal sewers or water supply mains have been extended outside the *urban areas* to correct an existing health problem as determined by the Medical Officer of Health or where there is a clean-up order from the Ministry of Environment, Conservation and Parks.

5.2.3.4 Individual water supply and sewage disposal systems are permitted outside the *urban areas* provided the site conditions are suitable for the long-term provision of such services with no negative impacts.

### 5.2.4 Municipal Waste Management Services

5.2.4.1 The Region will provide for the disposal and treatment of solid wastes to the Local Area Municipalities, and in alignment with the Region's Long Term Waste Management Strategic Plan.

5.2.4.2 The disposal and treatment of solid wastes shall be provided in an integrated manner that evaluates full life cycle impacts with respect to financial and environmental sustainability, public health, and aesthetics.

5.2.4.3 The Region shall provide *waste management* systems that are an appropriate size and type to accommodate present and future requirements, and facilitate, encourage, and promote reduction, reuse, and recycling objectives.

5.2.4.4 In collaboration with the Region, Local Area Municipalities should ensure that their official plan, zoning by-law, plan of subdivision approvals and site plan approvals for new *development* comply with the Region's requirements for waste collection to ensure safe and efficient waste collection and diversion and includes support for the resource recovery of food and organic waste for their residents.



5.2.4.5 During the development review process, the Local Area Municipality will promote enhanced waste reduction, composting and recycling initiatives, and the identification of new opportunities for energy generation from waste, source reduction, reuse, and diversion, where appropriate. Consideration shall be given to increased convenience and access for waste diversion collection programs to promote participation.

5.2.4.6 The selection of all solid *waste disposal sites* will involve consideration of:

a) the compatibility of the methods of operation with adjacent land uses;

b) the nature of bedrock and soil conditions in order to reduce the likelihood of groundwater contamination;

c) operational economics, transportation costs, maintenance, land prices, opportunity for future expansion, etc.; and

d) compliance with the policies of Chapter 3, and specifically Section 3.1, of this Plan.

5.2.4.7 Site and rehabilitation plans will be developed prior to the use of a particular site for solid waste disposal. These plans should make provision for:

a) the control of odour, vermin, and other nuisances;

b) the phasing of the site expansion;

c) the ultimate use of the site;

d) landscaping and berms;

e) access; and

f) a uniformly high standard of operation.



5.2.4.8 The Region will investigate the application of waste diversion techniques, including the reuse and recycling of construction material.

5.2.4.9 Proposed *development* within the influence area, as determined by Provincial Land Use Compatibility Guidelines or through site specific study, of all *waste management* facilities shall demonstrate that the solid *waste disposal site* will not have any unacceptable adverse effects on the proposed *development* and will not pose any risks to human health and safety.

5.2.4.10 Notwithstanding Policy 5.2.4.9, the following compatible uses may not require a study provided that the solid *waste disposal site* water table is not affected and excavations shall not result in landfill gas migration or removal of a visual screen buffering of the landfill from the public view: utilities, waste-processing facilities, above-grade transportation routes, forestry activities, and gravel pits, quarries and other mining activities. No new land-use shall be permitted within 30

metres of the licensed perimeter of an operating solid *waste disposal site*.

5.2.4.11 *Development* on, or within 250 metres of a non-operating *waste disposal site* (e.g., old closed landfills) shall address Provincial requirements for contaminated sites.

5.2.4.12 *Development* within 500 metres of a non-operating *waste disposal site* shall also demonstrate that there is no risk to human health and safety from landfill gas.

5.2.4.13 The Region will identify and support new opportunities to enhance waste reduction, composting and recycling initiatives and for energy from waste, source reduction, reuse, and diversion, where appropriate.

5.2.4.14 When exploring new food and organic waste resource recovery systems, the Region will pursue regional approaches, including considering potential partnerships with neighbouring municipalities and private industry.

5.2.4.15 Approvals for new or expanded resource recovery systems will address the Provincial Land Use Compatibility Guidelines and the Guidelines for the Production of Compost in Ontario, to ensure appropriate siting and compatibility between uses and adjacent uses as well as to prevent or mitigate adverse effects from odour, noise and other contaminants.

### 5.2.5 Stormwater Management and the Planning Process

5.2.5.1 All new *development* and redevelopment in *settlement areas* must be provided with separate storm drainage systems or separate storm drainage connections.

5.2.5.2 The Region will collaborate with the Local Area Municipalities for the provision of adequate storm drainage facilities.

5.2.5.3 Local Area Municipalities shall implement sustainable stormwater management plans and strategies as part of *development* and *redevelopment*.

5.2.5.4 Proposals for large-scale *development* proceeding by way of a secondary plan, plan of subdivision, vacant land plan of condominium or site plan will be supported by a stormwater management plan or equivalent, that:

a) conforms with watershed planning policies in Section 3.2;

b) is informed by a *subwatershed* plan or equivalent as completed by the Local Area Municipality;

c) ensures all proposals for *development* or *redevelopment* are designed based on an integrated treatment approach in order to address requirements for water quality, erosion control, flood control, thermal mitigation and water budget to minimize stormwater flows and reliance on stormwater ponds, which includes *low impact development* and *green infrastructure,* where appropriate;

d) establishes planning, design, and construction practices to minimize vegetation removal, grading and soil compaction, sediment erosion, and impervious surfaces;

e) ensures *stormwater management facilities* are designed to support key features and ecological functions in the Region's *natural environment system,* where possible; and

f) aligns with the *stormwater master plan* or equivalent for the *settlement area*, where applicable.



5.2.5.5 The Region and Local Area Municipalities shall consider through site plan control the development of *green infrastructure*, such as naturalized retention ponds and rain gardens to increase stormwater offset.

### 5.2.6 Provision of Utilities

5.2.6.1 The Region will coordinate with both private and public *utility* providers and the Local Area Municipalities to ensure that *utilities* are planned and managed in a manner that supports the objectives and policies of this Plan.

5.2.6.2 The joint use of rights-of-way and corridors is encouraged wherever feasible for various facilities in order to:

a) lessen the impact on the environment of uncoordinated alignments of various single purpose authorities; and

b) avoid land use and *development* conflicts associated with such rights-of-way and alignments.

5.2.6.3 The construction of *utilities* shall comply with the *natural environment system* policies of this Plan.

5.2.6.4 Necessary public *utilities* will be provided in accordance with the servicing needs of existing and future *development* and with economic, safety and environmental considerations.

5.2.6.5 The Region and Local Area Municipalities will confirm, as part of the development review process, that *utility* providers are able to provide services to support the proposed *development* in a timely manner and that, if required, appropriate locations for large *utility* equipment and *utility* cluster sites have been determined.

5.2.6.6 The Region will review and comment on Environmental Assessment Studies and may participate in the Environmental Assessment process for major *utility* related projects to ensure that potential impacts on matters of Regional and Provincial interest are addressed.

5.2.6.7 *Utility* providers proposing to locate, relocate, or replace a facility within a Regional Road allowance will require Regional approval and be subject to the provisions of all applicable Regional policies, by-laws, standards, and guidelines.

5.2.6.8 The Region will continue to advise *utility* providers of the need to:

a) consult with the Region and Local Area Municipalities, and Conservation Authority where applicable;

b) review the region-wide inventory of *cultural heritage resources* and *areas of archaeological potential* prior to undertaking construction, demolition, or maintenance projects;

c) mitigate any impacts on *cultural heritage resources* including *archaeological resources* through acceptable conservation measures;

d) place equipment and devices in locations which do not detract from the visual character of *cultural heritage resources* and do not have a negative impact on the architectural integrity of these resources; and

e) comply with the *natural environment system* policies in Section 3.1 and *agricultural system* policies of Section 4.1.

### 5.2.7 Green Energy Infrastructure

5.2.7.1 The Region shall closely monitor the Provincial regulations and provide appropriate policies to support the development of green energy *infrastructure*.

5.2.7.2 The Region will promote opportunities for the development of energy supply including electricity generation facilities and transmission and distribution systems, district energy, and *renewable energy systems* and *alternative energy systems*, to accommodate current and projected needs.

5.2.7.3 Subject to Provincial requirements, the Region and Local Area Municipalities will review the siting of all renewable energy generation facilities within the context of all policies of this Plan.

5.2.7.4 Subject to Provincial requirements, the Local Area Municipality will prepare official plan policies and zoning for the review of new or expanding renewable energy generation facilities to ensure consideration of safety, compatibility, and other impacts.

5.2.7.5 Wind energy systems and associated distribution *infrastructure* shall be located, designed, and constructed to eliminate or minimize adverse impacts on agricultural operations, lands, and activities; significant *natural heritage features*; existing *mineral aggregate operations*; and cultural and built heritage resources.

5.2.7.6 Wind energy systems shall be designed and constructed to be appropriately buffered and/or separated from sensitive land uses to prevent adverse effects and to minimize the risk to public health and safety.

5.2.7.7 Wind energy systems are generally permitted throughout the region subject to applicable Local area municipal criteria, Provincial plan policies, and policies set out in this Plan, except large scale wind energy systems will require a Regional Official Plan Amendment.

5.2.7.8 Application for wind energy *development* should comply with Section 7.8 for Complete Applications and the following:

a) a justification/impact report that demonstrates:

i. the need for, and public benefit of, locating the proposed generating capacity in these areas;

ii. an assessment of impacts on agricultural operations, lands and activities, *natural heritage features*, nearby residences and other *sensitive land uses* in the area; and,

iii. the means of minimizing any adverse effects.

b) a visual impact assessment;

c) a noise report demonstrating compliance with Provincial requirements; and

d) a report demonstrating compliance with Provincial shadow flicker guidelines.

5.2.7.9 The development of new or expanded wind energy systems within an area regulated under the Niagara Escarpment Planning and Development Act will be subject to the provisions of the Niagara Escarpment Plan. The policies of this Plan and policies in Local official plans will be the basis for providing municipal comments to the Niagara Escarpment Commission during the review of wind energy system applications.

5.2.7.10 The development of new wind energy systems in areas adjacent to or on known deposits of aggregate, mineral or petroleum resources shall be permitted where it has been demonstrated that the energy system serves a greater long-term public interest during the lifetime of the wind energy system and does not compromise the future extraction of the aggregate, mineral or petroleum resources..

5.2.7.11 The development of wind energy systems shall be prohibited where they may cause a potential aviation safety hazard as determined by Transport Canada or the appropriate agency.

### 5.2.8 Pipeline Infrastructure

5.2.8.1 TransCanada PipeLines Limited (TCPL) operates two high pressure natural gas pipelines within its right-of-way crossing the region as well as two industrial compressor stations as identified on Schedule B.

5.2.8.2 Development resulting in increased population density in proximity to TCPL's right-of-way and compressor stations may result in TCPL being required to replace its pipeline(s) to comply with CSA Code Z662. Early consultation with TCPL or its designated representative, for any development proposals within 200 metres of its pipelines and within 750 metres of TCPL's compressor station should be undertaken to ensure TCPL can assess potential impacts and provide recommendations to avoid adverse impacts to its facilities.

5.2.8.3 TCPL is regulated by the Canadian Energy Regulator which has a number of requirements regulating *development* in proximity to its pipelines. This includes approval requirements for activities within 30 metres of the pipeline centreline, such as conducting a ground disturbance, constructing or installing a facility across, on, or along

the pipeline right-of-way, driving a vehicle, mobile equipment or machinery across the right-of-way, and the use of explosives.

5.2.8.4 A minimum setback of 7 metres shall be provided from the edge of the right-of-way for all permanent buildings and structures. Accessory buildings and structures shall have a minimum setback of at least 3 metres from the edge of the right-of-way.

5.2.8.5 A minimum setback of 7 metres shall be provided from the edge of the pipeline right-of-way for:

a) road rights-of-way (paralleling pipeline rights-of-way), private driveways, parking spaces and parking areas; and,

b) stormwater management facilities.

5.2.8.6 Throughout any *built up areas*, the TCPL's right-of-way is encouraged to be designated for passive parkland or open space use.

## 5.3 Public Spaces, Recreation, Parks, Trails and Open Space

Parks, open spaces and trails provide an opportunity for healthy recreational activities, tourism and appreciation of *cultural heritage resources* and natural resources. Planning for open space encourages physical activity, supports mental health, increases the use of *active transportation*, and provides linkages between *natural heritage features*.

The objectives of this section are as follows:

a) plan for the inclusion of parks, open space and trails within and between communities;

b) support efforts to designate Niagara region as a UNESCO Global Geopark to foster conservation, education and sustainable economic development;

c) recognize the importance of the Niagara Escarpment as a UNESCO Biosphere Reserve; and

d) support the identification of *cultural heritage landscapes*.

### 5.3.1 Open Space in Communities

5.3.1.1 The Region shall ensure the provision of public open space and required parkland in the review of district and secondary plans to facilitate the creation of healthy, *complete communities*.

5.3.1.2 The Region will, in partnership with the Local Area Municipalities, Conservation Authority, Niagara Parks Commission, and other interested agencies:

a) maintain a map of publicly accessible parkland, open space and trails to support the connectivity of *natural heritage features* and the achievement of *complete communities*, and inform the Regional Greening Initiative, as per Policy 3.5.1.4;

b) explore opportunities to plan new trails or develop/enhance existing trails on a cross-boundary basis to enhance interconnectivity between Local Area Municipalities where practical and feasible; and

c) promote good stewardship practices for publicly accessible parkland and open spaces, especially when adjacent to the *natural environment system.*

5.3.1.3 The Region supports efforts to designate Niagara region as a UNESCO Global Geopark to foster conservation, education and sustainable economic development.

5.3.1.4 The Region encourages the Province, Provincial agencies, Conservation Authority, Local Area Municipalities and non-governmental organizations to continue acquiring and dedicating lands to further develop the Niagara Escarpment Parks and Open Space System, including the Bruce Trail, which provides significant economic and environmental benefit to the region.

5.3.1.5 Local Area Municipalities shall include policies in their official plans that address the following:

a) the acquisition of parkland in accordance with the provisions of the Planning Act, and/or direction to pass by-laws that allow for the acquisition of parkland; and

b) integration of *development* with, and connectivity to, existing and proposed parks and trails.

5.3.1.6 Where applicable, Local Area Municipalities should include policies in their official plans that:

a) establish and undertake improvements to public access to shorelines and dedication of shorelines to the Local Area Municipality or other public agency where there is a public benefit to the overall trail system. *Development* that will constrain ongoing or planned shoreline acquisition should not be permitted; and

b) increase open space, and park and recreational opportunities with the Welland Canal *Cultural Heritage Landscape*.

5.3.1.7 The Region encourages the Local Area Municipalities to:

a) develop park/trail master plans to strategically and equitably plan for the acquisition, use and management of publicly-accessible parks, open spaces and trails, including shorelines, to best serve the needs of all local residents. Master plans should clearly identify, plan for and protect these resources;



b) consider *climate change* when planning for parks, open space and trails, including opportunities for *green infrastructure* and tree planting;

c) establish an open space system within *settlement areas*, which may include opportunities for urban agriculture, rooftop gardens, communal courtyards, and public parks; and

d) evaluate public lands being disposed of for potential acquisition for recreation and open space uses in concert with other growth needs, including reuse of abandoned *rail facilities* and *utility* corridors for trail development.

# APPENDIX

## *A-4 REGION PROTOCOL FOR STORMWATER REVIEW (2018)*

# Protocol

For Planning Services

Between

the Regional Municipality of Niagara (The Region)

And

the Niagara Peninsula Conservation Authority (NPCA)

January 2018

# Table of Contents

1.0 Basis ..... 3

2.0 Purpose ..... 3

3.0 Definitions ..... 4

4.0 Principles ..... 5

5.0 Jurisdiction ..... 5

6.0 Roles and Responsibilities ..... 6

7.0 Coordination of Environmental Comments on Development Applications ..... 7

8.0 Protocol Terms and Implementation ..... 8

# List of Tables

Table 1: Responsibilities for Planning Application Review with Respect to Environmental Features ..... 10

Table 2: Implementation Responsibilities ..... 12

Table 3: Responsibilities for Stormwater Management Review with Respect to Area of Interest ..... 13

# List of Appendices

**Appendix A** - Excerpt from the 2001 Memorandum of Understanding on Procedures to Address Conservation Authority Delegated Responsibility

**Appendix B -** Excerpt from the Provincial Policy Statement 2014 – Conservation Responsibility for Natural Hazards

**Appendix C -** Excerpt from the Ontario Regulation 155/06 Niagara Peninsula Conservation Authority: Regulation of Development, Interface with Wetlands and Alterations to Shorelines and Watercourses

## 1.0 Basis

In 2007, the Niagara Region, local area municipalities and NPCA signed a Memorandum of Understanding ("MOU") for improving the planning function in Niagara with the ultimate goal of having "*an integrated and seamless planning system that is embraced and easily understood by Councils, the public, applicants and staff that encourages participation in policy development and application processing*."

Part 3 of the MOU - *Consolidation of the Review of Planning Applications as they Relate to the Natural Environment* - assigned to the NPCA certain responsibilities as part of its review of development applications[1] and proposed policy, and providing technical clearance services with respect to compliance with the Regional Official Plan and Provincial Policies and Plans. Specifics of this assignment of function were detailed in the *Protocol for Plan Review and Technical Clearance* ("Protocol") between the Region and NPCA, which was approved in 2008.

The MOU was reviewed and revised in 2011 and again in 2014. The Protocol has not been updated since its inception in 2008.

The MOU and Protocol have succeeded in managing relationships, reducing duplication and effecting continuous improvements. Since that time changes have occurred in Niagara in terms of legislation, relationships, resources, and growth that have impacted the established roles and responsibilities, particularly with respect to the review of environmental matters.

Through this revised Protocol, the NPCA and the Region will establish a new framework within which the NPCA will provide specified updated services to the Region.

This 2018 Protocol is intended to replace in its entirety the 2008 Protocol. Subsequent to the approval of the 2018 Protocol, the MOU will be updated to incorporate the approved revised functions and other aspects of the planning program in Niagara Region.

This Protocol has been prepared for the Niagara Region and NPCA by an Area Planners MOU Working Group consisting of senior representatives from Niagara Region, NPCA and local municipalities.

## 2.0 Purpose

The purpose of this Protocol is to:

- Redefine, clarify and set out a new Protocol within which the NPCA will provide specified planning application, policy and technical review services to the Region;
- Identify the respective roles and responsibilities of the NPCA and the Region in Ontario's Land Use Planning System with respect to environmental matters;
- Provide direction for consistent and streamlined circulation and review procedures for all applications under the *Planning Act, Environmental Assessment Act, and Niagara Escarpment Planning and Development Act*;
- Reinforce the positive relationship between the NPCA and the Region;
- Allow the NPCA and Region to focus on provincially mandated responsibilities, and
- Provide increased decision making autonomy.

[1] Including Planning Act, Niagara Escarpment and Development Act applications, and Environmental Assessments

## 3.0 Definitions

**3.1 Planning Application Review** means**:**

- The review of planning applications (including formal preconsultation) under the *Planning Act, the Niagara Escarpment Planning, and Development Act and the Environmental Assessment Act;*
- The identification of the need for and review of related technical reports (including scoping); and
- The identification of conditions of approval.

**3.2 Policy Review** means**:**

- The review of existing or new policy documents, including but not limited to stormwater management guidelines, watershed studies, secondary plans and background studies; and
- The identification of the need for and review of related technical reports.

**3.3 Technical Clearance Review** means:

- The assessment of technical reports submitted by a proponent of development to determine if the reports satisfy the specified requirements; and
- The clearing of conditions.

**3.4 Lead Agency** means:

- The organization responsible for the principal review of an environmental feature located within or in proximity to land subject to a planning application to ensure compliance and conformity with all applicable legislation and regulations; and
- The organization responsible for the principal review of proposed policies, studies, guidelines or Environmental Assessments as they relate to environmental features to ensure compliance and conformity with all applicable legislation and regulations.

**3.5 Environment Feature** means:

- All of the environmental features identified in the first column of Table 1 of this Protocol.

**3.6 Natural Hazards** means:

- Those environmental features identified in Table 1 of this Protocol as natural hazards and/or identified in the 2014 Provincial Policy Statement Section 3.1.

## 4.0 Principles

This Protocol is based upon the following principles:

1. Adoption of improvements to the planning application processes which results in streamlining and consistency.
2. Direction that interpreting policy is the responsibility of the organization writing and approving that policy unless delegated by the approving authority.
3. Continuing cooperation between the NPCA and the Region.
4. Effective communication and collaboration.
5. Effective, proactive planning[2].
6. Effective leveraging of resources to deliver planning application, policy and technical clearance reviews.
7. Eliminate overlap in planning application review processes to the extent possible.

## 5.0 Jurisdiction

This Protocol applies to those lands within the Regional Municipality of Niagara.

[2] Proactive planning refers to preparing new or updating existing comprehensive studies and guidelines that assist in the early identification of issues and the need for additional study, and include, but are not limited to, watershed and sub-watershed planning, stormwater guidelines, master servicing plans, updates to Schedule C of the Regional Official Plan, etc.

# 6.0 Roles and Responsibilities

## 6.1 NPCA

6.1.1 The NPCA, through the *Memorandum of Understanding between Conservation Ontario, the Ministry of Municipal Affairs and Housing and the Ministry of Natural Resources and Forestry*, is responsible for providing the Provincial interest comments on policy documents and development applications related to natural hazards (Section 3.1 of the Provincial Policy Statement except Section 3.1.8). See Appendices A and B. Specifically, the NPCA will provide planning application, policy and technical clearance reviews to ensure consistency with the Provincial Policy Statement related to flooding hazards, erosion hazards, dynamic beach hazards, unstable soils and unstable bedrock. This function is not impacted by this Protocol.

6.1.2 The NPCA has legislated responsibilities under the *Conservation Authorities Act* (see Appendix C) and will continue to provide planning application and technical clearance reviews pursuant to the NPCA Regulation, as administered through Board approved policies. This function is not impacted by this Protocol.

6.1.3 The NPCA will provide the services as identified in Table 1, Table 2 and Table 3.

6.1.4 The NPCA will review Region-initiated studies and projects, pursuant to the NPCA Regulation, as administered through Board approved policies, and to the Memorandum of Understanding between the Province and the Conservation Authorities, as a commenting agency without fee to the Region.

6.1.5 The NPCA will provide comments on Environmental Assessments pursuant to the NPCA Regulation, as administered through Board approved policies, and pursuant to the Memorandum of Understanding between the Province and the Conservation Authorities.

6.1.6 The NPCA will actively participate in formal pre-consultation meetings with developers and landowners when environmental features identified in Table 1 (when the NPCA is the Lead Agency) have potential to be impacted. To help ensure a consistent planning application review and a coordinated message, the NPCA and Region, together with the local municipality, will participate in pre-consultation meetings at the same time with the proponents. The NPCA will work to scope the complete application requirements related to environmental matters prior to the preconsultation meeting. Should the NPCA determine that no environmental features (where the NPCA is identified as the Lead Agency as shown in Table 1) will be impacted, the NPCA will notify the approving authority and may not attend the pre-consultation meeting.

6.1.7 The NPCA will scope Environment Impact Studies (EIS) and review the Terms of Reference (ToR) for EIS and similar reports to ensure *natural hazards* and NPCA Regulation/Policy are addressed.

6.1.8 Where the NPCA is identified as the Lead Agency on Table 1, the NPCA will provide Technical Clearance on the EIS with respect to those environmental features only.

6.1.9 The NPCA will copy the Region on all responses to requests for comment on development planning, technical clearance and policy matters.

6.1.10 Nothing in this Protocol shall limit the NPCA from independently appealing a decision or lack of a decision to the Ontario Municipal Board (OMB) or other tribunal. The NPCA will provide notice of an appeal to the Region and local municipality at the time of appeal.

6.1.11 The NPCA will provide the Region with its Regulatory Screening Map and provide regular updates.

### 6.2 Niagara Region

6.2.1 The Region will provide planning application review and technical clearance services as identified in Tables 1, 2 and 3, to ensure consistency with the Regional Official Plan, Provincial Policies, Provincial Plans, the Provincial Policy Statement (except Section 3.1 Natural Hazards policies 3.1.1 to 3.1.7), and matters of Provincial Interest.

6.2.2 The Region shall circulate to the NPCA for planning application review and/or technical clearance, all Regionally led planning applications, studies or Environmental Assessments that are located in or adjacent to a NPCA property or within a regulated feature/area.

6.2.3 The Region in its review of *Planning Act* and *Escarpment Planning and Development Act* applications and *Environmental Assessments* will comment on stormwater management, as identified in Table 3, in accordance with MOECC Stormwater Management Guidelines as well as the NPCA Stormwater Management Guidelines until such time as new stormwater management guidelines are approved by the Region.

6.2.4 The Region will review NPCA-initiated studies and projects without fee to the NPCA.

6.2.5 The Region will actively participate in formal preconsultation meetings with developers and landowners. To help ensure a consistent planning application review and a coordinated message, the NPCA and Region, together with the local municipality, will participate in preconsultation at the same time with the proponents.

6.2.6 Prior to a formal pre-consultation meeting, the Region will work to scope the complete application requirements related to environmental features by identifying environmental features that will be need to be addressed in an Environment Impact Study[3] (EIS). Where the NPCA, Region and/or local municipality have identified interests, the Lead Agency (see Table 2) will consult with those parties on the review of the EIS Terms of Reference.

6.2.7 Where the Region is identified as the Lead Agency on Table 1, the Region will provide Technical Clearance on EIS with respect to those environmental features.

6.2.8 Nothing in this Protocol shall limit the Niagara Region from independently appealing a decision or lack of a decision to the Ontario Municipal Board (OMB) or other tribunal.

6.2.9 The Region will be responsible for preparation and maintenance of a comprehensive natural environment screening map, incorporating the NPCA Regulatory screening map as provided and updated by the NPCA.

## 7.0 Coordination of Environmental Comments on Development Applications

The MOU, as may be revised, gives overall directions for the coordination of development applications, policy and Environmental Assessments review. For the purposes of clarity with respect to environmental features, the NPCA will review the following list of applications in accordance with the Conservation Ontario MOU with the Province and ensure that they are consistent with the NPCA Regulation, NPCA Board adopted Policies and Section 3.1. Natural Hazards of the Provincial Policy Statement (except Section 3.1.8). This may include providing comments directly to MMAH as part of the provincial one window process. The NPCA will copy the Region and local municipality on all correspondence.

- Regional Official Plan and Amendments
- Local Official Plans and Amendments

[3] Includes characterisation reports, natural heritage systems reports and other environmental reports.

- Zoning By-laws and Amendments
- Subdivisions/Condominiums
- Environmental Assessments
- Other Development Applications including: Site Plan, Consents, Minor Variances and NEC Development Permits

## 8.0 Protocol Terms and Implementation

The Region and NPCA agree to the following:

### 8.1 Monitoring and Cancellation

This Protocol will be reviewed and amended concurrent with the Memorandum of Understanding between the local municipalities, NPCA and Region to:

- Reflect any changing policies or programs at the provincial, watershed, or regional level, and
- Assess its effectiveness, relevance and appropriateness with respect to the affected parties.

### 8.2 Transition of Responsibilities

When a complete[4] development application, Notice of Commencement for an Environmental Assessment (EA) or major study (such as a Secondary Plan) has been received by the NPCA from a local area municipality or the Region prior to the effective date of this Protocol, the NPCA will continue to review the application consistent with the NPCA's roles and responsibilities identified in the 2008 Protocol in accordance with a matrix of open files to be prepared by the Region and NPCA, after which the files will transition to the 2018 Protocol provisions and the Region will assume responsibility.

In an effort to continue the timely reviews of development applications, EAs and major studies during the transition period, the NPCA may support the Region by providing expertise as needed on a fee for service basis; alternatively the Region may hire consultants as necessary.

### 8.3 Overlapping Mandate

There will be occasions when the responsibilities of the NPCA and the Region overlap. On those occasions, both parties shall work together to provide consistent and sound comments. This will be accomplished by maintaining open dialogue and a good working relationship.

### 8.4 Conflict

a) Where this Protocol is in conflict with the 2014 MOU, this Protocol will take precedence.

b) Where there is conflict between new (changing) legislation and this Protocol, new legislation will take precedence.

c) Subject to paragraph (d) below, where there is a conflict between the Region's Official Plan, the NPCA Regulation and/or Board adopted policies, the Regulation shall take precedence.

[4] As determined by the approving authority generally as identified through pre-consultation and shown on the Pre-consultation Form/Letter.

d) Where there are policy conflicts only, Regional, NPCA and local municipal staffs will work together to resolve the issue. If all efforts fail to resolve a policy conflict, a decision will be made by the approval authority, as per Table 2.

### 8.5 Streamlining

Further streamlining of the planning review process, as it relates to Provincial, NPCA and regional/local interests, is encouraged.

### 8.6 Information Sharing / Open Data

Any information or data sources generated by the Province, NPCA or Region, or generated through municipal or watershed studies will be shared, where possible.

### 8.7 Fees

a) The Region will collect the NPCA Fee for applications to amend the Region's Official Plan and remit any fees collected upon circulation of the application to the NPCA; fees for planning review and technical clearance services will be set by the NPCA;

b) The NPCA will be responsible for collecting any further processing, approvals and/or Final Clearance Fees, if required; and,

c) The NPCA will provide the Region and the local municipalities with an approved schedule of fees and updates.

### 8.8 Effective Date

This Protocol will take effect on the last date signed by the parties to this Protocol.

Date of Regional Council approval _____.

Date of NPCA Board approval _____.

**Table 1: Responsibilities for Planning Application Review with Respect to Environmental Features**

| Environmental Features | Lead Agency | Mandate Authority | Planning Application and Policy Review Agency | Technical Clearance Review |
|---|---|---|---|---|
| Natural Hazards[5] | | | | |
| Flooding Hazards, Floodways and Floodplains | NPCA | PPS Section 3.1,<br>MOU with Province,<br>O. Reg. 155/06 | NPCA | NPCA |
| Dynamic Beach and Erosion Hazards | NPCA | PPS Section 3.1,<br>MOU with Province,<br>O. Reg. 155/06 | NPCA | NPCA |
| Hazardous Lands and Hazardous Sites | NPCA | PPS Section 3.1,<br>MOU with Province,<br>O. Reg. 155/06 | NPCA | NPCA |
| Riverine Hazards | NPCA | PPS Section 3.1,<br>MOU with Province,<br>O. Reg. 155/06 | NPCA | NPCA |
| Regulated Watercourses | NPCA | PPS Section 3.1,<br>MOU with Province,<br>O. Reg. 155/06 | NPCA | NPCA |
| Wildland Fires | Region | PPS Section 3.1.8 | Region | Region |
| Natural Heritage | | | | |
| Wetlands | NPCA/Region | O. Reg. 155/06<br>PPS Section 2.1, ROP | NPCA/Region | NPCA/Region |
| Habitat of Endangered and Threatened Species | MNRF | Endangered Species Act (Federal and Provincial), ROP | Region | MNRF |
| Significant Woodlands | Region | PPS Section 2.1 , ROP | Region | Region |
| Significant Wildlife Habitat | Region | PPS Section 2.1, ROP | Region | Region |

[5] For the purposes of this document reference to PPS Section 3.1 includes Policies 3.1.1 to 3.1.7 only.

| Environmental Features | Lead Agency | Mandate Authority | Planning Application and Policy Review Agency | Technical Clearance Review |
|---|---|---|---|---|
| Significant Valleylands | Region | PPS Section 2.1, ROP | Region | Region |
| Significant ANSIs (life and earth) | Region | PPS Section 2.1, ROP | Region | Region |
| Fish Habitat | DFO | Fisheries Act,<br>PPS Section 2.1, ROP | Region | DFO |
| Water Resource | | | | |
| Vulnerable Groundwater Areas | Region | PPS Section 2.2, ROP | Region | Region |
| Groundwater Features | Region | PPS Section 2.2, ROP | Region | Region |
| Stormwater Management | Region | PPS Section 2.2, ROP | Region / Local | Region |
| Key Hydrologic Features | Region | Provincial Plans, ROP | Region | Region |
| Sensitive Water Features | Region | PPS Section 2.2, ROP | Region | Region |
| Significant Groundwater Recharge Areas | Region | Provincial Plans, ROP | Region | Region |
| Significant Surface Water Contribution Areas | Region | Provincial Plans, ROP | Region | Region |
| Intake Protection Zones/Vulnerable Surface Water Features | Local | Clean Water Act 2006<br>PPS Section 2.2, ROP | Region /Local | N/A |

**Acronyms from Table 1**

DFO – Depart of Fisheries and Oceans

NEC – Niagara Escarpment Commission

O. Reg. 155/06 - Provincial Legislation with respect to the Niagara Peninsula Conservation Authority: Regulation of Development, Interference with wetlands and Alteration to Shorelines and Watercourses.

PPS - Provincial Policy Statement 2014

ROP – Regional Official Plan

**Table 2: Implementation Responsibilities**

| Processes / Reports / Submissions | Lead Agency | Responsibility for Final Approval |
|---|---|---|
| Application Processes | | |
| Regional Official Plan/Amendments | Region | Region |
| Local Official Plan/Amendments | Local | Local / Region[6] |
| Zoning By-Law/Amendments | Local | Local |
| Draft Plans of Subdivision | Local | Local |
| Site Plan | Local | Local |
| Draft Plan of Condominium | Local | Local |
| Minor Variance/Permissions | Local | Local |
| Consent/Boundary Adjustments | Local | Local |
| NEC Applications | NEC | NEC |
| Building Permits | Local | Local |
| Aggregate Licence | Local / Region / MNRF | MNRF |
| Environmental Assessments | Local / Region / Province | Local / Region / Province |
| Reports / Studies | | |
| EIS in a NPCA Regulated Area | NPCA | NPCA |
| EIS outside Settlement Area[7] | Region | Region |
| EIS inside Settlement Area[8] | Local | Local |
| Watershed Studies | Region | Region |
| Subwatershed Studies | Local | Local |
| Technical Reports for Natural Hazard Identification | NPCA | NPCA |
| Regional Master Servicing Plans | Region | Region |
| Regional Stormwater Guidelines | Region | Region |

**Notes for Table 2:**

(i) The responsibility for the Review of Environmental Features is as noted in Table 1
(ii) The responsibility for Technical Clearance of Environmental Features is as noted in Table 1

[6] Regional Official Plan Policies 14.E.7 and 14.E.8 identify criteria under which approval of Local Official Plan Amendment amendments may be delegated to the local Council for approval.
[7] Notwithstanding the EIS is outside the Settlement Area, if the EIS includes a NPCA Regulated Area, the NPCA shall be the Lead and responsible for Final Approval of the EIS for the regulated features.
[8] Notwithstanding the EIS is within the Settlement Area, if the EIS includes a NPCA Regulated Area, the NPCA shall be the Lead and responsible for Final Approval of the EIS for the regulated features.

**Table 3: Responsibilities for Stormwater Management Review with Respect to Area of Interest**

| Area of Interest | NPCA | Region | MOECC | Local |
|---|---|---|---|---|
| Determination of need for Stormwater Report – Quality and Quantity | | ✓ | | ✓ |
| Review of Stormwater Report | | ✓ | ✓ | ✓ |
| Location of Facility with Respect to Vision of Area | | | | ✓ |
| Location of Facility with Respect to Natural Hazards | ✓ | | | |
| Location of Facility with Respect to Functionality | | * | | ✓ |
| Confirmation of Drainage Areas | | * | | ✓ |
| Sizing of Facility with Respect to Quality, Erosion and Quantity Controls, including Release Rates and Settling Calculations | | ✓ | | ✓ |
| Other Potential Impacts on Receiving Watercourse (e.g. thermal, water balance, etc) | | ✓ | | |
| Outlet Structure and Spillway Design | | ✓ | ✓ | ✓ |
| Outlet to Watercourse (if necessary) | ✓ | | ✓ | |
| Safety – Side Slopes, Grating, Grading, Emergency Access | | ✓ | | ✓ |
| Landscaping/Re-vegetation | | | | ✓ |
| Long Term Maintenance | | | ✓ | ✓ |
| Major and Minor Flow Conveyance (internal to subdivision) | | | | ✓ |
| Hydraulic Gradeline Analysis of Storm Sewer and Outlet | | | | ✓ |

*The Region will be involved in instances where the drainage of a Regional Road may be impacted.

# Appendix A - Excerpt from the Memorandum of Understanding on Procedures to Address Conservation Authority Delegated Responsibility

Conservation Ontario, Ministry of Natural Resources & Ministry of Municipal Affairs and Housing

Memorandum of Understanding on Procedures to Address Conservation Authority Delegated Responsibility

2001

**Purpose of the MOU**

The MOU defines the roles and relationships between Conservation Authorities (CAs), the Ministry of Natural Resources (MNR), and the Ministry of Municipal Affairs and housing (MMAH) in planning for implementation of CA delegated responsibilities under the Provincial One Window Planning System…

**Roles and Responsibilities**

Conservation Authorities (CAs)

a) The CAs will review policy documents and development proposals processed under the Planning Act to ensure that the application has appropriate regard to Section 3.1 of the PPS. [see Appendix C]

b) Upon request from MMAH, CAs will provide comments directly to MMAH on planning matters related to Section 3.1 of the PPS as part of the provincial one window review process.

c) Where there may be a potential conflict regarding a Conservation Authority's comments on a planning application with respect to Section 3.1 of the PPS and comments from provincial ministries regarding other Sections of the PPS, the Ministry of Municipal Affairs and Housing will facilitate discussions amongst the affected ministries and the Conservation Authority so that a single integrated position can be reached.

d) CAs will apprise MMAH of planning matters where there is an issue as to whether there has been "regard to" Section 3.1 of the PPS to determine whether or not direct involvement by the province is required.

e) Where appropriate, CAs will initiate an appeal to the OMB to address planning matters where there is an issue as to whether there has been "regard to" Section 3.1 of the PPS is at issue. CAs may request MMAH to support the appeal.

f) CAs will participate in provincial review of applications for Special Policy Area approval.

g) CAs will work with MMAH, to develop screening and streamlining procedures that eliminate unnecessary delays and duplication of effort.

# Appendix B - Excerpt from the Provincial Policy Statement 2014 – Conservation Responsibility for Natural Hazards

**3.1 Natural Hazards**

3.1.1 Development shall generally be directed to areas outside of:

a. hazardous lands adjacent to the shorelines of the Great Lakes - St. Lawrence River System and large inland lakes which are impacted by flooding hazards, erosion hazards and/or dynamic beach hazards;
b. hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards; and
c. hazardous sites.

3.1.2 *Development* and *site alteration* shall not be permitted within:

a. the dynamic beach hazard;
b. defined portions of the flooding hazard along connecting channels (the St. Marys, St. Clair, Detroit, Niagara and St. Lawrence Rivers);
c. areas that would be rendered inaccessible to people and vehicles during times of flooding hazards, erosion hazards and/or dynamic beach hazards, unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard; and
d. a floodway regardless of whether the area of inundation contains high points of land not subject to flooding.

3.1.3 Planning authorities shall consider the potential impacts of climate change that may increase the risk associated with natural hazards.

3.1.4 Despite policy 3.1.2, *development* and *site alteration* may be permitted in certain areas associated with the *flooding hazard* along *river*, *stream and small inland lake systems*:

a. in those exceptional situations where a *Special Policy Area* has been approved. The designation of a *Special Policy Area*, and any change or modification to the official plan policies, land use designations or boundaries applying to *Special Policy Area* lands, must be approved by the Ministers of Municipal Affairs and Housing and Natural Resources prior to the approval authority approving such changes or modifications; or
b. where the *development* is limited to uses which by their nature must locate within the *floodway*, including flood and/or erosion control works or minor additions or passive non-structural uses which do not affect flood flows.

3.1.5 *Development* shall not be permitted to locate in *hazardous lands* and *hazardous sites* where the use is:

a. an *institutional use* including hospitals, long-term care homes, retirement homes, pre-schools, school nurseries, day cares and schools;
b. an *essential emergency service* such as that provided by fire, police and ambulance stations and electrical substations; or
c. uses associated with the disposal, manufacture, treatment or storage of *hazardous substances*.

3.1.6 Where the *two zone concept* for *flood plains* is applied, *development* and *site alteration* may be permitted in the *flood fringe*, subject to appropriate floodproofing to the *flooding hazard* elevation or another *flooding hazard* standard approved by the Minister of Natural Resources.

3.1.7 Further to policy 3.1.6, and except as prohibited in policies 3.1.2 and 3.1.5, *development* and *site alteration* may be permitted in those portions of *hazardous lands* and *hazardous sites* where the effects and risk to public safety are minor, could be mitigated in accordance with provincial standards, and where all of the following are demonstrated and achieved:

a. development and site alteration is carried out in accordance with floodproofing standards, protection works standards, and access standards;
b. vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion and other emergencies;
c. new hazards are not created and existing hazards are not aggravated; and
d. no adverse environmental impacts will result. [9]

3.1.8 *Development* shall generally be directed to areas outside of lands that are unsafe for *development* due to the presence of *hazardous forest types for wildland fire*.

Development may however be permitted in lands with hazardous forest types for wildland fire where the risk is mitigated in accordance with wildland fire assessment and mitigation standards. [10]

[9] Policy 3.1.7 of the PPS was added to the PPS in 2014, and was not part of the Memorandum of Understanding on Procedure to Address *Conservation Authority Delegated Responsibility* in 2001 between
Conservation Ontario, Ministry of Natural Resources & Ministry of Municipal Affairs and Housing. However, Policy 3.1.7 provides clarity to Policies 3.1.2 and 3.1.5 and therefore could be considered part of the NPCA mandate.

[10] Policy 3.1.8 of the PPS was added to the PPS in 2014, and was not part of the Memorandum of Understanding on Procedures to Address Conservation Authority Delegated Responsibility in 2001 between
Conservation Ontario, Ministry of Natural Resources & Ministry of Municipal Affairs and Housing. As wildland fire is a new hazard, it should not be considered part of the NPCA mandate unless the Province gives further direction on this matter.

# Appendix C - Excerpt from the Ontario Regulation 155/06 Niagara Peninsula Conservation Authority: Regulation of Development, Interface with Wetlands and Alterations to Shorelines and Watercourses

**Development prohibited**

**2.** (1) Subject to section 3, no person shall undertake development or permit another person to undertake development in or on the areas within the jurisdiction of the Authority that are,

(a) adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to inland lakes that may be affected by flooding, erosion or dynamic beaches, including the area from the furthest offshore extent of the Authority's boundary to the furthest landward extent of the aggregate of the following distances:

(i) the 100 year flood level, plus the appropriate allowance for wave uprush shown in the most recent document entitled "Lake Ontario Shoreline Management Plan" available at the head office of the Authority,

(ii) the 100 year flood level, plus the appropriate allowance for wave uprush shown in the most recent document entitled "Lake Erie Shoreline Management Plan" available at the head office of the Authority,

(iii) the predicted long term stable slope projected from the existing stable toe of the slope or from the predicted location of the toe of the slope as that location may have shifted as a result of shoreline erosion over a 100-year period,

(iv) where a dynamic beach is associated with the waterfront lands, the appropriate allowance inland to accommodate dynamic beach movement shown in the most recent document entitled "Lake Ontario Shoreline Management Plan" available at the head office of the Authority, and

(v) where a dynamic beach is associated with the waterfront lands, the appropriate allowance inland to accommodate dynamic beach movement shown in the most recent document entitled "Lake Erie Shoreline Management Plan" available at the head office of the Authority;

(b) river or stream valleys that have depressional features associated with a river or stream, whether or not they contain a watercourse, the limits of which are determined in accordance with the following rules:

(i) where the river or stream valley is apparent and has stable slopes, the valley extends from the stable top of bank, plus 15 metres, to a similar point on the opposite side,

(ii) where the river or stream valley is apparent and has unstable slopes, the valley extends from the predicted long term stable slope projected from the existing stable

slope or, if the toe of the slope is unstable, from the predicted location of the toe of the slope as a result of stream erosion over a projected 100-year period, plus 15 metres, to a similar point on the opposite side,

(iii) where the river or stream valley is not apparent, the valley extends the greater of,

(A) the distance from a point outside the edge of the maximum extent of the flood plain under the applicable flood event standard, to a similar point on the opposite side, and

(B) the distance of a predicted meander belt of a watercourse, expanded as required to convey the flood flows under the applicable flood standard, to a similar point on the opposite side;

(c) hazardous lands;

(d) wetlands; or

(e) other areas where development could interfere with the hydrologic function of a wetland, including areas up to 120 metres of all provincially significant wetlands and wetlands greater than 2 hectares in size, and areas within 30 metres of wetlands less than 2 hectares in size. O. Reg. 155/06, s. 2 (1); O. Reg. 71/13, s. 1 (1-3).

(2) All areas within the jurisdiction of the Authority that are described in subsection (1) are delineated as the "Regulation Limit" shown on a series of maps filed at the head office of the Authority under the map title "Ontario Regulation 97/04: Regulation for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses". O. Reg. 71/13, s. 1 (4).

(3) If there is a conflict between the description of areas in subsection (1) and the areas as shown on the series of maps referred to in subsection (2), the description of areas in subsection (1) prevails. O. Reg. 71/13, s. 1 (4).

# APPENDIX

## *A-5 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS ECA DESIGN CRITERIA (APRIL 2022)*

Ontario

# Design Criteria for
# Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval

Ministry of Environment, Conservation and Parks

v.1 April 22, 2022

# Table of Contents

Preface ..... 1
Definitions ..... 2

**1.0. INTRODUCTION** ..... 6
1.1. General Requirements ..... 6
1.2. Design Considerations ..... 7
1.3. Protection of drinking water sources ..... 8
1.4. Protection of Water Supplies ..... 8

**2.0. DESIGN OF SANITARY SEWERS** ..... 9
2.1. Design Flows ..... 9
2.2. Friction Factors ..... 10
2.3. Pipe Diameters ..... 10
2.4. Flow Velocity ..... 10
2.5. Anchors/Restraints ..... 10
2.6. Pipe Material ..... 11
2.7. Pipe Strength ..... 11
2.8. Pipe Cover and Frost Protection ..... 11
2.9. Sanitary Sewers and Maintenance Holes Installed Below Seasonally High Groundwater Table ..... 12
2.10. Sanitary Maintenance Holes ..... 12
2.11. Inverted Siphons ..... 13
2.12. Service Connections (Service Laterals) ..... 14

**3.0. DESIGN OF FORCEMAINS** ..... 15
3.1. Pipe Diameters ..... 15
3.2. Friction Factors ..... 15
3.3. Flow Velocity ..... 15
3.4. Anchors/Restraints ..... 15
3.5. Pipe Material ..... 15
3.6. Pipe Strength ..... 16
3.7. Pipe Cover and Frost Protection ..... 16
3.8. Termination ..... 16
3.9. Identification ..... 17
3.10. Maintenance ..... 17
3.11. Transient Pressures ..... 17

3.12. Air and Vacuum Relief Valves ..... 17
3.13. Drain Valves ..... 17
3.14. Service Connections ..... 18

**4.0. COMBINED SEWERS** ..... 19
4.1. Rehabilitation of Existing Combined Sewers ..... 19
4.2. CSO Detention Facilities ..... 19

**5.0. STORM SEWERS** ..... 20
5.1. Design of Storm Sewers ..... 20
5.2. Runoff Calculations ..... 20
5.3. Friction Factors ..... 21
5.4. Pipe Diameter ..... 21
5.5. Flow Velocity ..... 21
5.6. Anchors/Restraints ..... 22
5.7. Pipe Material ..... 22
5.8. Pipe Strength ..... 22
5.9. Pipe Cover and Frost Protection ..... 22
5.10. Storm Maintenance Holes ..... 23
5.11. Catch Basins ..... 23
5.12. Inverted Siphons ..... 24
5.13. Service Connections (Service Laterals) ..... 24

**6.0. Third Pipe Collection System** ..... 25

**7.0. Documentation** ..... 26

**8.0. Inspection and Testing for Sanitary Sewers, Storm Sewers and Forcemains** ..... 27
8.1. General Requirements ..... 27
8.2. Inspections ..... 27
8.3. Leakage Testing ..... 28
8.4. Deflection Testing ..... 29
8.5. Hydrostatic Testing ..... 30

## List of Tables

Table 1 - Common Sewage Flowrates for Commercial and Institutional Uses ..... 10
Table 2 - Hazen-Williams C-Factors ..... 15
Table 3 - Runoff Coefficients ..... 21
Table 4 - Manning's Roughness Coefficient (n) for New Pipes ..... 21
Table 5 - Maintenance Hole Spacing ..... 23
Table 6 - Catch Basin Spacing ..... 23

## Appendices

Appendix I: Understanding Risks to Sources of Drinking Water

## Preface

The Design Criteria establish the minimum design requirements for Alteration to an existing Municipal Sewage Collection System and Municipal Stormwater Management System by adding, modifying, replacing, or extending Sanitary Sewers, forcemains, or Storm Sewers to satisfy one of the conditions imposed by the Director in Municipal Sewage Collection System ECA and Stormwater ECA authorizing future Alterations. Compliance with this Criteria and other conditions of the ECA negates the need for the Owner of the Municipal Sewage Collection System and Municipal Stormwater Management System to apply for an amendment to the ECA for the Alteration of Sanitary Sewers, forcemains or Storm Sewers within the collection system.

The existence of these Criteria does not preclude Alteration of Sanitary Sewers, forcemains or Storm Sewers that are not designed in accordance with these Design Criteria. However, any Alterations to collection systems that are either not designed in accordance with this Design Criteria or does not satisfy the conditions of the ECA are subject to the requirement to obtain an amendment to the ECA prior to proceeding with the undertaking.

Other approving authorities, such as municipalities in which the works are constructed or regional governments, may have servicing standards or criteria that are more stringent than the requirements outlined in the Design Criteria and they shall be considered acceptable for the purposes of complying with the requirements of the Design Criteria.

The Design Criteria document reflect program decisions that would be routinely made by the approving Director that issues ECAs under the authority of the Ontario Water Resources Act and the Environmental Protection Act. The Design Criteria may be updated from time to time by the Director or in order to conform to any future changes to the provincial policy, regulation or legislation that apply to Sanitary Sewers, forcemains or Storm Sewers.

## Definitions

For the purpose of this Design Criteria, the following definitions apply:

**“Adverse Effect(s)”** has the same meaning as defined in section 1 of the EPA.

**“Alteration(s)”** includes the following, includes the following, in respect of the Authorized System, but does not include repairs to the system:

a) An extension of the system,

b) A replacement of part of the system, or

c) A modification of**,** addition to or enlargement of the system.

**“Appurtenance(s)”** has the same meaning as defined in O. Reg. 525/98 (Approval Exemptions) made under the OWRA.

**“Authorized System”** means the Sewage Works authorized under an Environmental Compliance Approval for a Municipal Sewage Collection System or an Environmental Compliance Approval for a Municipal Stormwater Management System.

**“Collection System Overflow(s)”** means a discharge (SSO or CSO) to the environment at designed location(s) from the Authorized System.

**“Combined Sewer(s)”** means pipes that collect and transmit both sanitary Sewage and other Sewage from residential, commercial, institutional and industrial buildings and facilities and Stormwater runoff through a single-pipe system, but does not include Nominally Separate Sewers.

**“Combined Sewer Overflow(s)” or “(CSO)”** means a combined sewer overflow which is a discharge to the environment at designated location(s) from a Combined Sewer or Partially Separated Sewer that usually occurs as a result of precipitation when the capacity of the Sewer is exceeded. An intervening time of twelve hours or greater separating a CSO from the last prior CSO at the same location is considered to separate one overflow Event from another.

**"CWA"** means the *Clean Water Act*, R.S.O. 2006, c.22.

**“Design Criteria**” means the design criteria set out in the Ministry’s publication “Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval”, (as amended from time to time).

**"Director"** means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA.

**“ECA”** means an Environmental Compliance Approval.

**"Emergency Situation"** means a structural, mechanical, electrical failure, or operational health and safety incident, that causes a temporary reduction in the capacity, function or performance of any part of the Authorized System or an unforeseen flow condition that may result in:

a) Danger to the health or safety of any person;

b) Injury or damage to any property, or serious risk of injury or damage to any property;

c) Adverse Effect to the Natural Environment; or;

d) Spill.

**"EPA"** means the Environmental Protection Act, R.S.O. 1990, c.E.19;

**"Event(s)"** means an action or occurrence, at any given location within the Authorized System that causes a Collection System Overflow. An Event ends when there is no recurrence of a CSO or SSO in the Collection System at the same location in the 12-hour period following the last Collection System Overflow.

**"Facility"** means the entire operation located on the property where the Sewage Works is located;

**"Licensed Engineering Practitioner"** means a person who holds a licence, limited licence, or temporary licence under the *Ontario Professional Engineers Act* R.S.O. 1990, c. P.28.

**"LID"** means "low impact development" 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 and distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration, and detention of Stormwater.

**"MTD"** means manufactured treatment device;

**"Minister"** means the Minister of the Ministry or such other member of the Executive Council as may be assigned the administration of the EPA and OWRA under the *Executive Council Act*, R.S.O. 1990, c. E.25;

**"Ministry"** means the Ministry of the Minister and includes all employees or other persons acting on its behalf;

**"Municipal Sewage Collection System"** means all Sewage Works located in the geographical area of a municipality that collect and transmit sanitary Sewage and are owned, or may be owned pursuant to an agreement with a municipality entered into under the *Planning Act* or *Development Charges Act*, 1997, by:

a) A municipality, a municipal service board established under the *Municipal Act*, 2001 or a city board established under the *City of Toronto Act*, 2006; or;

b) A corporation established under sections 9, 10 and 11 of the *Municipal Act*, 2001 in accordance with section 203 of that *Act* or under sections 7 and 8 of the *City of Toronto Act*, 2006 in accordance with sections 148 and 154 of that Act;

**“Municipal Stormwater Management System”** all Sewage Works, located in the geographical area of a municipality, that collect, transmit, or treat Stormwater and are owned, or may be owned pursuant to an agreement entered into under the Planning Act or Development Charges Act, 1997, by:

a) A municipality, a municipal service board established under the Municipal Act, 2001 or a city board established under the City of Toronto Act, 2006; or

b) A corporation established under sections 9, 10 and 11 of the Municipal Act, 2001 in accordance with section 203 of that Act or under sections 7 and 8 of the City of Toronto Act, 2006 in accordance with sections 148 and 154 of that Act.

**“Natural Environment”** has the same meaning as defined in section 1 of the EPA;

**"Nominally Separate Sewer(s)"** mean Separate Sewers that also have connections from roof leaders and foundation drains, and are not considered to be Combined Sewers;

**“Operating Authority”** means, in respect of the Sewage Works, the person, entity or assignee that is given responsibility by the Owner for the operation, management, maintenance or Alteration of the Sewage Works or a portion of the Authorized System;

**"Owner"** means the owner of the Authorized System.

**"OWRA"** means the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40;

**"Partially Separated Sewer(s)"** means Combined Sewers that have been retrofitted to transmit sanitary Sewage but in which roof leaders or foundation drains still contribute Stormwater inflow to the Partially Separated Sewer;

**"Procedure F-5-5"** means the Ministry document titled “F-5-5 Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Sewer System” (as amended from time to time);

**“Sanitary Sewer(s)”** means pipes that collect and transmit wastewater from residential, commercial, institutional and industrial buildings;

**“Separate Sewer(s)”** means pipes that collect and transmit sanitary Sewage and other Sewage from residential, commercial, institutional, and industrial buildings;

**“Sewage”** has the same meaning as defined in section 1 of the OWRA;

**“Sewage Works”** has the same meaning as defined in section 1 of the OWRA*;*

**“Sewer”** has the same meaning as in O. Reg. 525/98 under the OWRA;

**"Significant Drinking Water Threat"** has the same meaning as defined in section 2 of the CWA*;*

**"Source Protection Plan"** means a drinking water source protection plan prepared under the CWA;

**“Spill(s)”** has the same meaning as defined in subsection 91(1) of the EPA;

**“Standard Operating Policy for Sewage Works”** means the standard operating policy developed by the Ministry to assist in the implementation of Source Protection Plan policies related to Sewage Works and providing minimum design and operational standards and considerations to mitigate risks to sources of drinking water, as amended from time to time;

**"Storm Sewer"** means Sewers that collect and transmit, but not exfiltrate or lose by design, Stormwater resulting from precipitation and snowmelt;

**“Stormwater”** means rainwater runoff, water runoff from roofs, snowmelt and surface runoff;

**“Stormwater Management Facility(ies)”** means a Facility for the treatment, retention, infiltration or control of Stormwater;

**“Stormwater Management Planning and Design Manual”** means the Ministry document titled “Stormwater Management Planning and Design Manual”, 2003 (as amended from time to time);

**“Stormwater Treatment Train”** means a series of Stormwater Management Facilities designed to meet stormwater management objectives (e.g., Appendix A of ECA) for a given area, and can consist of a combination of MTDs, LIDs and end-of-pipe controls**;**

**“Third Pipe Collection System”** means Sewage Works designed to collect and transmit foundation drainage and/or groundwater to a receiving surface water or dry well;

**“Uncommitted Reserve Hydraulic Capacity”** means uncommitted reserve capacity as described in MECP’s Procedure “D-5-1 Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants” (as amended from time to time);

# 1.0. INTRODUCTION

The Design Criteria establish the minimum design requirements for Alteration to a Municipal Sewage Collection System and Municipal Stormwater Management System to satisfy one of the conditions imposed by the Director in Environmental Compliance Approval (ECA) for a Municipal Sewage Collection System and ECA for a Municipal Stormwater Management System, authorizing future Alterations. The designers and proponents of such works are responsible to ensure that all the applicable federal and provincial requirements are incorporated in the design and construction of Sanitary Sewers, Storm Sewers, and forcemains. Where regulations and standards are referenced in this document, most recent version shall be used.

## 1.1. General Requirements

1.1.1. Alteration to an existing Municipal Sewage Collection System by adding, modifying, replacing, or extending existing sanitary or forcemains, and/or Appurtenances, is not permitted when such works;

1. Results in exceedance of hydraulic capacity of the downstream Municipal Sewage Collection System including Sewage pumping stations and Uncommitted Reserve Hydraulic Capacity of the receiving Sewage treatment plants;
2. Causes an Adverse Effect;
3. Any increase in Collection System Overflows and or deterioration of quality of the overflow discharge, that is not offset by measures; or
4. Adversely impacts the approved effluent quality of Sewage treatment Facilities, or its bypasses or overflows.

1.1.2. The existing Municipal Sewage Collection System may be altered by adding, modifying, replacing, or extending existing Sanitary Sewers or forcemains, Appurtenances, and other components of these systems that are pre-authorized in the ECA, subject to the following conditions;

1. The design for addition, modification, replacement, or extension of Sanitary Sewers, forcemains and/or Appurtenances;
    a. Has been prepared by a Licensed Engineering Practitioner;
    b. Has been designed to transmit but not to treat wastewater; and
    c. Satisfies or exceeds the minimum requirements specified in the Design Criteria.
2. Uncommitted Reserve Hydraulic Capacity calculations for the downstream Municipal Sewage Collection System and treatment Facilities including allowances for infiltration and inflow has been prepared and submitted by the proponent to the Owner with the supporting documentation as required by the Owner.
3. The Owner has a plan and process to forecast and track Uncommitted Reserve Hydraulic Capacity and verify the proposed Alteration of the system can be accommodated.
4. All required documentation detailed in this Design Criteria and/or in the ECA has been completed.

1.1.3. Alteration to an existing Municipal Stormwater Management System by adding, modifying, replacing, or extending existing Storm Sewers, and/or Appurtenances, is not permitted when such works;

1. Results in exceedance of hydraulic capacity of the downstream;
    a. Conveyance system;
    b. The receiving treatment / Stormwater Management Facilities;
2. Causes an Adverse Effect; or
3. Adversely impacts the approved effluent quality of Stormwater works.

1.1.4. The existing Municipal Stormwater Management System may be altered by adding, modifying, replacing, or extending existing Storm Sewers, Appurtenances, and other components of these systems that are pre-authorized in the ECA, subject to the following conditions;

1. The design for addition, modification, replacement, or extension of Storm Sewers, and/or Appurtenances;
    a. Has been prepared by a Licensed Engineering Practitioner;
    b. Satisfies or exceeds the minimum requirements specified in the Design Criteria; and
    c. Has been planned, designed and built to be consistent with the MECP's Stormwater Management Planning and Design Manual (March 2003).
2. All required documentation detailed in this Design Criteria and/or in the ECA has been completed.
3. Municipal Stormwater Management System should be designed using an integrated Stormwater Treatment Train approach used to minimize Stormwater management flows and reliance on end of pipe controls through measures including source controls, lot level controls, and conveyance techniques.

## 1.2. Design Considerations

1.2.1. All Sanitary Sewers, Storm Sewers, forcemains, maintenance holes, and chambers, shall be designed considering all relevant soil and hydrogeological conditions including groundwater elevations.

1.2.2. The design of all maintenance holes, chambers, and structures shall conform to all applicable requirements including, but not limited to: Occupational Health and Safety Act, Ministry of Labour Confined Space Guidelines and Fire Protection and Prevention Act.

1.2.3. All new maintenance holes and chambers shall be designed with explicit and documented consideration for future inspection, operation, and maintenance requirements.

1.2.4. All precast structures installed in frost-susceptible soils shall include necessary hardware to prohibit heave due to frost action unless alternative methods are employed to mitigate frost heaving.

1.2.5. Sewers, maintenance holes, and/or Appurtenances shall be avoided where possible in areas subject to flooding or in areas of high groundwater (regular and seasonal).

1.2.6. If Sewers, maintenance holes and/or Appurtenances are located in areas subject to flooding/high groundwater, Inflow and Infiltration reduction, and flotation prevention measures shall be included in the design.

1.2.7. The design shall include in the project specifications requirements for;

1. Mandatory inspection and testing as per Section 8 of this document; and
2. Adequate control of siltation and erosion during construction.

## 1.3. Protection of drinking water sources

1.3.1. An assessment of the proposed works shall be completed to determine if the works pose a Significant Drinking Water Threat and if they are, the design shall incorporate features that mitigate the threat to sources of drinking water, such as those included in:

1. Ministry's Standard Operating Policy for Sewage Works as amended from time to time; and
2. Source Protection Plan policies pertaining to the works.

Refer to Appendix I for Understanding Risks to Sources of Drinking Water.

## 1.4. Protection of Water Supplies

1.4.1. Sanitary Sewers, Storm Sewers, forcemains, and all associated Appurtenances and structures shall be designed with provisions to provide the required protection for drinking water supply systems in accordance with;

1. The MECP's F-6-1 Procedures to Govern Separation of Sewers and Watermains; and
2. Section 15 of the MECP's Watermain Design Criteria for Future Alterations Authorized Under a Drinking Water Works Permit.

# 2.0. DESIGN OF SANITARY SEWERS

## 2.1. Design Flows

2.1.1. Residential Flows

1. The average daily residential flows of 225 to 450 L/cap/day shall be used in the design for sizing the pipe.
2. Peaking factor can be calculated using either the Harmon Formula or Babbitt Formula. At minimum, a peaking factor of 2.0 shall be used in the design.

2.1.2. Commercial Flows

1. The minimum allowance for commercial flows shall be 28 $m^3$/ha/day. Actual flow monitoring data (covering at least 2 years) at the subject site or a similar site observed locally can be used.
2. The Sewage flows listed on Table 1 may be used in the design for individual commercial facilities, provided that the minimum flow capacity listed in 2.1.2.1 are maintained for the development.

2.1.3. Institutional Flows

1. Historical water use data at the subject site or a similar site (covering at least 2 years) of the facility or other similar facilities can be used to calculate average institutional flows. Where historical water use data is not available, the unit values for institutional flows listed in Table 1 can be used. The designer shall use professional judgement to select appropriate flow rate within the range.

2.1.4. Industrial Flows

1. Where available, actual sanitary flow monitoring data at the subject site or a similar site (covering at least 2 years) shall be used for accurate prediction of industry specific wastewater flows. Where actual flow data is not available, an average flow from 0.2 to 0.5 L/s/ha can be used.

2.1.5. Extraneous Flow (I&I)

1. A long-term (end-of-pipe life) peak inflow and infiltration (I&I) rate allowance of up to 0.28 L/s/ha shall be used in pipe sizing to maintain capacity throughout the designed life of the sewers.

**Table 1 - Common Sewage Flowrates for Commercial and Institutional Uses**

| Description | Unit Sewage Flow (L/d) | Flow Unit Per |
|---|---|---|
| Shopping Centre (floor area in $m^2$) | 2.5 – 5.0 | Total floor area in $m^2$ |
| Hospitals | 900 – 1,800 | Bed |
| Schools | 70 - 140 | Student |
| Travel Trailer Parks | 340 | Space (without water hook-ups) |
| | 800 | Space (with individual. water hook-ups) |
| Campgrounds | 225 - 570 | Campsite |
| Mobile Home Park | 1,000 | Parking space |
| Motels | 150 - 200 | Bed space |
| Hotels | 225 | Bed space |

## 2.2. Friction Factors

2.2.1. Sanitary Sewers shall be designed using either the Chézy- Kutter, Darcy Weisbach, or Chézy-Manning's formula. Appropriate roughness coefficient shall be used according to the type of pipe used. The friction loss coefficient must be appropriate to the installed pipe, but not less than the equivalent of a Manning's equation "n" of 0.013 for all new smooth-wall Sewer pipes.

## 2.3. Pipe Diameters

2.3.1. The minimum size of the gravity Sewer in a Municipal Sewage Collection System shall be 200 mm in diameter (nominal pipe size). Sewer pipe 150 mm in diameter can be used if it is demonstrated in the design that there is no risk of clogging and the design is accepted by the Owner.

## 2.4. Flow Velocity

2.4.1. Gravity Sewers shall be designed with uniform slopes between the maintenance holes.

2.4.2. All gravity Sanitary Sewers shall be designed and constructed with slopes to provide at least 0.6 m/s of flow velocity, when flowing full to maintain solids in suspension.

2.4.3. In certain circumstances, such as rehabilitation/replacement of an existing Sewer where deepening of individual Sewer section will not be possible, design flow velocities of less than 0.6 m/s may be considered provided that appropriate measures are taken to facilitate frequent flushing and maintenance needs and the Owner accepts the increased maintenance requirements.

2.4.4. The maximum velocity in all Sanitary Sewers shall be less than or equal to 3.0 m/s at peak flows to minimize erosion.

## 2.5. Anchors/Restraints

2.5.1. Sanitary Sewers on 20 percent slope or greater shall be anchored securely with concrete anchors or equal.

2.5.2. Anchors and anchorage spacing shall be designed by a Licensed Engineering Practitioner based on Sewer material, anchor type and site conditions. Recommended maximum

anchorage spacing is 11 m on grades between 20 percent and up to 35 percent, 7.3 m on grades between 35 percent and up to 50 percent, and 4.9 m on grades that exceed 50 percent.

2.5.3. Where velocity in the Sanitary Sewers approaching or exceeding 3 m/s due to steep grades and providing a drop maintenance hole is not possible, receiving sewers shall be designed for protection against maximum scouring velocity and erosion control measures, that are acceptable to the Owner shall be taken.

## 2.6. Pipe Material

2.6.1. All material used in the addition, modification, replacement, or extension of Sanitary Sewers including pipes, fittings, valves, devices, and materials used for the rehabilitation shall meet all applicable quality conditions adopted by the Ontario Provincial Standards for Roads and Public Works and/or local municipal standards. Where applicable standards conflict, the more stringent standard shall apply.

2.6.2. Prior to specifying pipe material, soils shall be assessed for contamination and for the presence of compounds that may negatively impact the suitability of the proposed materials. Nitrile gaskets or equivalent shall be specified for soils contaminated with hydrocarbons unless soil remediation prior to construction provides satisfactory results.

2.6.3. If the material is used based on specific site conditions, the reasons for material selection shall be stated and location shall be identified in the record / as-built drawings.

## 2.7. Pipe Strength

2.7.1. The Sanitary Sewer pipe material selected for a particular application shall be able to withstand all the combinations of loading conditions to which the pipe is likely to be exposed, along with an appropriate safety factor.

## 2.8. Pipe Cover and Frost Protection

2.8.1. Sanitary Sewers shall be installed at sufficient depth (greater than local frost penetration) to prevent freezing. If this is not achievable, the Sewer shall be insulated to provide the required protection. Insulation must be designed or verified by a Licensed Engineering Practitioner or where available as per the local municipal standards acceptable to the Owner.

2.8.2. For Sanitary Sewers subject to traffic load, a loading factor in accordance with the regulations, codes, and by-laws of authorities having jurisdiction shall be considered for selecting depth of pipe cover. This includes but not limited to: Highway Bridge Design Code (for vehicular traffic), Railway Safety Act, and Transport Canada Act. Appropriate structural support shall be provided to the pipes as required.

2.8.3. Maximum pipe cover should be as per the manufacturer recommendations.

## 2.9. Sanitary Sewers and Maintenance Holes Installed Below Seasonally High Groundwater Table

2.9.1. Sanitary Sewer systems which are installed lower than 0.6m below the Seasonally High Groundwater Table (SHGWT) shall be designed to minimize infiltration.

1. The Sewer pipes, pipe joints, and connections shall be designed to withstand a pressure of at least 45 psi without leakage.
2. The sanitary maintenance holes shall be externally wrapped with Waterproof membrane placed externally around all precast joints, including joints below the maintenance hole frame and cover, with a minimum 300mm wide strip.
3. Buoyancy of Sewers and maintenance holes shall be considered in the design, and where required, adequate provision shall be made to prevent flotation.

2.9.2. Where the SHGWT is unknown, Sewers shall be designed with assumption that they are installed 0.6 m below SHGWT.

## 2.10. Sanitary Maintenance Holes

2.10.1. Maintenance holes shall be provided at the end of each Sewer line; at all changes in grade, size, or alignment; at all pipe intersections and/or at a distance not greater than 120 m for Sewers up to 400 mm in diameter, and 150 m for Sewers between 450 mm to 750 mm in diameter.

2.10.2. In circumstances where maintenance holes cannot be provided, an upstream maintenance hole is required at 30 m (max) from where a maintenance hole could not be placed to facilitate maintenance.

2.10.3. An additional straight-through maintenance hole with similar upstream and downstream sloped Sewers shall be provided between new subdivisions and the Municipal Sewage Collection System, or at other appropriate location(s) for the purposes of flow monitoring from new subdivisions. The maintenance hole must either include or allow for the insertion of flow monitoring equipment.

2.10.4. The minimum drop across maintenance holes shall be minimum 25 mm for straight runs and 50 mm for 90-degree bends. Alternately, Sewer grade may be maintained across maintenance holes provided minimum required flow velocity is maintained (as outlined in this document).

2.10.5. Where a smaller diameter Sewer line joins a larger one, the invert of the larger Sewer shall be lowered where practical, to maintain the same energy gradient, or the pipe obverts are matched.

2.10.6. A drop structure shall be provided for Sewers entering a maintenance hole at an elevation of 610 mm or more above the maintenance hole outlet pipe invert;

1. An external drop structure is recommended for all new maintenance holes. An internal drop structure can be used if;
    i. Accepted by the Owner;
    ii. There is adequate space to allow for internal drop structure and unobstructed maintenance access; and
    iii. The structure is provided with restraint straps or equivalent.
2. Where drop structure is not feasible, alternative methods of energy dissipation from falling flow and minimizing air entrainment and odors problems shall be specified.

2.10.7. Maintenance holes shall be located away from any route or ponding area. Grading around maintenance holes shall be benched to direct water away from the maintenance hole.

2.10.8. In cases where the sanitary maintenance hole cannot be located away from an overland flow route for a 25-year storm event or cannot be benched, an analysis must be completed to verify;

1. If the overland flow will submerge the maintenance hole. Watertight design, including water-tight covers, shall be specified for submerged sanitary maintenance holes, and
2. Where more than one consecutive sanitary maintenance hole requires sealing due to exposure to overland flow, appropriate ventilation shall be provided.

2.10.9. Frost straps (internal or external) shall be provided to hold maintenance hole sections together (at least two (2) between each section). External straps to extend vertically from top to bottom and for deep maintenance holes extended at least 1 m below frost depth.

2.10.10. Joints between maintenance hole sections, and inlet and outlet pipes shall be sealed with gasketed flexible watertight connections. Where works are cast-in-place, sealing is required only at the point of connection between individual components of the maintenance hole structures.

2.10.11. Maintenance holes shall be designed based on the pipe size, alignment, and inspection and maintenance needs. The minimum diameter of maintenance holes shall be 1200 mm (48 in). A minimum access diameter of 610 mm (24 in) shall be provided.

2.10.12. Safety platforms or alternate safety measures shall be employed for deep maintenance holes as per Occupational Health and Safety Act requirements and inspection, operation, and maintenance needs. Multiple platforms may be required based on the depth of the maintenance holes.

## 2.11. Inverted Siphons

2.11.1. Inverted siphons shall be designed with consideration of potential siltation, grease and debris accumulation, air locking, maintenance, and odor issues.

2.11.2. The minimum pipe size for inverted siphons shall be nominally 200 mm in diameter.

2.11.3. Pipes shall be sized such that a Self-Cleansing velocity between 1.1 m/s to 1.3 m/s is achieved at least once per day. Where the required velocities cannot be achieved alternate means of flushing shall be incorporated in the design.

2.11.4. Gravity drains or any other means of draining or dewatering the inverted siphon shall be incorporated to facilitate inspection and maintenance.

2.11.5. Air jumpers shall be sized to carry the required air flow between the inlet and outlet chambers. Maintenance measures for air jumpers shall be incorporated as required.

2.11.6. Inverted siphons shall be designed with at least two (2) parallel barrels to accommodate flow variations. If a double barrel siphon is not feasible, a single barrel inverted siphon is acceptable provided that additional arrangements are incorporated in the design to facilitate inspection, operation, and maintenance.

2.11.7. Inverted siphons shall be equipped with inlet and outlet chambers sized to facilitate inspection, operation, and maintenance.

2.11.8. Control valves/sluice gates shall be installed in inlet and outlet chambers especially on multi-barrel siphons to isolate or divert flows to each pipe.

2.11.9. Inverted siphons shall not be designed with sharp vertical or horizontal bends. The slope for the upward vertical leg shall be limited to 2:1 (H:V).

2.11.10. Ventilation is required at the Inlet and Outlet chambers.

## 2.12. Service Connections (Service Laterals)

2.12.1. All service connections shall be constructed to be watertight.

2.12.2. The minimum diameter for a service connection to main Sewer for gravity flow shall be 100 mm in diameter. Sanitary Sewer pipes shall be colour coded green to avoid cross connections. Color coding method includes pipe color, wrapping, demarcation tape, or stenciling.

2.12.3. Sanitary laterals and sanitary service connections shall be specified with a minimum 1% slope (2% slope is recommended).

2.12.4. Where required, the riser pipe on the sanitary service pipe should be installed at a maximum 1:1 slope where feasible, before transitioning to a nominally horizontal installation. The transition from the nominally horizontal section to the steep section should be completed with a long radius bend.

2.12.5. Cleanouts if installed, should be located at or near the property line to facilitate inspection, or as required by the local municipal standard.

2.12.6. Maintenance hole should be provided for commercial service connections, or residential service connection servicing more than five (5) buildings.

2.12.7. Tracer wire is recommended for service connections where feasible as determined by the design engineer.

# 3.0. DESIGN OF FORCEMAINS

## 3.1. Pipe Diameters

3.1.1. The minimum size for a Sewage forcemain shall be 100 mm in diameter.

3.1.2. A smaller diameter forcemain may be acceptable if it is used to maintain the minimum velocity in the forcemain (as outlined in this document). A grinder pump or equivalent shall be provided for such applications and Design Brief including detailed hydraulic calculations shall be prepared by a Licensed Engineering Practitioner.

## 3.2. Friction Factors

3.2.1. Forcemains shall be designed using Hazen-Williams formula or Darcy -Weisbach equation. Hazen- Williams formula is recommended for design of forcemains. Where data are not available, the forcemains shall be designed using the equivalent to Hazen-Williams C-factors listed in Table 2 for pipes made of traditional materials or their equivalent.

**Table 2 - Hazen-Williams C-Factors**

| Material | C-Factor |
|---|---|
| Unlined Steel pipe, Concrete pipe | 100 |
| PVC, HDPE, lined ductile iron | 120 |

## 3.3. Flow Velocity

3.3.1. Forcemains shall be designed for a cleansing velocity of at least 0.6 m/s.

3.3.2. The maximum velocity in the forcemains shall not exceed 3.0 m/s.

## 3.4. Anchors/Restraints

3.4.1. Restrained joints shall be installed at all tees, bends, end of forcemains, and connections for all forcemains. A Licensed Engineering Practitioner shall complete the calculation to determine the number of joints to be restrained beyond the bend, fitting, tee, etc.

3.4.2. In the case of non-restraining mechanical and/or slip-on joints, restraint shall be provided by adequately sized thrust blocks positioned at all plugs, caps, tees, line valves, reducers, wyes, and bends deflecting 22.5 degrees or more.

3.4.3. In designing thrust blocks or other restraint systems, transient pressures shall be added to the normal operating pressures when calculating the thrust forces.

## 3.5. Pipe Material

3.5.1. Forcemain material used in the addition, modification, replacement, extension, or rehabilitation including pipes, fittings, valves, devices, and other materials used shall meet the more stringent of quality standards adopted by Ontario Provincial Standards for Roads and Public Works or local Municipal standards.

3.5.2. Prior to specifying pipe material, soils shall be assessed for contamination and for the presence of compounds that may negatively impact the suitability of the proposed materials. Nitrile gaskets or equivalent shall be specified for soils contaminated with hydrocarbons.

3.5.3. If the material is used based on specific site conditions, the reasons for material selection shall be stated and location shall be identified in the record drawings.

## 3.6. Pipe Strength

3.6.1. The forcemain pipe material selected for a particular application shall be able to withstand, with a margin of safety, all the combinations of loading conditions to which the forcemain is likely to be exposed.

## 3.7. Pipe Cover and Frost Protection

3.7.1. Forcemains shall be installed at sufficient depth (greater than frost penetration) to prevent freezing. If this is not achievable, forcemains shall be insulated/or heat traced. Insulation/heat tracing shall be designed/verified by a Licensed Engineering Practitioner.

3.7.2. For forcemains subject to traffic loading, a loading factor in accordance with the regulations, codes and by-laws of authorities having jurisdiction shall be considered for selecting depth of pipe cover. This includes but not limited to: Highway Bridge Design Code (for vehicular traffic), Railway Safety Act, and Transport Canada Act. Appropriate structural support shall be provided to the pipes as required. If a protective sleeve is used, appropriate sleeve material shall be selected based on the site conditions.

3.7.3. Maximum pipe cover should be as per the manufacturer recommendations.

## 3.8. Termination

3.8.1. All forcemains shall be discharged to maintenance holes.

3.8.2. For flows greater than 30 L/s, transition maintenance holes shall be provided at forcemain discharge points to provide smooth flow transition into the receiving gravity Sewers.

3.8.3. The transition maintenance hole shall be designed based on the pipe size, alignment and inspection and maintenance needs. The minimum diameter of maintenance holes shall be 1200 mm (48 in). A minimum access diameter of 610 mm (24 in) shall be provided.

3.8.4. The forcemains shall enter the transition maintenance hole at a point not more than 0.3 m above the flow line. No other gravity Sewers shall enter the transition maintenance hole.

3.8.5. Protective coatings or corrosion resistant material shall be used in the maintenance holes to prevent deterioration due to presence of hydrogen sulfide or other corrosive chemicals.

3.8.6. The Sewer connecting the transition maintenance hole to downstream maintenance hole shall be sized to flow at half depth to ensure a smooth flow.

3.8.7. Safety platforms or alternative safety measures shall be incorporated in the designed for deep maintenance holes per Occupational Health and Safety Act and any other municipal requirements.

## 3.9. Identification

3.9.1. A Tracer Wire shall be installed for all non-metallic forcemains regardless of the size, identifier codes, or markings can be added to identify the use of pipe in conformance with local municipal standards. Where metallic pipe is used tracer wire shall be provided at the material transition point to ensure electrically conductive connection point for future detection.

## 3.10. Maintenance

3.10.1. All new forcemains longer than 150 m shall be provided with swab launching ports and/or flushing ports. Swab catching ports may be required.

3.10.2. Isolation valves shall be provided as required to facilitate maintenance. Non-return valves may be required when forcemains are connecting into a common forcemain.

3.10.3. Cleanouts/drain chambers shall be provided at low points of a forcemain.

## 3.11. Transient Pressures

3.11.1. A hydraulic transient analysis shall be undertaken as part of the design process considering the worst-case failure scenario involving the most critical pump and forcemain-in-service combination. The analysis shall be completed using hydraulic models based on the final sizes and layout of pumps and forcemains including locations of air/vacuum release valves. Based on the hydraulic transient analysis, provide devices, if necessary, to protect the forcemain such as, but not limited to, surge valves, surge tanks, etc.

3.11.2. The forcemains shall be designed so that pipes and joints are able to withstand the maximum operating pressure plus the surge pressure that would be created by stopping a water column moving at the higher of 0.6 m/s or the theoretical velocity in the forcemain.

3.11.3. The forcemains shall be designed such that pipes, joints, fittings, and valves are able to withstand full vacuum pressure.

## 3.12. Air and Vacuum Relief Valves

3.12.1. A combination of Sewage air and vacuum relief valves shall be placed at all high points in the forcemain to relieve air locking and to relieve negative pressures on forcemains.

3.12.2. At minimum, the Air/Vacuum relief valves shall conform to AWWA standard C512-15 Air Release, Air/Vacuum and Combination Air Valves for Water and Wastewater Service, as amended from time to time.

## 3.13. Drain Valves

3.13.1. Drain valves shall be placed at all low points in the forcemain to facilitate draining/cleaning.

3.13.2. Drain valves on the forcemain are to be flanged connections in valve chambers. Where possible, the valve chamber may be drained to the closest gravity Sanitary Sewer or maintenance hole or drained back into the wet well.

## 3.14. Service Connections

3.14.1. Minimum diameter of a forcemain for a service connection without grinder pumps shall be 100 mm in diameter.

3.14.2. A smaller diameter forcemain may be used for low flow applications provided that the grinder pump or equivalent is specified and the design brief including detailed hydraulic calculations are prepared by a Licensed Engineering Practitioner.

# 4.0. COMBINED SEWERS

## 4.1. Rehabilitation of Existing Combined Sewers

4.1.1. The design and rehabilitation of the Combined Sewer systems shall meet the requirements of the Ministry's Procedure F-5-5, Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Sewer Systems.

4.1.2. Sewers shall be planned, designed, installed, and operated to minimize or eliminate Combined Sewer Overflows.

4.1.3. New Combined Sewer systems are not permitted.

4.1.4. Addition or extension of an existing Combined Sewer is not permitted.

4.1.5. Rehabilitation, repair, and replacement of an existing Combined Sewer is permitted as per the conditions listed in the ECA.

4.1.6. Rehabilitation of existing Combined Sewer overflow structures is permitted including instrumentation and controls that are installed for the purpose of monitoring and reporting only.

4.1.7. Rehabilitation of existing CSO control structures is permitted including modifications that are intended only to improve the performance or optimize utilization of the existing control structures.

4.1.8. A Storm Sewer connection to a Combined Sewer is not permitted except for Combined Sewer separation project where the municipality plans a temporary storm connection to a combined system. This approach requires a detailed plan to disconnect and separate the Storm Sewer to a separated storm outlet according to an established schedule. Specifically, if it is demonstrated that such works will not result in an increase in CSO volume, frequency, duration, or by-pass of treatment during the schedule period.

## 4.2. CSO Detention Facilities

4.2.1. Construction of new CSO detention facility for an existing CSO control structure for the purpose of reducing volume, frequency, or duration of a CSO discharge and to improve quality of combined CSO discharges is permitted provided that;

1. Is not designed to replace an existing outfall to a watercourse;
2. Does not have a direct environmental discharge such as to watercourse, groundwater, or the ground from the detention structure;
3. Is controlled by an existing CSO control structure; and
4. It is demonstrated in a design brief by a Licensed Engineering Practitioner that such works has structural integrity to function as intended/designed.

# 5.0. STORM SEWERS

## 5.1. Design of Storm Sewers

5.1.1. Only Stormwater, drainage from foundations and roads, or LIDs shall be accepted or collected by Storm Sewers.

5.1.2. Sanitary Sewage or combined Sewage shall not be accepted or collected by Storm Sewers or transmitted or directed to a Stormwater works.

5.1.3. Storm sewers shall be designed, using the most recent rainfall intensity, duration, and frequency (IDF) curves available from the respective municipality for which the sewers are to be constructed. If the municipality does not have access to current IDF curves, adjacent jurisdictions shall be consulted for IDF curves, and the most stringent values shall be used in design.

5.1.4. In the design of conveyance drainage system, local climate data is to be used to establish design storm frequency criteria, at a 2-year return design storm or greater storm event can be used for minor system design.

5.1.5. Inlet times shall be calculated based upon the overland flow route modeled under fully developed system conditions as per the Official Plan.

5.1.6. Storm Sewer which are installed below seasonally high groundwater table shall be designed to minimize infiltration.

5.1.7. Storm Sewers design shall be verified (major system and minor system capacity analysis) accounting for the captured flows that enter the Storm Sewers (minor system) through inlets and the flow remaining at the surface (major system) at minimum under the following conditions;

1. No inlet capacity restriction; and
2. 50% inlet capacity restriction at depressions and roadway sags.

Maximum depths of flows at the surface and maximum hydraulic grade lines in the Storm Sewers shall be verified for up to the 100-year design storm.

## 5.2. Runoff Calculations

5.2.1. The peak rate of runoff from an area may be calculated using the following formula:

$$Q = 2.78\ C \cdot I \cdot A$$

Where Q is the Peak flow in liters per second, A is the area in hectares, C is run-off coefficient (dimensionless), and I is average rainfall in mm per hour for a duration equal to the time of concentration for a particular storm frequency.

5.2.2. Hydrologic and hydraulic simulation models can be used for systems to verify the capacity of the systems serving small or large areas or involving treatment and/or storage systems.

5.2.3. A Licensed Engineering Practitioner shall select the appropriate “C” values based on site conditions. The range of runoff coefficients shown in Table 3 may be used for design purposes.

**Table 3 - Runoff Coefficients**

| Source | Runoff Coefficient (C) |
|---|---|
| Asphalt, concrete, roof areas | 0.90-1.00 |
| Grassed areas, parkland | 0.15-0.35 |
| Brick Roads | 0.7-0.85 |
| Sandy Soil | 0.05-0.25 |
| Playgrounds | 0.2-0.35 |
| Gravel | 0.6-0.7 |
| forest and dense wooded areas | 0.10–0.25 |
| Permeable pavements | 0.15 to 0.25 |
| | |

5.2.4. For calculating runoff for less frequent, high intensity storms (e.g., 50 or 100-year storm) for particular type of area in Table 3, upper values of the range shall be used. The lower value of the range may be used for shorter (e.g., 2- or 5-year storm) recurrence interval storms under conditions of moderate to flat slopes. For urban areas the runoff coefficient may be increased to suit urban conditions.

## 5.3. Friction Factors

5.3.1. Storm Sewers shall be designed to transmit the required capacity when pipe is flowing full. Storm Sewer capacities can be calculated using the Manning's equation or Darcy–Weisbach equation. If Manning's equation is used for the roughness coefficient (n) as specified by the manufacturer or as listed in Table 4 or equivalent may be used for all new pipes.

**Table 4 - Manning's Roughness Coefficient (n) for New Pipes**

| Pipe Material | Roughness Coefficient (n) |
|---|---|
| Smooth-walled pipe materials (HDPE, PVC, Concrete) | 0.013 |
| Corrugated metal pipe<br>Plain Pipe<br>Paved Invert | <br>0.024<br>0.020 |

## 5.4. Pipe Diameter

5.4.1. The minimum size of the Storm Sewer shall be 250 mm in diameter. For Storm Sewer laterals, the minimum service connections shall be 100 mm diameter color coded white. Color coding method includes pipe color, wrapping, demarcation tape, or stenciling.

## 5.5. Flow Velocity

5.5.1. The minimum flow velocity in the Storm Sewer shall be 0.75 m/s. Velocities in Storm Sewers shall not exceed 6 m/s.

5.5.2. Additional protection against erosion, scouring, and pipe displacement must be provided by a Licensed Engineering Practitioner where flow velocities exceed 4.5 m/s.

5.5.3. In certain circumstances, such as rehabilitation/replacement of an existing Sewer where deepening of individual Sewer section will not be possible, design flow velocities of less

than 0.75 m/s may be considered provided that appropriate measures are taken to facilitate frequent flushing and maintenance needs and the Municipality accepts the increased maintenance requirements.

## 5.6. Anchors/Restraints

5.6.1. Storm Sewers on 20 percent slope or greater shall be anchored securely with concrete anchors or equal.

5.6.2. Anchors and anchorage spacing shall be designed by a Licensed Engineering Practitioner based on Sewer material, anchor type, and site conditions.

5.6.3. Where velocity in the Storm Sewers approaching or exceeding 3 m/s due to steep grades and providing a drop maintenance hole is not possible, Sewers shall be designed for protection against maximum scouring velocity and erosion control measures, acceptable to the Owner shall be taken.

## 5.7. Pipe Material

5.7.1. All material used in the addition, modification, replacement, or extension of Storm Sewers including pipes, fittings, valves, and devices and materials used for the rehabilitation shall meet all applicable quality adopted by the Ontario Provincial Standards for Roads and Public Works and/or local municipal standards. Where applicable standards conflict, the more stringent standard shall apply.

5.7.2. Prior to specifying pipe material, soils shall be assessed for contamination and for the presence of compounds that may negatively impact the suitability of the proposed materials. Nitrile gaskets or equivalent shall be specified for soils contaminated with hydrocarbons.

5.7.3. If the material is used based on specific site conditions, the reasons for material selection shall be stated and location shall be identified in the record/ as-built drawings.

## 5.8. Pipe Strength

5.8.1. The Storm Sewer pipe material selected for a particular application shall be able to withstand all of the combinations of loading conditions to which the pipe is likely to be exposed along with an appropriate safety factor.

## 5.9. Pipe Cover and Frost Protection

5.9.1. Storm Sewers shall be installed at sufficient depth (greater than frost penetration) to prevent freezing, if this is not achievable, Sewers shall be insulated. Insulation must be designed/verified by a Licensed Engineering Practitioner.

5.9.2. For Storm Sewers that are subject to traffic loading, a loading factor in accordance with the regulations, codes and by-laws of authorities having jurisdiction shall be considered for selecting depth of pipe cover. This includes but not limited to: Highway Bridge Design Code (for vehicular traffic), Railway Safety Act, and Transport Canada Act. Appropriate structural support must be provided to the pipes as required.

5.9.3. Maximum pipe cover should be per the manufacturer recommendations.

## 5.10. Storm Maintenance Holes

5.10.1. Maintenance holes shall be provided at each change in alignment, pipe size, grade, material, and at all pipe junctions. For blind connections, an upstream maintenance hole at a distance of 30 m (max) is required to facilitate maintenance. Pre-manufactured bends may be acceptable if maintenance access is provided and is acceptable to the Owner.

5.10.2. Maintenance hole spacing depends on pipe size; spacing shall be in conformance to local municipal design guidelines. Where municipal design guidelines do not exist, the maximum spacing as listed in Table 5 should be used.

**Table 5 - Maintenance Hole Spacing**

| Sewer Diameter (mm) | Maximum Spacing (m) |
|---|---|
| 250 to 975 | 110 |
| 1050 to 1350 | 130 |
| 1500 to 1650 | 160 |
| 1800 and above | 305 |

## 5.11. Catch Basins

5.11.1. Catch basins shall be provided at adequate intervals to ensure that the drainage is intercepted up to the capacity of the Storm Sewer.

5.11.2. Street catch basin spacing will vary with the street width, grade and cross fall, the location of pedestrian crossing points, intersections, low points, location of sanitary maintenance holes and driveway depressions. Maximum Catch basin spacing shall be per Table 6.

**Table 6 - Catch Basin Spacing**

| Road Gradient (%) | Maximum Spacing (m) |
|---|---|
| 0 to 3 | 110 |
| 3.1 to 4.5 | 90 |
| Over 4.5 | 75 |

5.11.3. The minimum diameter of the catch basin lead is 250 mm and the minimum of 1% slope shall be provided for a catch basin lead.

## 5.12. Inverted Siphons

5.12.1. Inverted siphons shall be designed with consideration of potential siltation and air locking.

5.12.2. Inverted siphons shall be designed with water-tight joints, and to withstand hydrostatic pressure.

5.12.3. Gravity drains or any other means of draining or dewatering the inverted siphon shall be incorporated to facilitate inspection and maintenance.

5.12.4. The minimum pipe size for inverted siphons shall be nominally 250 mm in diameter.

5.12.5. Appropriate cover shall be provided above the inverted siphon based the type of crossing structure.

5.12.6. Pipes shall be sized such that a self-cleansing velocity between 1.1 m/s to 1.3 m/s is achieved in 25 mm storm event (First Flush). Where the required velocities cannot be achieved alternate means of flushing shall be incorporated in the design.

5.12.7. Inverted siphon shall be designed with at least two parallel barrels of same size, each capable of transmitting the design flowrate. Single barrel inverted siphons are acceptable provided that additional arrangements are incorporated in the design to facilitate inspection, and maintenance.

5.12.8. Inverted siphons shall be equipped with inlet and outlet chambers sized to facilitate inspection and maintenance.

5.12.9. Control valves/sluice gates shall be installed in inlet and outlet chambers especially on multi-barrel siphons to isolate or divert flows to each pipe.

5.12.10. Inverted siphons shall not be design with sharp vertical or horizontal bends, the slope for the upward vertical leg shall be limited to 2:1 (H: V).

## 5.13. Service Connections (Service Laterals)

5.13.1. The minimum diameter for a service connection shall be 150 mm in diameter.

5.13.2. Storm Sewer pipes shall be colour coded white to avoid cross connections. Color coding method includes pipe color, wrapping, demarcation tape, or stenciling.

5.13.3. Tracer wire is recommended for service connections where feasible as determined by the design engineer.

## 6.0. Third Pipe Collection System

6.1.1. Third Pipe Collection System shall be designed to collect water only from the foundation drains.

6.1.2. Foundation drain discharge collection system shall not receive water from any sites that are contaminated or suspected to be contaminated unless;

1. Environmental site assessment is completed to confirm that site is free from contamination;
2. Remediation work is undertaken prior to acceptance by the system; or
3. Pretreatment is in place to achieve acceptable results.

6.1.3. Foundation drain collection pipes shall be installed at sufficient depth (greater than frost penetration) to prevent freezing. If this is not achievable due to site specific condition, the pipes shall be insulated to provide the required protection.

6.1.4. The minimum size of the pipe in the foundation drain collection system shall be 150 mm in diameter (nominal pipe size).

6.1.5. The minimum slope for the gravity pipes within the foundation drain collection system shall be 1% where feasible.

6.1.6. Maintenance holes shall be provided for foundation drain collection system as required, maintenance hole spacing shall not be more than 150 m.

6.1.7. All material used in the foundation drain Sewers including pipes, fittings, valves, devices, shall meet all applicable quality standards adopted by the Ontario Provincial Standards for Roads and Public Works and/or local municipal standards. Where applicable standards conflict, the more stringent standard shall apply.

## 7.0. Documentation

7.1.1. The required documentation specified here in this document and in the ECA shall be completed.

7.1.2. A Design Brief shall be prepared by a Licensed Engineering Practitioner to demonstrate the proposed design is in conformance with all the applicable requirements of the Design Criteria and complies with all applicable Ministry policies, guidelines, and regulations. At minimum, the Design Brief shall include; hydraulic calculations; approval requirements, and completed pipe data form PIBS 6238e; additionally, the design brief shall include but not limited to the following for:

1. Sanitary Sewers/forcemain/conveyance ditches/swales;
    i. Hydraulic design sheets (applicable only to Sewers);
    ii. A design report or equivalent detailing the engineer's design decisions and rationale, especially where high groundwater and/or other inflow and infiltration risk factors exist.
    iii. "Forcemain or siphon: contingency plans for possible overflows (applicable to forcemain or siphon only)".
2. Municipal Stormwater Management System;
    i. Stormwater management report (including lot level and conveyance controls);
    ii. A description of the water quality and quantity criteria;
    iii. Hydraulic performance of the system verifying Storm Sewer capture rates and major and minor system capacities;
    iv. "Oil / grit separators: design brief, calculations and manufacturers specifications (applicable to oil / grit separators only)".
3. Sewage pumping stations;
    i. Buoyancy calculations; forcemain hydraulic calculations; assessment of transient pressures; wet well and emergency storage tank sizing; design flows and firm capacity; headworks;
    ii. Electrical systems including standby power; controls and instrumentation description including alarms;
    iii. HVAC systems; and hazard ratings throughout station - risk assessment; and
    iv. Contingency plans for Emergency Situations.

7.1.3. The forms referenced in the Environmental Compliance Approvals (ECAs) for Sewage and Stormwater are available in the Central Forms Repository at www.forms.ssb.gov.on.ca.

# 8.0. Inspection and Testing for Sanitary Sewers, Storm Sewers and Forcemains

## 8.1. General Requirements

8.1.1. All new and replaced Sanitary Sewers, forcemains, maintenance holes, connections and chambers shall be inspected and tested to ensure integrity of the installed material for water tightness prior to placing into service.

8.1.2. All inspections and testing shall be performed as specified here in this document.

8.1.3. Inspection and testing plans including; procedure, equipment, schedule, safety requirements, and emergency response plan shall be submitted to the Owner/Operating Authority at least two (2) weeks or as required by the Owner/Operating Authority prior to the inspection or testing. Plans must be accepted by the Owner prior to proceeding with the inspection or testing.

8.1.4. The Owner and the Operating Authority shall be notified and a confirmation of receipt shall be acquired at least five (5) business days or otherwise required by the Owner/Operating Authority prior to inspection or testing.

8.1.5. All inspection reports and test results shall be provided to the Owner in a format (e.g., printed copies, PDF copies and digital files) specified by the Owner or the Operating Authority.

8.1.6. A single testing plan can be used for similar tests on the same project; however, each test shall be recorded separately.

8.1.7. Seasonal variation (e.g., spring freshet) on groundwater conditions shall be considered on selecting appropriate testing method.

8.1.8. In special circumstances, specific inspection and testing requirements may apply, refer to MECP's Watermain Design Criteria for Future Alterations Authorized Under a Drinking Water Works Permit for additional inspection and testing requirements for Sanitary Sewers, forcemains, and associated Appurtenances when;

1. Installed within areas the works would pose a Significant Drinking Water Threat; and
2. If the required separation distance from watermains and associated Appurtenances cannot be achieved.

## 8.2. Inspections

8.2.1. All new Sanitary Sewers including connections, Storm Sewers, and associated Appurtenances shall be inspected to confirm alignment and to ensure that the Sewer pipe is free from obstructions, debris, and defects.

8.2.2. All maintenance holes/access structures shall be inspected for any defects, leaks, debris, and to ensure proper benching.

8.2.3. Acceptable inspection methods for Sanitary Sewers, Storm Sewers, and maintenance holes include;

1. Visual Inspections as per OPSS.MUNI 433;
2. Closed-Circuit Television (CCTV) Inspection as per OPSS.MUNI 409;
3. Zoom Camera Inspections as per OPSS.MUNI 432;
4. Sonar Inspections as per OPSS.MUNI 435; and
5. Laser Inspections as per OPSS.MUNI 434.

8.2.4. All new, replaced, and rehabilitated Sanitary Sewers, Storm Sewers, and maintenance holes shall be video inspected to evaluate the physical condition and to identify any obstructions or defects. Any issues identified in the inspections shall be corrected and the respective pipe segments and maintenance holes shall be re-inspected.

8.2.5. Sonar inspections can be used for Sanitary Sewers, and Storm Sewers under submerged and partially submerged conditions.

8.2.6. Laser inspections are recommended for more accurate measurement of defects and deflection in the Sanitary Sewers and Storm Sewers.

## 8.3. Leakage Testing

8.3.1. Leakage Test shall be performed on all new Sanitary Sewers and maintenance holes to ensure integrity of the conveyance system.

8.3.2. Prior to performing a leakage test, both active and inactive service connections and stubs shall be identified using dye testing or other equivalent methods.

8.3.3. All service laterals shall be plugged using plugs designed to withstand test pressures, plugs shall be suitably braced for additional safety. All inactive service connections shall be sealed.

8.3.4. Pipe sections and associated components that are subject to pressure testing shall be fully restrained against movements in the event of failure. Component that are not intended to be pressurized shall be isolated.

8.3.5. Prior to leakage testing potential risks and hazards shall be identified and appropriate safety measure shall be taken. The procedure shall conform to all applicable health and safety requirements, including, but not limited to: Occupational Health and Safety Act, and Fire Protection and Prevention Act.

8.3.6. The following are acceptable leakage tests for Sanitary Sewers and maintenance holes:

1. Low Pressure Air Testing;
2. Water (Hydrostatic) Testing;
3. Vacuum Testing.

8.3.7. Groundwater elevations shall be considered for selection of the appropriate testing method.

8.3.8. Low pressure air test is not recommended when groundwater elevation is 600 mm or greater above the crown of the pipe being tested at the time of testing. Where groundwater elevation is less than or equal to 600 mm test pressure shall be adjusted to compensate for ground water pressure.

8.3.9. Low pressure air testing equipment shall include a pressure relief valve set to 9 psi (max) to avoid over pressurizing.

8.3.10. Low pressure air testing procedure shall conform to:

1. OPSS.MUNI 410;
2. ASTM F1417; or
3. ASTM C924M.

8.3.11. Water test procedure shall conform to:

1. OPSS.MUNI 410; or
2. ASTM C 969.

8.3.12. Vacuum testing procedure shall conform to:

1. ASTM C1244/C1244M

8.3.13. Clean water shall be used for hydrostatic testing. Water used in the hydrostatic testing shall be disposed as per all the applicable requirements.

8.3.14. If a segment of the system fails during leak testing, source of leakage shall be identified, and all defective material shall be repaired or replaced to the satisfaction of the Owner. The repaired or replaced sections shall be retested until results acceptable to the Owner are obtained. During retesting, maintenance holes shall be tested separately to pipe Sewers.

## 8.4. Deflection Testing

8.4.1. A deflection test shall be completed for all new flexible Sanitary Sewers and Storm Sewers at least 30 calendar days after backfilling but prior to paving.

8.4.2. Pipe segments failing the deflection test shall be removed and replaced.

8.4.3. Mandrel testing and laser profiling are acceptable tests for pipe deflection testing.

8.4.4. Mandrel test shall be performed in accordance with OPSS.MUNI 438.

8.4.5. Laser profiling shall conform to OPSS. MUNI 434.

8.4.6. Equipment used to perform Mandrel tests shall be specifically designed for the pipe material being tested.

## 8.5. Hydrostatic Testing

8.5.1. Hydrostatic testing shall be performed to all new and rehabilitated/repaired forcemains in accordance with OPSS.MUNI 412 (Ontario Provincial Standards Specification, published by Ontario Ministry of Transportation) at a minimum pressure of 1.5 times the maximum operating pressure.

8.5.2. Water used in the hydrostatic testing shall be disposed to Sanitary Sewers as per all the applicable requirements for disposal.

8.5.3. The maximum pressure shall be measured and recorded at the lowest point along the length of the pipe subject to testing.

# APPENDIX I

# Understanding Risks to Sources of Drinking Water

- Components of Sewage systems may present a risk to sources of drinking water, and therefore be subject to Source Protection Plans made under the Clean Water Act.
- Whether you are designing a new Municipal Sewage Collection System, expanding an existing system, or conducting normal operations and maintenance, it is important to be able to identify which components of your system (Sanitary Sewers, pumping stations, holding tanks, etc.) and the location where they may pose a significant risk, in order to plan and implement risk management measures as well as comply with any requirements for drinking water source protection within the ECA.
- Under the Clean Water Act, sources of water that are accessed by municipal drinking water systems are protected from threats to drinking water quality and quantity.
- A total of 22 specific activities are prescribed as **Drinking Water Threats** in Ontario Regulation 287/07, section 1.1. This includes "*the establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage*."
- The risk level of a prescribed drinking water threat is determined in accordance with:
    i. The **Directors Technical Rules** established under the Clean Water Act which set out the methods for delineating the shape and size of vulnerable areas (including wellhead protection areas (WHPA) and intake protection zones (IPZ) around municipal systems), determining the intrinsic vulnerability within those areas, and assessing the risk posed by drinking water threats.
    ii. The **Tables of Drinking Water Threats** (chemical and pathogen tables for water quality) identify the specific circumstances under which a drinking water threat poses a low, moderate, or significant threat to drinking water sources. The Tables of Drinking Water Threats are organized by subcategories of activities for the prescribed threats in O. Reg. 287/07, including different types of Sewage Works, and are available at Ontario.ca as well as through an interactive threats look-up tool.
- Activities may also be a Significant Drinking Water Threat if they are associated with a chemical or pathogen identified as a drinking water issue within an **issue contributing area** (ICA) in the Assessment Report.
- Activities may also be a Significant Drinking Water Threat if they occur within an **event-based area** (EBA) that represents an area modelled for Spills that would reach a surface water intake during extreme storm events (e.g., Sanitary Sewer trunk breaks, or wastewater treatment plant disinfection failure).
- The vulnerable areas and vulnerability scores for each source protection area are listed and mapped in local assessment reports and Source Protection Plans and available through the provincial Source Protection Information Atlas.
- If the Sewage Works are located in an area where they may pose a significant threat to drinking water sources (WHPAs, IPZs, ICAs, or EBAs), Source Protection Plan policy may apply.
- For additional information on Source Protection Plans and resources that can support the identification of threats to sources or drinking water, you may also refer to guidance from MECP and your local conservation authority.

# APPENDIX

## *A-6 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS ECA APPLICATION TEMPLATE (MAY 2022)*

Ontario

# ENVIRONMENTAL COMPLIANCE APPROVAL
# For a Municipal Stormwater Management System

## ECA Number: ${LICNO}
## Issue Number: ${ISSUENO}

Pursuant to the *Environmental Protection Act*, R.S.O 1990, c. E. 19 (EPA*),* and the regulations made thereunder and subject to the limitations thereof, this environmental compliance approval is issued under section 20.3 of Part II.1 of the EPA to:

## ${OWNERNAME}

**{Address Line 1}**
**{Address Line 2}**

For the following Sewage Works:

## ${SYSTEMNAME}

This Environmental Compliance Approval (ECA) includes the following:

| Schedule | Description |
|---|---|
| Schedule A | System Information |
| Schedule B | Municipal Stormwater Management System Description |
| Schedule C | List of Notices of Amendment to this ECA: Additional Approved Works |
| Schedule D | General |
| Schedule E | Operating Conditions |
| Schedule F | Residue Management |
| Appendix A | Stormwater Management Criteria |

Except where specified otherwise, all prior ECAs, or portions thereof, issued by the Director for Sewage Works described in section 1 of Schedule B are revoked and replaced by this Approval.

DATED at TORONTO this ${DAY} day of ${MONTH}, ${YEAR}

Signature

${CURRENTUSER}, P.Eng.
Director, Part II.1, *Environmental Protection Act*

## Schedule A: System Information

| | |
|---|---|
| System Owner | **${OWNERNAME}** |
| ECA Number | **${LICNO}** |
| System Name | **${SYSTEMNAME}** |
| ECA Issue Date | **${MONTH} ${DAY}, ${YEAR}** |

## 1.0 ECA Information and Mandatory Review Date

| | |
|---|---|
| ECA Issue Date | ${MONTH} ${DAY}, ${YEAR} |
| Application for ECA Review Due Date | ${APPRENEWAL} |

1.1 Pursuant to section 20.12 of the EPA, the Owner shall submit an application for review of the Approval no later than the Application for ECA Review Date indicated above.

## 2.0 Related Documents

2.1 Other Documents

| Document Title | Version |
|---|---|
| Design Criteria for Sanitary Sewers, Storm Sewers, and Forcemains for future Alterations Authorized under ECA | v.X, <DATE> |

## 3.0 Stormwater master Plan and Asset Management Plan

| Document Title | Version |
|---|---|
| Placeholder for reference to the Asset Management Plan | v.X, <DATE> |
| Stormwater Master Plan | v.X, <DATE> |
| Watershed/Subwatershed Plan(s) | v.X, <DATE> |

## 4.0 Operating Authority

| System | Operating Authority |
|---|---|
| [Operational System Name for Municipal Sewage Collection System or part thereof] | [Operating Authority Name] |

## Schedule B: Municipal Stormwater Management System Description

| | |
|---|---|
| System Owner | **${OWNERNAME}** |
| ECA Number | **${LICNO}** |
| System Name | **${SYSTEMNAME}** |
| ECA Issue Date | **${MONTH} ${DAY}, ${YEAR}** |

## 1.0 System Description

1.1 The following is a summary description of the Sewage Works comprising the Municipal Stormwater Management System:

**Overview**

The ${SYSTEMNAME} serving the City of $Blank's$ drainage area, is a separate system for Stormwater (i.e. designed not to transmit sanitary Sewage and/or Combined Sewage) within the Lake $Blank$ and the $Blank$ watershed(s). The Municipal Stormwater Management System consists of Storm Sewers, culverts, ditches, Stormwater Management Facilities and outlets.

This Approval covers the entire Municipal Stormwater Management System owned and operated by the City of $Blank$. This Approval does not cover municipally, or Privately Owned Stormwater Works on industrial, commercial, or institutional land.

This Municipal Stormwater Management System connects to the Blank Municipal Stormwater Management System ECA #.

**Sewage Collection System**

1.2 The Authorized System comprises:

1.2.1 The Sewage Works described and depicted in each document or file identified in column 1 of Table B1.

| **Table B1: Infrastructure Map** | |
|---|---|
| Column 1<br>Document or File Name | Column 2<br>Date |
| [Asset ID/Name] | [DATE] |

1.2.2 Storm Sewers, Stormwater Management Facilities, stormwater pumping stations and Sewage Works associated with a Third Pipe

Collection System that have been added, modified, replaced, or extended through authorization provided in a Schedule C Notice respecting this Approval, where Completion occurs on or after the date identified in column 2 of Table B1 for each document or file identified in column 1.

1.2.3 Storm Sewers, Stormwater Management Facilities and Sewage Works associated with a Third Pipe Collection System that have been added, modified, replaced, or extended through authorization provided by Schedule D of this Approval, where Completion occurs on or after the date identified in column 2 of Table B1 for each document or file identified in column 1.

1.2.4 Any Sewage Works described in conditions 1.3 through 1.8 below.

**Stormwater Collection System**

1.3 Categorization of the Authorized System at the date of issue of this Approval is as follows:

**Table B2. Stormwater Collection System by Diameter**

| System Type | Pipe Diameter (mm) | Length (km) | System Totals (km) |
|---|---|---|---|
| Storm Sewers | Up to 250 | | |
| Storm Sewers | > 250 - 500 | | |
| Storm Sewers | > 500 - 1050 | | |
| Storm Sewers | > 1050 | | |
| Total Storm Sewers | | | |
| Ditches / Swales | NA | | |
| Total System Length (km) | | | |

**Table B3. Summary of Stormwater Management Facilities by Type and Pumping Stations**

| Facility Type | Basic Treatment for Suspended Solids* | Normal Treatment for Suspended Solids * | Enhanced Treatment for Suspended Solids * | Other Treatment Level for Suspended Solids** | Total Quality Control | Total Quantity Control | Total Number of Facilities |
|---|---|---|---|---|---|---|---|
| LID Facilities - Retention (infiltration, evapotranspiration, harvest) | | | | | | | |
| LID Facilities - Filtration | | | | | | | |
| Stormwater Management Ponds – Wet (includes | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| wetlands, hybrids) | | | | | | | |
| Stormwater Management Ponds - Dry | | | | | | | |
| Super Pipe / Storage Facility | | | | | | | |
| Filtration MTD - Filter Unit | | | | | | | |
| Sedimentation MTD - OGS | | | | | | | |
| Pumping Stations | | | | | | | |
| Other | | | | | | | |
| Total Number of Facilities | | | | | | | |

* Basic, normal, and enhanced treatment correspond to 60%, 70% and 80% suspended solids removal on an annual average long-term basis, respectively.

** Treatment levels below 60% suspended solids removal on an annual average long-term basis.

| **Table B4. Third Pipe Collection System** | | | | |
|---|---|---|---|---|
| Description | Pipe Diameter (mm) | Length (km) | Quantity | System Totals |
| Third Pipe Sewer | Up to 250 | | N/A | |
| Third Pipe Sewer | > 250 - 500 | | N/A | |
| Third Pipe Sewer | > 500 | | N/A | |
| Total | | | | Km |
| Other Infrastructure Components (e.g., storage tank) | N/A | N/A | | |

| **Table B5. Sewage Works on Private Land that are part of the Municipal Stormwater Treatment Train*** | | | |
|---|---|---|---|
| Description | Location | ECA # (if applicable) | |
| | | | |
| | | | |
| | | | |

* Identifies privately owned Sewage Works that are not part of the Authorized System, but are part of a Stormwater Treatment Train

### Stormwater Management Facilities

1.4 The following are Stormwater Management Facilities in the Authorized System:

**[*Asset ID* *Type of Facility * (e.g. 201 – Stormwater Management Wet Pond)]**

| | |
|---|---|
| Location | e.g. Latitude and longitude or physical address (UTM coordinates can provided in addition) |
| Watershed/Subwatershed | e.g. Lake Simcoe/Bunkers Creek |
| Receiver of discharge | e.g. Surface discharge to “BLANK” creek |

| | |
|---|---|
| Outlet location | e.g. Latitude and longitude. (UTM coordinates can be provided in addition) |
| Catchment Area | e.g. 10 ha |
| Level of Treatment for suspended solids | e.g. Level 1/2/3 80/70/60% Long-term suspended solids removal |
| Treatment for other Contaminants, as required | e.g. phosphorus, water temperature |
| Level of Volume control | e.g. Local 90th percentile rainfall event or local water balance (X mm) |
| Design Storm | e.g. Quantity: X-yr storm; Quality: X-yr storm |
| Reference ECA(s) | |
| Reference Sewage Works as part of treatment train | e.g. 102-LID Bioretention Facility; ECA# if private Sewage Works as per Schedule D, condition 5.2.9 |
| Brief Description | *Include model number if equipment is used (e.g. OGS/filters)* |
| Receive Emergency Sanitary Overflows | Y/N; briefly describe |
| Notes | Placeholder for any other information that should be added. |
| Location | e.g. Latitude and longitude or physical address (UTM coordinates can provided in addition) |

**Stormwater Pumping Stations**

1.5 The following are identified Stormwater pumping stations in the Authorized System:

**[Stormwater Pumping Station Name]**

| | |
|---|---|
| Asset ID and Name | |
| Site Location | |
| Watershed/Subwatershed | |
| Latitude and Longitude | |
| Coordinates (optional) | |
| Description | |
| Pumping Station Capacity | |
| Equipment | [x] pumps (x duty, x standby) with X $m^3$/d and X total head, [x] grinders, [x] screens, [x] wet well of __ $m^3$ capacity. The station is connected to [x] ___ mm diameter forcemains, discharging to ____. |
| Emergency Storage | Emergency storage tank/pipe volume (volume in $m^3$) |
| Equipment: Associated controls and Appurtenances | |
| Overflow | Overflow discharge location and pathway to final receiver (waterbody/creek/river)<br>Response time (buffer volume in $m^3$ available in storage prior to overflow at peak flow)<br>Emergency storage volume ($m^3$) |

| | |
|---|---|
| Standby Power | _____ kW _____ propane/diesel/natural gas or ATS for portable generator or battery, and fuel tank size |
| Notes | Discharging to Stormwater Management Facility (Asset ID), if applicable.<br>If a former ECA exists for a pumping station, it would be included in this notes section |

**Third Pipe Collection System**

1.6 The following are identified third pipe systems in the Authorized System.

**[*Asset ID* (e.g., Third Pipe 10]**

| | |
|---|---|
| Asset ID and Name | |
| Location | e.g. Latitude and longitude or physical address (UTM coordinates can provided in addition) |
| Watershed/Subwatershed | e.g. Lake Simcoe/Bunkers Creek |
| Receiver of discharge | e.g. Surface discharge to “BLANK” creek |
| Outlet location | e.g. Latitude and longitude. (UTM coordinates can be provided in addition) |
| Catchment Area | e.g. 10 ha |
| Treatment, if applicable | *type of Contaminant treated for* |
| Reference ECA(s), if applicable | |
| Brief Description | Also include if there are other components such as storage tanks, etc. |
| Notes | Any other relevant information not described above |

**Other Works:**

1.7 The following works are part of Authorized System:

| **Table B6: Other Works** | | | |
|---|---|---|---|
| Column 1<br>Asset ID / Name | Column 2<br>Site Location<br>(Latitude & Longitude) | Column 3<br>Component | Column 4<br>Description |
| [Name] | [Location] | <identify type of works> | <describe Sewage Works > |

**Developer-Operated Facilities:**

1.8 The following facilities are part of the Authorized System, have been constructed, and are being operated by the developer under the authority of an agreement entered into with the Owner of the system.

| **Table B7: Developer-Operated Facilities** | | | |
|---|---|---|---|
| Asset ID | Type of Facility | Location | Developer Name |

| Table B7: Developer-Operated Facilities | | | |
|---|---|---|---|
| Asset ID | Type of Facility | Location | Developer Name |
| | | | |
| | | | |

1.9 The Owner shall notify the Director, using the Director Notification Form, within thirty (30) days where the operation of any Facility identified in Table B7 has been:

1.9.1 Incorporated into the overall Stormwater Management System and assumed by an Operating Authority identified in Schedule B of this Approval.

1.9.2 Has been transferred from the developer identified in Table B7 to another party.

**Transitional – Facilities with Individual ECAs**

1.10 The following Facilities are connected to the Authorized System, but ownership has not been assumed by the Owner. These Sewage Works are not part of the Authorized System and will continue to have separate ECAs until the Facilities are assumed by the Owner.

| Table B8: Facilities with Individual ECAs | | | | |
|---|---|---|---|---|
| Asset ID | Type of Facility | Location | ECA Number | Developer Name |
| | | | | |

1.11 The Owner shall notify the Director, using the Director Notification Form, within thirty (30) days where the ownership of any Facility identified in Table B8 has been assumed by the Owner.

1.12 The Director Notification required in condition 1.11 shall include:

1.12.1 A request from the developer to revoke the ECA identified in Table B8; or

1.12.2 A copy of an agreement or other documentation that demonstrates that the municipality has assumed ownership of the Facility and that the ECA identified in Table B8 should be revoked.

## Schedule C: List of Notices of Amendment to this ECA: Additional Approved Sewage Works

| | |
|---|---|
| System Owner | **${OWNERNAME}** |
| ECA Number | **${LICNO}** |
| System Name | **${SYSTEMNAME}** |
| ECA Issue Date | **${MONTH} ${DAY}, ${YEAR}** |

### 1.0 General

1.1 Table C1 provides a list of all notices of amendment to this Approval that have been issued pursuant to clause 20.3(1) of the EPA that impose terms and conditions in respect of the Authorized System after consideration of an application by the Director (Schedule C Notices).

**Table C1: Schedule C Notices**

| Column 1<br>Issue # | Column 2<br>Issue Date | Column 3<br>Description | Column 4<br>Status | Column 5<br>DN# |
|---|---|---|---|---|
| Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |

## Schedule D: General

| | |
|---|---|
| System Owner | **${OWNERNAME}** |
| ECA Number | **${LICNO}** |
| System Name | **${SYSTEMNAME}** |
| ECA Issue Date | **${MONTH} ${DAY}, ${YEAR}** |

### 1.0 Definitions

1.1 For the purpose of this Approval, the following definitions apply:

**"Adverse Effect(s)"** has the same meaning as defined in section 1 of the EPA.

**"Alteration(s)**" includes the following, in respect of the Authorized System, but does not include repairs to the system:

a) An extension of the system,

b) A replacement or retirement of part of the system, or

c) A modification of, addition to, or enlargement of the system.

**"Appendix A"** means Appendix A of this Approval.

**"Approval"** means this Environmental Compliance Approval including any Schedules attached to it.

**"Appurtenance(s)"** has the same meaning as defined in O. Reg. 525/98 (Approval Exemptions) made under the OWRA.

**"Authorized System"** means the Sewage Works comprising the Municipal Stormwater Management System authorized under this Approval".

**"Class Environmental Assessment Project"** means an Undertaking that does not require any further approval under the EAA if the proponent complies with the process set out in the Municipal Engineers Association Class Environmental Assessment document, (Municipal Class Environmental Assessment approved by the Lieutenant Governor in Council on October 4, 2000 under Order in Council 1923/2000), as amended from time to time.

**"Combined Sewer(s)"** means pipes that collect and transmit both sanitary Sewage and other Sewage from residential, commercial, institutional, and industrial buildings and facilities and Stormwater through a single-pipe system, but does not include Nominally Separate Sewers.

**“Completion”** means substantial performance as described in s.2 (1) of the *Construction Act*, R.S.O. 1990, c. C.30.

**“Compound of Concern”** means a Contaminant that is discharged from the Facility in an amount that is not negligible.

**“Contaminant”** has the same meaning as defined in section 1 of the EPA.

**“CSO”** means a combined sewer overflow which is a discharge to the environment at designated location(s) from a Combined Sewer or Partially Separated Sewer that usually occurs as a result of precipitation when the capacity of the Sewer is exceeded. An intervening time of twelve hours or greater separating a CSO from the last prior CSO at the same location is considered to separate one overflow Event from another.

**"CWA"** means the *Clean Water Act*, R.S.O. 2006, c.22.

**“Design Criteria”** means the design criteria set out in the Ministry’s publication “Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval”, (as amended from time to time).

**“Design Guidelines for Sewage Works”** means the Ministry document titled “Design Guidelines for Sewage Works”, 2008 (as amended from time to time).

**"Director"** means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of EPA (Environmental Compliance Approvals).

**“Director Notification Form”** means the most recent version of the Ministry form titled Director Notification – Alterations to a Municipal Stormwater Management System, as obtained directly from the Ministry or from the Ministry’s website.

**"District Manager"** means the district manager or a designated representative of the Local Ministry Office.

**"EAA"** means the *Environmental Assessment Act*, R.S.O. 1990, c. E.18.

**"EPA"** means the *Environmental Protection Act*, R.S.O. 1990, c.E.19.

**“ESC”** means erosion and sediment control.

**“Facility”** means the entire operation located on the property where the Sewage Works or Equipment is located.

**“Form SW1”** means the most recent version of the Ministry form titled Record of Future Alteration Authorized for Storm Sewers/Ditches/Culverts as obtained directly from the Ministry or from the Ministry’s website.

**“Form SW2”** means the most recent version of the Ministry form titled Record of Future Alteration Authorized for Stormwater Management Facilities as obtained directly from the Ministry or from the Ministry’s website.

**“Form SW3”** means the most recent version of the Ministry form titled Record of Future Alteration Authorized for Third Pipe Collection Systems as obtained directly from the Ministry or from the Ministry’s website.

**"Licensed Engineering Practitioner”** means a person who holds a licence, limited licence, or temporary licence under the *Ontario Professional Engineers Act* R.S.O. 1990, c. P.28.

**"LID"** means “low impact development” 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 and distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration, and detention of Stormwater.

**“Local Ministry Office”** means the local office of the Ministry responsible for the geographic area where the Authorized System is located.

**"Minister"** means the Minister of the Ministry or such other member of the Executive Council as may be assigned the administration of the EPA and OWRA under the *Executive Council Act*, R.S.O. 1990, c. E.25.

**"Ministry"** means the Ministry of the Minister and includes all employees or other persons acting on its behalf.

**“Monitoring Plan”** means the monitoring plan prepared and maintained by the Owner under condition 4.1 in Schedule E of this Approval.

**“MTD”** means manufactured treatment device.

**“Municipal Drain”** has the same meaning as drainage works as defined in section 1 of the *Drainage Act* R.S.O. 1990, c. D.17.

**“Municipal Drainage Engineer’s Report”** means a report signed by a drainage engineer employed or contracted by a municipality and approved in writing by municipal council or equivalent.

**“Municipal Sewage Collection System”** means all Sewage Works, located in the geographical area of a municipality, that collect and transmit sanitary Sewage and are owned, or may be owned pursuant to an agreement with a municipality entered into under the *Planning Act* or *Development Charges Act*, 1997, by:

a) A municipality, a municipal service board established under the *Municipal Act*, 2001 or a city board established under the *City of Toronto Act*, 2006; or

b) A corporation established under sections 9, 10, and 11 of the *Municipal Act*, 2001 in accordance with section 203 of that Act or under sections 7 and 8 of the *City of Toronto Act*, 2006 in accordance with sections 148 and 154 of that Act.

“**Municipal Stormwater Management System”** means all Sewage Works, located in the geographical area of a municipality, that collect, transmit, or treat Stormwater and are owned, or may be owned pursuant to an agreement entered into under the *Planning Act* or *Development Charges Act*, 1997, by:

a) A municipality, a municipal service board established under the *Municipal Act*, 2001 or a city board established under the *City of Toronto Act*, 2006; or

b) A corporation established under sections 9, 10, and 11 of the *Municipal Act*, 2001 in accordance with section 203 of that Act or under sections 7 and 8 of the *City of Toronto Act*, 2006 in accordance with sections 148 and 154 of that Act.

**“Natural Environment”** has the same meaning as defined in section 1 of the EPA.

**"Nominally Separate Sewer(s)"** mean Separate Sewers that also have connections from roof leaders and foundation drains, and are not considered to be Combined Sewers.

**“OGS”** means Oil and Grit Separators;

**“Operating Authority”** means, in respect of the Authorized System, the person, entity, or assignee that is given responsibility by the Owner for the operation, management, maintenance, or Alteration of the Authorized System, or a portion of the Authorized System.

**"Owner"** for the purposes of this Approval means the [Municipality XYZ or Municipal Services Board XYZ], and includes its successors and assigns.

**"OWRA"** means the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40.

**“O&M Manual”** means the operation and maintenance manual prepared and maintained by the Owner under condition 3.2 in Schedule E of this Approval.

**"Partially Separated Sewer(s)"** means Combined Sewers that have been retrofitted to transmit sanitary Sewage but in which roof leaders or foundation drains still contribute Stormwater inflow to the Partially Separated Sewer.

**“Pre-development”** means the more stringent of a site’s:

a) Existing condition prior to proposed development or construction activities; or

b) Condition as defined by the local municipality.

**"Prescribed Person”** means a person prescribed in O. Reg. 208/19 (Environmental Compliance Approval in Respect of Sewage Works) for the purpose of ss. 20.6 (1) of the EPA, and where the alteration, extension, enlargement, or replacement is carried out under an agreement with the Owner.

“**Privately Owned Stormwater Works”** means Stormwater Sewage Works on private land that are privately owned and, while not part of the Authorized System, are considered part of a Stormwater Treatment Train.

**“Qualified Person (QP)”** means persons who have obtained the relevant education and training and have demonstrated experience and expertise in the areas relating to the work required to be carried out by this Approval.

**“Schedule C Notice(s)”** means a notices of amendment to this Approval issued pursuant to clause 20.3(1) of the EPA that imposes terms and conditions in respect of the Authorized System after consideration of an application by the Director.

**“Separate Sewer(s)”** means pipes that collect and transmit sanitary Sewage and other Sewage from residential, commercial, institutional, and industrial buildings.

**“Sewage”** has the same meaning as defined in section 1 of the OWRA.

**“Sewage Works”** has the same meaning as defined in section 1 of the OWRA.

**“Sewer”** has the same meaning as defined in section 1 of O. Reg. 525/98 under the OWRA.

**"Significant Drinking Water Threat"** has the same meaning as defined in section 2 of the CWA.

**“Significant Snowmelt Event(s)”** means the melting of snow at a rate which adversely affects the performance and function of the Authorized System and/or the Sewage Treatment Plant(s) identified in Schedule A of this Approval.

**“Significant Storm Event(s)”** means a minimum of 25 mm of rain in any 24 hours period.

**“Source Protection Authority”** has the same meaning as defined in section 2 of the CWA.

**"Source Protection Plan"** means a drinking water source protection plan prepared under the CWA.

**“SSO”** means a sanitary sewer overflow which is a discharge of Sewage from a Separate Sewer or Nominally Separate Sewer to the environment from designated location(s) in the Authorized System.

**“Standard Operating Policy for Sewage Works”** means the standard operating policy developed by the Ministry to assist in the implementation of Source Protection Plan policies related to Sewage Works and providing minimum design and operational standards and considerations to mitigate risks to sources of drinking water, as amended from time to time.

**“Storm Sewer”** means Sewers that collect and transmit, but not exfiltrate or lose by design, Stormwater resulting from precipitation and snowmelt.

**“Stormwater”** means rainwater runoff, water runoff from roofs, snowmelt, and surface runoff.

**“Stormwater Management Facility(ies)”** means a Facility for the treatment, retention, infiltration, or control of Stormwater.

**“Stormwater Management Planning and Design Manual”** means the Ministry document titled “Stormwater Management Planning and Design Manual”, 2003 (as amended from time to time).

**“Stormwater Treatment Train”** means a series of Stormwater Management Facilities designed to meet Stormwater management objectives (e.g., Appendix A) for a given area, and can consist of a combination of MTDs, LIDs and end-of-pipe controls.

**“TRCA”** means the Toronto Region Conservation Authority.

**“Third Pipe Collection System”** means Sewage Works designed to collect and transmit foundation drainage and/or groundwater to a receiving surface water or dry well;

**"Undertaking"** has the same meaning as in the EAA.

**“Vulnerable Area(s)”** has the same meaning as in the CWA.

## 2.0 General Conditions

2.1 The works comprising the Authorized System shall be constructed, installed, used, operated, maintained, replaced, or retired in accordance with the conditions of this Approval, which includes the following Schedules:

Schedule A – System Information

Schedule B – Municipal Stormwater Management System Description

Schedule C – List of Notices of Amendment to this ECA

Schedule D – General

Schedule E – Operating Conditions

Schedule F – Residue Management

Appendix A – Stormwater Management Criteria

2.2 The issuance of this Approval does not negate the requirements of other regulatory bodies, which includes but is not limited to, the Ministry of Northern Development, Mines, Natural Resources and Forestry and the local Conservation Authority.

2.3 Where there is a conflict between a provision of any document referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence. Where there is a conflict between the information in a Schedule C Notice and another section of this Approval, the document bearing the most recent date shall prevail.

2.4 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Authorized System is provided with a print or electronic copy of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2.5 The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

## 3.0 Alterations to the Municipal Stormwater Management System

3.1 For greater certainty, the Alterations authorized under this Approval are limited to Sewage Works comprising the Authorized System which does not include municipally or Privately Owned Stormwater Works:

3.1.1 On industrial, commercial, or institutional land;

3.1.2 Serving a single parcel of land, unless the stormwater management facility is located on a municipally owned park or community center;

3.1.3 That are operated as waste disposal sites defined under the EPA, and snow dump/melt facilities; or

3.1.4 That propose to collect, store, treat, or discharge stormwater containing substances or pollutants (other than Total Suspended Solids, or oil and grease) detrimental to the environment or human health;

3.2 Any Schedule C Notice shall provide authority to alter the Authorized System in accordance with the conditions of this Approval.

3.3 All Schedule C Notices issued by the Director for the Municipal Stormwater Management System shall form part of this Approval.

3.4 The Owner and a Prescribed Person shall ensure that the documentation required through conditions in this Approval and the documentation required in the Design Criteria are prepared for any Alteration of the Authorized System.

3.5 The Owner shall notify the Director within thirty (30) calendar days of placing into service or Completion of any Alteration of the Authorized System which had been authorized:

3.5.1 Under Schedule D to this Approval where the Alteration results in a change to Sewage Works specifically described in Schedule B of this Approval;

3.5.2 Through a Schedule C Notice respecting Sewage Works other than Storm Sewers; or

3.5.3 Through another approval that was issued under the EPA prior to the issue date of this Approval.

3.6 The notification requirements set out in condition 3.5 do not apply to any Alteration in respect of the Authorized System which:

3.6.1 Is exempt under section 53(6) of the OWRA or by O. Reg. 525/98;

3.6.2 Constitutes maintenance or repair of the Authorized System; or

3.6.3 Is a Storm Sewer, ditch, or culvert authorized by condition 4.1 of Schedule D of this Approval.

3.7 The Owner shall notify the Director within ninety (90) calendar days of:

3.7.1 The discovery of existing Sewage Works not described or depicted in Schedule B, or

3.7.2 Additional or revised information becoming available for any Sewage Works described in Schedule B of this Approval.

3.8 The notifications required in condition 3.5 and 3.7 shall be submitted to the Director using the Director Notification Form.

3.9 The Owner shall ensure that shall ensure that any chemicals, coagulants, or polymers used in the stormwater management system have obtained written approval from the Director prior to use, unless required for spill control or spill clean-up.

3.10 The Owner shall ensure that an ESC plan is prepared, and temporary ESC measures are installed in advance of and maintained during any construction activity on the Authorized System, subject to the following conditions:

3.10.1 Inspections of ESC measures are to be conducted at a frequency specified per the ESC plan, for dry weather periods (active and inactive construction phases), after Significant Storm Events and Significant Snowmelt Events, and after any extreme weather events.

3.10.2 Any deficiencies shall be addressed, and any required maintenance actions(s) shall be undertaken as soon as practicable once they have been identified.

3.10.3 Inspections and maintenance of the temporary ESC measures shall continue until they are no longer required.

3.11 The Owner shall ensure that records of inspections required by this Approval during any construction activity, including those required under condition 3.10:

3.11.1 Include the name of the inspector, date of inspection, visual observations, and the remedial measures, if any, undertaken to maintain the temporary ESC measures.

3.11.2 Be retained with records relating to the Alteration that the construction relates to, such as the form required in conditions 4.4.1, 5.5.1, and 6.2.1 of Schedule D, or the Schedule C Notice.

3.11.3 Be retrievable and made available to the Ministry upon request.

3.12 The document(s) or file(s) referenced in Table B1 of Schedule B of this Approval shall:

3.12.1 Be retained by the Owner;

3.12.2 Include at a minimum:

a) Identification of Storm Sewers, which shall include the following information:

i Location relative to street names or easements; and

ii Sewer diameters.

b) Identification of existing municipally owned Stormwater Sewage Works, including but not limited to ditches, swales, culverts, outlets, Stormwater Management Facilities, sedimentation MTD (for example oil grit separators), filtration MTD, LID, end of pipe controls, Third Pipe Collection Systems, and pumping stations, including any applicable Asset IDs.

c) Identification of the main tributaries and receiving water bodies to that the Sewage Works discharge to.

d) Delineation of municipal, watershed, and subwatershed boundaries, as available.

e) Identification of the storm sewersheds for each outlet.

f) Identification of any source protection Vulnerable Areas.

g) Identification of any Sewage Works that receive SSOs or CSOs.

3.12.3 Be updated to include:

a) Alterations authorized under Schedule D of this Approval or through a Schedule C Notice within twelve (12) months of the Alteration being placed into service.

b) Updates to information contained in the document(s) or files(s) not associated with an Alteration within twelve (12) months of becoming aware of the updated information.

3.13 An Alteration is not authorized under Schedule D of this ECA for projects that impact Indigenous treaty rights or asserted rights where:

3.13.1 The project is on Crown land or would alter access to Crown land;

3.13.2 The project is in an open or forested area where hunting, trapping or plant gathering occur;

3.13.3 The project involves the clearing of forested land unless the clearing has been authorized by relevant municipal, provincial, or federal authorities, where applicable;

3.13.4 The project alters access to a water body;

3.13.5 The proponent is aware of any concerns from Indigenous communities about the proposed project and these concerns have not been resolved; or,

3.13.6 Conditions respecting Indigenous consultation in relation to the project were placed in another permit or approval and have not been met.

3.14 No less than 60 days prior to construction associated with an Alteration the Director may notify the Owner in writing that a project is not authorized through Schedule D of this ECA where:

3.14.1 Concerns regarding treaty rights or asserted rights have been raised by one or more Indigenous communities that may be impacted by the Alteration; or

3.14.2 The Director believes that it is in the public interest due to site specific, system specific, or project specific considerations.

3.15 Where an Alteration is not authorized under condition 3.13 or 3.14 above:

3.15.1 An application respecting the Alteration shall be submitted to the Ministry; and,

3.15.2 The Alteration shall not proceed unless:

a) Approval for the Alteration is granted by the Ministry (i.e., a Schedule C Notice); or,

b) The Director provides written notice that the Alteration may proceed in accordance with conditions in Schedule D of this ECA.

## 4.0 Authorizations of Future Alterations to Storm Sewers, Ditches, or Culverts - Additions, Modifications, Replacements and Extensions

4.1 The Owner or a Prescribed Person may alter the Authorized System by adding, modifying, replacing, or extending a Storm Sewer, ditch, or culvert within the Authorized System subject to the following conditions and conditions 4.2 and 4.3 below:

4.1.1 The design of the addition, modification, replacement, or extension:

a) Has been prepared by a Licensed Engineering Practitioner;

b) Has been designed only to collect and transmit Stormwater;

c) Has not been designed to collect or treat any sanitary Sewage;

d) Has not been designed to collect, store, treat, control, or manage groundwater, unless for the purpose of foundation drains, road subdrains, or LIDs;

e) Satisfies the Design Criteria or any municipal criteria that have been established that exceed the minimum requirements set out in the Design Criteria;

f) Satisfies the standards set out in Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD), as applicable to ditches and culverts;

g) Is consistent with or otherwise addresses the design objectives contained within the Design Guidelines for Sewage Works;

h) Is planned, designed, and built to be consistent with the Stormwater Management Planning and Design Guidance Manual. If there is a conflict Appendix A of this Approval, then Appendix A shall prevail; and

i) Includes design considerations to protect sources of drinking water, including those set out in the Standard Operating Policy for Sewage Works, and any applicable local Source Protection Plan policies.

4.1.2 The addition, modification, replacement, or extension shall be designed so that it will:

a) Not adversely affect the ability to maintain a gravity flow in the Authorized System without overflowing or increase surcharging any maintenance holes as per design; and

b) Provide smooth flow transition to existing gravity Storm Sewers;

4.1.3 The Alteration shall not result in:

a) Adverse Effects; or

b) A deterioration of the approved effluent quality or quantity of downstream Stormwater Management Facilities which results in not being able to achieve the overall Stormwater performance criteria per Appendix A.

4.1.4 The Storm Sewer, ditch or culvert addition, modification, replacement, or extension is wholly located within the municipal boundary over which the Owner has jurisdiction or there is a written agreement in place with the adjacent property owner respecting the Alteration and resulting Sewage Works.

4.1.5 The Owner consents in writing to the addition, modification, replacement, or extension.

4.1.6 A Licensed Engineering Practitioner has verified in writing that the addition, modification, replacement, or extension meets the requirements of conditions 4.1.1 a) to h), 4.3.9, and 4.3.10.

4.1.7 The Owner has verified in writing that the addition, modification, replacement, or extension has complied with inspection and testing requirements in the Design Criteria.

4.1.8 The Owner has verified in writing that the addition, modification, replacement, or extension meets the requirements of conditions 4.1.1 i), 4.1.2 to 4.1.6, 4.3.7, and 7.2.

4.2 The addition of Storm Sewers or ditches can be constructed but not operated until the Stormwater Management Facilities required to service the new Storm Sewers or ditches are in operation.

4.3 The Owner or a Prescribed Person is not authorized to undertake an Alteration described above in condition 4.1 where the Alteration relates to the addition, modification, replacement, or extension of a Storm Sewer that:

4.3.1 Passes under or through a body of surface water, unless trenchless construction methods are used or the local Conservation Authority has authorized an alternative construction method.

4.3.2 Has a nominal diameter greater than 2,400 mm, or equivalent sizing.

4.3.3 Is a Combined Sewer.

4.3.4 Is a concrete channel.

4.3.5 Is designed to, at any time, transmit, store, or control sanitary Sewage.

4.3.6 Converts rural road cross section ditches to curb, gutter, and Storm Sewers if the Stormwater volume and/or peak flow is increased and no water quality treatment is planned or demonstrated to be achieved, in accordance with this Approval and Appendix A, to offset the increase in Stormwater.

4.3.7 Results in new discharges or increased discharges to a Municipal Drain without written approval by the Owner and a signed Municipal Drainage Engineer's Report in accordance with the *Drainage Act* R.S.O. 1990, c. D.17.

4.3.8 Establishes a new outlet with direct discharge into the Natural Environment without monitoring in accordance with this Approval and without achieving the requirements set in Appendix A.

4.3.9 Increases Stormwater flow of an existing Storm Sewer or ditch without achieving water quality criteria set in Appendix A in accordance with this Approval unless the existing downstream Municipal Stormwater Management System has sufficient residual transmission and treatment capacity to accommodate the additional Stormwater.

4.3.10 Increases local hydraulic capacity of an existing Storm Sewer or ditch to accommodate new Stormwater flows unless the existing downstream Municipal Stormwater Management System has sufficient residual hydraulic capacity to accommodate the additional Stormwater.

4.3.11 Connects to another Municipal Stormwater Management System, unless:

a) Prior to construction, the Owner of the Authorized System obtains written consent from the Owner or Owner's delegate of the Municipal Stormwater System being connected to; and

b) The Owner of the Authorized System retains a copy of the written consent from the Owner or Owner's delegate of the Municipal Stormwater Management System being connected to as part of the record that is recorded and retained under condition 4.4.

4.3.12 Is part of an Undertaking in respect of which:

a) A request under s.16(6) of the EAA has been made, namely a request that the Minister make an order under s.16;

b) The Minister has made an order under s.16; or

c) The Director under that EAA has given notice under s.16.1 (2) that the Minister is considering making an order under s.16.

4.4 The consents and verifications required in conditions 4.1 and 4.3, if applicable, shall be:

4.4.1 Recorded on SW1, prior to the Storm Sewer, ditch, or culvert addition, modification, replacement, or extension being placed into service; and

4.4.2 Retained for a period of at least ten (10) years by the Owner.

4.5 For greater certainty, the verification requirements set out in condition 4.4 do not apply to any Alteration in respect of the Authorized System which:

4.5.1 Is exempt under section 53(6) of the OWRA or by O. Reg. 525/98; or

4.5.2 Constitutes maintenance or repair of the Authorized System.

## 5.0 Authorizations of Future Alterations to Stormwater Management Facilities - Additions, Modifications, Replacement, and Extensions

5.1 Subject to conditions 5.2 and 5.3, the Owner or a Prescribed Person may alter the Stormwater Management Facilities in the Authorized System by adding, modifying, replacing, or extending the following components:

5.1.1 Rooftop storage

5.1.2 Parking lot storage

5.1.3 Superpipe storage

5.1.4 Reduced lot grading

5.1.5 Roof leader to ponding area

5.1.6 Roof leader to soakaway pit

5.1.7 Infiltration trench

5.1.8 Engineered grassed swales / bioswale

5.1.9 Pervious pipes

5.1.10 Pervious catchbasins

5.1.11 Vegetated filter strips

5.1.12 Natural buffer strips

5.1.13 Green roofs/Rooftop gardens

5.1.14 Wet pond

5.1.15 Engineered wetland

5.1.16 Dry pond

5.1.17 Hybrid Facility

5.1.18 Infiltration basin

5.1.19 Filtration MTD

5.1.20 Sedimentation MTD - OGS

5.1.21 LID that relies on one or more of the following mechanisms to achieve treatment and control:

a) Evapotranspiration;

b) Infiltration into the ground; or

c) Filtration.

5.1.22 Any other Stormwater Management Facilities where the Director has provided authorization in writing to proceed with the Alteration.

5.2 Any Alteration to the Authorized System authorized under condition 5.1 is subject to the following conditions:

5.2.1 The design of the Alteration shall:

a) Be prepared by a Licensed Engineering Practitioner;

b) Be designed only to collect, receive, treat, or control only Stormwater and has not been designed to collect, receive, treat, or control sanitary Sewage;

c) Is planned, designed, and built to be consistent with the Stormwater Management Planning and Design Guidance

Manual. If there is a conflict Appendix A of this Approval, then Appendix A shall prevail;

d) Satisfy the Design Criteria or any municipal criteria that have been established that exceed the minimum requirements set out in the Design Criteria;

e) Be part of a Stormwater Treatment Train approach that satisfies the requirements outlined in Appendix A, or transmits Stormwater to a Stormwater Management Facility that satisfies the requirements outlined in Appendix A;

f) Includes an outlet or an emergency overflow for the Sewage Works, with the verification of the location, route, and capacity of the receiving major system to accommodate overflows; and

g) Include design considerations to protect sources of drinking water, including those set out in the Standard Operating Policy for Sewage Works and any applicable local Source Protection Plan policies.

5.2.2 The Alteration shall not result in:

a) Adverse Effects; or

b) A deterioration on the approved effluent quality or quantity of downstream Stormwater Management Facilities which results in not being able to achieve the overall Stormwater performance criteria per Appendix A.

5.2.3 The Alteration may incorporate co-benefits, but in doing so shall not diminish functionality or efficiency of any Stormwater Management Facility(ies) that may be impacted by the Alteration.

5.2.4 Any new sedimentation MTD that is part of the Alteration shall meet the following requirements:

a) Tested in accordance with the TRCA protocol Procedure for Laboratory Testing of OGSs and testing data verified in accordance with the ISO 14034 Environmental Technology Verification (ETV) protocol. The suspended solids removal claimed for the sedimentation MTD in achieving the water quality criteria in Appendix A, and the sizing methodology used to determine the appropriate sedimentation MTD dimensions for the particular site, shall be based on the verified removal efficiency for all particle size fractions comprising the particle size distribution specified within the

testing protocol or a particle size distribution approved by the Director.

b) Using the verified sediment removal efficiencies for the respective surface loading rates specified in the testing protocol, the sedimentation MTD sizing methodology shall use linear interpolation to calculate sediment removal efficiencies for surface loading rates that lie between the specified surface loading rates. For surface loading rates less than the lowest specified and tested surface loading rate, the sediment removal efficiency shall be assumed to be identical to the verified removal efficiency for the lowest specified and tested surface loading rate. Where available, 15 min rainfall stations shall be used for sizing the sedimentation MTD.

c) When two or more sedimentation MTD are installed in series, no additional sediment removal credit shall be applied beyond the sediment removal credit of the largest device in the series.

d) The sediment removal rate at the specified surface loading rates determined for the tested full scale, commercially available MTD may be applied to similar MTDs of smaller or larger size by proper scaling. Scaling the performance results of the tested MTD to other model sizes without completing additional testing is acceptable provided that:

   i The claimed sediment removal efficiencies for the similar MTD are the same or lower than the tested MTD at identical surface loading rates; and

   ii The similar MTD is scaled geometrically proportional to the tested unit in all inside dimensions of length and width and a minimum of 85% proportional in depth.

e) The units must be installed in an off-line configuration if the unit had an effluent concentration greater than 25 mg/L at any of the surface loading rates conducted during the sediment scour and resuspension test as part of the ISO 14034 verification.

f) The sedimentation MTD should be sized for the highest suspended solids percent removal physically and economically practicable, and used as a pre-treatment device in a treatment train designed to achieve the water quality criteria in Appendix A.

5.2.5 Any new filtration MTD that is part of the Alteration shall meet the following requirements:

a) Field tested and verified in accordance with a minimum of one of the following protocols:

   i Washington State Technology Assessment Protocol - Ecology (TAPE) General Use Level Designation (GULD); and

      1. Has ISO 14034 ETV verification to satisfy ETV Canada requirements;

      2. The field monitoring data set used to obtain GULD certification should include a minimum of three (3) events that exceed 75th percentile rainfall event with at least one hour with an intensity of 6 mm/h or greater.

   ii Another testing and verification method, where the Director has communicated acceptability in writing.

b) Where available, 15 min rainfall stations shall be used for sizing the filtration MTD using the rainfall intensity corresponding to 90% of annual runoff volume;

c) The SS removal rate determined for the tested full scale, commercially available filtration MTD, or single full-scale commercially available cartridge or filtration module, may be applied to other model sizes of that filtration MTD provided that appropriate scaling principles are applied. Scaling the tested filtration MTD or single full-scale commercially available cartridge or filtration module, to determine other model sizes and performance without completing additional testing is acceptable provided that:

   i Depth of media, composition of media, and gradation of media remain constant.

   ii The ratio of the maximum treatment flow rate to effective filtration treatment area (filter surface area) is the same or less than the tested filtration MTD;

   iii The ratio of effective sedimentation treatment area to effective filtration treatment area is the same or greater than the tested filtration MTD; and

   iv The ratio of wet volume to effective filtration treatment area is the same or greater than the tested filtration MTD.

5.2.6 When it is necessary to use Privately Owned Stormwater Works in the Stormwater Treatment Train to achieve Appendix A criteria as part of or as a result of an Alteration, the following conditions apply:

a) The Owner shall, through legal instruments or binding agreements, obtain the right to access, operate, and maintain the Privately Owned Sewage Works;

b) The Owner shall ensure that the right to access, operate and maintain the Privately Owned Sewage Works described in condition 5.2.6 a) above is maintained at all times that the works are in service and used to achieve Appendix A criteria.

c) The Owner shall ensure on-going operation and maintenance of the Privately Owned Stormwater Works;

d) The Owner ensures on-going operation and maintenance of the Privately Owned Stormwater Works; and

e) The Owner shall ensure that the Privately Owned Stormwater Works have obtained separate approval(s) under the EPA, as required.

5.2.7 The Alteration is wholly located within the municipal boundary over which the Owner has jurisdiction or there is a written agreement in place with the adjacent municipality respecting the Alteration and resulting Sewage Works.

5.2.8 The Owner consents in writing to the Alteration authorized under condition 5.1.

5.2.9 A Licensed Engineering Practitioner has verified in writing that the Alteration authorized under condition 5.1 meets the design requirements of conditions 5.2.1 a) to f), 5.2.4 and 5.2.5.

5.2.10 The Owner has verified in writing that the Alteration authorized under condition 5.1 meets the requirements of conditions 5.2.1 g), 5.2.2, 5.2.6 to 5.2.9, 5.3, 5.4, and 7.2.

5.3 The authorization in condition 5.1 does not apply:

5.3.1 To the establishment of a regional Stormwater management end-of-pipe flood control Facility;

5.3.2 Where the Alteration will result in new or increased discharges to a Municipal Drain without written approval by the Owner and a signed Municipal Drainage Engineer's Report in accordance with the *Drainage Act* R.S.O. 1990, c. D.17;

5.3.3 To the establishment of a new outlet with direct discharge into the Natural Environment without treatment and monitoring in accordance with this Approval;

5.3.4 Where the Alteration will service a drainage area greater than 65 ha;

5.3.5 Where the Alteration will result in conversion of an existing Stormwater Management Facility into another type of Stormwater Management Facility;

5.4 Any Alteration to LID or end-of-pipe Stormwater Management Facilities shall be inspected before operation of the Alteration to confirm construction as per specifications (including depth, as applicable).

5.5 The consents and verifications required in conditions 5.2.8 to 5.2.10 if applicable, shall be:

5.5.1 Recorded on Form SW2, prior to undertaking the Alteration; and

5.5.2 Retained for a period of at least ten (10) years by the Owner.

5.6 For greater certainty, the verification requirements set out in condition 5.5 do not apply to any Alteration in respect of the Authorized System which:

5.6.1 Is exempt under section 53(6) of the OWRA or by O. Reg. 525/98; or

5.6.2 Constitutes maintenance or repair of the Authorized System.

## 6.0 Authorizations of Future Alterations for Third Pipe Collection System Additions, Modifications, Replacements and Extensions

6.1 The Owner or a Prescribed Person may alter the Authorized System by adding, modifying, replacing, or extending, and operating works comprising a municipal Third Pipe Collection System to collect foundation drainage and groundwater where:

6.1.1 The design of the Alteration:

a) Has been prepared by a Licensed Engineering Practitioner;

b) Is limited to collection, transmission, reuse and/or treatment of only foundation drainage and groundwater, and is not designed to collect or treat sanitary Sewage;

c) Satisfies the Design Criteria or any municipal criteria that have been established that exceed the minimum requirements set out in the Design Criteria; and

d) Is scoped so that the resulting Sewage Works are intended to:

i Primarily function for the non-potable reuse, as deemed acceptable by the Owner and the local health unit, of foundation drainage and/or groundwater, and no discharge to a Storm Sewer or Separate Sewer if there is excess volume that cannot be reused; and/or

ii Provide wetland recharge, in which case, collection of rooftop runoff will also be acceptable.

6.1.2 The Alteration is not located on a contaminated site, or where natural occurring conditions result in contaminated discharge, or where the site receives contaminated groundwater or foundation drainage from another site, unless the discharge being received has been remediated or treated prior to acceptance by the Third Pipe Collection System.

6.1.3 The Owner has undertaken a site assessment for water quantity, water quality, and hydrogeological site conditions regarding the Alteration.

6.1.4 The Alteration will not result in Adverse Effects.

6.1.5 The Alteration is wholly located within the municipal boundary over which the Owner has jurisdiction or there is a written agreement in place with the adjacent property owner respecting the Alteration and resulting Sewage Works.

6.1.6 The Owner consents in writing to the Alteration.

6.1.7 A Licensed Engineering Practitioner has verified in writing that the Alteration meets the requirements of condition 6.1.1.

6.1.8 The Owner has verified in writing that the Alteration meets the requirements of conditions 6.1.2 to 6.1.7.

6.2 The consents, verifications and documentation required in conditions 6.1.7 and 6.1.8 shall be:

6.2.1 Recorded on Form SW3 prior to undertaking the Alteration; and

6.2.2 Retained for a period of at least ten (10) years by the Owner.

6.3 For greater certainty, the verification requirements set out in condition 6.2 do not apply to any Alteration in respect of the Authorized System which:

6.3.1 Is exempt under section 53(6) of the OWRA or by O. Reg. 525/98; or

6.3.2 Constitutes maintenance or repair of the Authorized System, including changes to software for an existing SCADA system resulting from Alterations authorized in condition 6.1.

6.4 The Owner shall update, within twelve (12) months of the Alteration of the Sewage Works being placed into service, any drawings maintained for the Municipal Stormwater Management System to reflect the Alterations of the Sewage Works, where applicable.

## 7.0 Outlets

7.1 Any outlet established or altered as part of an Alteration authorized through conditions 4, 5, or 6 of Schedule D in this Approval shall have regard to the 2012 TRCA Stormwater Management Criteria document, Appendix E, for outlets.

7.2 Any outlet established as part of an Alteration authorized through conditions 4, 5, or 6 of Schedule D in this Approval shall not:

7.2.1 Increase discharge or create a new point source discharge to privately owned land unless there is express written consent of the owner(s) of such private land(s).

7.2.2 Result in Adverse Effects.

## 8.0 Previously Approved Sewage Works

8.1 If approval for an Alteration to the Authorized System was issued under the EPA and is revoked by this Approval, the Owner may make the Alteration in accordance with:

8.1.1 The terms of this Approval; or

8.1.2 The terms and conditions of the revoked approval as of the date this approval was issued, provided that the Alteration is commenced within five (5) years of the date that the revoked approval was issued.

## 9.0 Transition

9.1 An Alteration of the Authorized System is exempt from the requirements in clause (e) of condition 4.1.1, clause (d) of condition 5.2.1, and clause (c) of condition 6.1.1 where:

9.1.1 Effort to undertake the Alteration, such as tendering or commencement of construction of the Sewage Works associated with the Alteration, begins on or before <DATE>.

9.1.1 The design of the Alteration conforms to the Stormwater Management Planning and Design Manual, and where applicable, Design Guidelines for Sewage Works;

9.1.2 The design of the Alteration was completed on or before the issue date of this Approval or a Class Environmental Assessment was completed for the Alteration and changes to the design result in significant cost increase or significant project delays; and

9.1.3 The Alteration would be otherwise authorized under this Approval.

## Schedule E: Operating Conditions

| | |
|---|---|
| System Owner | **${OWNERNAME}** |
| ECA Number | **${LICNO}** |
| System Name | **${SYSTEMNAME}** |
| ECA Issue Date | **${MONTH} ${DAY}, ${YEAR}** |

### 1.0 General Operations

1.1 The Owner shall ensure that, at all times, the Sewage Works comprising the Authorized System and the related equipment and Appurtenances used to achieve compliance with this Approval are properly operated and maintained.

1.2 Prescribed Persons and Operating Authorities shall ensure that, at all times, the Sewage Works under their care and control and the related equipment and Appurtenances used to achieve compliance with this Approval are properly operated and maintained.

1.3 In conditions 1.1 and 1.2 “properly operated and maintained” includes effective performance, adequate funding, adequate operator staffing and training, including training in applicable procedures and other requirements of this Approval and the EPA, OWRA, CWA, and regulations, adequate laboratory services, process controls and alarms and the use of process chemicals and other substances used in the Authorized System.

1.4 The Owner ensure that Sewage Works are operated with the objective that the effluent from the Sewage Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam, or discoloration on the receiving waters, and shall evaluate the need for maintenance if the objective is not being met.

1.5 The Owner shall ensure that any Storm Sewers or ditches authorized under Schedule D of this approval are not placed into operation until the associated Stormwater Management Facilities to provide treatment are constructed and operated.

### 2.0 Duties of Owners and Operating Authorities

2.1 The Owner, Prescribed Persons, and any Operating Authority shall ensure the following:

2.1.1 At all times that the Sewage Works within the Authorized System are in service the Sewage Works are:

a) Operated in accordance with the requirements under the EPA and OWRA, and

b) Maintained in a state of good repair.

2.1.2 The Authorized System is operated by persons that are familiar with the requirements of this Approval.

2.1.3 All sampling, testing, monitoring, and reporting requirements under the EPA and this Approval that relate to the Authorized System are complied with.

2.1.4 All necessary steps are taken to ensure that operations of the Sewage Works and any associated physical structures do not constitute a safety or health hazard to the general public.

2.1.5 Where a Stormwater Management Facility ceases to function as a Stormwater Management Facility, whether by intent, accident, or otherwise (e.g., a CSO or an SSO), a workplan shall be developed that includes local community notification, plans for rehabilitating the Stormwater Management Facility to proper function in a reasonable time, identification of actions that will be taken to prevent reoccurrences, and timelines for implementing the workplan.

2.1.6 That operations and maintenance activities are undertaken at the frequency and in conformance with the procedures set out in the O&M Manual.

a) A Prescribed Person or Operating Authority shall only undertake operations and maintenance activities where they have been delegated the authority to undertake such activities by the Owner or the Owner has expressly approved the activity(ies).

2.2 For clarity, the requirements outlined in the above conditions 2.1 for Prescribed Persons and any Operating Authority only apply to Sewage Works within the Authorized System where they are responsible for the operation.

2.3 The Owner, Prescribed Persons, and Operating Authority shall take all reasonable steps to minimize and ameliorate any Adverse Effect on the Natural Environment or impairment of the quality of water of any waters resulting from the operation of the Authorized System, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

## 3.0 Operations and Maintenance

3.1 Inspection

3.1.1 The Owner shall ensure that all Sewage Works within the Authorized System are inspected at the frequency and in accordance with procedures set out in their O&M Manual.

3.1.2 The owner shall ensure that:

a) Any Stormwater Management Facilities, pumping stations, and any outlets that discharge to a receiver, are inspected at least once before December 31, 2026, if these have not been inspected since January 1, 2018 and thereafter as required by the O&M Manual; and

b) Any Stormwater Management Facilities, pumping stations, and any outlets that discharge to a receiver, established, or replaced within the Authorized System after the date of issuance of this Approval, are inspected within one year of being placed into service and thereafter as required by the O&M Manual.

3.1.3 The Owner shall clean and maintain Sewage Works within the Authorized System to ensure the Sewage Works perform as designed.

3.1.4 The Owner shall inspect the Stormwater Management Facilities in the Authorized System after significant flooding events as defined in, and in accordance with procedures documented in, the O&M Manual.

3.1.5 The Owner shall maintain records of the results of the inspections required in condition 3.1.1, 3.1.2 and 3.1.4 and any cleaning and maintenance operations undertaken, and shall make available the records for inspection by the Ministry upon request. The records shall include the following:

a) Asset ID and name of the Sewage Works;

b) Date and results of each inspection, maintenance, or cleaning;

c) Name of person who conducted the inspection, maintenance, or the name of the inspecting official, where applicable, and

d) As applicable to the type of works, observations resulting from the inspection including, at a minimum:

i Hydraulic operation of the works (e.g., length of occurrence since the last rainfall event, evidence or occurrence of overflows).

ii Condition of vegetation in and around the works.

iii Occurrence of obstructions at the inlet and outlet of the works.

iv Evidence of spills and/or oil/grease contamination.

v Presence of trash build-up, and

vi Measurements of other parameters as required in the Monitoring Plan.

3.2 Operations & Maintenance (O&M) Manual

3.2.1 The Owner shall prepare and implement an operations and maintenance manual for Sewage Works within the Authorized System on or before <DATE>, that includes or references, but is not necessarily limited to, the following information:

a) Procedures for the routine operation of the Sewage Works;

b) Inspection programs, including the frequency of inspection, and the methods or tests employed to detect when maintenance is necessary, including;

i Presence of algae and/or invasive species impairing the Works (e.g. phragmites, goldfish)

ii Measurements of sediment depth, manual water levels (staff gauge) and/or visual observations, as appropriate to the Stormwater Management Facilities

c) Maintenance and repair programs, including:

i The frequency of maintenance and repair for the Sewage Works;

ii Stormwater pond sediment cleanout, dewatering, and management;

iii Excavation, modification, replacement of LID soil/media/aggregate/geotextile, such as bioretention cells, green roof, permeable pavement; and

iv The frequency of maintenance for any other Stormwater Management Facilities identified in Schedule B that collect sediment.

d) Operational and maintenance requirements to protect sources of drinking water, such as those included in the Standard Operating Policy for Sewage Works, and any applicable local Source Protection Plan policies;

e) Procedures for routine physical inspection and calibration of monitoring equipment or components in accordance with the Monitoring Plan;

f) Emergency Response, Spill Reporting and Contingency Plans and Procedures for dealing with Equipment breakdowns, potential Spills, and any other abnormal situations, including notification to the SAC, the Medical Officer of Health, and the District Manager, as applicable;

g) Procedures for receiving, responding, and recording public complaints, including recording any follow-up actions taken; and

h) As-built drawings or record drawings of the Sewage Works.

3.2.2 The Owner shall review and update the O&M Manual and ensure that access to a copy is available at each Stormwater Management Facility for the operational life of the works.

3.2.3 The Owner shall provide a copy of the O&M Manual to Ministry staff, upon request.

3.2.4 The Owner shall revise the O&M Manual to include procedures necessary for the operation and maintenance of any Sewage Works within the Authorized System that are established, altered, extended, replaced, or enlarged after the date of issuance of this approval prior to placing into service those Sewage Works.

3.2.5 For greater certainty, the O&M Manual may be a single document or a collection of documents that, when considered together, apply to all parts of the Authorized System.

3.3 On or before <DATE>, the Owner shall establish signage to notify the public at any Stormwater Management Facility identified in Schedule B that is a wet pond, dry pond, hybrid Facility, or engineered wetland. The signage shall include the following minimum information:

3.3.1 Identification that the site contains a Stormwater Management Facility;

3.3.2 Identification of potential hazards and limitations of water use, as applicable;

3.3.3 Identification of the purpose of the Facility;

3.3.4 ECA approval number and/or asset ID; and

3.3.5 Owner's contact information.

3.4 Prior to any maintenance of Sewage Works comprising the Authorized System, the Owner shall ensure that all applicable permits or authorizations have been obtained from Federal or Provincial agencies having legislative mandates relating to species at risk or water resources.

## 4.0 Monitoring Plan

4.1 On or before <DATE > or within twenty-four (24) months of the date of the publication of the Ministry's monitoring guidance, whichever is later, the Owner shall develop and implement a monitoring plan for the Authorized System. The monitoring plan shall be:

4.1.1 Signed and approved by management with the authority delegated by the Owner to do so;

4.1.2 Peer-reviewed by a third-party Qualified Person (QP), external to the development of the Monitoring Plan, to verify the adequacy of the Monitoring Plan in complying with conditions 4.4 and 4.5 of Schedule E. The results of the peer review shall include:

a) Written confirmation from the QP that they have the experience and qualifications to carry out the work; and

b) Written confirmation from the QP of the adequacy of the Monitoring Plan.

4.2 The Owner, or a QP designated by the Owner, may jointly develop the Monitoring Plan in partnership with Owner(s) of other Municipal Stormwater Management Systems as long as the Municipal Stormwater Management Systems are within the same watershed.

4.3 The Owner shall ensure the Monitoring Plan is implemented and any resulting monitoring data is recorded in an electronic database.

4.4 The Monitoring Plan shall include:

4.4.1 Procedures to verify that the operational performance of the Authorized System is as designed/planned;

4.4.2 Procedures to assess the environmental impact of the Municipal Stormwater Management System; and

4.4.3 Procedures for any corrective action that may be required to address any performance deficiencies or environmental impacts identified from above conditions 4.4.1 or 4.4.2.

4.5 The Monitoring Plan shall also include, but not be limited to:

4.5.1 Identification of the Sewage Works to be monitored, including outlets and any works that provide quality and/or quantity control;

4.5.2 Identification of the key receivers to be monitored within the Owner's municipal boundaries and the monitoring locations;

4.5.3 Consideration of relevant municipal land use and environmental planning documents (e.g., Stormwater Management Master Plan, Class Environmental Assessment Project, asset management plan, subwatershed studies, and planned development);

4.5.4 Characterization of water quality and quantity conditions and identification of water users to be protected, based on conditions 4.5.2 and 4.5.3;

4.5.5 Identification of water quality and quantity goals, as it relates to Stormwater management, using the information collected in condition 4.5.4;

4.5.6 Identification of locations of rainfall gauges to be used;

4.5.7 Identification of inspections, measurements, sampling, analysis and/or other monitoring activities that were used as the basis for or will inform future updates to the procedures identified in condition 4.4.

4.5.8 Details respecting a monitoring program for the works and the receivers, that includes, at a minimum:

a) Hydrological, chemical, physical, and biological parameters, as appropriate, in alignment with the goals;

b) Ensures water level of the Stormwater Measurement Facilities, excluding MTDs, are measured at regular intervals with a water level gauge;

c) Monitoring methodology, including the frequency and protocols for sampling, analysis, and recording, with consideration of dry and wet weather events and timing of sampling during wet weather events.

d) Ensures that the time of all samples or measurements are recorded.

4.5.9 An implementation plan for the monitoring program that identifies timelines and, if the monitoring occurs on a rotational basis, provides a description of the rotational schedule and associated works.

4.5.10 Includes a summary of all monitoring data along with an interpretation of the data and any conclusion drawn from the data evaluation about the need for future modifications to the Authorized System or system operations, and

4.5.11 Consideration of adaptive management practices (e.g., evidence-based decision making).

4.6 The Owner shall ensure that the Monitoring Plan is updated where necessary within twelve (12) months of any Alteration to the Authorized System, or more frequently as required by the Monitoring Plan.

4.7 The Owner shall, on request and without charge, provide a copy of the Monitoring Plan and any resulting monitoring data to members of the public.

## 5.0 Reporting

5.1 The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

5.2 The Owner shall prepare an annual performance report for the Authorized System that:

5.2.1 Is submitted to the Director on or before April 30th of each year and covers the period from January 1st to December 31st of the preceding calendar year.

a) For clarity, the first report shall cover the period of January 1, 2023 to December 31st, 2023 and be submitted to the Director on or before April 30th, 2024.

5.2.2 Includes a summary of all monitoring data along with an interpretation of the data and an overview of the condition and operational performance of the Authorized System and any Adverse Effects on the Natural Environment;

5.2.3 Includes a summary and interpretation of environmental trends based on all monitoring information and data for the previous five (5) years;

5.2.4 Includes a summary of any operating problems encountered and corrective actions taken;

5.2.5 Includes a summary of all inspections, maintenance, and repairs carried out on any major structure, equipment, apparatus, mechanism, or thing forming part of the Authorized System;

5.2.6 Includes a summary of the calibration and maintenance carried out on all monitoring equipment;

5.2.7 Includes a summary of any complaints related to the Sewage Works received during the reporting period and any steps taken to address the complaints;

5.2.8 Includes a summary of all Alterations to the Authorized System within the reporting period that are authorized by this Approval including a list of Alterations that pose a Significant Drinking Water Threat;

5.2.9 Includes a summary of all Spills or abnormal discharge events;

5.2.10 Includes a summary of actions taken, including timelines, to improve or correct performance of any aspect of the Authorized System; and

5.2.11 Includes a summary of the status of actions for the previous reporting year.

5.3 The report described in condition 5.2 shall be:

5.3.1 Made available, on request and without charge, to members of the public who are served by the Authorized System; and

5.3.2 Made available, by June 1st of the same reporting year, to members of the public without charge by publishing the report on the Internet, if the Owner maintains a website on the Internet.

## 6.0 Record Keeping

6.1 The Owner shall retain for a minimum of ten (10) years from the date of their creation:

6.1.1 All records, reports and information required by this Approval and related to or resulting Alterations to the Authorized System, and

6.1.2 All records, report and information related to the operation, maintenance and monitoring activities required by this Approval.

6.2 The Owner shall update, within twelve (12) months of any Alteration to the Authorized System being placed into service, any drawings maintained for the Municipal Stormwater Management System to reflect the Alteration of the Sewage Works, where applicable.

## 7.0 Review of this Approval

7.1 No later than the date specified in Condition 1 of Schedule A of this Approval, the Owner shall submit to the Director an application to have the Approval reviewed. The application shall, at minimum:

7.1.1 Include an updated description of the Sewage Works within the Authorized System, including any Alterations to the Sewage Works that were made since the Approval was last issued; and

7.1.2 Be submitted in the manner specified by Director and include any other information requested by the Director.

## 8.0 Source Water Protection

8.1 The Owner shall ensure that any Alteration in the Authorized System is designed, constructed, and operated in such a way as to be protective of sources of drinking water in Vulnerable Areas as identified in the Source Protection Plan, if available.

8.2 The Owner shall prepare a “Significant Drinking Water Threat Assessment Report for Proposed Alterations” for the Authorized System on or before <DATE> that includes, but is not necessarily limited to:

8.2.1 An outline of the circumstances under which proposed Alterations could pose a Significant Drinking Water Threat based on the Director’s Technical Rules established under the CWA.

8.2.2 An outline of how the Owner assesses the proposed Alterations to identify drinking water threats under the CWA.

8.2.3 For any proposed Alteration a list of components, equipment, or Sewage Works that are being altered and have been identified as a Significant Drinking Water Threat.

8.2.4 A summary of design considerations and other measures that have been put into place to mitigate risks resulting from construction or operation of the components, equipment, or Sewage Works identified in condition 8.2.3, such as those included in the Standard Operating Policy for Sewage Works.

8.3 The Owner shall make any necessary updates to the report required in condition 8.2 at least once every twelve (12) months.

8.4 Any components, equipment, or Sewage Works added to the report required in condition 8.2 shall be include in the report for the operational life of the Sewage Works.

8.5 Upon request, the Owner shall make a copy of the report required in condition 8.2 available to the Ministry or Source Protection Authority staff.

## 9.0 Storm Sewer Catchment Asset Inventory

9.1 The Owner shall prepare and submit to the Director an inventory of the storm sewersheds and classify in accordance with Tables E1 and E2, on or before <DATE>. Minimum classification of the level of Stormwater management is as follows:

9.1.1 Level A – Stormwater receives treatment for water quality and quantity prior to discharge to the environment;

9.1.2 Level B – Stormwater receives treatment for water quality but no water quantity prior to discharge to the environment; and

9.1.3 Level C – Stormwater receives no treatment for water quality prior to discharge to the environment.

**Table E1. Storm Sewershed and Associated Treatment**

| Outlet Asset ID | Sewershed Catchment Area (ha) | Tributary or Receiver | Subwatershed/ Watershed | Stormwater Management Level (A, B or C) | Treatment provided by other municipality (if applicable) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

**Table E2. Summary of Storm Sewersheds**

| Stormwater Management Level | Total Number of Outlets to Environment | Total Sewershed Catchment Area (ha) |
|---|---|---|
| Level A | | |
| Level B | | |
| Level C | | |

9.2 Within 12 (twelve) months of the date that the inventory required in condition 9.1 is submitted to the Director, the document(s) or file(s) referenced in Table B1 of Schedule B of this Approval shall be updated to identify the storm sewersheds for each outlet and their level of Stormwater management.

## Schedule F: Residue Management

| | |
|---|---|
| System Owner | **${OWNERNAME}** |
| ECA Number | **${LICNO}** |
| System Name | **${SYSTEMNAME}** |
| ECA Issue Date | **${MONTH} ${DAY}, ${YEAR}** |

### 1.0 Residue Management System

1.1 The following [types of system / Facility] are considered part of the Municipal Sewage Collection System described in this Approval:

**Placeholder Item 1**

| | |
|---|---|
| Location | |
| Longitude/Latitude Coordinates | |
| Description | |

**Placeholder Item 2**

| | |
|---|---|
| Location | |
| Longitude/Latitude Coordinates | |
| Description | |

### 2.0 Applicable Residue Activities

2.1 The following residue activities have been authorized:

2.1.1 Placeholder

### 3.0 Terms & Conditions

3.1 The operation of the residue management systems described in condition (above) are subject to the following conditions:

3.1.1 Placeholder

## Appendix A – Stormwater Management Criteria

### 1.0 Applicability of Criteria

1.1 The criteria listed under Table A1 of this Appendix applies to all drainage areas greater than 0.1 ha, with the construction erosion and sediment control criteria applying also to sites <0.1 ha;

1.2 Despite condition 1.1 of Appendix A, if some or all of the criteria listed under Table A1 of this Appendix have been assessed for and addressed in other adjacent developed lands to the project site through a subwatershed plan or equivalent study, then those criteria may not be applicable to the project site.

**Table A1. Performance Criteria**

| | |
|---|---|
| **Water Balance** [1] | **FOR DEVELOPMENT SCENARIOS** [2]<br><br>**Assessment Studies:**<br>i) Control [3] as per the criteria identified in the water balance assessment completed in one or more of the following studies [15], if undertaken: a watershed/subwatershed plan; Source Protection Plan (Assessment Report component); Master Stormwater Management Plan, Master Environmental Servicing Plan; Class EA, or similar approach that transparently considers social, environmental and financial impacts; or local site study including natural heritage, Ecologically significant Groundwater Recharge Areas (EGRA), inflow and infiltration strategies. The assessment should include sufficient detail to be used at a local site level and consistent with the various level of studies; OR<br><br>**IF Assessment Studies in i) NOT completed:**<br>ii) Control [3] the recharge [4] to meet Pre-development [5] conditions on property; **OR**<br>iii) Control [3] the runoff from the 90$^{th}$ percentile storm event.<br><br>**Lake Simcoe Watershed Municipalities:**<br>iv) Control [3] as per the evaluation of anticipated changes in water balance between Pre-development and post-development assessed through a Stormwater management plan in support of an application for Major Development [6]. The assessment should include sufficient detail to be used at a local site level. If it is demonstrated, using the approved water balance estimation methods **[7]**, that the site's post to Pre-development water balance cannot be met, and Maximum Extent Possible [8] has been attained, the proponent may use Lake Simcoe and Region Conservation Authority's (LSRCA) Recharge Compensation Program [9].<br><br>**FOR RETROFIT SCENARIOS** [10]<br>**Assessment Studies:**<br>i) Control as per criteria identified in the water balance assessment completed in one or more of the following studies: a watershed/subwatershed |

| | |
|---|---|
| | plan, Source Protection Plan (Assessment Report component), Master Stormwater Management Plan, Master Environmental Servicing Plan, Class EA, or local site study including natural heritage, EGRA, inflow and infiltration strategies, if undertaken. The assessment should include sufficient detail to be used at a local site level and consistent with the various level of studies; **OR**<br>ii) If constraints [11] identified in i), then control [3] as per Maximum Extent Possible [8] based on environmental site feasibility studies or address local needs[14].<br><br>**IF Assessment Studies in i) NOT completed:**<br>iii) Control [3] the recharge [4] to meet Pre-development [5] conditions on property; **OR**<br>iv) Control [3] the runoff from the 90th percentile storm event. |
| **Water Quality** [1] | **FOR DEVELOPMENT SCENARIOS** [2]<br>All of the following criteria must be met for development scenarios:<br><br>**General:**<br>i) Characterize the water quality to be protected and Stormwater Contaminants (e.g., suspended solids, nutrients, bacteria, water temperature) for potential impact on the Natural Environment, and control as necessary, **OR**<br>ii) As per the watershed/subwatershed plan, similar area-wide Stormwater study, or Stormwater management plan to minimize, or where possible, prevent increases in Contaminant loads and impacts to receiving waters.<br>**Suspended Solids:**<br>i) Control [3] 90th percentile storm event and if conventional methods are necessary, then enhanced, normal, or basic levels of protection (80%, 70%, or 60% respectively) for suspended solids removal (based on the receiver).<br>**Phosphorus:**<br>i) Minimize existing phosphorus loadings to Lake Erie and its tributaries, as compared to 2018 or conditions prior to the proposed development, **OR**<br>ii) Minimize phosphorus loadings to Lake Simcoe and its tributaries. Proponents with development sites located in the Lake Simcoe watershed shall evaluate anticipated changes in phosphorus loadings between Pre-development and post-development through a Stormwater management plan in support of an application for Major Development [6]. The assessment should include sufficient detail to be used at a local site level. If, using the approved phosphorus budget tool [12], it is demonstrated that the site's post to Pre-development phosphorus budget cannot be met, and Maximum Extent Possible [8] has been attained, the proponent may use LSRCA's Phosphorus Offsetting Policy [9].<br><br>**FOR RETROFIT SCENARIOS** [10]<br>i) Improve the level of water quality control currently provided on site; **AND**<br>ii) As per the 'Development' criteria for Suspended Solids, **OR**<br>iii) **If 'Development' criteria for Suspended Solids cannot be met**, Works are designed as a multi-year retrofit project, in accordance with a rehabilitation study or similar area-wide Stormwater study, such that the completed treatment train will achieve the 'Development' criteria for |

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|---|---|
| | Suspended Solids or local needs[14], within ten (10) years; **OR**<br>iv) If constraints [11] identified in ii) and iii), then control [3] as per Maximum Extent Possible [8] based on environmental site feasibility studies. |
| **Erosion Control (Watershed)** [1] | **FOR DEVELOPMENT SCENARIOS** [8]<br>i) As per erosion assessment completed in watershed/subwatershed plan, Master Stormwater Management Plan, Master Environmental Servicing Plan, Drainage Plan, Class EA, local site study, geomorphologic study, or erosion analysis; **OR**<br>ii) As per the Detailed Design Approach or Simplified Design Approach methods described in the Stormwater Management Planning and Design Manual:<br>a. The Detailed Design Approach may be selected by the proponent for any development regardless of size and location within the watershed provided technical specialists are available for the completion of the technical assessments; or considered more appropriate than the simplified approach given the size and location of the development within the watershed and the sensitivity of the receiving waters in terms of morphology and habitat function.<br>b. The Simplified Design Approach may be adopted for watersheds whose development area is generally less than twenty hectares AND either one of the following two conditions apply:<br>1) The catchment area of the receiving channel at the point-of-entry of Stormwater drainage from the development is equal to or greater than twenty-five square kilometres; or<br>2) Meets the following conditions:<br>• The channel bankfull depth is less than three quarters of a metre;<br>• The channel is a headwater stream;<br>• The receiving channel is not designated as an Environmentally Sensitive Area (ESA) or Area of Natural or Scientific Interest (ANSI) and does not provide habitat for a sensitive aquatic species;<br>• The channel is stable to transitional; and<br>• The channel is slightly entrenched; **OR**<br>iii) In the absence of a guiding study, detain at minimum, the runoff volume generated from a 25 mm storm event over 24 to 48 hours.<br><br>**FOR RETROFIT SCENARIOS** [10]<br>i) If approaches i-iii) under 'Development Scenarios' are not feasible as per identified constraints [11], then improve the level of erosion control [3] currently provided on site to Maximum Extent Possible [8] based on environmental site feasibility studies or address local needs[14]. |
| **Water Quantity (Minor and Major System)** [1] | **i)** As per municipal standards, Master Stormwater Management Plan, Class EA, Individual EA and/or ECA, as appropriate for the type of project [13] |
| **Flood Control (Watershed Hydrology)** [1] | **FOR DEVELOPMENT SCENARIOS** [2]<br>i) Manage peak flow control as per watershed/subwatershed plans, municipal criteria being a minimum 100 year return storm (except for site-specific considerations and proximity to receiving water bodies), municipal guidelines and standards, Individual/Class EA, ECA, Master Plan, |

| | |
|---|---|
| | as appropriate for the type of project [13].<br><br>**FOR RETROFIT SCENARIOS** [10]<br>i) If approaches i) under 'Development Scenarios' are not feasible as per identified constraints [11], then improve the level of flood control [3] currently provided on site to Maximum Extent Possible [8] based on environmental site feasibility studies. |
| **Construction Erosion and Sediment Control** | i) Manage construction erosion and sediment control through development and implementation of an erosion and sediment control (ESC) plan. The ESC plan shall:<br>a. Have regard to Canadian Standards Association (CSA) W202 Erosion and Sediment Control Inspection and Monitoring Standard (as amended); OR<br>b. Have regard to Erosion and Sediment Control Guideline for Urban Construction 2019 by TRCA (as amended).<br>ii) Be prepared by a QP for sites with drainage areas greater than 5 ha or if specified by the Owner for a drainage lower than 5 ha.<br>iii) Installation and maintenance of the ESC measures specified in the ESC plan shall have regard to CSA W208:20 Erosion and Sediment Control Installation and Maintenance (as amended).<br>iv) For sites with drainage areas greater than 5 ha, a QP shall inspect the construction ESC measures, as specified in the ESC plan. |
| **Footnote** | 1. Where the opportunity exists on your project site or the same subwatershed, reallocation of development elements may be optimal for management as described in footnote [3].<br>2. Development includes new development, redevelopment, infill development, or conversion of a rural cross-section into an urban cross-section.<br>3. Stormwater volumes generated from the geographically specific 90th percentile rainfall event on an annual average basis from all surfaces on the entire site are targeted for control. Control is in the following hierarchical order, with each step exhausted before proceeding to the next: 1) retention (infiltration, reuse, or evapotranspiration), 2) LID filtration, and 3) conventional Stormwater management. Step 3, conventional Stormwater management, should proceed only once Maximum Extent Possible [8] has been attained for Steps 1 and 2 for retention and filtration.<br>4. Recharge is the infiltration and movement of surface water into the soil, past the vegetation root zone, to the zone of saturation, or water table.<br>5. Pre-development is defined as the more stringent of the two following scenarios: 1) a site's existing condition, or 2) as defined by the local municipality.<br>6. Major Development has the same meaning as in the Lake Simcoe Protection Plan, 2009.<br>7. Currently, the approved tool by LSRCA for calculating the water balance is the Thornthwaite-Mather Method. Other tools agreed upon by relevant approval agencies (e.g., LSRCA, municipality, or Ministry) may also be acceptable, subject to written acceptance by the Director.<br>8. Maximum Extent Possible means maximum achievable Stormwater volume control through retention and LID filtration engineered/landscaped/technical Stormwater practices, given the site constraints [11].<br>9. Information pertaining to LSRCA's Recharge Compensation Program and Phosphorus Offsetting Policy is available on LSRCA's website (lsrca.on.ca), or in "Water Balance Recharge Policy for the Lake Simcoe Protection Plan", dated July 2021, and prepared by Lake Simcoe Region Conservation Authority and "Phosphorus Offsetting Policy", dated July 2021, and prepared by Lake Simcoe Region Conservation |

| | |
|---|---|
| | Authority.<br>10. Retrofit means: 1) a modification to the management of the existing infrastructure, 2) changes to major and minor systems, or 3) adding Stormwater infrastructure, in an existing area on municipal right-of-way, municipal block, or easement. It does not include conversion of a rural cross-section into an urban cross-section.<br>11. Site constraints must be documented. A list of site constraints can be found in Table A2.<br>12. Tools for calculating phosphorus budgets may include the Ministry's Phosphorus Tool, the Low Impact Development Treatment Train Tool developed in partnership by TRCA, LSRCA, and Credit Valley Conservation (CVC), or other tools agreed upon by the LSRCA and other relevant approval agencies including the municipality.<br>13. Possible to look at combined grey infrastructure and LID system capacity jointly.<br>14. Local needs include requirements for water quality, erosion, and/or water balance retrofits identified by the owner through ongoing operation and maintenance of the stormwater system, including inspection of local receiving systems and the characterization of issues requiring remediation through retrofit controls.<br>15. All studies shall conform with Ministry policies. If any conclusions in the studies negate policy, then the project will require a direct submission to the Ministry for review through an application pertaining to a Schedule C Notice. |

**Table A2. Stormwater Management Practices Site Constraints**

| | Site Constraints |
|---|---|
| a) | Shallow bedrock [1], areas of blasted bedrock [2], and Karst; |
| b) | High groundwater [1] or areas where increased infiltration will result in elevated groundwater levels which can be shown through an appropriate area specific study to impact critical utilities or property (e.g., susceptible to flooding); |
| c) | Swelling clays [3] or unstable sub-soils; |
| d) | Contaminated soils (e.g., brownfields); |
| e) | High Risk Site Activities including spill prone areas; |
| f) | Prohibitions and or restrictions per the approved Source Protection Plans and where impacts to private drinking water wells and /or Vulnerable Domestic Well Supply Areas cannot be appropriately mitigated; |
| g) | Flood risk prone areas or structures and/ or areas of high inflow and infiltration (I/I) where wastewater systems (storm and sanitary) have been shown through technical studies to be sensitive to groundwater conditions that contribute to extraneous flow rates that cause property flooding / Sewer back-ups; |
| h) | For existing municipal rights-of-way infrastructure (e.g., roads, sidewalks, utility corridor, Sewers, LID, and trails) where reconstruction is proposed and where surface and subsurface areas are not available based on a site-specific assessment completed by a QP; |
| i) | For developments within partially separated wastewater systems where reconstruction is proposed and where, based on a site-specific assessment completed by a QP, can be shown to:<br>i Increase private property flood risk liabilities that cannot be mitigated through design; |

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| ii Impact pumping and treatment cost that cannot be mitigated through design; or<br>iii Increase risks of structural collapse of Sewer and ground systems due to infiltration and the loss of pipe and/or pavement support that cannot be mitigated through design. |
| j) Surface water dominated or dependent features including but not limited to marshes and/or riparian forest wetlands which derive all or a majority of their water from surface water, including streams, runoff, and overbank flooding. Surface water dominated or dependent features which are identified through approved site specific hydrologic or hydrogeologic studies, and/or Environmental Impact Statements (EIS) may be considered for a reduced volume control target. Pre-consultation with the MECP and local agencies is encouraged; |
| k) Existing urban areas where risk to water distribution systems has been identified through assessments to meet applicable drinking water requirements, including Procedures F-6 and F-6-1, and substantiated by a QP through an appropriate area specific study and where the risk cannot be reasonably mitigated per the relevant design guidelines; |
| l) Existing urban areas where risk to life, human health, property, or infrastructure has been is identified and substantiated by a QP through an appropriate area specific study and where the risk cannot be reasonably mitigated per the relevant design guidelines; |
| m) Water reuse feasibility study has been completed to determine non-potable reuse of Stormwater for onsite or shared use; |
| n) Economic considerations set by infrastructure feasibility and prioritization studies undertaken at either the local/site or municipal/system level [4]. |
| **Footnote:**<br>1. May limit infiltration capabilities if bedrock and groundwater is within 1m of the proposed Facility invert per Table 3.4.1 of the LID Stormwater Planning and Design Guide (2010, V1.0 or most recent by TRCA/CVC). Detailed assessment or studies are required to demonstrate infiltration effects and results may permit relaxation of the minimum 1m offset.<br>2. Where blasting is more localized, this constraint may not be an issue elsewhere on the property. While infiltration-based practices may be limited in blasted rock areas, other forms of LID, such as filtration, evapotranspiration, etc., are still viable options that should be pursued.<br>3. Swelling clays are clay soils that is prone to large volume changes (swelling and shrinking) that are directly related to changes in water content.<br>4. Infrastructure feasibility and prioritization studies should comprehensively assess Stormwater site opportunities and constraints to improve cost effectiveness, environmental performance, and overall benefit to the receivers and the community. The studies include assessing and prioritizing municipal infrastructure for upgrades in a prudent and economically feasible manner. |

# APPENDIX

# B TECHNICAL STEERING COMMITTEE CORRESPONDENCE

| Municipality | Reference Document | Watershed/Sub Watershed Plan | Storm Water Quantity Control | Minor Systems | Major Systems |
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| **City of Niagara Falls** | **City of Niagara Falls Engineering Design Guidelines (2012)** | • Designers should meet with municipality to determine requirements for quantity control and post development runoff (S. 5.1). | • The design guideline does not mention master drainage or sub watershed plans. Instead, designers are advised to meet with municipality for quantity control requirements (S. 5.1)<br>• The rational method can be used to calculate flows in small catchment areas and to size sewers (S 5.1). | • Minor systems designed for storms with **5yr return frequency.**<br>• **Intensity of Rainfall:** Municipality uses Niagara Falls IDF curve<br>• **5 yr storm values:** A = 719.50, B = 6.34, and C = 0.7687 (NPCA SWM Appendices Appendix H)<br>• **Runoff Coefficients:** Table S. 5.2.4 of The Niagara Falls Engineering and Design Guideline<br>• **Time of Concentration:** Not mentioned in design guideline. 10mins for overland flow + time for pipe flow.<br>• **Roughness Coefficient:** smooth walled pipe: 0.013; corrugated and rough walled pipe according to manufacturer's recommendation (S. 5.3.2).<br>• **Min Diameter of Pipe:** sewer mains: 300mm, single catch basin connections: 200mm, double catch basin connections: 300mm (S. 5.3.4)<br>• **Flow velocity through storm sewer:** 0.80m/s ≤ V ≤ 6.0m/s (S. 5.3.3) | • The Niagara Falls Design Guideline does not include specific requirements for major system flows on and around local, collector, and arterial roads.<br>• Refer to MOE guideline. |
| **City of Port Colborne** | **None Available** | Uses MOE SWM Guideline | Uses MOE SWM Guideline | See MOE guidelines for details on SWM requirements for minor systems | See MOE guidelines for details on SWM requirements for major systems. |
| **City of St. Catharines** | **St Catharines Engineering Standards Manual (2015) Being updated 2020** | • Recommends creation of Master Drainage Plans providing info including major and minor system routes and flows pre- and post-development.<br>• Contact the city for other high level SWM documents. | • SWM works should be constructed based on the master drainage plan, if one exists, to ensure that runoff is controlled to pre-development levels.<br>• The rational method can be used to calculate flows in small catchment areas and to size sewers.<br>• Refer to section 7.1.4 of the 2015 Manual for detention criteria, and for geographic criteria for control | • Minor systems designed for storms with **5yr return frequency**.<br>• Major systems designed for the 1:100 year (s 7.1.2 of the 2015 manual)<br>• **Local Roads:** Flow may spread to the crown (S. 7.1.1.4 of the 2015 Manual)<br>• **Collector Roads:** Flow spread should leave 1 lane of traffic open **during 5yr events** (S. 7.1.1.4).<br>• **Arterial Roads:** Flow spread should leave 1 lane of traffic in both directions open **during 5 yr events** (S. 7.1.1.4).<br>• **Intensity of Rainfall:** City of St. Catharines IDF curves (pg 57-58 of the 2015 Manual).<br>• **5 yr storm values:** A = 664, B = 4.7, and C = 0.744<br>• **Runoff Coefficients:** Page 75 of the 2015 manual<br>• **Time of Concentration:** A standard inlet time (10 mins) plus pipe flow time is used.<br>• **Roughness Coefficient:** Table of common values for Manning's page 71 of the 2015 Manual.<br>• **Min diameter of pipe: 25**0mm (page 77 2015 Manual)<br>• **Flow Velocity through storm sewer:** 0.6m/s ≤ V ≤ 6.0m/s (s 7.3.2 page 76 of the 2015 Manual)<br>• **Min Slope:** Table of min slopes available (Section 7.3.1.9 page 76 of the 2015 Manual). | • No building inundated at ground line for 1:100 year storm, unless the building has been flood proofed.( no buildings within regulated flood plain) (S. 7.1.2 pg 45 of the 2015 Manual)<br>• **All classes of roads:** The product of depth of water (m) at the gutter times the velocity of flow (m/s) **≤ 0.65 $m^2/s$.** (S. 7.1.2.2.pg 45)<br>• **Arterial roads:** water at the crown should not exceed 150mm (6") (S. 7.1.2.2) |
| **City of Thorold** | **None Available** | • No design guideline available. No requirement to refer to sub watershed or other higher level plans. | • The rational method can be used to calculate flows in small catchment areas and to size sewers.<br>• No indication of higher levels plans that provide quantity control requirements. | See MOE guidelines for details on SWM requirements for minor systems | See MOE guidelines for details on SWM requirements for major systems. |

| Municipality | Reference Document | Watershed/Sub Watershed Plan | Storm Water Quantity Control | Minor Systems | Major Systems |
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| **City of Welland** | **City of Welland Municipal Standards (2013)** | • City of Welland recommends creation of watershed/sub watershed plans that govern design of SWM systems.<br>• SWM systems should meet the requirements in the following hierarchy of studies:<br>▪ Watershed Plans<br>▪ Sub watershed Plans<br>▪ Sub-watershed impact studies<br>▪ Storm water management plans (functional and detailed design plans)<br>• Contact the city for other high level SWM documents. | • SWM plans should be developed to control peak flows due to attenuated runoff downstream of developed sites (S. 11.1.1).<br>• If watershed/sub water shed plans exist, storm water quantity control should be based on these plans.<br>• If watershed/sub watershed plans do not exist, and are not deemed necessary, a SWM plan should be created with a design that controls runoff to pre-development levels.<br>• The rational method can be used to calculate flows in small catchment areas and to size sewers. | • Minor systems designed for storms with **2yr return frequency**.<br>• City may recommend that some higher value areas be designed for 10 yr event.<br>• **Intensity of Rainfall:** Municipality uses City of Welland IDF curve<br>• **2 yr storm values:** A = 755, B = 8.0, and C = 0.789 (S. 7.2.4)<br>• **Runoff Coefficients:** Table of coefficients S. 7.2.5.<br>• **Time of Concentration:** Not indicated in Welland Design Standards. 10 mins for overland flow + pipe flow time?<br>• **Roughness Coefficient:** 0.013 for smooth pipe; based on MTO recommendations for corrugated and rough pipe (S. 7.4.3)<br>• **Min Diameter of Pipe:** 300mm (S. 7.4.4)<br>• **Flow velocity through storm sewer:** 0.75m/s ≤ V ≤ 6.0m/s (S. 7.4.4)<br>• **Minimum Slope:** Table of minimum slopes for different pipe diameters available on (S. 7.4.4). | • Major overland flow not > 200-250mm at crown for any roadway (S. 11.2.2.3).<br>• Ponding at low points should not exceed 60cm. |
| **Town of Fort Erie** | **Town of Fort Erie Subdivision Control Guideline (2014); By-Law 110-05 (June 2005)** | • SWM systems must be designed according to criteria set out by director of infrastructure services and MOE design manual (S. 3.15). | • Development proposals must be accompanied by SWM report detailing upstream and downstream impacts of development (S. 3.15).<br>• Quantity control to pre development levels up to 100yr storm. Must control to **2 yr** storm if capacity of downstream outlet is limited (NPCA SWM appendices pg 5).<br>• The rational method can be used to calculate flows in small catchment areas and to size sewers (S. 3.9.2). | • Minor systems designed for storms with **5yr return frequency**.<br>• **Intensity of Rainfall:** Town of Fort Erie IDF Curves<br>• **5 yr storm values:** A = 747.93, B = 6.800, and C = 0.768 (S. 3.9.2)<br>• **Runoff Coefficients:** Table of coefficients on (S. 3.9.2).<br>• **Time of Concentration:** Inlet times for larger tributary areas should be calculated; Airport method is commonly used. Smaller tributary areas can be estimated by using 10mins for overland flow + pipe flow time (S. 3.9.2).<br>• **Roughness Coefficient:** 0.013 for smooth walled, and 0.024 for corrugated pipe (S. 3.11).<br>• **Min Diameter of Pipe:** 300mm for sewers. 200mm for single catch basins, and 250mm for double catch basins (S. 3.9.4).<br>• **Flow velocity through storm sewer:** 0.80m/s ≤ V ≤ 6.0m/s (S. 3.9.3) | • No specific requirements regarding major system overland flow on major roads or elsewhere. See MOE guideline. |
| **Town of Grimsby** | **Storm Drainage Criteria 1989** | Uses MOE Guideline | • Quantity control to pre development levels up to 100yr storm | • Minor systems designed for storms with **5yr return frequency**<br>• Town rainfall design storms, and/or IDF | See MOE guidelines for details on SWM requirements for major systems. |

| Municipality | Reference Document | Watershed/Sub Watershed Plan | Storm Water Quantity Control | Minor Systems | Major Systems |
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| **Town of Lincoln** | **Town of Lincoln Standards (2012, 2017)** | • The standards mention a document called 'Storm Drainage Policies and Criteria' (unavailable online) for information on management of runoff (S. 5.1).<br>• Also recommends consulting Master drainage plans and other higher level studies, if they exist, for info (S. 5.1).<br>• Contact the city for other high level SWM documents. | • Consult 'Storm Drainage Policies and Criteria', and master drainage plans, if they exist, for information on quantity control.<br>• The rational method can be used to calculate flows in small catchment areas and to size sewers. | • Minor systems designed for storms with **5yr return frequency**.<br>• **Intensity of Rainfall:** Town of Lincoln uses Vineland Station IDF Curve<br>• **5 yr storm values:** A = 1039.20, B = 7.000, and C = 0.8210 (Part 5 – Municipal Quality Standards – Form)<br>• **Runoff Coefficients:** Table of coefficients included in standard (S. 5.2.4).<br>• **Time of Concentration:** Not indicated in standard. 10 mins for overland flow + pipe flow time.<br>• **Roughness Coefficient:** 0.013 for smooth-walled pipe; corrugated and rough walled pipe according to manufacturer specs.<br>• **Min Diameter of Pipe:** 300mm for sewer mains; 200mm for catch basin connections (S. 5.3.2).<br>• **Flow velocity through storm sewer:** 0.75m/s ≤ V ≤ 4.5m/s (S. 5.3.3) | • The standard does not include specific requirements for overtopping during major systems. See the MOE guideline.<br>• **Collector and Arterial Roads**, and their associated infrastructure (bridges culverts) should be designed to weather the **5yr** minor system and **100 yr** major system (S. 3.1.3). |
| **Town of Niagara on the Lake** | **Town of NOTL Engineering Standards (2007)** | • Developers must also meet with the public works department to discuss SWM requirements (S 5.1)<br>• The standard recommends consulting master drainage plans for higher level SWM info (S 5.4).<br>• Contact the town for other high level SWM documents. | • SWM plans are required for new development (S. 5.4).<br>• SWM plans should explain how new development will control runoff to meet requirements of master drainage plan, if one exists.<br>• The rational method can be used to calculate flows in small catchment areas and to size sewers. | • Minor systems designed for storms with **5yr return frequency**.<br>• **Intensity of Rainfall:** NOTL uses the St Catharines IDF Curve (S. 5.2)<br>• **5 yr storm values:** A = 664, B = 4.7, and C = 0.744 (S 5.2.4.1)<br>• **Runoff Coefficients:** Table of runoff coefficients available on (S. 5.2.5).<br>• **Time of Concentration:** Not mentioned in the standard. 10 mins + pipe flow time.<br>• **Roughness Coefficient:** 0.013 for smooth walled pipes and as per MOE recommendation for corrugated and rough walled pipes (S 5.5.3).<br>• **Min Diameter of Pipe:** 300mm (S. 5.5.4)<br>• **Min Slope:** Table of minimum slopes for different pipe diameters available on (S. 5.5.4).<br>• **Flow velocity through storm sewer:** 0.75m/s ≤ V ≤ 6.0m/s (S. 5.5.5) | • Relief systems shall be put in place to keep ponding in low lying areas to 0.6m or less (S. 5.2).<br>• The standard does not include specific requirements for overtopping and velocity of overland flow during major systems. See the MOE design guideline. |
| **Town of Pelham** | **Town of Pelham Official Plan (2012)**<br><br>**Preliminary SWM Plan for East Fonthill** | • SWM reports should reference watershed and sub watershed plans, where available, and should manage runoff according to the requirements in these plans.<br>• Contact the town for other high level SWM documents. | • All development proposals must include a SWM report that explains how SWM will return post development runoff to pre development levels for systems up to 1:100yr (Town of Pelham Official Plan S. C6).<br>• SWM report should also explain impact of development on watershed. | • Minor SWM systems designed for storm with **5yr return frequency**.<br>• **Intensity of Rainfall:** Pelham uses City of Welland IDF Curve (Pelham Preliminary SWM Plan S. 3.1). A = 830, B = 7.300, and C = 0.777. See also NPCA SWM Appendix H.<br>• **Runoff coefficients:** (MOE)<br>• **Time of Concentration:** (MOE)<br>• **Roughness Coefficient**: 0.013 for smooth walled pipe and as per design specifications for corrugated and rough-walled pipe. (MOE)<br>• **Min diameter of pipe**: (MOE)<br>• **Flow Velocity**: 0.75m/s ≤ V ≤ 6.0m/s (MOE) | • No specific requirements regarding overland flow on arterial roads. See MOE guideline for requirements. |

| Municipality | Reference Document | Watershed/Sub Watershed Plan | Storm Water Quantity Control | Minor Systems | Major Systems |
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| **Township of West Lincoln** | **West Lincoln Storm Drainage Policies and Criteria (1990)**<br><br>**West Lincoln Municipal Engineering Standards** | • SWM plans should reference sub watershed master drainage plan, where available, and should manage runoff according to the requirements of these plans.<br>• Contact the town for other high level SWM documents. | • Volumes of storage systems should not be calculated using the rational method.<br>• Runoff hydrographs not required for minor drainage design<br>• Computer modeling should be used to calculate runoff and determine design requirements for larger areas and major systems (West Lincoln Storm Drainage Policies S. 4.2.1).<br>• Sewer runoff can be calculated using the rational method for areas < 40ha (S. 4.2.1) | • Minor systems designed for storms with **5yr return frequency** (West Lincoln Municipal Design Standards S.5.4**)**.<br>• **Intensity of Rainfall:** West Lincoln uses 'Smithville North' rainfall data to develop IDF curves.<br>• **5 yr storm values:** The Municipal Engineering Standards recommends the following equation: **$I = 3175/(t_c + 20)$** (S. 5.4.1)<br>• **Runoff Coefficients:** Table of runoff coefficients (S . 5.5)<br>• **Time of Concentration:** Initial time of concentration shall be 10mins. Additional time added for pipe flow time.<br>• **Roughness Coefficient:** Table of manning's numbers for different pipe types (S. 5.6)**.**<br>• **Min Diameter of Pipe:** 300mm for storm sewer, 250mm for single catch basin, 300mm for double catch basin (S. 5.7.4)<br>• **Min Slope:** Min slope will depend on min and max velocities. For pipe sizes < 750mm, however, slopes < 0.5% will be permitted only under special circumstances (S. 5.7.3).<br>• **Flow velocity through storm sewer:** 0.75m/s ≤ V ≤ 4.5m/s (S. 5.7.2) | • Street flooding should be limited to the following levels:<br>▪ **Local Roads:** 150mm above crown<br>▪ **Collector Roads**: 150mm above crown<br>▪ **Arterial Roads:** 0mm above crown (West Lincoln Storm Drainage Policies and Criteria, S. 3.1.2)<br>• **Collector and arterial roads**, and their associated infrastructure (bridges culverts) be designed to weather the 5yr minor system and 100 yr major system (S. 3.1.2). |
| **Township of Wainfleet** | **None Available** | Uses MOE SWM Guideline | Uses MOE SWM Guideline | See MOE guidelines for details on SWM requirements for minor systems | See MOE guidelines for details on SWM requirements for major systems. |

# Niagara Region Stormwater Management Guidelines
## Questionnaire - Response Summary

| # | Question | Wood Summary Response | Fort Erie | NPCA | Pelham |
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| 1 | **Would you support the adoption of a standard of MOE Enhanced water quality control for all watercourses in the Region, i.e. provide a minimum of 80 % removal of total suspended solids from stormwater discharging from a site (as opposed to the current standard of Normal water quality control and 70 % removal being allowed for downstream receiving watercourses with important (i.e. Type 2) aquatic habitat)?** | Overall yes to increasing water quality standard - concerns raised regarding enforcement, municipalities capacity to enact and ensuring proper maintenance of private facilities. Comments made that region-wide ehanced standard may not be achievable. Thoughts regarding applicability in retrofit situations, "normal" level may still be appropriate. | Yes | Yes – strongly support. | This would be considered relevant to the Town, as the increased target is associated with a general move to a better environmental stewardship and is being suggested across all of Ontario. In particular, the Town does philosophically support this enhanced level of adoption, but may not have the capacity to take this on board? |
| 2 | **Do you support a proposed requirement to achieve a water balance for developing sites? Other Municipalities in Ontario have adopted a target of 5 mm of infiltration/evaporation or re-use from each rainfall – what target depth/volume do you believe is appropriate? Based on feedback at the TSC meeting, would you agree that specific guidelines related to local groundwater levels are required?** | Overall agreement to implementing a water balance component (5 mm if this is the standard for southern Ontario). Concerns raised regarding whether this would be the responsibility of the town, or region to enforce with development. Conflicting responses regarding the inclusion of local conditions (soil/groundwater) in the requirement of a water balance component - could limit implementation. Concerns raised regarding ponding on private property (current issues would be worsened through additional on-site retention). Different requirements may be needed for infill vs subdivision development - available land area constraints. | Yes, we typically depend on the CA to determine criteria and details for water balance. | A generic target of 5mm is appropriate. No specific guidelines for local conditions should be required as this would make practical implementation very difficult. | The Town has actively been looking at setting a quantitative standard for achieving a water balance target at developing sites. Through the Green Infrastructure Champions program, staff have had the opportunity to work closely with green infrastructure (GI) champions, where best municipal practices have been analyzed. In particular, the extensive analysis focused on the City of Toronto, City of Mississauga, and the City of Kitchener's SWM practices. The Town is curious if the requirement of a water balance means that the Niagara Region is willing to support the 5 mm through the use of green infrastructure?<br>Currently, the Town does not have a water balance target and 5mm would add additional demands on developers in the region. Does this mean the Niagara Region is ready to suggest a larger target? Ideally, if there was better support, 10mm is considered to be appropriate.<br>This question comes down to whether the municipalities are responsible for ensuring that the developers are meeting these targets or if the Region is? Ideally, the consulting engineers would understand the target, so it would be easy for the Town to implement this and be supportive at the Regional level. I'm just not sure if the Region or the Town would be responsible for ensuring that the developers are meeting these targets? |
| 3 | **Do you support a proposed requirement to apply both Low Impact Development (LID) and Green Infrastructure (GI) as tools for water balance, water quality, quantity and erosion control for development? Examples include bioswales, bioretention facilities, infiltration trenches, green roofs, permeable pavement, rain barrels, exfiltration storm sewers and trenches.** | Support for LID/GI as tools for achieving SWM criteria (primarily quality and erosion control), however not as a requirement. Concerns regarding local soil conditions (applicability of LID/GI), and the enforceable maintenance. Comments made regarding financial incentives from the Region for LID/GI implementation. | We don't think making LID and GI requirements is necessary or practical for application across the entire Region. Not all Municipalities have the soil composition to support the majority of LID/ GI methods. If it is a requirement there should be some financial incentives from the Regional level to promote their use. | Both LID and GI should be tools allowed to be utilized rather than required. They are tools to achieve a goal (water balance, quality control), not the goal itself. | The Town is very interested in LID and GI as tools for water balance, water quality, quantity and erosion control for development. Is the Region in a position to help the Town better understand and evaluate these proposals when they come in through training and/or consultation?<br>This initiative is supported philosophically, however, the Town would like to know how this will be implemented. |
| 4 | **Do you support a proposed requirement to provide water quality treatment and criteria for the removal of phosphorous and/or chlorides?** | A requirement would not be fully supported, as the technology and knowledge to remove each contaminant is still in development. Difficulty to remove both contaminants, therefore a required treatment would be expensive/unfamiliar to developers. Chlorides are best addressed through alternatives to road salt and public education - coordination between all road authorities required (City, Region, MTO). | Similar to our response to Question 3 above, it seems from the background information provided that the technology for these measures is still emerging and therefore either expensive or unfamiliar and also from a consultant's perspective to design. Financial incentives from the Regional level would assist in motivating Developer's to build these especially since they are new to our area and would be case studies for broader Development research. | No, as the ability to remove each is very limited. | I believe this has two separate issues in one question. Phosphorous is relative to a surplus in fertilization. This focuses on farmland, and whether people are capturing excess runoff from their fields by creating a pond downstream to capture the excess phosphorous in the water, otherwise you get algae in the Great Lakes.<br>The other issue is chloride, which predominately comes from salting our roads. Our GI consultant informed me that there is no treatment to really treat chlorides. Chlorides can be slowed down, and the only way in doing so is to slow the flow of water. Chloride isn't very sticky, so it doesn't get caught up in soil and plants.<br>Therefore, it'd be interesting to hear more about the Region's "water quality treatment and criteria" before fully answering this question. |

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| **5** | **Do you support a proposed requirement to include climate change resiliency planning and assessment within the stormwater management guidelines, e.g. adjust design standards for new development to incorporate impacts of climate change?** | Overall yes - would require further details on what this would entail and how it would be enforced. Would need to be consistent across all approval authorities. | Yes, as long as specific ways are provided on how this can be accomplished. It should not be open ended and up to interpretation by the approval authority. | Yes. | The Town is fully supportive of climate change resiliency planning and assessment within the storm water management guidelines. We are currently reviewing our SWM criteria to include a climate adaptation lens for future developers. |
| **6** | **One of the discussions in the TSC meeting involved using a risk-based approach for design of stormwater conveyance systems. Do you support this approach, and believe the Public would accept certain levels of ponding on private property?** | Overall no to supporting a risk-based approach (exception of Thorold), best to keep it simple. Ponding on private property is not likely to be supported by the public, due to insect, odour, slips, and general maintenance. Public education would be required. | No, our experience has been that a Developer and his Consultant have a very different opinion of what is acceptable ponding on private lands than what the "regular" public is comfortable with. Any ponding typically triggers calls about insect issues and odour from the public. | No | This is tricky. Having a shallow depression or swale at a residential property or at the back of an industrial property can be considered low in tolerance for two reasons. During the winter season, ponds freeze and thus people do consider ponds as a slip and/or tripping hazard. On the other hand, during the summer seasons, ponding isn't quite ideal because ponds can be considered a breeding area for mosquitos. People have applied a safety factor to this initiative, by stating that water should not be standing for more than 3 days (it takes an average of 5 7 days for mosquitos to breed). However, we could tolerate ponding water by using little depressions that would last a day or two? In the end I really think it's a societal question, and public education would be a key part in making this successful. |
| **7a** | **Further to the meeting, do you fence your stormwater management facilities (wet ponds/wetlands)?** | Each municipality differs (mix between fenced and open) - if the SWM facilities are not fenced, specific design criteria for safe grading/access, and aesthetics required. Comments made regarding trying to normalize SWM facilities as part of the landscape to increase public awareness and education (i.e. no fencing). | Our standards say (By-law 110-05): To facilitate the SWM pond as a neighbourhood feature, the pond shall be designed with a minimum sideslope of 7:1 with a 10:1 sideslope where it abuts a neighbourhood park or a public roadway. This facility will be integrated as a park area in conjunction with the proposed parkland dedication or an existing parkland. A 3.0m wide maintenance and pedestrian walkway will be required around the top of slope along the perimeter of the facility. As a functional facility, the minimum acceptable sideslope shall be 5:1. This functional facility shall be fenced with a 1.50m high black vinyl coated chain link fence, including a maintenance access and gate for vehicles, when abutting existing or proposed lots. | N/A | The Town does not fence their stormwater management facilities. We believe that fencing SWM caters to the public concerns and it shouldn't be a huge issue. To address the public concern, the Town does encourage a careful site design in order for the public to accept it as a normal part of landscape. |
| **7b** | **Further to the meeting, have you determined whether the Municipality's storm outlets are legal outlets?** | Differs for each municipality - pending city asset managemer | N/A | N/A | Most are legal outlets and some are in progress/pending. |
| **8** | **We have compiled a list of stormwater criteria, guidelines, and standards which we believe reflects the most recent documents created by each Municipality (ref. attached table, and summary table below). Those without specific in-house guidelines have been following the Provincial (MECP, 2003) stormwater management guidelines, and the Niagara Peninsula Conservation Authority SWM Guidelines from 2010.** | All documents appear up to date - exception of Pelham, who is currently reviewing the SWM practices in the Engineering Design Guide (2020), and St. Catherines engineering manual (2015) which is currently being updated (pending 2020/2021). | N/A | N/A | The Town is currently reviewing the SWM practices in the Engineering Design Guide (2020). |
| | **We are asking whether there are newer documents to which you refer for stormwater management guidelines? (Table on next sheet)** | | N/A | N/A | The Town is currently reviewing the SWM practices in the Engineering Design Guide (2020). |

| Thorold | West Lincoln | Niagara Region | St Catharines | Wainfleet | Niagara Falls |
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| We don't believe a Region-wide standard is achievable but would support a higher standard where outlet water quality is sensitive (like raw water intakes, watercourses with public access). | We would be supportive if there is a clear way of proving this criteria can and will be met. A big issue is how to ensure OGS units in private developments are maintained annually. Without proper maintenance the units won't operate correctly anyway. | Yes. | St. Catharines staff are generally supportive and currently use the Enhanced water quality control standard in some circumstances. However, there may be circumstances when the normal level is still appropriate especially in retrofit situations. Given that the Transfer of Review process requires the Enhanced standard (versus direct submission to the ministry), St. Catharines staff don't feel this is a high priority. | Yes. | Yes. But will need to define waterways not categorized as a receiving watercourse (such as canals) and will require more information on the pros/cons of this change relative to a)Measureable environmental impacts; b) Development application processing (procedures [Transfer of Review?] and expediency); and c) Infrastructure requirements generally needed to support this change (e.g. larger OGS's, larger SWMF's, etc..) |
| Where soil conditions permit a water balance then this should be the goal. | Yes, we would be supportive of this requirement with the target depth/volume being set at 5mm of infiltration/evaporation if this standard has been accepted throughout Ontario. Yes, we are in agreement that specific guidelines related to local groundwater levels are required. | I think that retention of 5 mm rainfall-runoff is an appropriate target. Specific guidelines related to local groundwater levels and heavy clay soil are required. | St. Catharines staff feel that in general SWM is moving in this direction, but that a cautious approach is required. Due to the amount of infilling / redevelopment in St. Catharines we currently received many complaints about water ponding on private property (e.g. backyards). So while in theory we would like to see this adopted, in St. Catharines, where we have very little land left for development and where most soils are heavy clay, water balancing is not practical. Most lots being created are by infill. There are only a few remaining small areas for subdivision, and even in these our Planners are pushing hard for higher and medium density developments. Single-family lots are rare with the lowest densities being townhouses. These townhouse developments have larger housing units on smaller lots with rear yards usually less than 36 $m^2$ and even smaller front yards. Usually one third of the rear yard is taken up with a deck or hard surface patio and half the front yard is a driveway. Often, as a condition of development, the City Planners require landscaping (trees) for screening. After a few years these trees create large amounts of shade which prevent swales from drying out. In addition home owners often plant raised gardens and/or put up small sheds, both of which block these swales, create ponding. Add to this, roof water downspouts from roof areas usually covering as much as 70% of the lot area, and a sump pump discharge, and there isn't much land remaining for water balancing without constant wetness for long periods of time.<br>In addition, even if this was adopted, specific guidelines may be required depending on soil and bedrock conditions at the site, not just groundwater levels. E.g. Infiltration can be done much easier in sandy soils than clay soils. | Yes. | Generally support based on best-practices elsewhere in Ontario, especially if this will reduce infrastructure demands (e.g. reduced pipe and SWMF sizes). The 5 mm of infiltration/evaporation seems appropriate, but may not be able to be achieved or desirable where high groundwater table exists. For Niagara Falls, it is believed that groundwater recharge won't necessarily provide much benefit to our watershed due to abundance of source water from nearby lakes. |
| We support LID and GI strategies however in order for these assets to be sustainable they need to be located on publicly-owned or controlled land. | We are supportive of these initiatives but perhaps not as a requirement. The concern is maintenance, since there would be no enforcement if not adequately maintained over time things won't operate as designed. | I support implementation of LID and GI to meet water balance/water quality and erosion control targets. Due to most of LID measures heavily depending on soil infiltration, I see they are supplementary to the flood control measure. | St. Catharines staff feel that in general SWM is moving in this direction but have concerns with the long-term viability of these systems. Staff are more supportive of these on public property where they can be managed than on private property where a change in property ownership may not be supportive and continue the required maintenance / upkeep. Currently there is no enforcement mechanism on private property related to SWM components.<br>St. Catharines does recognize that some of these systems may provide significant secondary benefits (ecosystem benefits, property values etc.) but would like to see how other municipalities have dealt with it (esp. to make sure viable over the long term) | Yes. | The City's MDP Update study completed in 2017 recommended the implementation of a City-wide Stormwater strategy which would utilize source and conveyance controls along with the more traditional end-of-pipe measures. It included a number of LID and Green infrastructure techniques as potential tools to achieve this strategy. However, that was at a time when a provincially guideline on LID's was imminent. As far as I am aware, that is still pending from the Province. We have not moved forward on this recommendation (waiting on the release of the guideline document to provide some more scope and potential requirements), but are generally in favour of the concepts. I believe we can support some requirements for development, but anything too onerous will get push back from the development community, so it needs to be reasonable. |
| No | We would likely not be supportive of this as a requirement across the board but perhaps in site specific situations. | Upon my limited experience, I don't think it is easy to remove phosphorous. | St. Catharines staff are supportive in principle for Phosphorous removal if it can be cost effective. Chlorides are better addressed though alternatives to road salt and public education, as most of the chloride comes from road salt applied by the various road authorities (e.g. City, Region, MTO). | Yes. | While in principle this makes sense, it will need to be a tailored approach with the requirement varying based on existing conditions on a watershed-by-watershed basis. In general, the City's watercourses do not have many water quality issues (per our 2017 MDP Update). A one-size fits all solution will not work in this case. |

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| Yes. Maybe. We will need to understand this better. | Possibly, it would depend on the specific requirements. | Yes. | YES | Yes. | Yes – we included a climate change assessment in our MDP Update with respect to the analysis of the ongoing applicability of our current IDF curves and Storm sewer design criteria. The output from this analysis indicated a slight adjustment in the IDF's over time to account for the impacts of climate change. It will also mean that we will end up with potentially larger sewers dumping into smaller pipes on an interim basis until we have opportunity to upsize the downstream system appropriately. We would need to acknowledge then an impaired level of service during that transitional period. Our MDP Update only loosely touches on Overland flow and the Major Drainage system. I think that this should be something that should be established (criteria and requirements) and included in our future developments (if not as part of this exercise, then independently). It appears that others in the group brought it up but it is not addressed in any of the questions. |
| Yes. Risk-based approach. Ponding on private property is very difficult to control and maintain. | It is dependent on the proposed criteria but overall no, we are not supportive of using a risk-based approach. From experience it does not seem that the Public would accept any level of regular ponding. | No. I don't think the Public would accept water ponding on private property. | St. Catharines staff do not believe the public would accept ponding on private property, especially in residential areas. Currently, we receive complaint about water within designated floodplain and rear yards generally. They also express concerns about West Nile Virus from mosquitoes. Ponding water may be appropriate in industrial or commercial situations in some cases.<br>While a risk based approach does make sense it may also lead to a much more complicated guideline and cause additional confusion. Generally, it is felt better to keep it simple. However, if risk-based rules are to be considered they must be easily articulated. | No. | Yes. Limited acceptance on private property, more acceptance on municipal property. |
| No, but we would consider in the right situation. | Yes, fencing around wet ponds is a requirement in our Engineering Standards. There is interest in the possibility of finding a balance between having wet ponds that are highly visible to be appealing yet safe and not accessed by the public. | N/A. I think it should be case by case basis. | Some facilities are fenced, but not all. | No- We are a Rural Community and utilize ponds for fire protection. Fencing is required in Urban planning areas. | Our current criteria indicates this is required. Generally most of our SWM Ponds have fencing. |
| No | No, we are undertaking an assessment of our storm sewer system so this is something that will be confirmed. | N/A | We do not have any known outlets which are not approved or g | No. | Not Completed to the best of our knowledge. |
| N/A | N/A | N/A | A copy of the St. Catharines engineering manual can be found here (2015): link in next sheet. Note: This manual is currently being updated. Tentatively scheduled to be complete by late 2020 or early 2021. | | 2017 – MDP Update Study. Included a Review of most guidelines and criteria, but did not specifically recommend any changes |
| N/A | N/A | N/A | https://www.stcatharines.ca/en/buildin/resources/EngineeringStandardsManual.pdf | | |

**Stormwater Management Guidelines**

**Comments Response Matrix – 70% Draft (June 2022) and 90% Draft Final (August/Sept 2022)**

| # | Comments | Response |
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| | **Niagara Peninsula Conservation Authority** | |
| 1. | Section 1.4.3 – Ecosystem Approach: The NPCA fully endorses this approach. | Acknowledged |
| 2. | Section 3.2.2 – Roles and Responsibilities for Review: With respect to the NPCA's review:<br>a. Please remove reference to woodlots. The NPCA does not regulate woodlots.<br>b. Please add a reference to valley lands.<br>c. Please add: 'With respect to development adjacent to a wetland or PSW, the NPCA will review the SWM report to ensure that the feature is not hydrologically impacted. This may require supporting water balance calculations. It is recommended that the NPCA be contacted early in the design process to determine the scope of the SWM report.' | Wood will revise the text to incorporate these comments. |
| 3. | Section 3.2.3 – Scenarios: For Scenario 1.3 Outlet to a wetland or PSW please add: 'The NPCA will conduct a technical review to ensure that the feature is not hydrologically impacted. This may require supporting water balance calculations.' | Wood will revise the text to incorporate this comment. |
| 4. | Section 4.3.1.3 – Water Budget:<br>a. The NPCA supports the proposal that pre-development infiltration rates are maintained in the post development condition.<br>b. The NPCA would suggest that the minimum infiltration rate be increased from 5mm unless the rational for 5mm can be explained.<br>c. The note that off-site supplemental benefits may be allowed at off-site locations will be very difficult to practically implement. | Wood will revise the text to incorporate these comments. |
| 5. | Section 4.3.1.4 – Quality Control<br>a. The NPCA supports an 80% TSS removal standard throughout the watershed.<br>b. What is the rational for a 70% TSS removal rate for sites draining into the Chippawa Hydro Canal? The NPCA would prefer that this tributary to the Niagara River (an Area of Concern) be afforded an 80% TSS removal rate in an effort to improve the quality of surface water in the Niagara River watershed. | a. Acknowledged<br>b. This question was answered in the TSC meeting #3. Per the meeting minutes, Wood to revise text to 80% TSS removal required for entire Region. |
| 6. | Section 4.3.3.1.5 – Inlets and Catchbasins: This section indicates that Goss Traps may be required at the discretion of the Niagara Region. Should the provision for Catchbasin Inserts be included here as well? | Wood to revise text to discuss option, focus on CB shields |
| 7. | Section 4.3.3.2.1 – Roadway Conveyance: The reference to Hurricane Hazel should be removed. The Regulatory Storm in this watershed is the 100 year storm event. This should be used instead. | Wood will revise the text to incorporate this comment. |

| # | Comments | Response |
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| 8. | Section 4.3.3.2.2 – Overland Flow Routes: Consideration should be given to determining the need to provide erosion protection for the major overland flow routes between roadways and SWM facilities. | Wood will revise the text to incorporate this comment. |
| 9. | Section 4.3.3.3 – Watercourse Crossings: The reference to Hurricane Hazel should be removed. The Regulatory Storm in this watershed is the 100 year storm event. This should be used instead. | Wood will revise the text to incorporate this comment. |
| 10. | Figure 1 – Quaternary Watersheds in the Niagara Region – Twelve Mile Creek is incorrectly labelled as Twenty Mile Creek. | Wood will revise the text to incorporate this comment. |
| | **Township of West Lincoln** | |
| 11. | 4.3.1.9 discusses entering into a long-term agreement for maintenance of private storm ponds, would this be part of the development agreement? | Comment addressed |
| 12. | I recall talking about these 2 items at the 2nd meeting but I'm not sure if anything was decided:<br>1. Oil/Grit Separators should be inspected yearly and cleaned as appropriate, as a municipality we clear ours every year but we have no way to require this maintenance on private sites. Was any thought given to having an agreement for this maintenance requirement similar to the private storm pond maintenance?<br>2. We were asked if our storm pond outlets were considered "legal outlets", I'm not sure if it was defined what would be required for them to be considered legal outlets. I think that would be good to know for new ponds and hopefully addressing this for our existing ponds if required. | Comment addressed |
| | **City of Thorold** | |
| 13. | 3.1.2 – could have a heading Watershed Plans | Wood will revise the text to incorporate this comment. |
| 14. | 4.3.1.4 – please outline the name of the hydro canal | Wood will revise the text to incorporate this comment. |
| 15. | In addition to the markup document, we like the Niagara Region Stormwater Management Guidelines to include criteria to discharge stormwater into the private waterbody. OPG owned Lake Gibson and the City of Thorold's many developments needed to discharge to Lake Gibson. Although Artisan Ridge and DeCew Terrace development have approval from MECP to discharge water to Lake Gibson, OPG raised concerns for the Stormwater discharge to Lake Gibson. Regional SWM guidelines should outline the criteria and a clear direction of the approval process to discharge stormwater to Lake Gibson. | Per the TSC meeting #3 - Wood will revise the guidelines to make reference to the noted private waterbodies and local SWM criteria. The reference will indicate that the proponents have a responsibility to ensure that they adhere to the local SWM criteria that are applicable to their site. |
| | **Town of Grimsby** | |
| 16. | One comment/question, which is related to the Climate Change section. The guidelines do speak to a consideration for climate change and provides some methods to do this but no specific direction or recommendation on how to or the best approach. I can anticipate 12 of the LAM's approaching climate change adaptation differently, which perhaps in light of there | Guidelines will not stipulate method, will continue to cite options |

| # | Comments | Response |
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| | not being a clear scientific approach is ok. My concern is that for many LAM's, not knowing what to do, or how to do it, may result in doing nothing.<br><br>I'm curious if the final guidelines will provide an approach(s) that the Region plans to adopt in relation to Climate Change adaptation for the design and maintenance of their infrastructure. In the presence of nothing else, LAM's would be able to defer to the Regional Guidelines for direction. | |
| | **Niagara Region (Planning)** | |
| 17. | 1.2 - a note: we are the process of preparing a new Regional official plan | Acknowledged |
| 18. | 1.3 - Confirm, there are 12 quaternary watersheds as per the tables | Wood will revise the text to incorporate this comment. |
| 19. | 2.2.1.3 - I don't think that there is a requirement to "conform" to this (A Made in Ontario Environment Plan, 2018) plan. At least not in the same way that we conform to the PPS, Growth Plan, Greenbelt Plan | Wood will revise the text to incorporate this comment. |
| 20. | 2.2.2.2 - PWQO should be in a different section (vs Acts) | Wood will revise the text to incorporate this comment. |
| 21. | 2.2.2.9-2.2.2.13 - should be labelled as Ministries (vs Legislation); note that MECP issues ECAs | Wood will revise the text to incorporate this comment. |
| 22. | 2.3.1 - Natural Environment work plan could use an introduction paragraph | Wood will revise the text to incorporate this comment. |
| 23. | Fig 3.1 - should be consistent with the Region NWP | Wood will revise the text to incorporate this comment. |
| 24. | 3.1.3 - edit section definitions (quaternary and subwatershed) per comments on the Region NWP | Wood will revise the text to incorporate this comment. |
| 25. | 3.1.4 - edit definition of MESPs | Wood will revise the text to incorporate this comment. |
| 26. | 3.2.2 - confirm table prepared in consideration of the protocol for planning service | Wood will revise the text to incorporate this comment. |
| 27. | 3.2.2 - confirm language regarding "all developments" - Is it all? Or just those listed in the table where the Region has an interest/responsibility; confirm language regarding submissions, including SPA and DPA | Wood will revise the text to incorporate this comment. |
| 28. | 4.2.2 - climate change - I will send around the updates to this from January 2021. We have added modelling and a greening initiative to the work program | Acknowledged |
| 29. | 4.3.1.8- edit to definitions of wet pond and wetland | Wood will revise the text to incorporate this comment. |
| 30. | 4.3.1.9 - May want to note that the landscape plans should be signed by a landscape architect. | Wood will revise the text to incorporate this comment. |
| 31. | Sean Norman and Karen Costantini also provided the following comments on the figures:<br>• From as aesthetic view, the Municipal names are hard to see on Figure 2.<br>• On Figure 1, "Fifteen" needs to be capitalized.<br>• I think Twelve Mile Creek is incorrectly named "Twenty Mile Creek". | Wood will revise the figures to incorporate these comments. |

| # | Comments | Response |
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| | **Comments from TSC Meeting #3 (April 28, 2021)** | |
| 32. | 2.2.4 - Wood will revise the guidelines to make reference to the noted private waterbodies and local SWM criteria. The reference will indicate that the proponents have a responsibility to ensure that they adhere to the local SWM criteria that are applicable to their site. | Wood will revise the text to incorporate this comment. |
| 33. | 2.2.4 - Wood will review the guidelines and confirm that all relevant source water protection studies are referenced. | Wood will revise the text to incorporate this comment. |
| 34. | 3.2.3 - Marvin Ingebrigtsen suggested that an additional scenario should be added to cover sites discharging to a municipal drain covered by the Ontario Drainage Act. Wood to add this scenario to the guidelines | Wood will revise the text to incorporate this comment. |
| 35. | 3.2.3 - Steve Miller suggested adding a scenario for sites that outlet to the Great Lakes. Wood to add this scenario to the guidelines. | Wood will revise the text to incorporate this comment. |
| 36. | 3.2.3 - Steve Miller suggesting removing reference to "watercourse" for scenario 1.1 so that this scenario covers all regulated features. Wood to revise wording in guidelines. | Wood will revise the text to incorporate this comment. |
| 37. | 3.2.3 - Steve Miller noted that Section 3.2.3 would be a good location to address a scenario in which a site discharges to a private waterbody. Wood and the Region to consider adding this scenario. | This would fall under Scenario 1.2. Text for this scenario will be revised based on other comments. |
| 38. | 3.2.3 - Mark Green suggested including development examples under scenario 1.2. Wood to revise wording in guidelines. | Wood will revise the text to incorporate this comment. |
| 39. | 3.2.3 - Steve Miller suggested adding reference to some of the specific non-regulated features, such as the Lower 12 Mile Creek, Queenston-Chippewa Power Canal, Welland Canal and Lake Gibson. Smaller non-regulated features (e.g. headwater swales or features) would not be suitable outlets. Wood to revise wording in guidelines. | Wood will revise the text to incorporate this comment. |
| 40. | 3.2.4 - Phill Lambert indicated that a new section should be added to the guidelines (Section 3.2.4) to reference and explain the CLI ECA process and how it impacts the development application review process. Wood to updated text in guidelines. | Wood will revise the text to incorporate this comment. |
| 41. | 4.3 - Mark Green questioned if there will be a section added to the guidelines that outlines how readers are supposed to use the guidelines, or an executive summary. Brian Bishop agreed that it would be beneficial to add this information into the guidelines. Wood and the Region to determine contents of this section and add it to the guidelines. | Wood to revise text in introduction to include paragraph under Section 4.3. |
| 42. | 4.3.1.2 - Steve Miller questioned why the water quality criteria for the hydro canal is noted to be 70% total suspended solids (TSS) removal instead of 80% TSS removal. Maggie Ding noted that the hydro canal is used for power generation and does not have any fish habitat, and therefore is understood to require a lower TSS removal rate. Steve Miller questioned if the TSS removal rate for the hydro canal could be increased to 80% TSS removal to align with all other areas of the Niagara Region. Kent Schachowskoj indicated that City of Niagara Falls staff will discuss the | City of Niagara Falls to provide further information |

| # | Comments | Response |
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| | TSS removal rate for the hydro canal and provide further information in the City's review comments. | |
| 43. | 4.3.2.2.5 Steve Miller indicated that the Mike suite of software could be added to Table 4.5. Mark Green indicated that Infoworks could also be added to Table 4.5. Brian Bishop noted that Wood will review these software with the Region to determine if they will be added to the list. | Wood to add software to list with footnote to indicate third party review may be required. |
| 44. | 5.1.2 - Brian Bishop indicated that Wood will revise the wording in the guidelines to define public vs. private infrastructure. | Wood will revise the text to incorporate this comment. |
| 45. | 5.1 - Phill Lambert noted that the text in Section 5.1 should be revised to include LAMs, in addition to the Region. Wood to revise wording. | Wood will revise the text to incorporate this comment. |
| 46. | General - Maggie Ding noted that wording within the guidelines that applies to Low-Impact Development (LID) Best Management Practices (BMPs) should be written to be assertive. The example of using "required" rather than "recommended" was discussed. | Wood will revise the text to incorporate this comment. |
| 47. | West Lincoln – email comment on legal outlet | Wood will revise the text to incorporate this comment. |
| | **Niagara Region (Phill Lambert)** | |
| 48. | Cover page Document will need to be AODA when finalized | Acknowledged |
| 49. | List of Tables All references to tables throughout document will need to be reviewed and corrected | Wood will revise the text to incorporate this comment. |
| 50. | 2.2.3 - Not sure why the format switched to bullets – it should be consistent with the format above – please remove bullets | Wood will revise the text to incorporate this comment. |
| 51. | 2.3.1 - It will be prepared in draft by Fall 2021 | Acknowledged |
| 52. | 3.1.2 - This may be completed by Fall 2021 | Acknowledged |
| 53. | 3.2.3 Add a Section 3.2.4 for Consolidated Linear Infrastructure ECA Process? | Agree. Wood will add a section to summarize process |
| 54. | 3.3 Consider adding additional references that Steve provided here for other studies if not captured | Wood will revise the text to incorporate this comment. |
| 55. | 4.0 This is worth repeated and highlighting. | Wood will revise the text to incorporate this comment. |
| 56. | 4.3.1.3 - How to determine the # of trees? Is there a BMP for calculation for size of site per tree? Perhaps this would be dealt with under the Region's Greening Initiative | Wood to revise text to remove tree planting example. Reword last paragraph "In this instance, the Region may negotiate alternative solutions…" |
| 57. | 4.3.4.3.4 - Should there be a reference to the new Provincial updates for fill material? https://www.ontario.ca/page/handling-excess-soil | Yes Wood can update text to provide a reference |
| 58. | 5.1.1 - Has this been updated? I seem to recall some recent guidelines from the TRCA/CVC on LIDs. | MECP has released draft LID guidelines January 2022<br>Wood to revise text to include link to MECP document and link to STEP website in reference section |

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| 59. | Phill also provided many textual and formatting edits within the guidelines document and the Appendix X document. Wood will ensure these edits are incorporated into the 90% document. | Wood will ensure these edits are incorporated into the revised document. |
| | **City of Niagara Falls** | |
| 60. | General Comments – to clarify and confirm discussions from the TSC meeting: the Guidelines, Criteria and Requirements presented represent the Region's Standards and would be considered supplemental to any LAM Standards, or would apply if the LAM had no applicable standards. In the case of any discrepancies, the LAM standards and criteria would supercede any Regional requirements (see Section 3.2, page 21) except where Regional Assets are directly impacted (Roads, Sewers, Ditches) or the Region is reviewing on behalf of the NPCA. | Correct |
| 61. | Guideline Comments:<br>• Section 1.4.3, page 6, item 6 – "*Protect, Rehabilitate and Enhance ecological linkages which secure wildlife movement and the biodiversity of plants and animals, such as valley buffers.*" Are there measureable parameters or criteria and benchmarks to be established on how this will be achieved? Who will set these values, and what/where is the proposed source or references? | Will be further reviewed/investigated through Region's OP |
| | • Section 2.3.1, page 13, Official Plan Update – "*The following section summarizes the 2014 Official Plan, and should be revised following the completion of the new Niagara Official Plan and the Niagara Watershed Plan (Equivalency).*" What is the approximate timing of these Updated Plans? | To be completed spring 2022 |
| | • Section 2.3.1, page 15, Natural Environment Work Program – "*water budget assessments on unrepresented watershed planning areas, and water conservation plans should be developed and integrated with the stormwater management plans*." Which Agency will take the lead, undertake reviews, and where can guidance and documentation be found to implement these?<br>"*Note that man-made offline stormwater management ponds were not classified as fish habitat (so it could be inferred that online ponds are included in the definition of habitat).*" Can this distinction be confirmed with the relevant approval agencies (will all online ponds be considered as fish habitat)? | This is ongoing work with Region's OP. For immediate guidance refer to 3.1.1. Wood to revise text to make reference to Region's OP website for additional information/guidance.<br><br>Confirmed by NPCA, no SWM Ponds (on-line vs. offline) are fish habitat. NPCA not aware of any on-line SWM Ponds. |
| | • Table 3.2.1, page 23 – Row for "*Unregulated Ditches*". Can the reasoning or circumstances and rationale behind this being different in Roles from Municipal Storm Sewers and Drains be explained? | Wood to revise text to change unregulated ditch to unregulated feature, and add footnote for further explanation. Wood to add Municipal Easement to row above. |
| | • Section 3.2.2, Local Municipality SWM Review (page 24) and Region SWM Review (page 25) – re SWM Report requirement for all development proposals – is this still required if development area was part of larger study area with allowance to accommodate post-development flows already built into downstream infrastructure? | Yes, but may be able to prepare a scope SWM Report rather than a full SWM Report (i.e. confirm downstream & land use) |

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| | Also, will a development size threshold be determined where a full SWM report will not be required?<br><br>MECP SWM Review (page 26) – confirming that implementation of future MECP Consolidated Linear Infrastructure ECA will impact this process and the Transfer of Review process phase out. | No, but proponent can scope SWM Report to complexity of site. Up to proponent to determine. May also be identified at the pre-consultation stage.<br><br>Yes |
| | • Section 3.2.3, List of Potential Scenarios and Coordinated Review, Scenario 3.1 and 3.2, page 27, - interested in the reasoning behind the Region not reviewing SWM facility sizing when the scenario includes a Regional sewer discharging to Local infrastructure. Is responsibility for this review falling on the LAM? | Wood to review 3.1 & 3.2 to indicate upstream development, Wood to add 4.1 & 4.2 where no upstream development/SWMF exists |
| | • Section 4.2.2 Climate Change, page 33 - Is there any intent to develop a Region-wide approach, methodology or philosophy on how to accommodate or allow for Climate change or Climate Change Adaptation? Will the Region be the leader here? Will there be the development of any minimum criteria or best management practices as with other requirements laid out in this guideline? | Guidelines will not stipulate method, will continue to cite options |
| | • Section 4.3.1.3 Water Budget, page 37 – Is there any intent to provide guidance or adopt recommended Best Management practices in order to assist with assessing and reviewing Development proposals in this regard? Please also refer to comments for Section 4.3.1.4.4 and 4.3.1.5 (below). | Wood to revise text to reference STEP, plus Draft MECP LID Guidelines, and include list of recommended BMPs in appendix |
| | • Section 4.3.1.4 Quality Control and Oil Grit Separators, pages 37 and 38 - Looking for clarification – does this mean that we can only accept 50% of the published removal capabilities for these devices or does this mean that only 50% of TSS removal can come from these devices? Also is the reasoning behind this due known issues with performance due to lack of maintenance? Should alternate standards be considered depending on whether the OGS is owned and maintained by the Municipality or is Private owned? | This applies to TSS removal from devices, and will be updated to reflect current Provincial guidance, which is that ETV certified units may receive full credit of the published rates.<br><br>Wood to revise to note that the Region will follow the Provincial guidelines, and to note MECP plans to update guidelines (draft guidance September 22, 2021)<br><br>No, performance based |
| | • Section 4.3.1.4.4 Assessment of New Technologies, page 39 - Can this assessment process be conducted in cooperation with the LAM's and the results shared so that we can all benefit from new accepted technologies? Also so that individual pilots for the same technologies are not being conducted in each LAM. | Yes, that is intent. |
| | • Section 4.3.1.5 Low Impact Development Best Management Practices (LID BMPs), page 39 - Does it make sense to look to develop a "made in Niagara" set of guidelines for use of LIDs that can be utilized by all of us? | Current LID guidance is suitable. LAMs are encouraged to develop their own if they would like, (e.g. Lincoln is doing this). Region guidelines do not supersede LAM guidelines. |
| | • Section 4.3.1.6 Site Grading, page 40 – We are in agreement with this approach, however we foresee some potential issues with enforcement on Site Plan developments (at least in our Municipality). We would be interested in other Municipality's approaches on Site Grading Control enforcement and oversight. | LAMs can share experiences and approaches with each other at next TSC meeting |

| # | Comments | Response |
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| | • Section 4.3.1.9 Requirements prior to Assumption, page 42 – "*A detailed monitoring and evaluation program, demonstrating that the facility is functioning as designed to the satisfaction of the Niagara Region.*" Who will be responsible for the cost, ongoing monitoring and enforcement of these programs? What will be the required timelines and could this impact assumption of the subdivision? | The developer is responsible<br>Based on Region or LAM requirements for maintenance periods, and will be included in development agreement. If not satisfactory it must be remedied before assumption. Wood to revise text to indicate that assuming agency will need to determine if SWMF is acceptable. |
| | • Section 4.3.1.2 Climate Change (Alternative Method), page 44 – "*Where the Niagara Region deems that an analysis of the hydrologic impacts of climate change is warranted, the proponent shall consult with the Region to determine the preferred methodology and approach prior to undertaking such analyses.*" How and when would this be done? Please also refer to comments from Section 4.2.2 (also on Climate Change) above. | 4.3.2.1.2 - Would be determined in consultation with Region, or done as part of SWM study |
| | • Section 4.3.2.2.5 Approved Hydraulic Models, page 51 – "*Where no higher level hydraulic model is defined or available, proponents should determine the most appropriate modelling platform based on the list of currently approved hydraulic models and discussion with the Niagara Region and other review agencies (such as local area municipalities and NPCA).*" Who will be the ultimate authority is setting the acceptable methodologies for this analysis? Should be consistent. | The LAM will be the ultimate authority |
| | • Section 4.3.3.1.1 Storm Sewer Design Principles, page 52 – "*Region owned storm sewer systems shall be designed to limit surcharging during the 100-year storm event to below ground surface. An exception may be granted for rear-yard catchbasins, provided that a Hydraulic Grade Line (HGL) analysis is completed (as per Section 4.3.3 and 5.1.4) and it demonstrates no adverse effects to adjacent properties.*" How will this apply to LAM owned storm systems on Regional Roads? How will this be applied to inlet capacity? | Wood to include condition to cover LAM owned storm sewer within Region owned road. LAM sewer will follow LAM criteria, however overland flow needs to be reviewed by Region. |
| | • Section 5.2.1.2 SWM Facility Monitoring, page 65 – as per comments from Section 4.3.1.9 (above), could this impact timing of Assumption? Also Section 5.2.1.2.1 Stormwater Quantity Control – "*Where feasible and appropriate, the monitoring for stormwater quantity control performance shall be coordinated with holistic monitoring programs to collect flow data along the receiving watercourses. Opportunities to integrate the stormwater quantity control requirements for stormwater management facilities within holistic monitoring programs shall be at the discretion of the Region.*" This is important to look at impacts on a sub-watershed basis rather than spending a lot of resources doing micro monitoring. Maybe get developers to contribute to the cost of this. | See response to comment on Section 4.3.1.9 above.<br>Region agrees with the comment regarding sub-watershed monitoring versus local monitoring, however this was not the focus/intention of this section.<br>The monitoring requirements should be scoped by location, to ensure that they are not over- or under-scoped, i.e. right-sized for the site. The MECP should be consulted, and if one exits, an EIS should also be consulted. The MECP cite monitoring as one reason for transitioning to the CLI format. Typically the local municipality and NPCA will review the monitoring requirements. Note that the NPCA also takes a watershed-based approach to monitoring. The Region added that they are reviewing internally on resources for review and use of increased monitoring data.<br>The section on monitoring is being revised. A note will be added that the monitoring scope in the guidelines is for consideration only and is to be refined through pre-consultation. |
| | **City of St. Catharines** | |
| 62. | 2.3.1 - "pervious surfaces"? | Wood will revise the text to incorporate this comment. |

| # | Comments | Response |
|---|---|---|
| 63. | 3.1.1 - Should apply to all development and re-development. | Wood will revise the text to incorporate this comment. |
| 64. | Table 3.2.1 - Please define "Unregulated Ditch" | Not regulated by NPCA. Wood will revise the text to incorporate this comment. |
| 65. | 3.2.2 - Fully agree! To the exception that peak flow control may not necessarily be required near the outlet of a large watershed | Acknowledged |
| 66. | 3.2.3 - City to review to ensure adjacent properties would not be negatively impacted. | Wood will revise the text to incorporate this comment. |
| 67. | 3.3 - ONLY applicable to 2015. There is no 2020 Update. The Storm Drainage Manual is part of the 2015 Engineering Design Manual. | Wood will revise the text to incorporate this comment. |
| | **June 16, 2021 deadline extended** | |
| | **City of Port Colborne (Nov 6, 2021)** | |
| 68. | No comments but full support of the guideline. Where could we find a copy of the Watershed/Subwatershed Planning Guidance (2018). | Region forwarded a copy of the Province's draft guidelines for watershed planning (2018). Note that the Province released draft guidelines for subwatershed planning in January 2022. |
| | **City of St. Catharines (Oct 19, 2021)** | |
| 69. | Note comments from May 2021 still stand (see above). | The draft 70% report is unchanged from the April 2021 edition on which the City previously provided the comments in May 2021. The additional Oct 2021 comments are appreciated and added below. |
| 70. | 3.1.1 – Greenfield is not re-development. Should apply to all development, greenfield and re-development, infill/intensification. | Typo for greenfield "development" will be updated. |
| 71. | Table 3.2.1 – unregulated watercourse - If it's unregulated then why should either the Region or the Local Municipality have any reviewing and approval interests? Under what authority would we have that regardless? | Unregulated refers to the NPCA classification. The Region or LAM would still comment on impacts off the site downstream on an adjacent property. |
| 72. | 3.2 – Scenario 2.3 – outlets to a Region sewer or Region road - The Municipality would only review to ensure the site itself and any abutting properties are not negatively affected | Will add this to the text. |
| 73. | 3.3 City design manual is "2015 As amended" and not 2020 | Will update the text. |
| 74. | 4.3.1.4.1 OGS - This may be true in cases where the units have not been properly maintained to the design state. Intensified developments most of the time, are not large enough to accommodate anything more than a unit given the required density targets mandated by the Provincial Planning policies. | Noted. |
| 75. | 4.3.1..7 roof leader discharge to concrete splash pad - This does not always work in intensified developments. The City accepts roof flows to be accepted by the municipal storm sewer via a direct storm lateral connection if there is an on-site detention system incorporated within the site design for quantity control. | Will add text that it is not always feasible. |
| 76. | Tables 4.1 and 4.2 - The City shall adopt these runoff coefficients and impervious values moving forward. | Noted |

| # | Comments | Response |
|---|---|---|
| | **City of Welland (Dec 15, 2021)** | |
| 77. | Triggers for planning processes and coordination of review should be reviewed and confirmed upon further understanding of the new consolidated linear infrastructure system ECAs. | The document will include the most current CLI-ECA status. It is anticipated to impact the current Transfer of Review agreements. |
| 78. | Region should confirm that the SWM document is a guideline only for City owned infrastructure. | Confirmed, and is in the text, each LAM retains its own standards and guidelines. |
| 79. | No figures or appendices were provided. | These will be circulated with the 90 % draft. |
| 80. | Section 4.3.1 – Region to confirm that the City will not be required to obtain easements on private lands to maintain private controls. | This will not be a blanket Region requirement. It may be considered during pre-consultation, on a site-by-site basis where appropriate. |
| 81. | Section 4.3.1.1.3 – What is meant by the surface overflow/relief path? Is there a requirement to have a second overland route if storage facilities are clogged? | The proponent needs to show that, if the tank is pugged/blocked/full, there is a suitable bypass incorporated in the design proposed, so the runoff being directed to it can be safely conveyed either around the tank or if will surcharge, then overland without flooding impacts. |
| 82. | Section 4.3.1.3 – Retain first 5mm of rain on site. Although great in principle, most soils in the area are clay. What is the storm frequency. If soils are saturated, infiltration capacity is lost. This should not be a consideration in overall on site storage. | This applies to the entire Region, and local soils apply on a site-by-site basis. The 5 mm criteria is independent of storm frequency – it applies to each rainfall event. Agree that saturated soil conditions are not to be taken into account in the budget calculations. |
| 83. | Section 4.3.1.4 & 4.3.1.4.1 – Limiting use of OGS units for quality control to 50% of removals is not practical, especially in smaller sites. LIDS require land. What studies is the statement noting the minimal benefits of reducing managing nutrients and organic matter based on? Why not allow 100% removal, especially for smaller sites? | The Region proposes to be consistent with the Provincial guidelines. The Region accepts the MECP ETV process for verifying technological performance. New MECP LID draft guidelines have been released in January 2022.<br>The wording will be reviewed. The reference to the limited credit for 50% removal will be removed. |
| 84. | Section 4.3.1.5 – Most soils in the area are clay. Clay drains at 0.3mm/hr, only sand can meet the 15mm/hr requirement. Many LIDS require land. | This guideline applies to the entire Region, and local soils apply on a site-by-site basis. If the local soils do not have the suggested minimum capacity, then this will be taken into account, as will land constraints, if a greater contact surface is required.<br>Note that the requirement can be met through a combination of: infiltration, evaporation, evapotranspiration and reuse. |
| 85. | Section 4.3.2.1.3 – Why limit the use of Rational Method by area? A better criteria would be to limit use by circumstance. And, when indicating the need for design sheets, is this only where Rational Method is used? | The area was suggested to be limited due to the Rational Method producing conservatively higher peak flows. Each LAM may decline this suggested limit. Conservative flows means an inherent buffer is built into the system. Design calculations are required for stormwater systems, whether spreadsheets or model input and output. |
| 86. | Section 4.3.2.1.3 – Has a sensitivity analysis been completed for the use of multiplication factors on coefficients for larger storms? | Unknown. This is based on MTO guidelines for recognizing saturated soils. |
| 87. | Section 4.3.2.1.3 – Why not use road slope rather than assume an aggressive velocity of 2 m/s? | Alternate methods for estimating the velocity, such as the actual topography or average road slope are acceptable, and recommended instead using of the conservative 2.0 m/s. |

| # | Comments | Response |
|---|---|---|
| 88. | Section 4.3.3.1.1 – Why stray from the MECP velocity range? | The Region will review the MECP recommended range and may update the text. |
| 89. | Section 4.3.3.1.1 – The minimum slope of 0.5% is unrealistic, especially for large pipe. | The Region acknowledges that placing storm sewers at 0.5% is difficult, however will accept this. |
| 90. | Section 4.3.3.1.2 – The maximum change of direction of 45 degrees for pipe 675mm in a single MH seems unnecessary. | The Region will review this guideline. |
| 91. | Section 4.3.3.1.3 – Reduced depth should be allowed where no other option exists. | Agreed – provided this is demonstrated- text will be added. |
| 92. | Section 4.3.3.1.5 – Minimum CB slopes seem unnecessarily high. | The Region will review this guideline. Exceptions would be granted if the minimum slope can be shown to not be achievable for the connections. |
| 93. | Section 4.3.3.1.5 – The paragraph on ICDs was not understood. What is sump draw design? | If an ICD is used, the preference is that the outlet from the CB/inlet to the ICD, be located at an elevation within the sump, so the water from the CB shall be drawn from a point within the sump, as opposed to from the upper portion of the CB, so that under storm conditions the floating debris will be less likely to block the ICD. This is sometimes also referred to as a "bottom-draw" system. |
| 94. | Section 5.1.1 – Why can't the operation and maintenance requirements just be included as a subsection of the SWM plan? | Agreed – the O&M section can be a subsection of the SWM report. |
| 95. | Section 5.2 – All sections. Is monitoring required for all infrastructure, or just Regional plant? | These are Region guidelines for scenarios described earlier where Region plant is involved. |
| 96. | Section 5.2.1.1 – When is watercourse sampling required? For accuracy, would you not also need baseline samples? | Monitoring requirements are to be scoped at the pre-consultation stage. Ideally yes, a baseline sample would be required. Typically one dry weather sample and multiple wet weather samples may be required. MECP guidance may also be used to develop a right-sized monitoring plan.<br>The section on monitoring is being revised. A note will be added that the monitoring scope in the guidelines is for consideration only and is to be refined through pre-consultation. |
| 97. | Section 5.3 – This section seems out of place and ends the document abruptly. Is the document unfinished? | It was a placeholder - the Region has not yet prepared the section on remediation guidelines. |

**No Written Comments from Town of Fort Erie, Town of Lincoln, Town of Niagara-on-the-Lake, Town of Pelham, Township of Wainfleet**

**END of 70% Draft Stormwater management Guidelines Comments Response Matrix**

**90% Draft Stormwater Management Guidelines**

**Comments Response Matrix – July 21 – Aug 12, 2022**

| # | Comments | Response |
|---|---|---|
| | **Niagara Peninsula Conservation Authority** | |
| 98. | No further comments | |
| | **Niagara Region** | |
| 99. | The Official Plan was approved by the Region in June, filed and approved by the Province in November 2022 | Text has been updated. Final version of OP used for references. |
| 100. | Incorporate the findings of TRCA 2022 report "Climate Projections for Niagara Region" | Text has been updated – Section 4.2.2.1 |
| 101. | Revise the overview of the Niagara Watershed Plan - Equivalent | Text has been updated – Section 2.3.2 overview, and details in Section 3 |
| 102. | Note that Places to Grow is now under MMAH, no longer MOI | Text has been updated |
| 103. | Adjust wording for Natural Heritage System objective | Changed from "manage" to implement" as per the OP |
| 104. | Remove section on Natural Environment Work Program – superseded by OP | Text has been removed. |
| 105. | Revise section 3.1.3 quaternary plan / subwatershed plan, to follow OP | Text has been revised to be in agreement with the text in the new OP |
| | **City of Welland** | |
| 106. | MECP CLI licenses will be issued soon. Recent MECP webinars describe a review, approval and post monitoring process that does not align with the roles, responsibilities and processes described in the 90% Stormwater Management Guidelines document. In particular, staff is looking for clarification of the Region's role for the review of municipal infrastructure. | Section 3.2.4 MECP Review and Consolidated Linear Infrastructure ECA identifies this process change for the MECP CLI Licenses. Our understanding is that this will essentially replace the Transfer of Review that the Region currently does on behalf of the MECP. Between the Region and Municipalities, we have been discussing how best to have the process for review for sanitary sewers and potentially storm sewers that would impact Regional infrastructure. When it comes to development applications, the Region's review for Stormwater would be consistent with Table 3.2 and 3.3. For example, if there is a potential impact to a Regional Road, the Region would want to review the municipal infrastructure. |
| | **Town of Lincoln** | |
| 107. | Consider adding Region policy on cost sharing of storm drainage systems to the list of documents. | Added to the list – Section 2.3.3. The Niagara Region Public Works engineering section developed a policy for storm drainage systems - cost sharing in 1979. The policy was updated in 1998. |

**No further comments received from the TSC**

# APPENDIX

C

# DEVELOPMENT COMMUNITY WORKSHOP AND FEEDBACK

# NIAGARA REGION STORMWATER MANAGEMENT GUIDELINES

## DEVELOPMENT INDUSTRY MEETING

**September 14, 2021**

**1:30 pm – 3:00 pm**

**Virtual Meeting**

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# Agenda

1. Welcome and Introductions
2. Overview - Study Purpose / Background
3. Summary of Research into Local Area Municipalities and Other Ontario Municipalities
4. Overview of How the SWM Guidelines are to be used
5. SWM Guideline Highlights
6. Open Discussion
7. Next Steps

# 1. Welcome and Introductions

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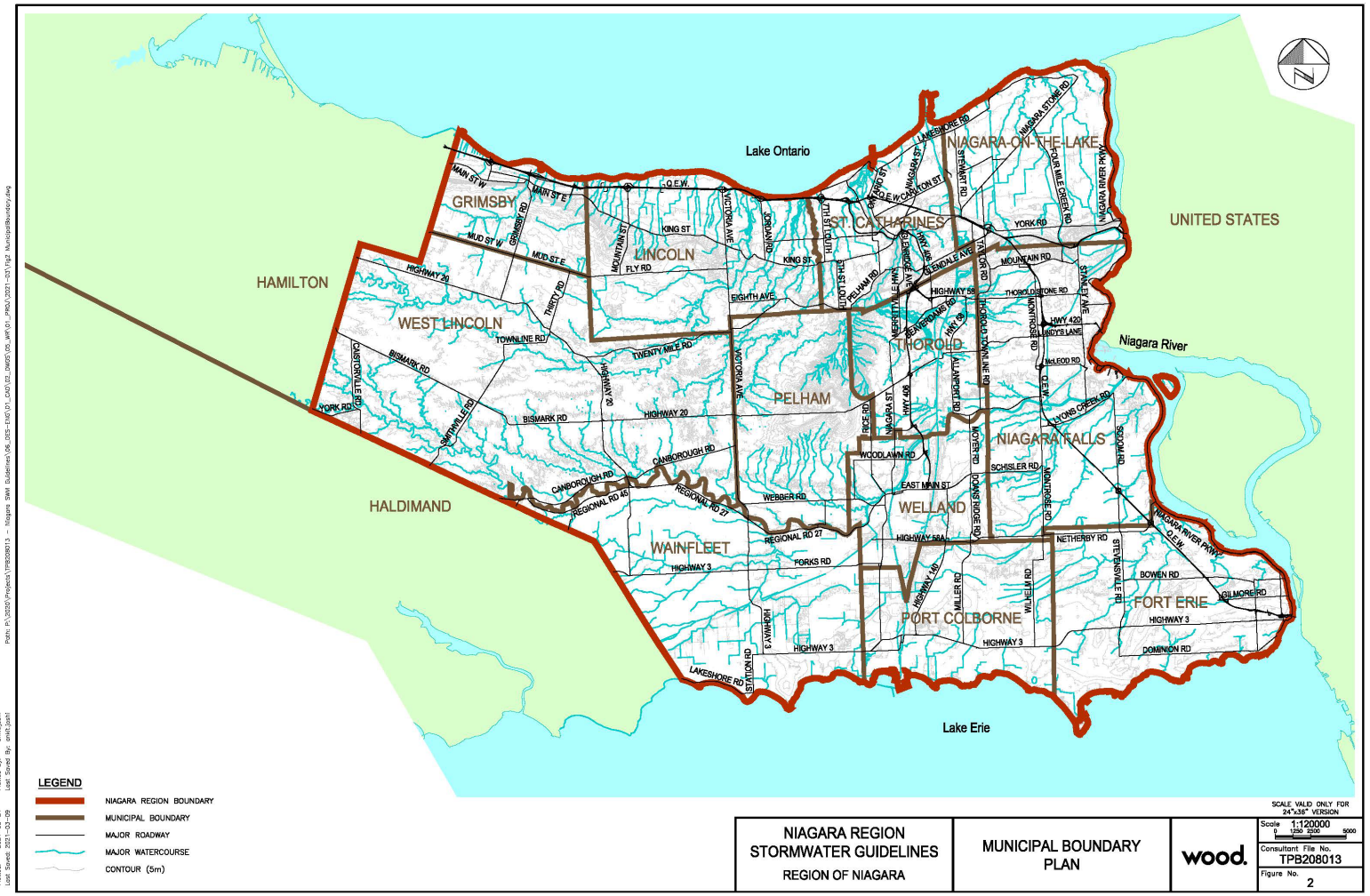
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# 1. Welcome and Introductions

- Region of Niagara – Maggie Ding (PM), Phill Lambert
- Wood – Brian Bishop (PM), Ron Scheckenberger
- Development Industry Representatives
- Local Area Municipality Representatives
- Niagara Peninsula Conservation Authority

# 1. Welcome and Introductions




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# 2. Overview – Study Purpose/ Background

# 2. Overview – Study Purpose/Background

Purpose of Regional Stormwater Management Guidelines

- Develop guidelines which provide a consistent Stormwater Management approach for the Region;
- Technical guidance for reviewing stormwater management and engineering reports in support of development applications.
- *Note: Technical guidelines are not intended to replace those of local area municipalities (LAMs) but rather to complement and enhance local guidance*

# 2. Overview – Study Purpose/Background

Background

- From 2008-2018 the NPCA provided stormwater review services on behalf of the Region.
- The transfer also included policy, development approvals, and natural interests.
- In 2018/2019, this responsibility was transferred back to the Niagara Region (January 2018 a new Protocol document and March 2019 a new MOU), creating the need for the Region to develop SWM Guidelines.

# 2. Overview – Study Purpose/Background

Purpose of Regional Stormwater Management Guidelines

- Need for contemporary SWM Guidelines to assist proponents and practitioners in meeting complex stormwater management requirements.
- To document the goals and objectives for SWM reports which are to be submitted to the Region for review and approval.
- To align with the Region's new Official Plan.

# 2. Overview – Study Purpose/Background

Application

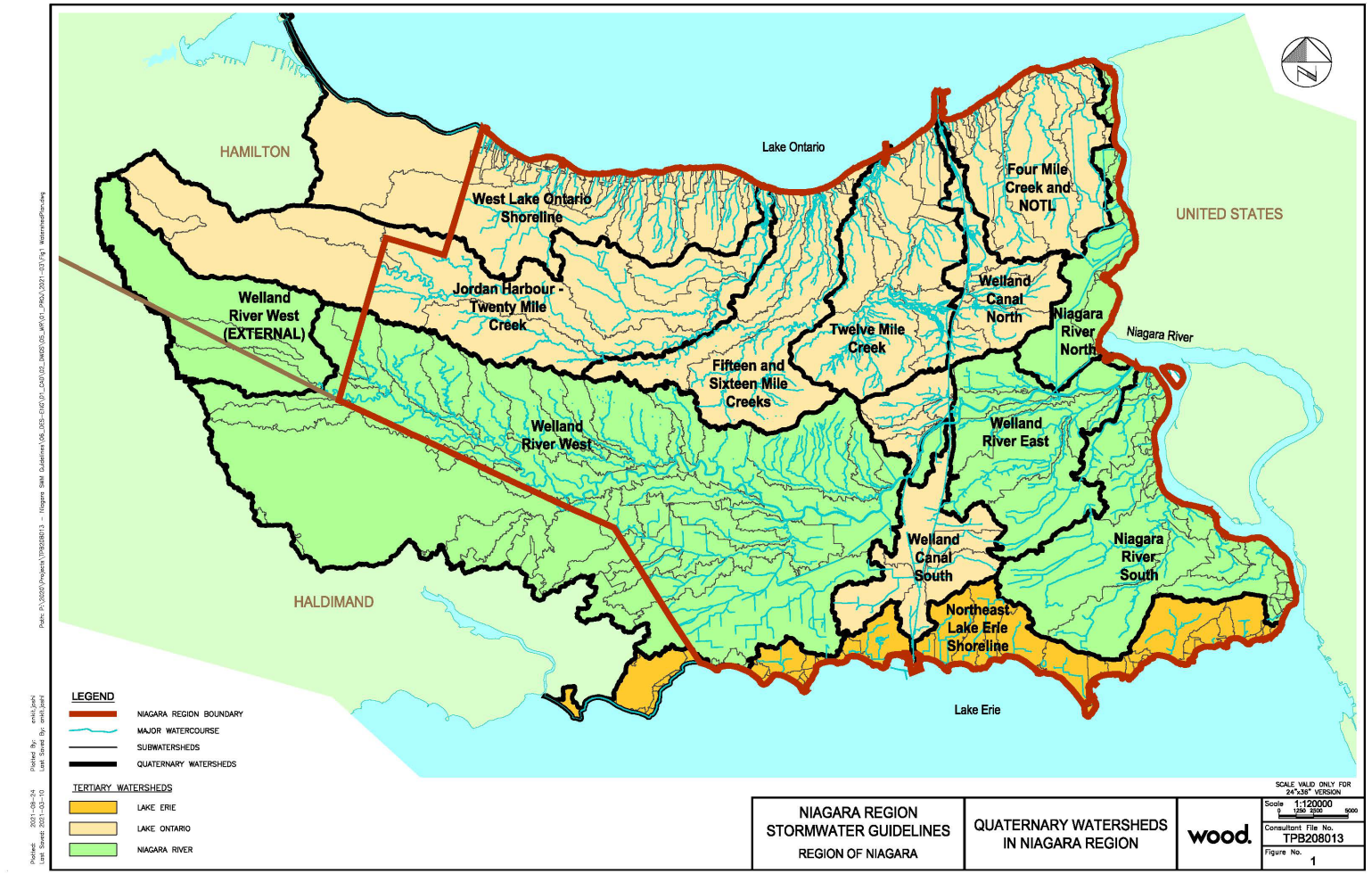
- Proponents, when developing SWM plans for development applications, must adhere to the technical guidelines of the local area municipality in which the development is located.
- Region's Technical Guidelines apply in instances where local area municipality guidelines do not exist or may be out-of-date, or where the proponent is developing a SWM plan that impacts Region owned infrastructure, as well as other Regional interests such as the Regional Official Plan (ROP).

# 2. Overview – Study Purpose/Background

Integration with Regional Official Plan (ROP)

- Region's New Official Plan has considered the needs for SWM across the Region to meet the goals of the PPS and Provincial Growth Plan to proactively manage growth impacts related to stormwater runoff.
- Watershed Plan (Equivalent) prepared at the Tertiary scale has outlined the needs for future study (Quaternary Level and Subwatershed Level), as well as the specifics for future development SWM Plans.
- Objective to establish "**Made in Niagara**" Regional SWM Guidelines which complement those of the LAMs.

# 2. Overview – Study Purpose/Background

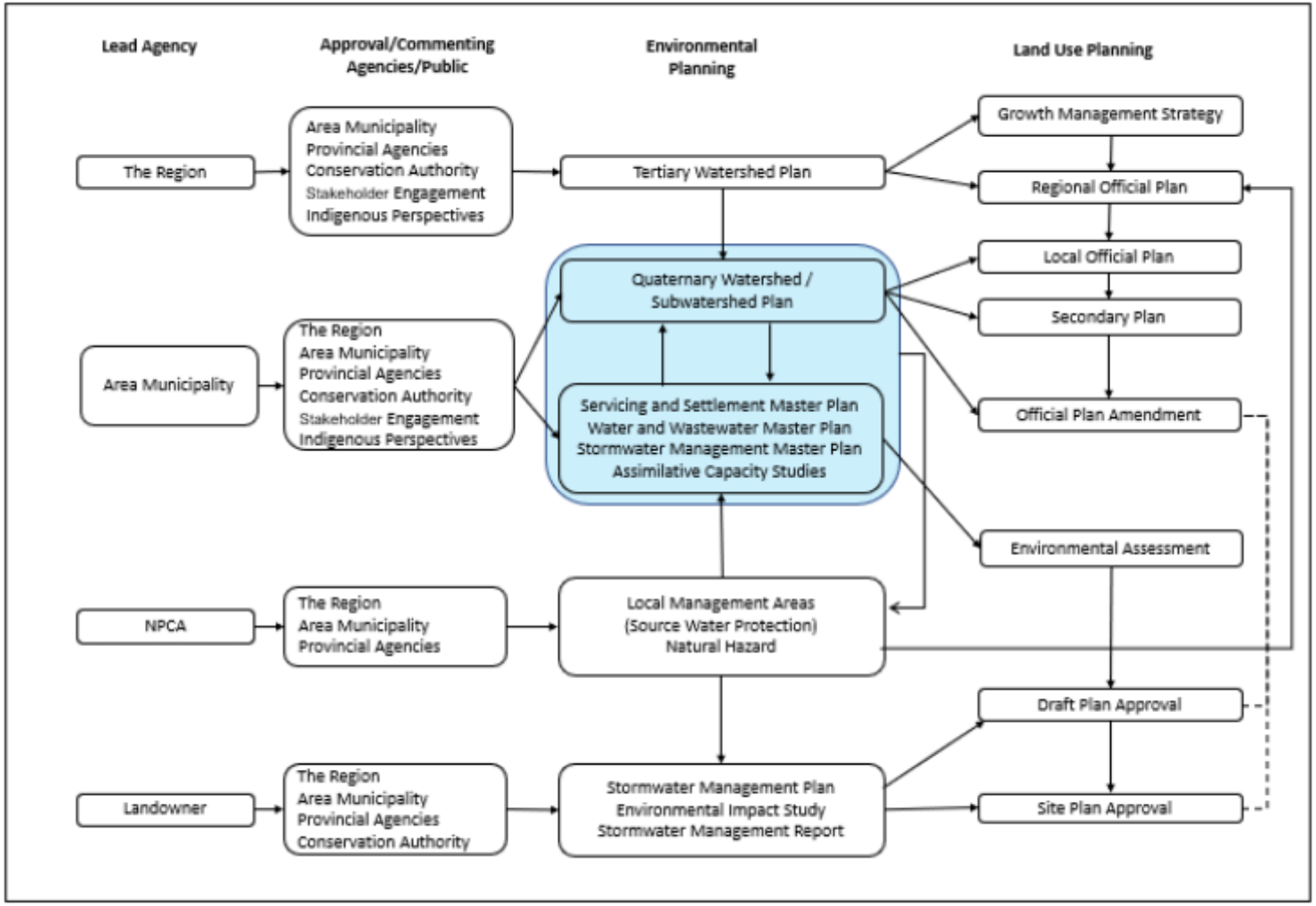



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# 2. Overview – Study Purpose/Background




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# 3. Summary of Research into Local Area Municipalities and Other Ontario Municipalities

# 3. Summary of Research

- Reviewed available Region of Niagara information
- Contacted Local Area Municipalities to obtain current SWM guidelines
- Reviewed recent SWM Guidelines for selected Southern Ontario Municipalities
- Reviewed current framework of the Provincial and Regional planning approval process
- Reviewed and summarized applicable legislation

# 3. Summary of Research

SWM Guidelines

- All twelve (12) Niagara Municipalities responded – three (3) (Thorold, Port Colborne, Wainfleet) do not have specific SWM guidelines documented, and rely on the MECP (MOE) 2003 guidelines
- Most municipalities design the minor storm system for a 5-year capacity (Welland uses the 2-year)
- Other Southern Ontario Municipalities' SWM guidelines reviewed included: Hamilton, Burlington, Oakville, Mississauga, Toronto, Markham, Vaughan

# 3. Summary of Research

Planning and Policy Framework

**Regional**

- Niagara Region Official Plan (2014)
- Niagara Region Official Plan Update (ongoing)
- Natural Environment Work Program (2019-2020)

**Provincial**

- Provincial Policy Statement 2020
- A Place to Grow: Growth Plan for the Greater Golden Horseshoe
- A Made-in-Ontario Environment Plan
- Niagara Escarpment Plan
- Greenbelt Plan

# 3. Summary of Research

Applicable legislation

**Federal**

- Environmental Protection Act
- Fisheries Act

**Provincial**

- Water Resources Act
- Provincial Water Quality Objectives
- Clean Water Act
- Brownfields Act
- Emergency Management Act
- Drainage Act
- Aggregate Resources Act

# 3. Summary of Research

Based on research and feedback from the Study Technical Steering Committee, a list of current/contemporary issues and needs was prepared:

- Runoff Management approaches design standards and criteria
- Stormwater Management Facilities designs – ponds & oil and grit separators (design and maintenance)
- Low impact Development practices and Green Infrastructure
- Major Overland Systems and Emergency Routes
- Climate Change and Resiliency Planning

# 3. Summary of Research

Issues and Needs (Cont'd)

- Water Quality – enhanced treatment
- Water Balance/Budget – runoff volume reduction
- Impact management for phosphorus and chlorides
- Risk management
- Regional Storm Control Approaches (Regulatory)
- Headwater Drainage Features Management Protocols
- Watershed / Subwatershed Planning Guidance (2018 Draft)
- Species at Risk (SAR) Provisions

# 3. Summary of Research

**Example: *Chlorides Management***

- No viable option for removing chloride once it has been dissolved into stormwater.
- Preferred management approach is through prevention via design (i.e., roadways and parking lots requiring less salt use) and best management practices for reduced salt use.
- SWM facilities - can dilute chloride concentration in discharge, by discharging from the top where concentrations are lower concentrations.

# 3. Summary of Research

**Example: *Phosphorus Management***

- Phosphorous reduction policies prevalent within watersheds where lake eutrophication is a primary concern, including Lake Simcoe and Lake Erie, and hence would be applicable to part of the Niagara Region.
- Region is considering guidelines and phosphorous reduction targets, which can potentially be achieved through extensive monitoring, wastewater treatment, LID source controls, and SWM facility retrofits.

# 3. Summary of Research

**Example: *Water Budgets***

- Runoff Volume reduction techniques include infiltration, reuse and rainwater harvesting, canopy interception, evapotranspiration and/or additional techniques.
- Higher priority given to LID Practices that include volume reduction.
- Secondary preference is to employ filtration techniques, followed by rate control BMPs.
- The recommendations of hydro-geotechnical reports and environmental impact studies need to be considered as part of any design.

# 4. Overview of how the SWM Guidelines are to be Used

# 4. Overview of how the SWM Guidelines are to be used

**Regional Planning application process**:

a) Pre-submission pre-consultation with the Local Municipality

b) Provide applicant with the necessary submission requirements: studies, drawings and documents - includes a SWM report along with determination of the need for controls and agencies that will be reviewing the SWM requirements

c) Review of SWM plan/report through the Planning Application submission process (provide comments on report content, calculations, modelling, drawings and any supporting documents identified at the pre-consultation stage).

***Note: Development Proponents required to pre-consult with local Municipality and submit a SWM report to both the Region and LAM. The Region will comment, and the NPCA will only comment in select circumstances.***

# 4. Overview of how the SWM Guidelines are to be used

## Review Agency and Responsibility:

| Storm Water Receiver | Water Quality | Water Quantity | Stream Erosion Control | LID Requirement | Construction Erosion and Sediment Control | Subdivision SWM Facility Operation and Maintenance | NPCA | MECP |
|---|---|---|---|---|---|---|---|---|
| **Regional Road (roadside ditch/crossing culvert)** | Region | Region | Region | Region | Region | Region/Local Municipality | | |
| **Regional Storm Sewer (overland flow on Regional Road)** | Region | Region | Region | Region | Region | Region/Local Municipality | | |
| **Municipal Road (roadside ditch/crossing culvert)** | Region/ Local Municipality[1] | Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | | |
| **Municipal Storm Sewer or Municipal Drain** | Region/ Local Municipality[1] | Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | | |
| **Unregulated Ditch** | Region/ Local Municipality | Local Municipality/ Region | Local Municipality/ Region | Local Municipality/ Region | Local Municipality/ Region | Local Municipality | | |
| **Regulated Feature[2, 5]** | Region/ Local Municipality | Region/ Local Municipality | Region/ Local Municipality | Region/ Local Municipality | NPCA | Local Municipality | Review of outlet and may require Work Permit | ECA approval needed for Municipal Storm Sewer and SWM Facilities; ECA approval needed for SWM facilities on Industrial Lands or for facilities that provide SWM for more than one site |

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# 4. Overview of how the SWM Guidelines are to be used

**Responsibilities**:

- Coordination of review to be discussed at pre-consultation;
- Where Outlet to a Provincially Significant Wetland (PSW) is required, water balance is needed which invokes a coordinated review by NPCA and Region;
- NPCA will review any outlets to regulated features and may require review of stormwater management report as part of the development application;
- MECP will supply final certificate (ECA) outlining the maintenance requirements for the owner.

***Note: Consolidated Linear Infrastructure ECA changes proposed by the MECP will potentially put the review and approval role with the Local Municipality or Region***

# 4. Overview of how the SWM Guidelines are to be used

**Responsibilities**: ***MECP Consolidated Linear Infrastructure ECA changes***

Should the Local Municipality or Region decide to apply for the CLI-ECA process, this would set up a system approach for future applications.

Successful applicants receive a single CLI-ECA which will encompass all sewage works including stormwater management infrastructure, and will revoke all existing ECAs, replacing it with a single approval for the system.  Future works would be added to the system CLI-ECA.

Some works under an existing Transfer of Review may be pre-authorized, and the Transfer of Review process phased out.

# 4. Overview of how the SWM Guidelines are to be used

MECP Responsibility – Consolidated Linear Infrastructure




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# 4. Overview of how the SWM Guidelines are to be used

**Development Scenarios**

Various potential development scenarios for which a combination of SWM reviews will be required from the Region, Local Municipalities, NPCA and MECP have been considered in the Guidelines including:

***Features***

1.1 – outlet to a NPCA regulated feature (e.g. watercourse)
1.2 – outlet to a NPCA non-regulated feature (e.g. watercourse)
1.3 – outlet to a NPCA regulated wetland or a PSW

***Roads***

2.1 – site outlets to a local municipal road – municipal pipe/roadside ditch/municipal drain
2.2 – site outlets to a local municipal sewer under a Regional road
2.3 – site outlets to a Region sewer under a Regional road

# 4. Overview of how the SWM Guidelines are to be used

***Regional Sewers***

3.1 – Region sewer outlets to a local municipal sewer (both with and without u/s development)

3.2 – Region sewer outlets to a local municipal watercourse (both with and without u/s development)

***Others***

Region is considering adding other scenarios:

- Outlets to Great Lakes
- Outlets to specific non-regulated features such as the Lower 12 Mile Creek, Queenston-Chippewa Power Canal, Welland Canal and Lake Gibson.
- Outlets to private waterbodies

# 4. Overview of how the SWM Guidelines are to be used

**EXAMPLE**

***Scenario 1.1* – outlet to a NPCA regulated feature (e.g., watercourse)**

- Region reviews the sizing of SWM facility and quality control (previously completed by NPCA)
- NPCA conducts a technical review of the outlet location and proposed discharge characteristics to ensure that the regulated feature is not hydrologically impacted - this may require supporting water balance calculations
- Municipality reviews location of facility, sizing for quantity and quality control, design of storm sewer (HGL), major/minor drainage, and easements
- May require MECP ECA if none exists for system

# 4. Overview of how the SWM Guidelines are to be used

**EXAMPLE**

***Scenario 1.2* – outlet to a non-regulated feature (e.g., watercourse, wetland)**

- Region reviews the sizing of facility and quality control (previously completed by NPCA)
- NPCA would not review the outlet
- Municipality reviews location of facility, sizing for quantity and quality control, design of storm sewers (HGL), major/minor drainage, and easements
- May require MECP ECA if none exists for system

# 4. Overview of how the SWM Guidelines are to be used

**EXAMPLE**

***Scenario 2.2* – site outlets to a local municipal sewer under a Regional road**

- Region reviews the sizing of facility and quality control (previously completed by NPCA) including potential impacts to Regional Road
- NPCA would not review (non-regulated feature)
- Municipality reviews location of facility, sizing for quantity and quality control, design of storm sewers (HGL), major/minor drainage, and easements
- May require MECP ECA if none exists for this system

# 5. SWM Guideline Highlights

# 5. SWM Guideline Highlights

Considerable content – some highlights include:

- Low Impact Development
- Climate Change
- Runoff Coefficients
- Water Budgets
- Infill/Intensification

# 5. SWM Guideline Highlights

**Low Impact Development practices**

Niagara Region encourages proponents to implement LID practices (NOP, SWM Guidelines) consistent with Provincial Policy.

Objective to address:

- water quality control criteria
- water balance
- erosion control.

# 5. SWM Guideline Highlights

**Low Impact Development practices**

Potential LID practices supported by the Region include (but are not limited to):

- Bioretention areas and bioswales,
- Vegetated filter strips,
- Enhanced grassed swales,
- Permeable pavements (asphalt, concrete, and paving stones),
- Soakaway pits and infiltration chambers,
- Exfiltration pipes,
- Pre-fabricated modules (including soil retention cells) and tree pits, and
- Green Roofs

# 5. SWM Guideline Highlights



*Dry Swale*



*Bioretention*





*Dry Swales can be vegetated with turf grass or more elaborate vegetation*

wood.

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# 5. SWM Guideline Highlights



*Centre Median Bioswale*



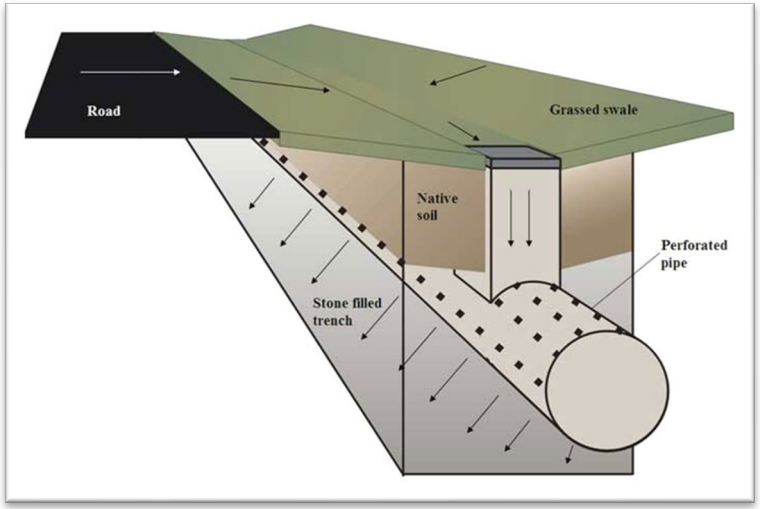
*Rain Barrels*



*Permeable Paving*



*Bioretention Swale*




*Perforated Pipe*

wood.

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# 5. SWM Guideline Highlights

**Low Impact Development practices:**

- Reference available resources through the Credit Valley Conservation (CVC) and Toronto Region Conservation Authority (TRCA) and others.
- Local Municipalities may also develop their own LID Guidelines, which would govern.
- On-site locations to be established in consultation with Region staff based on site characteristics and justified to the satisfaction of the Region.
- Where sub-surface infiltrative LID practices are proposed, it is recommended that an additional water quality treatment measure be placed upstream, to prevent clogging and improve long term functionality.

# 5. SWM Guideline Highlights



*Permeable/Porous Asphalt Paving*

# 5. SWM Guideline Highlights

**Low Impact Development practices:**

The selection and design of LID practices must consider site characteristics, including but not limited to:

- Local groundwater table elevation (seasonal maximum),
- Subsurface soil type(s) and associated permeability/infiltration capacity,
- Depth to bedrock,
- Sub-surface utility conflicts,
- Existing zoning and land use, including legacy contamination sites,
- Existing groundwater use including downgradient groundwater receptors (e.g., private wells, wetlands, source water protection areas, etc.), and
- Long term Operations and Maintenance requirements.

# 5. SWM Guideline Highlights



*Bioretention Swale*

wood.

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# 5. SWM Guideline Highlights

Climate Change

- Niagara Region acknowledges the potential impact that ongoing climate change is expected to have on rainfall patterns.
- In Ontario, climate change is expected to result in more intense and severe rainfall events, occurring on a more frequent basis.
- Climate change science is however acknowledged to not have advanced sufficiently to provide a definitive recommendation with respect to the rainfall data adjustment to be applied. A range of potential future rainfall trends is possible, depending on numerous factors.

# 5. SWM Guideline Highlights

Climate Change

Predictive tools provide a range of potential future outcomes for practitioners. Three (3) primary online tools available in Ontario industry for climate change influenced IDF data, including:

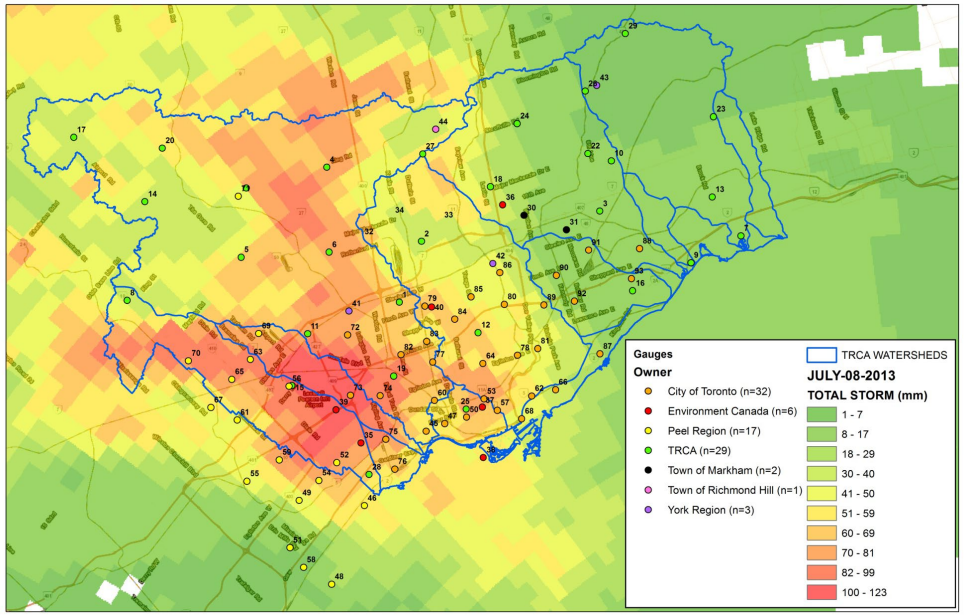
- *University of Western Ontario IDFCC Tool*
- *Ontario Climate Change Data Portal (OCCDP) IDF Rainfall Tool*
- *MTO IDF Curve Lookup Tool*

Alternatively, “stress tests” (adjusting existing IDF by a percentage 10 to 20%) can be considered. Results of the stress tests can indicate where future problems are likely to occur in the system should rainfall intensities increase.

# 5. SWM Guideline Highlights

## Climate Change

- Ultimately the owning municipality must determine an acceptable level of uncertainty and risk based on the range of potential impacts.
- Where the Niagara Region and Local Area Municipality deems that an analysis of the hydrologic impacts of climate change is warranted, the development proponent shall consult with the Region and Local Area Municipality to determine the preferred methodology and approach prior to undertaking such analyses.




wood.

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# 5. SWM Guideline Highlights



## Runoff Coefficients considerations

- Where impervious and pervious areas are directly measured, the proponent must also account for anticipated amenity areas (i.e. areas beyond the rooftop, such as driveways, walkways, patios, etc.).
- For detached and semi-detached residential properties, if no additional information is available, amenity areas shall be calculated as 90% of the rooftop area (including the driveway). The revised combined Runoff Coefficient should however not exceed 0.9.

# 5. SWM Guideline Highlights

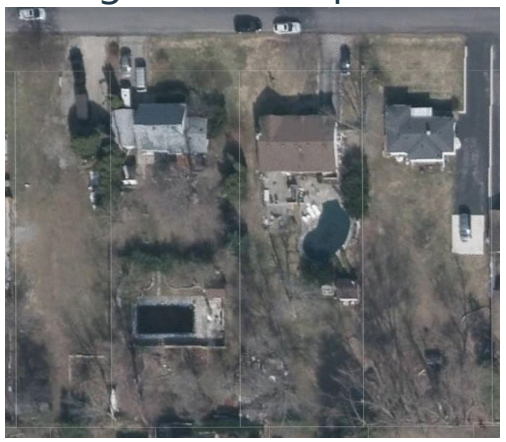
## Intensification Scenario Model Development

**Expected Overall Increase in Imperviousness for the As-of-Right (Future) Conditions**

| Existing Conditions Imperviousness (%) | Increase in Imperviousness (%) | As-of-Right Conditions Imperviousness (%) |
|---|---|---|
| 41.6 | 15.6 | 57.2 |

Amenity areas were found to be 91% of the size of the existing building footprints

Original Development



Re-development



wood.

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# 5. SWM Guideline Highlights

Runoff Coefficients considerations

- Runoff Coefficient values apply for storms up to and including the 10-year event. For storms greater than this return period, an adjustment factor shall be applied to account for expected soil saturation. Runoff Coefficients shall be multiplied by factors of 1.1, 1.2 and 1.25 for the 25, 50- and 100-year return periods respectively, to a maximum runoff coefficient of 1.0.

# 5. SWM Guideline Highlights

## Runoff Coefficients

| Area Type | Runoff Coefficient (C) |
|---|---|
| **Where Impervious/Pervious Areas are directly measured from a plan:** | |
| Impervious Areas (Asphalt, Concrete, Rooftop, and Water Surfaces) | 0.95 |
| Gravel Surfaces | 0.80 |
| Permeable Pavement (varies depending on product type) | 0.30 - 0.80 |
| Pervious Areas (Grass, Meadow, Forest) | 0.25 |
| **For Use in Design Without Detailed Site Plans/Plot Plans:** | |
| Parks | 0.35 |
| Commercial | 0.90 |
| Industrial | 0.90 |
| Institutional (Schools and Churches) | 0.75 |
| Greenfield Residential: | |
| Single Family (under 30 ft width) | 0.65 |
| Single Family (between 30 and 50 ft width) | 0.60 |
| Single Family (greater than 50 ft width | 0.40 – 0.50 |
| Semi-Detached | 0.70 |
| Row Housing, Town Houses | 0.75 |
| Apartments | 0.85 |

# 5. SWM Guideline Highlights

## Water Budgets

- Proponents are required to demonstrate the maintenance of an infiltration-based water budget in accordance with the specified level of control outlined within a Subwatershed Study (SWS), Master Drainage Plan (MDP), or Master Servicing Plan (MSP) that encompasses the proponent's site.
- Where a SWS, MDP, or MSP does not exist, proponents would be required to ensure that pre-development infiltration volumes calculated on a site basis are maintained under post-development conditions.
- Niagara Region supports the application of Green Infrastructure (GI) and Low Impact Development Best Management Practices (LID BMPs) to achieve these requirements.

# 5. SWM Guideline Highlights

## Water Budgets

- At a minimum, Niagara Region requires that the proponent ensure that the first 5 mm of rainfall which lands on the site is retained and infiltrated on site (i.e., zero runoff for the first 5 mm of rainfall).
- Where site constraints limit the ability to achieve the required water budget criteria, proponents must document the site constraints, and take a best-efforts approach to achieving the required criteria.



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# 5. SWM Guideline Highlights

Infills and Intensification

- The redevelopment of lands (infill/intensification), typically takes guidance from locally specific studies in conjunction with higher-level planning stages, to fully capture the factors influencing the environment and infrastructure (i.e., receiver sensitivity and local capacity).
- Functional Servicing Reports (FSRs) are prepared to support development/re-zoning and intensification projects to identify how servicing will be provided while meeting approved environmental targets from preceding studies.

# 5. SWM Guideline Highlights

- Larger homes / footprints
- Severances
- Hard surface amenity areas:  Driveways, Patios, Walkways, Pools, Hardscaping





# 5. SWM Guideline Highlights




*47% Impervious*

*22% Impervious*
*Original Development*



*47%Impervious*

*67% Impervious*
*Redevelopment*

wood.

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# 5. SWM Guideline Highlights

Infills and Intensification

- 2D modelling should be considered in areas where overland flow routes are poorly defined or restricted or the minor drainage system has known capacity constraints, particularly older development areas which predate requirements for overland flow route designs.
- The necessity and requirements (Terms of Reference) for 2D modelling should be discussed with the Niagara Region and local area municipalities on a case-by-case basis, at the pre-consultation.

# 6. Open Discussion

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# 7. Next Steps

# 7. Next Steps

- Draft 70% SWM Guidelines will be circulated to the Development Industry representatives for review
- 3 weeks to comment on 70% SWM Guidelines
- Public Digital Open House Meeting – October 2021
- Incorporate feedback into 90% SWM Guidelines
- Circulate 90% SWM Guidelines to TSC and Development Industry for review and comment
- Presentation to Region Planning & Development Services Committee – Early 2022

January 12, 2022

**70% Draft Stormwater Management Guidelines**
**Comments Response Matrix – Development Industry**

| # | Comments | Response |
|---|---|---|
| | **Webinar – September 14, 2021** | |
| 1. | Have the water budget retention requirements (i.e. the 5mm retention target) been coordinated with the NPCA? Does the NPCA require 5mm of 'runoff' retention vs. 5mm of precipitation? | The TSC includes the NPCA, with Steve Miller representing, and the CA supports the 5 mm.<br>The Region and NPCA have quaternary watershed plans in development. The 5 mm is a default for guidance in advance of the plans.<br>The water budget target of 5 mm is based on a review of current policies in both local and Greater Golder Horseshoe Area municipalities. Several require 5 mm for water budget, (e.g. Burlington, Mississauga, Toronto) and some allow this to count towards erosion control (e.g. Vaughan); Lake Simcoe Conservation Authority requires up to 25 mm. |
| 2. | Can you elaborate about the overlap between the Transfer of Review and the CLI-ECA, if any? | Please check with the MECP. The Region will continue with TOR until the MECP advises of a different system. Not all municipalities have the CLI-ECA process in place, so the TOR will continue for the near future. |
| 3. | Is there specific guidance on when quantity/quality control and LIDs must be used for Regional Road upgrade projects? and specific examples for preferred LIDs in-roads? | The Region is working with the Transportation Department who are also on the TSC. There is no specific guidance yet. The Region is looking for opportunities to use LIDs on roads. Across Southern Ontario, virtually all road operators are looking at this alternative, and the requirement for source control, and what level of control is appropriate, and what means are available.<br>General guidance is provided whereby quality control is expected and quantity control may be required as a function of potential impacts on downstream lands, and downstream constraints within the receiving system. |
| 4. | How will climate change be implemented in future projects? | The guidelines discuss a number of options for assessing impacts of climate change, using IDF information to calculate an adjustment to reflect climate change. The municipality can look at sustainability requirements on a site-by-site basis. The local municipalities may also adjust their standard IDF curves. |
| 5. | Touching on Regional Road reconstruction projects that include storm sewer installations, does or will the Region consider vacant parcels along the right-of-way in their storm sewer designs for future use and acceptance of storm flows at runoff coefficients for the currently zoned property uses at the time? | External contributing drainage areas must be considered, typically for existing and currently zoned land use, but possibly for approved future use, depending on the location and studies completed. The runoff coefficient for the local area development would need to reflect pre-development conditions. Regional road storm sewers may also include a buffer of 10 m. The storm sewer may take runoff from external drainage areas in some cases when it serves greater than the road allowance, and then an agreement with the local municipality would be needed, to potentially assume the sewer. |
| 6. | Often times the manner and use of LIDs in roadways fails due to operations and maintenance, claiming they don't have the resources to follow-through. Are their plans to provide increased funding/resources to Operations to increase the long-term success of roadway SWM LIDs. | Funding of SWM infrastructure capital and operations budgets is not a topic of the guidelines. The Region Transportation group and local municipalities are looking at funding and implementation. In other jurisdictions, LIDs are being introduced by the road authority and by greenfield developers with their infills and intensification. LID features have both high and low maintenance forms, with varying effectiveness. A number of studies in the province have shown that the cost of maintaining and operating LIDs has not yet been taken into account for in operating budgets. |
| 7. | Have you estimated the cost of applying these policies? Increase cost to housing etc. | No, not as part of this process. Studies typically comment on both the lifecycle cost of SWM BMPs as well as the cost of not providing SWM. |

| # | Comments | Response |
|---|---|---|
| 8. | In your research, have you identified any problems generated by the lack of SWM quantity control for infill development? | In the past couple of years, in other municipalities, widespread infill and intensification has led to standing water, flooding, poor overland flow, and increased runoff problems. |
| 9. | Are their plans to update the Region Road Design Guidelines for typical cross-sections to provide dedicated space for LIDs (possibly wider medians/boulevards) | The Region transportation group is working on a complete streets policy document. This will include utilities and LIDs. The urban design guidelines will also consider room for LIDs in boulevards and medians. |
| 10. | Can you actually calculate the impact upon a watercourse by an upstream infill with/without SWM Quantity control? | Yes, numerous municipalities with infill and intensification plans have assessed the impacts and derived management criteria. In one example in Hamilton, increases up to 40 or 50 % in peak flows were found with modelled results. |
| 11. | Is there a process to evaluate innovative approaches that may come about in the future? | It is the Region's intent to not limit technology, and allow for new developments, and remain flexible. The guidelines refer to the provincial certification process (ETV) through the MECP. The Region will not be evaluating new technologies themselves. |
| 12. | Will these new guidelines be applied to all lands in the Region, or just Region roads and/or lands crossing/discharging to Region lands/roadway. | The intent is to review layers and points where the Region has an interest – roads, environmental management, and land use. This will be covered in the application and pre-consultation. The guidelines will cover "who does what" under various scenarios, in terms of the Region, municipality, NPCA, and MECP. |
| 13. | Will 'unregulated ditches' be further defined as well as the additional authority? | The draft documents define this condition, and comments are welcomed on the draft. |
| 14. | If enhanced SWM requirements are spelled out at the pre-consultation stage and perhaps are found to be infeasible at the detailed design stage, will there be opportunities to modify requirements or move forward under some alternative measures? | It does occur when more information becomes available, and is accepted as a possibility by the Region. The onus is still on the development to demonstrate that it is infeasible, provide the reasoning behind the infeasibility, and propose what alternative will be offered for the Region and municipality to consider. |
| 15. | Will we be able to review the document presented? | Yes, everyone at the workshop will receive the document and the Region would ask for comments within three weeks. |
| | **Comments – October 18, 2021 (CIMA)** | |
| 16. | Section 3.2.3, Scenario 1.1 – Outlet to NPCA regulated watercourse: It looks like that the requirements given there in the text is for new outlet. If an existing outlet structure can be used for improvement or new development work without disturbing the regulated watercourse, in such case it is not clear if Scenario 1.1 is applicable. | NPCA will still comment on a proposed alteration to an existing outlet to a regulated watercourse, to confirm that it can be done without impacts. |
| 17. | Climate Change: Section 4.2.2.2 discusses about restricting maximum allowable storm sewer capacity to 95% for providing a safety factor/resilience in storm sewer design. Section 4.3.2.1.2 provides available tools for climate change IDF data. All tools provide some sort of different results. Therefore, it will be better if there will be some concrete guideline for climate change consideration. | The guidelines discuss a number of options for assessing impacts of climate change, including using IDF information to calculate an adjustment to reflect climate change. The local municipality may also have guidance which can be reviewed at the pre-consultation level, on a site-by-site basis. At this time, the Region is not prepared to recommend a single tool for including resiliency. |
| 18. | Section 4.3.3.3: "Roadway crossings shall be sized in accordance with MTO Directive B-100, at a minimum. Consideration for Regional Storm (Hurricane Hazel) conveyance shall be given, and if feasible, shall be the target for the design conveyance capacity". However, Standards provided in MTO Highway Drainage Design Standards (HDDS) 2008 replaces MTO Directive B-100. Therefore, rather than Directive B-100 it is better to say MTO HDDS 2008. | The MTO HDDS do not replace Directive B-100. Refer to the following MTO website for details:<br><br>http://www.mto.gov.on.ca/english/publications/drainage/hydrology/section11.shtml<br><br>The MTO note that "Highway drainage system design criteria are outlined in PHY Directive B100, or the "Drainage Management Manual" (MTO 1997). Refer to these documents for complete details". |

| # | Comments | Response |
|---|---|---|
| | **Comments – November 8, 2021 (Hydroworks)** | |
| 19. | We request that the following change be made to the Region's draft guidelines: As per the Ministry of Environment draft language in the ECA to municipalities (ENVIRONMENTAL COMPLIANCE APPROVAL<br>For a Municipal Stormwater Management System, Sept 22,2021, Section 5.2.4 d) two OGS units in series (i.e. CB insert and OGS) is not considered a treatment train and only credit for the highest TSS removal of the two devices should be given credit. This stems from the fact that if a first device removes a fraction of the TSS, this fraction is not seen by the second OGS and therefore the second OGS will not remove the same TSS as it would if it were used as a stand-alone device. | The Region will remove the reference to two OGS units in series, and will add a note about the MECP draft language on the credit for MTDs in series being limited to the one largest unit.<br><br>The Region notes that the referenced draft MECP document is current, however no date is available for finalizing the document, and that further changes may come from MECP. |
| 20. | We request that the following change be made to the Region's draft guidelines: TSS removal performance of Oil Grit Separators is to be based on the results from the ETV Canada verifications (ISO 14034) based on independent testing to the 2014 TRCA oil grit separator protocol. | The Region will add this clarification and remove the comment regarding a proposed 50% limit on removal performance. The Region accepts the ETV findings and will follow the current MECP criteria. The text will be amended to reflect this. |
| | **Meeting – November 11, 2021 (with Better Neighbourhoods)** | |
| 21. | What is expected of infill sites, under the new guidelines? | The local municipality will review the storm sewers and quality and quantity control requirements in accordance with their standards. The Region will recommend water quality controls. Should Region infrastructure be involved, the Region will require that a stormwater management assessment be prepared which will address the potential stormwater impacts on quality, quantity, erosion, flooding and water balance, and how the development will mitigate or eliminate these impacts.<br><br>A subwatershed study, if available, would assist with defining the constraints. These are typically led by either the local municipality, or sometimes a development group. The Region notes that these broader-based studies can be used to identify the most effective use of resources to manage development impacts.<br><br>Erosion in natural watercourses is an identified concern throughout Niagara Region, and proposed uncontrolled runoff would need to be demonstrated to not have any impacts.<br><br>The Region acknowledges that there are a lot of infills in the Region, however each one must "do its part" for stormwater management, since the lack of management leads to impacts which can add up if nothing is done to mitigate negative impacts, regardless of the relatively small size of each individual infill. |
| 22. | Concerned that quantity control is required as a default, and would prefer to have wording added: "where appropriate". Improper quantity control may be detrimental. | The wording "where appropriate" or similar, can be added to the guidelines. This is implied. It is possible that quantity control may not be required, provided local and downstream conditions and constraints have been reviewed. Peak flow timing effects with the surrounding watershed must also be taken into account. Note that quality control is always required. |
| 23. | Concern that the draft guidelines discourage rooftop controls. | The Region will approve rooftop controls provided they include a fixed or unalterable design. It is noted that the MTO do not approve rooftop storage (within their commenting area), and only accept underground storage if the outlet control is unalterable. |
| 24. | Supports the use of green technology and LID but clients find it expensive, and small sites have land constraints. | Noted. Each site is different and the development is expected to provide controls, or fully justify why controls are infeasible. |

| # | Comments | Response |
|---|---|---|
| | **Meeting – November 15, 2021 (with Upper Canada Consultants)** | |
| 25. | Will there be a transition period and “grandfathered” policy for the guidelines. | Yes. Approvals prior to the SWM guidelines being finalized will follow the local municipality, NPCA and MECP guidelines. Even if a development is phased, approved SWM facilities will not be required to be retrofit to meet the new guidelines. Text will be added to outline the grandfathering. |
| 26. | Are these guidelines for private development only? | No, they will apply to Region lands and infrastructure as well, e.g. the Region transportation department will use the guidelines on Region road projects. |
| 27. | Please clarify the major overland flow route section. | Will clarify that a major overland flow route must be defined/provided. |
| 28. | Concern with implementation of LID bringing costly infrastructure and maintenance, plus overlap with the local municipality guidelines. | Noted. The Region is following the Provincial mandate for increased use of LIDs and the Region Official Plan policies. The guidelines are intended to enhance and support the local municipal guidelines. Pre-consultation with the municipality and Region is required. Master planning is also recommended for the local municipalities to refine their criteria and guidelines. |
| 29. | Table 3.2.1 needs more categories to cover unregulated watercourses, and consent drains. | Noted – will add text and consent drains (a type of Municipal Drain) to the definitions.<br>Region will consider adding more categories, including outlet easements. |
| 30. | Can MTO drainage requirements be defined in the guidelines? | Yes, will add a note that select sites within MTO corridor control will be required to be reviewed by the MTO in addition to the Region, LAMs, NPCA and MECP. |
| 31. | Can sites with multiple outlets use a weighted balance approach to SWM control? | Yes. |
| 32. | Can a statement be added regarding design of OGS with backwater? | A statement will be added that backwater effects must always be accounted for in design. |
| 33. | Are peak flow timing effects to be considered/supported? | Yes. |
| 34. | Please confirm ETV performance is supported. | Yes, the Region accepts the MECP ETV process for verifying technological performance. The wording will be reviewed. The Region proposes to be consistent with the Provincial guidelines. New MECP LID draft guidelines are expected in early 2022. |
| 35. | Agree that the onus is on the proponent to demonstrate whether the 5 mm minimum target is achievable. | The Region and NPCA have quaternary watershed plans in development. The 5 mm is a default for guidance in advance of the plans.<br>The water budget target of 5 mm is based on a review of current policies in both local and Greater Golder Horseshoe Area municipalities. Several require 5 mm for water budget, (e.g. Burlington, Mississauga, Toronto, Vaughan).<br>The 5 mm target can be achieved through a combination of infiltration, evaporation, evapotranspiration and/or reuse. |
| 36. | Please define habitat enhancement? | This text is aligned with the OP, and the role of stormwater management in supporting the preservation and enhancement of natural features. Region will consider changing the wording to “protection and/or enhancement”. |
| 37. | Clarity requested with overlap with local municipal road standards, and the 675 mm threshold. | Will add text that notes the criteria are for design of Regional infrastructure, and local infrastructure is to follow the local municipal guidelines. Will clarify the policy regarding oversizing. |

| # | Comments | Response |
|---|---|---|
| 38. | Monitoring requirements seem to be more onerous than what MECP ask. Following the meeting (also on Nov 15, 2021), UCC provided a high-level estimate of the typical cost to provide the monitoring program as scoped in the guidelines, prepared by WSP. | The monitoring requirements should be scoped by location, to ensure that they are not over- or under-scoped, i.e. right-sized for the site. The MECP should be consulted, and if one exits, an EIS should also be consulted. The MECP cite monitoring as one reason for transitioning to the CLI format. Typically the local municipality and NPCA will review the monitoring requirements. Note that the NPCA also takes a watershed-based approach to monitoring. The Region added that they are reviewing internally on resources for review and use of increased monitoring data.<br>The section on monitoring is being revised. A note will be added that the monitoring scope in the guidelines is for consideration only and is to be refined through pre-consultation. |
| 39. | Please define “out-of-date” as it relates to design standards. | Text will be added to define this as it relates to new Provincial guidelines, and Official Plan documentation. |
| 40. | Please clarify climate change IDF methodology. | The guidelines discuss a number of options for assessing impacts of climate change, including using IDF information to calculate an adjustment to reflect climate change. The local municipality may also have guidance which can be reviewed at the pre-consultation level, on a site-by-site basis. At this time, the Region is not prepared to recommend a single tool for including resiliency. |
| 41. | Would like to see Appendix A – modified rational method example. | Region will forward this separately for review, as an example. |
| 42. | Would recommend technical staff be present at pre-consultation meetings. | Noted. |
| | **Comments on 70% Draft – Jan 14, 2022 (Upper Canada Consultants)** | |
| 43. | Page 5,6 – comments on objectives of the Region’s ecosystem approach | Acknowledged. The SWM guidelines are referencing the OP documents, which has a separate commenting process. |
| 44. | Page 20 – FSRs - In agreement with this. Example: blocks on approved subdivisions should not require extensive stormwater management within the FSR. We support this Section. | Noted. |
| 45. | Page 21 – add MTO where they have a role in review. | Will add text. |
| 46. | Section 3.2.1 Region review process - Significant confusion existing in current process to identify to proponents if ECA'S are required for their project. Often no technical staff are present and this leads to future problems with approvals. | Noted. SWM guidelines are documenting the process. Text may be added to reinforce the need to define the need for ECAs, which the proponent can determine with consultation with the MECP. |
| 47. | Section 3.2.1 Region review process - Concerned with current state of pre-consultation meetings with respect to the nature of SWM requirements being provided by staff without knowledge or understanding of specifics related to the site location, flooding, etc. | Noted. |
| 48. | Page 23 – Table 3,2.1 – please add noted additional scenarios and try to improve clarity of the table | Will add text. |
| 49. | Page 24, 25 – please note exceptions to requirements for SWM, e.g. local municipality waiving the requirement | See “exceptions” on page 25 – will add text regarding the LAMs |
| 50. | Section 3.2 - Please add outlets to NPCA flood plains, and ECA requirements. | Will add scenario, and text. |

| # | Comments | Response |
|---|---|---|
| 51. | Section 4.2.1 - Is the review of Chlorides and Phosphorus for information only or will the Region be setting policies and guidelines? | The information is for consideration as it may be applied to each specific site. The Region is not recommending a specific criteria for control, and is not recommending the LSRCA criteria for areas drainage to Lake Erie.<br>The section will be amended to note that the MECP draft LID Manual was released in Jan 2022 for review and comment. |
| 52. | Section 4.3 - For clarification, these guidelines will not be enforced when the LAM's current guidelines are considered "out of date"? | Correct. All in-force LAM guidelines and standards will govern over the Region guidelines unless the LAM suggests otherwise in the pre-consultation. Compliance with Provincial criteria is expected. |
| 53. | Section 4.3.1.1 – What about sites with split minor/major drainage and split outlets. | Will add this scenario. |
| 54. | Page 36 – clarify Region position on water quality treatment and underground storage proximity | Agree that both orientations are acceptable, with consideration of potential for fouling of the underground tank or system (the reason for pre-treatment), backwater effects, and other maintenance concerns.<br>The section will add text to note that both configurations are acceptable. |
| 55. | Page 36 – please define a permanently fixed orifice plate | This refers more to the permanence of the control. One that cannot be readily removed or altered or tampered with. Exchangeable ICD inserts are acceptable, provided they cannot be readily removed/altered. |
| 56. | Page 37 – 80% removal and ETV | The Region requires the MECP enhanced level (80% removal) of control on Region projects and where Region infrastructure is involved; the Region recommends 80 % removal on the balance of LAM projects.<br>The Region accepts the ETV findings and will follow the current MECP criteria. The text will be amended to reflect this. |
| 57. | Page 42 – please add “With the exception of a dry pond facility, which has no permanent pool component”. | Noted and will add text. |
| 58. | Page 43 - What is the Region's intention for the Climate Change section? Will a Climate Change component be requested for stormwater management design? | Yes a climate change component will be requested. The guidelines discuss a number of options for assessing impacts of climate change, including using IDF information to calculate an adjustment to reflect climate change. The local municipality may also have guidance which can be reviewed at the pre-consultation level, on a site-by-site basis. At this time, the Region is not prepared to recommend a single tool for including resiliency. |
| 59. | Page 45 - Are these coefficients to be applicable for projects impacting Regional infrastructure only? These coefficients are generally greater than LAM standards. | Yes, Region only. |
| 60. | Page 46 – sewer design average velocity | The Region will review the MECP recommended range and may update the text. |
| 61. | Page 46 – modified rational method example | Region will forward this separately for review. |
| 62. | Page 52 – Section 4.3.3.1 sewer design - will consideration be made where a minimum slope of 0.25% is also not feasible due to grade? The alternative may result in submerged outlets or a need for an alternative, less suitable outlet. | Yes. |

| # | Comments | Response |
|---|---|---|
| 63. | Page 56 - Will there be no consideration to pressure effects within the storm sewer system during a major flooding event? Flow through the storm pipes will exceed the full flow capacity with a minimum of 1.2 m of head on the system. This also seems contradictory to Page 52 (section 4.3.3.1.1) where it is stated that 100 year flows are to be contained within the storm sewers for Regionally owned infrastructure. | Yes, the full capacity of the minor system should consider pressure flow, when estimating the difference.<br><br>The Region will review the statement in 4.3.3.1.1 which is to “limit surcharging” during the 100 year. |
| 64. | Page 57 – MTO directive B-100 and HDDM. | Will update the text to include a reference to the current MTO drainage guidelines/manual.<br><br>The MTO HDDM are to be used in conjunction with Directive B-100. Refer to the following MTO website for details:<br><br>http://www.mto.gov.on.ca/english/publications/drainage/hydrology/section11.shtml<br><br>The MTO note that “Highway drainage system design criteria are outlined in PHY Directive B100, or the "Drainage Management Manual" (MTO 1997). Refer to these documents for complete details”. |

# APPENDIX

# D PUBLIC PRESENTATION AND FEEDBACK

# NIAGARA REGION STORMWATER MANAGEMENT GUIDELINES

## PUBLIC PRESENTATION

**October 5, 2021**

**6:30 pm – 8:00 pm**

**Virtual Meeting**

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# Agenda

1. Welcome and Introductions
2. Overview - Study Purpose / Background
3. Stormwater Management Primer
4. Summary of Research into Local Area Municipalities and Other Ontario Municipalities
5. SWM Guideline Highlights
6. Open Discussion
7. Next Steps

# 1. Welcome and Introductions

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# 1. Welcome and Introductions

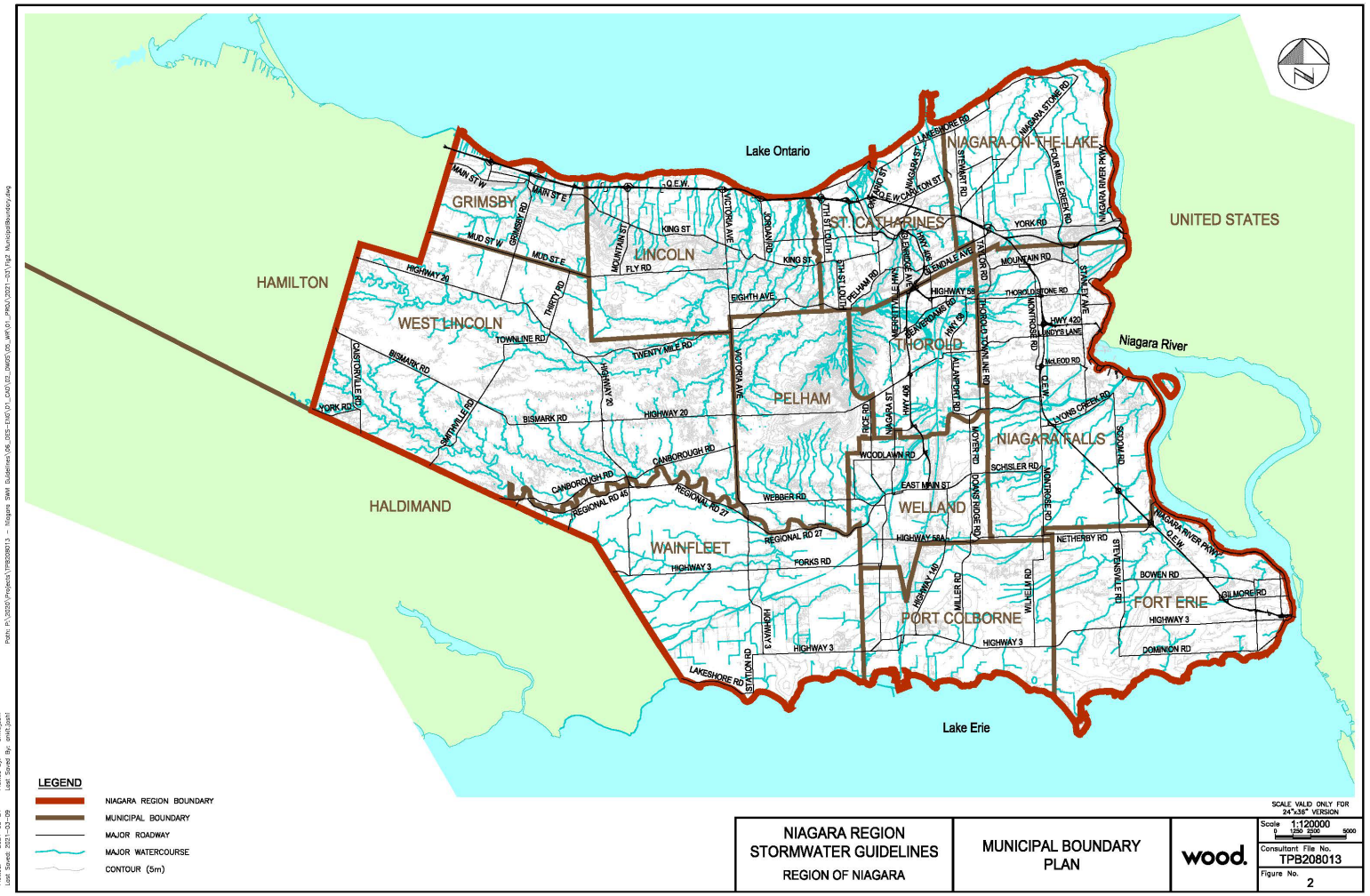
- Region of Niagara – Maggie Ding (PM), Phill Lambert

- Wood – Brian Bishop (PM), Ron Scheckenberger

Technical Steering Committee comprised of:

- Region staff
- Local Area Municipality Representatives
- Niagara Peninsula Conservation Authority

# 1. Welcome and Introductions




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# 2. Overview – Study Purpose/ Background

# 2. Overview – Study Purpose/Background

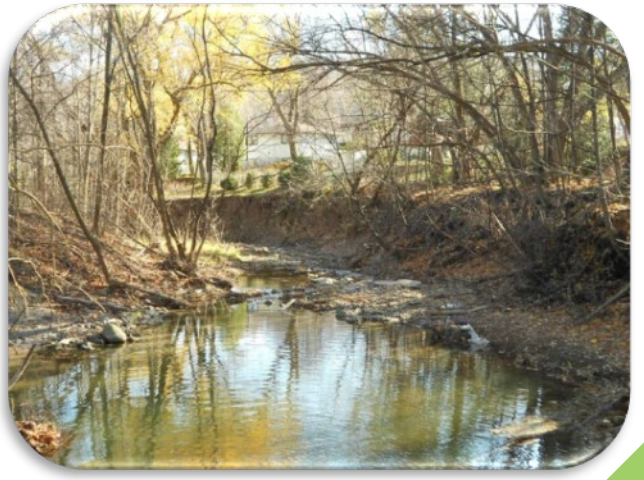
Purpose:

- Develop guidelines which provide a consistent Stormwater Management approach for the Region;
- Technical guidance for reviewing stormwater management and engineering reports in support of development applications.
- *Note: Technical guidelines are not intended to replace those of local area municipalities (LAMs) but rather to complement and enhance local guidance*

# 2. Overview – Study Purpose/Background

Purpose:

- To assist proponents and practitioners in meeting complex stormwater management requirements.
- To document the goals and objectives for SWM assessments and reports which are to be submitted to the Region for review and approval.
- To align with the Region's new Official Plan.



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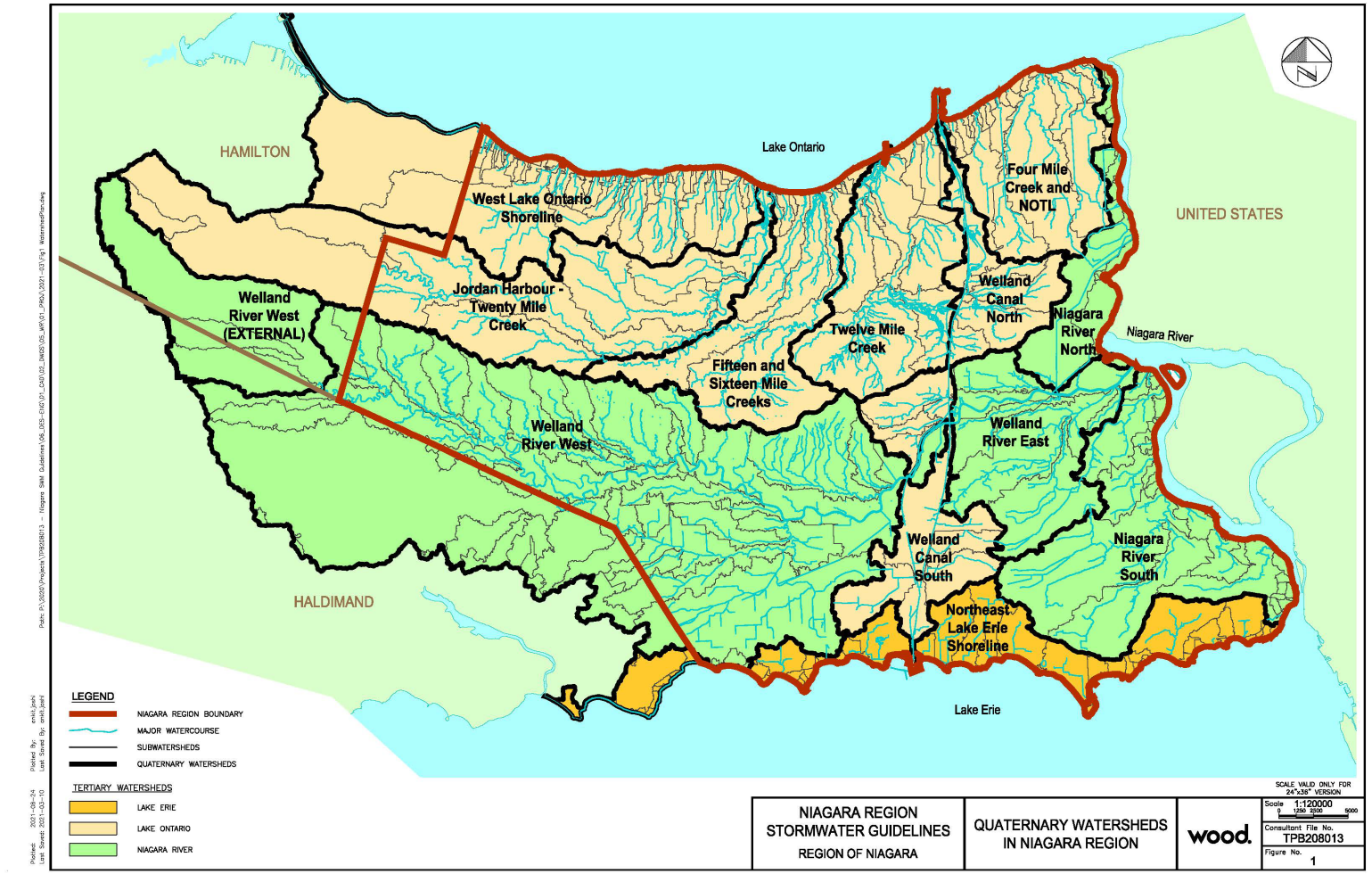
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# 2. Overview – Study Purpose/Background

Integration with Regional Official Plan (ROP)

- Region's New Official Plan has considered the needs for SWM across the Region to meet the goals of the Provincial Policy Statement and Provincial Growth Plan to proactively manage growth impacts related to stormwater runoff.
- For the ROP, Region prepared a Watershed Plan (Equivalent) prepared at the Tertiary scale which has outlined the needs for future study (Quaternary Level and Subwatershed Level), as well as the specifics for future development SWM Plans.
- Objective to establish "**Made in Niagara**" Regional SWM Guidelines which complement those of the LAMs.

# 2. Overview – Study Purpose/Background




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# 2. Overview – Table of Contents

## Table of Contents


1.0 Introduction ..... 1
- 1.1 Stormwater Management Context ..... 1
- 1.2 Document Purpose ..... 1
- 1.3 Region Drainage System Context ..... 2
- 1.4 Integrated Approach ..... 4
  - 1.4.1 Overview ..... 4
  - 1.4.2 Planning and Design Process ..... 4
  - 1.4.3 The Ecosystem Approach ..... 5

2.0 Current Legislative Climate (Legislation, Acts, Regulations and Guidelines) ..... 7
- 2.1 Federal ..... 7
  - 2.1.1 Canadian Environmental Protection Act ..... 7
  - 2.1.2 Canadian Fisheries Act ..... 7
- 2.2 Provincial ..... 7
  - 2.2.1 Provincial Policy ..... 7
  - 2.2.2 Provincial Legislation ..... 9
  - 2.2.3 Provincial Agency Guidelines and Requirements ..... 13
- 2.3 Region of Niagara Policies ..... 13
  - 2.3.1 Niagara Region Official Plan ..... 13

3.0 Development Application Process, Roles and Responsibilities ..... 16
- 3.1 Planning and Servicing Studies ..... 16
  - 3.1.1 General Process ..... 16
  - 3.1.2 Tertiary Watershed Plans ..... 17
  - 3.1.3 Quaternary Watershed/ Subwatershed Studies ..... 18
  - 3.1.4 Master Servicing Plans/ Assimilative Capacity Studies ..... 19
  - 3.1.5 Functional Servicing Report ..... 20
- 3.2 Roles and Responsibilities ..... 21
  - 3.2.1 Potential Scenarios for Coordinated Review ..... 26
- 3.3 Relevant Stormwater Drainage Documents and Studies ..... 27



## Table of Contents



4.0 Stormwater Management Goals, Requirements and Technical Guidelines ..... 30
- 4.1 Goals/Objectives ..... 30
- 4.2 Key Issues and Results of Survey ..... 31
  - 4.2.1 Stormwater and Environmental Management ..... 31
  - 4.2.2 Climate Change ..... 33
  - 4.2.3 SWM Facility Maintenance ..... 34
- 4.3 Technical Guidelines ..... 34
  - 4.3.1 Analytical Methodology ..... 34
  - 4.3.2 Conveyance Systems ..... 52
  - 4.3.3 Stormwater Management ..... 57
  - 4.3.4 Erosion & Sediment Control ..... 57

5.0 Operation, Monitoring and Maintenance of Stormwater Management Measures ..... 63
- 5.1 Operation and Maintenance Program ..... 63
  - 5.1.1 Public ..... 63
  - 5.1.2 Private ..... 63
  - 5.1.3 Inspection Form Templates ..... 64
- 5.2 Monitoring Requirements ..... 64
  - 5.2.1 Public ..... 64
  - 5.2.2 Private ..... 67
- 5.3 Remediation ..... 67


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# 3. Stormwater Management - *Primer*

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# 3. Stormwater Management - *Primer*

**What is stormwater?**

- Rainwater and melted snow that runs off lawns, streets and other land surfaces
- Hard surfaces such as pavement and roofs prevent precipitation from naturally soaking into the ground



**Why do we need to "manage" it?**

- Prevent the flooding of homes, roads and businesses
- Prevent creek erosion and stop harmful pollutants from entering local bodies of water



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# 3. Stormwater Management - *Primer*

**Stormwater Management Challenges:**

- Aging Infrastructure and Growing Communities
- Legislated and Proactive Maintenance
- Flood Safety and Mitigation
- Regulatory Requirements
- Water Quality Protection
- Sustainable Funding



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# 3. Stormwater Management - *Primer*

## How we think about stormwater management has changed

| Past: | Now: |
|---|---|
| Stormwater as a nuisance – flood control through rapid removal | More emphasis on source controls and retaining stormwater on-site |
| Transportation safety – ditches, ponds and road drainage | Protect all infrastructure, implement alternate technologies for water quality and quantity controls |

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# 3. Stormwater Management - *Primer*

## How we think about stormwater management has changed

| Past: | Now: |
|---|---|
| Quality control only incorporated in new development; existing climate conditions used in design | Existing lands now considered for quality control; Climate change leading to increased design standards and adaptation planning |
| Protect private property – upstream stormwater quantity controls (ponds) | Maintain controls, however stream restoration and habitat protection are increased in priority |

# 3. Stormwater Management - *Primer*

**Stormwater Management Infrastructure Ownership in Niagara:**

Local Municipalities:

- Majority of Storm Sewers and Stormwater Management facilities (SWMF) are owned and operated by Local Municipalities; local municipality assumes new storm sewers and SWMF from subdivisions
- Manage and accommodate external drainage areas beyond roads, Municipal Drains, Overall grading plans for subdivisions, and individual lot grading plans

Niagara Region:

- Region has some storm sewers for Regional Roads where it is only collecting road drainage (typically sized 675 mm in diameter or less)
- Region builds and improves existing storm sewer systems with Road Projects

Note: Local Municipalities, Niagara Region, and NPCA all have a role in SWM review for new development

# 4. Summary of Research into Local Area Municipalities and Other Ontario Municipalities

# 4. Summary of Research

## Process:

- Reviewed available Region of Niagara information
- Contacted Local Area Municipalities to obtain current SWM guidelines
- Reviewed recent SWM Guidelines for select Southern Ontario Municipalities
- Reviewed current framework of the Provincial and Regional planning approval process
- Reviewed and summarized applicable legislation

# 4. Summary of Research



**SWM Guidelines**

- All twelve (12) Niagara Municipalities responded – three (3) (Thorold, Port Colborne, Wainfleet) do not have specific SWM guidelines documented, and rely on the MECP (MOE) 2003 guidelines

- Other Southern Ontario Municipalities' SWM guidelines reviewed included:

*Hamilton, Burlington, Oakville, Mississauga, Toronto, Markham, Vaughan, Guelph, Kitchener, London*

# 4. Summary of Research

Planning and Policy Framework

**Regional**

- Niagara Region Official Plan (2014)
- New Niagara Official Plan (ongoing)
- Natural Environment Work Program (2019-2020)

**Provincial**

- Provincial Policy Statement 2020
- A Place to Grow: Growth Plan for the Greater Golden Horseshoe
- A Made-in-Ontario Environment Plan
- Niagara Escarpment Plan
- Greenbelt Plan

# 4. Summary of Research

Applicable legislation

**Federal**

- Environmental Protection Act
- Fisheries Act

**Provincial**

- Water Resources Act
- Provincial Water Quality Objectives
- Clean Water Act
- Brownfields Act
- Emergency Management Act
- Drainage Act
- Aggregate Resources Act

# 4. Summary of Research –

## Issues/Needs

Based on research and feedback from the Technical Steering Committee, a list of current/contemporary issues and needs was prepared including:

- Runoff Management approaches design standards and criteria
- Stormwater Management Facilities designs – ponds & oil and grit separators (design and maintenance)
- Low impact Development practices and Green Infrastructure
- Major Overland Systems and Emergency Routes
- Climate Change and Resiliency Planning



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# 4. Summary of Research

**Issues and Needs (Cont'd)**



- Water Quality – enhanced treatment
- Water Balance/Budget – runoff volume reduction
- Impact management for phosphorus and chlorides
- Risk management
- Regional Storm Control Approaches (Regulatory)
- Headwater Drainage Features Management Protocols
- Watershed / Subwatershed Planning Guidance (2018 Draft)
- Species at Risk (SAR) Provisions

# 5. SWM Guideline Highlights

# 5. SWM Guideline Highlights

**Regional Planning application process**:

a) Pre-submission pre-consultation with the Local Municipality

b) Provide applicant with the necessary submission requirements: studies, drawings and documents

c) Review of SWM plan/report through the Planning Application submission process

***Note: Development Proponents required to pre-consult with local Municipality and submit a SWM report to both the Region and LAM. The Region will comment, and the NPCA will only comment in select circumstances.***

# 5. SWM Guideline Highlights

## Who reviews what?

| Storm Water Receiver | Water Quality | Water Quantity | Stream Erosion Control | LID Requirement | Construction Erosion and Sediment Control | Subdivision SWM Facility Operation and Maintenance | NPCA | MECP |
|---|---|---|---|---|---|---|---|---|
| Regional Road (roadside ditch/crossing culvert) | Region | Region | Region | Region | Region | Region/Local Municipality | | Approval needed for Municipal Storm Sewer and SWM Facilities; approval needed for SWM facilities on Industrial Lands or for facilities that provide SWM for more than one site |
| Regional Storm Sewer (overland flow on Regional Road) | Region | Region | Region | Region | Region | Region/Local Municipality | | |
| Municipal Road (roadside ditch/crossing culvert) | Region/ Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | | |
| Municipal Storm Sewer or Municipal Drain | Region/ Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | Local Municipality | | |
| Unregulated Ditch | Region/ Local Municipality | Local Municipality/ Region | Local Municipality/ Region | Local Municipality/ Region | Local Municipality/ Region | Local Municipality | | |
| Regulated Feature[2, 5] | Region/ Local Municipality | Region/ Local Municipality | Region/ Local Municipality | Region/ Local Municipality | NPCA | Local Municipality | Review of outlet and may require Work Permit | |

# 5. SWM Guideline Highlights

**Low Impact Development practices:**

Niagara Region encourages proponents to implement LID practices (NOP, SWM Guidelines) consistent with Provincial Policy.

Objective to address:

- *water quality control criteria*
- *water balance*
- *erosion control*.

# 5. SWM Guideline Highlights

**Low Impact Development practices:**

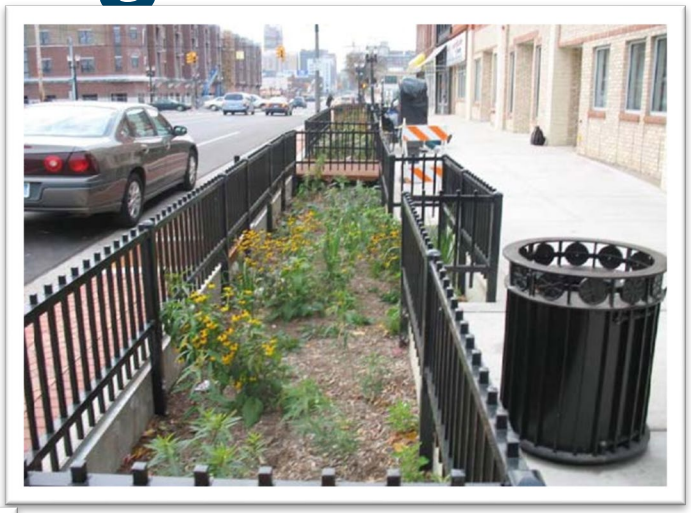
Potential LID practices supported by the Region include (but are not limited to):

- Bioretention areas and bioswales,
- Vegetated filter strips,
- Enhanced grassed swales,
- Permeable pavements (asphalt, concrete, and paving stones),
- Soakaway pits and infiltration chambers,
- Exfiltration pipes,
- Pre-fabricated modules (including soil retention cells) and tree pits, and
- Green Roofs

# 5. SWM Guideline Highlights



*Dry Swale*



*Bioretention*



*Dry Swales can be vegetated with turf grass or more elaborate vegetation*

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# 5. SWM Guideline Highlights



*Centre Median Bioswale*



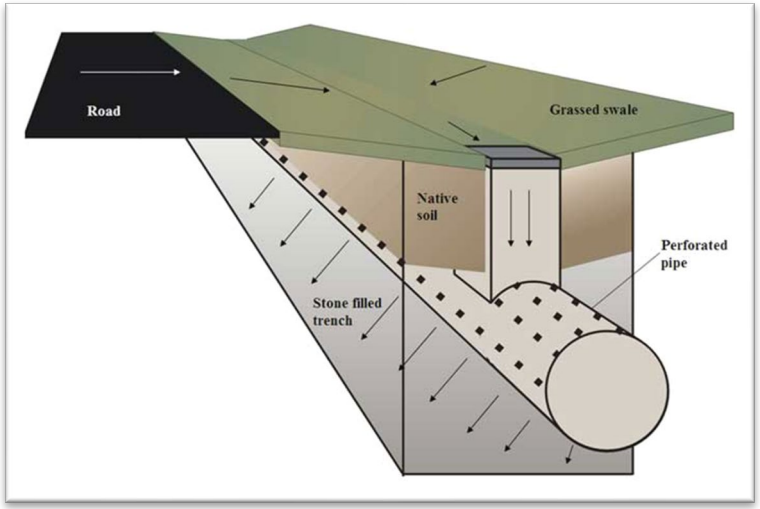
*Rain Barrels*



*Permeable Paving*



*Bioretention Swale*




*Perforated Pipe*

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# 5. SWM Guideline Highlights

## Low Impact Development practices:

- Available resources through the Credit Valley Conservation (CVC) and Toronto Region Conservation Authority (TRCA) and others.
- Local Municipalities may also develop their own LID Guidelines, which would govern.
- On-site locations to be established in consultation with Region staff based on site characteristics and justified to the satisfaction of the Region and LAM.

# 5. SWM Guideline Highlights



*Bioretention Swale*

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# 5. SWM Guideline Highlights

**Low Impact Development practices:**

The selection and design of LID practices must consider site characteristics, including but not limited to:

- Local groundwater table elevation (seasonal maximum),
- Subsurface soil type(s) and associated permeability/infiltration capacity,
- Depth to bedrock,
- Sub-surface utility conflicts,
- Existing zoning and land use, including legacy contamination sites,
- Existing groundwater use including downgradient groundwater receptors (e.g., private wells, wetlands, source water protection areas, etc.), and
- Long term Operations and Maintenance requirements.

# 5. SWM Guideline Highlights

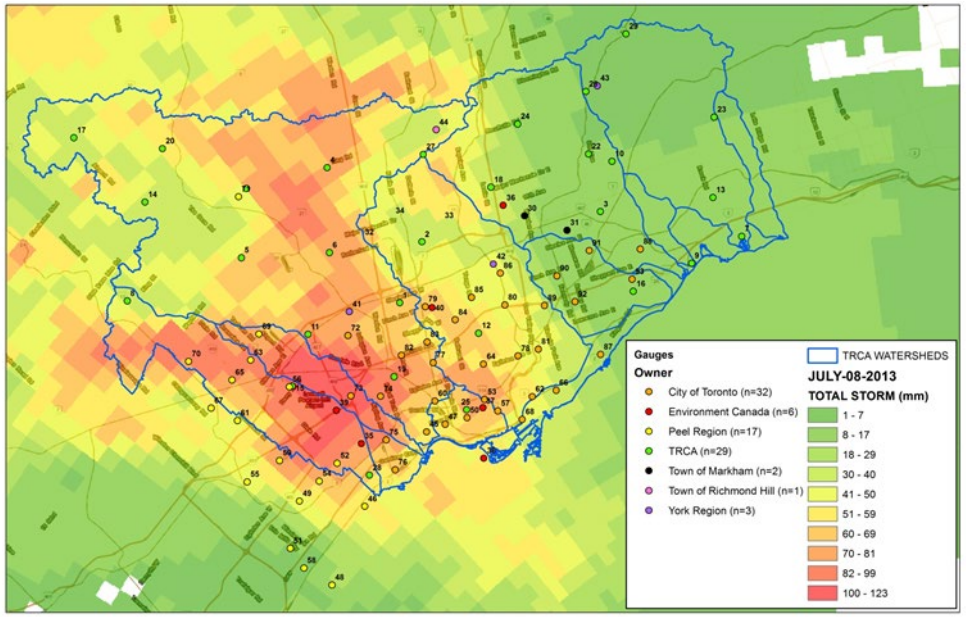
**Climate Change**

- Niagara Region acknowledges the potential impact that ongoing climate change is expected to have on meteorologic patterns.
- In Ontario, climate change is expected to result in more intense and severe rainfall events, occurring on a more frequent basis.
- Climate change science remains uncertain hence there is not a definitive recommendation with respect to rainfall data adjustment for design. As such Region advocates for a range of potential future rainfall trends, depending on numerous factors.

# 5. SWM Guideline Highlights

## Climate Change

- Predictive tools provide a range of potential future outcomes.
- Alternatively, “stress tests” (adjusting existing IDF by a percentage 10 to 20%) can be considered. Results of the stress tests can indicate where future problems are likely to occur in the system should rainfall intensities increase.
- Ultimately the owning municipality must determine an acceptable level of uncertainty and risk based on the range of potential impacts.




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# 5. SWM Guideline Highlights



**Runoff considerations**

Where impervious (hard) and pervious (permeable) areas are directly measured, the proponent must also account for anticipated amenity areas (i.e. areas beyond the rooftop, such as driveways, walkways, patios, etc.).

- Increasing densities
- Changes not necessarily reflected in current standards
- Impact on existing infrastructure

# 5. SWM Guideline Highlights

## Intensification Considerations

- Larger homes / footprints
- Severances
- Hard surface amenity areas:  Driveways, Patios, Walkways, Pools, Hardscaping





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# 5. SWM Guideline Highlights

## Intensification Considerations:




*47% Impervious*

*22% Impervious*
*Original Development*



*47% Impervious*

*67% Impervious*
*Redevelopment*

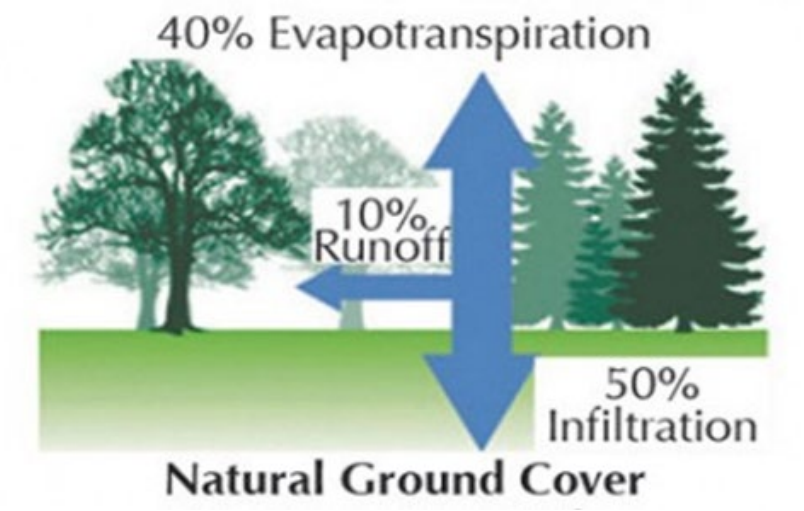
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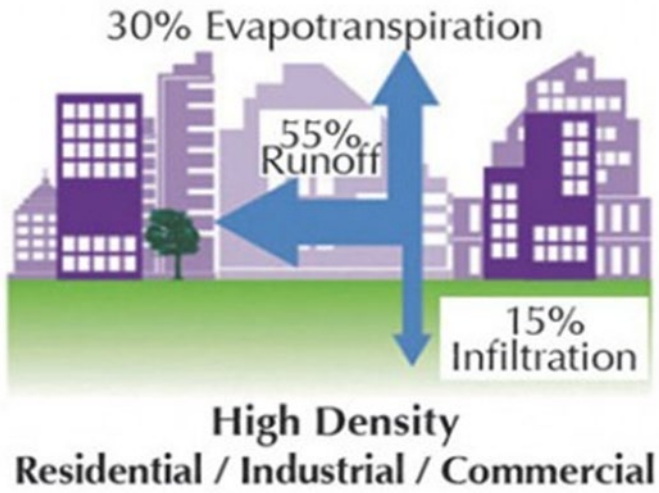
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# 5. SWM Guideline Highlights –
## Water Budgets

**Pre-Development**




**Post-Development**




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# 5. SWM Guideline Highlights

## Water Budgets

- Proponents need to maintain the site's water budget in accordance with the specified level of control outlined within governing studies.
- If these studies do not exist, proponents required to ensure that pre-development infiltration volumes are maintained under post-development conditions for the development site.
- Niagara Region supports the application of Green Infrastructure (GI) and Low Impact Development Best Management Practices (LID BMPs) to achieve these requirements.

# 5. SWM Guideline Highlights

## Water Budgets

- At a minimum, Niagara Region requires that proponents retain the first 5 mm of rainfall which lands on the site (i.e., zero runoff for the first 5 mm of rainfall).
- Where site constraints limit the ability to achieve these criteria, proponents must document the site constraints, and take a best-efforts approach to achieving the required criteria.



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# 5. SWM Guidelines - *Summary*

## Table of Contents


1.0 Introduction ..... 1
- 1.1 Stormwater Management Context ..... 1
- 1.2 Document Purpose ..... 1
- 1.3 Region Drainage System Context ..... 2
- 1.4 Integrated Approach ..... 4
  - 1.4.1 Overview ..... 4
  - 1.4.2 Planning and Design Process ..... 4
  - 1.4.3 The Ecosystem Approach ..... 5

2.0 Current Legislative Climate (Legislation, Acts, Regulations and Guidelines) ..... 7
- 2.1 Federal ..... 7
  - 2.1.1 Canadian Environmental Protection Act ..... 7
  - 2.1.2 Canadian Fisheries Act ..... 7
- 2.2 Provincial ..... 7
  - 2.2.1 Provincial Policy ..... 7
  - 2.2.2 Provincial Legislation ..... 9
  - 2.2.3 Provincial Agency Guidelines and Requirements ..... 13
- 2.3 Region of Niagara Policies ..... 13
  - 2.3.1 Niagara Region Official Plan ..... 13

3.0 Development Application Process, Roles and Responsibilities ..... 16
- 3.1 Planning and Servicing Studies ..... 16
  - 3.1.1 General Process ..... 16
  - 3.1.2 Tertiary Watershed Plans ..... 17
  - 3.1.3 Quaternary Watershed/ Subwatershed Studies ..... 18
  - 3.1.4 Master Servicing Plans/ Assimilative Capacity Studies ..... 19
  - 3.1.5 Functional Servicing Report ..... 20
- 3.2 Roles and Responsibilities ..... 21
  - 3.2.1 Potential Scenarios for Coordinated Review ..... 26
- 3.3 Relevant Stormwater Drainage Documents and Studies ..... 27


## Table of Contents


4.0 Stormwater Management Goals, Requirements and Technical Guidelines ..... 30
- 4.1 Goals/Objectives ..... 30
- 4.2 Key Issues and Results of Survey ..... 31
  - 4.2.1 Stormwater and Environmental Management ..... 31
  - 4.2.2 Climate Change ..... 33
  - 4.2.3 SWM Facility Maintenance ..... 34
- 4.3 Technical Guidelines ..... 34
  - 4.3.1 Analytical Methodology ..... 34
  - 4.3.2 Conveyance Systems ..... 52
  - 4.3.3 Stormwater Management ..... 57
  - 4.3.4 Erosion & Sediment Control ..... 57

5.0 Operation, Monitoring and Maintenance of Stormwater Management Measures ..... 63
- 5.1 Operation and Maintenance Program ..... 63
  - 5.1.1 Public ..... 63
  - 5.1.2 Private ..... 63
  - 5.1.3 Inspection Form Templates ..... 64
- 5.2 Monitoring Requirements ..... 64
  - 5.2.1 Public ..... 64
  - 5.2.2 Private ..... 67
- 5.3 Remediation ..... 67


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# 6. Open Discussion

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# 7. Next Steps

# 7. Next Steps

- Incorporate Public feedback into Draft SWM Guidelines
- Region, Technical Steering Committee and Development Industry representatives to review and comment
- Presentation to Region Planning & Development Services Committee – Early 2022
- Guidelines finalized subject to adoption by Region Council

January 12, 2022

**70% Draft Stormwater Management Guidelines**
**Comments Response Matrix – Public Webinar**

| # | Comments | Response |
|---|---|---|
| | **Webinar – October 5, 2021** | |
| 1. | If stormwater is going into municipal infrastructure/ditches and the municipality is looking at the water quality, what is the purpose of the Region also reviewing? It would appear that this would be a duplication. | There is an integrated approach proposed between the Region and municipalities. The local municipal review comments will govern, and there are representatives from each municipality on the technical steering committee. The Region will recommend the "enhanced" water quality objective of 80% total suspended solids removal on all projects in the Region and will recommend that Low Impact Development best management practices be considered. There has been general support from the local municipal members of the Technical Steering Committee. The Region will consult again with each of the municipal members of the TSC. |
| 2. | In many parking lots I see significant raingarden features. However, these raingardens virtually always to be elevated above the parking lots. Should not these features be re-designed to absorb some of the storm water generated by the actual paved parking area. | Agreed – there are Low Impact Development (LID) practices such as bioswales which can be designed within parking lots, and are typically below the parking lot grade, so as to receive sheet runoff from the parking area. |
| 3. | There appears to be no roof gardens in Niagara. Could by-laws be developed to require them as exist in Toronto. | While roof gardens may slow down runoff (it still ends up in the storm sewers) and provide a thermal benefit, they typically absorb limited amounts of rainwater and the biological plant uptake is also limited, hence there is minimal credit which may be given to them as stormwater management features. They are also expensive to construct and maintain. This limits the circumstances in which they may be practical. The Region does not propose to make them a requirement, however they will not prohibit them. There is a new green roof on the Canada Summer Games building by the Region offices. |
| 4. | There was only a passing reference to SWM outlets to IPZs. There are 3 IPZs in Niagara that potentially will receive new SWM outlets. Should there not be recognition of this potential, and who would be responsible for the review in these situations? | The Region supports this through a separate process, the Source Protection Plan prepared through the NPCA, which addresses the constraints associated with Intake Protection Zones IPZs. Any development in an IPZ is managed in a separate process. This document is for SWM in general, and will note that if the site outlets to a waterbody within an IPZ that the Region will provide further comment through the Source Protection Plan process. |
| 5. | Where new condo developments have "Stormceptor" oil & grit separators for stormwater infrastructure and condo boards are required to maintain and service these, is there any municipal or NPCA oversight where these discharge into Lake Ontario in close proximity (within 150' and the hazard overlay)? | In the development agreement with the local municipality, there may be requirements for reporting and maintenance. There is no Region oversight on private SWM infrastructure such as OGS units. The NPCA is responsible for reviewing outlets to regulated hazard lands, and mitigation of any impacts. |
| 6. | A lot of money is spent separating storm and sanitary sewers. In my work with the Niagara RAP, I learned that the Ministry of Environment believed that some of this money could be better spent on vegetative buffers to reduced phosphorous loadings. Could this be considered as part of this review. | Vegetated buffers are an approved LID practice and will be supported. There is work being done through the Official Plans and policies for water management, and the use of vegetated buffers. Vegetated buffers on water courses are considered a part of good land stewardship. The buffers can reduce the contaminant loading from surfaces. Separating combined sewers is intended to address overflows and point source pollution. Both are part of a multi-pronged approach to overall management. |

| # | Comments | Response |
|---|---|---|
| 7. | Requiring 5mm of rainwater capture seems so low---why not higher, so more LIDs "encouraged"? meet---what ##mm is required elsewhere? | The 5 mm is a minimum, in areas where there is no data. Where broader studies such as watershed plan exist, there would be updated numbers based on local soils. 5 mm is a significant amount, especially in clayey soils. A review of several Niagara, and Greater Toronto and Hamilton Area (Burlington, Mississauga, Toronto, Vaughan) municipalities determined that between 5 mm and 10 mm of capture is recommended, with some locations slightly higher. Lake Simcoe Conservation Authority in some instances has 25 mm required, where possible. Rainwater capture and reuse is site specific and related to existing soils which vary across the Region. LID practices are encouraged. |
| 8. | One additional benefit of roof gardens would be reducing beach closures, which take place from surge of storm water. Is there any discussion of beach closure problems in the strategy review? | No, these are stormwater management guidelines. This is not a strategy review. Beach closures and strategy reviews are separate issues, typically addressed in watershed and subwatershed plans. The Region Official Plan and Watershed Plan may offer some discussion on watershed management strategies. Beach closures are also often related to non-point source discharges. The Regional swm guidelines are intended for the municipalities to assess development applications and how they propose to address impacts of urban development. |
| 9. | What are the species at risk that could benefit from better storm water management. One might be the Grass Pickerel | Many aquatic and terrestrial species could benefit. The Province has a list of SAR identified in Niagara Region. |
| 10. | Could parkland dedication requirements be used to acquire natural storm water features. Currently, I believe that in Niagara they are just used for such purposes as ball pitches. | Yes parkland dedication may potentially include natural watercourse features. Municipalities may do a master plan which could include using existing parks for retroactive treatment. Under new development, Environmental Impact Studies are done that would identify areas that can be incorporated in protected Natural Heritage Systems. These require a source of water to sustain them. These natural areas are typically protected through secondary planning and subwatershed planning. This would occur earlier in the process than parkland dedication. |
| 11. | Not a question but a comment: A 5mm initial rainwater capture also has the benefit of retention of the "first flush" which has the highest level of contaminant content. | Noted. |
| 12. | How much is spent every year in separating storm and sanitary sewers? | Unknown. It varies by Municipality and Region. |
| 13. | Will the Region be offering incentives, or suggesting that lower tiers do, for LID BMP for new developments (i.e. reduction in DC's, community benefit offset for increased density or height)? Or will these be mandatory requirements to be incorporated into the pre-consultation MOU with municipalities for new development applications? | Incentives will not be offered as part of these SWM Guidelines. The Region currently focuses some of its incentives on brownfield development. Source controls should not require an incentive, it is part of a functional and sustainable water budget. These will become science-related requirements, as part of subwatershed planning. |
| 14. | Is it still possible under current guidelines to bury streams underground and put them in sewers? | Watercourses are either regulated by the NPCA, or smaller headwater features which are not regulated by the NPCA. Once defined as regulated, it may not be enclosed. Depending on the classification, watercourses can either be required to remain or can be realigned and enhanced. Larger headwater features can also remain or be realigned. Smaller features may be eliminated if their function is replicated. |

| # | Comments | Response |
|---|---|---|
| 15. | When was the last time a higher level stream was buried in Niagara. In West St. Catharines there were two areas that were actually identified as environmental protection areas, in the official plan, rezoned and buried in the 1980s. | Unknown. |
| 16. | LIDs , Climate Change Adaptation and other Best Practices I think are great from a project to project level. I understand the watershed and subwatershed guide in a draft form. Any development to this end. | Region watershed plan is proposed to be released in 2022. |
| 17. | Green Infrastructure and LID – how will it be promoted, not just encouraged, to get best for the environment. | The Region supports the use of GI and LIDs and the responsibility lies with the owner, be it the Region or the local municipality. The Region is working on developing standards for the use and maintenance of GI and LID measures. Others, such as the Town of Lincoln, are developing their guidelines. |
| 18. | Does the Region support underground storage tanks? | Yes, subsurface tanks are an approved form of stormwater quantity control. They tend to be expensive and have long-term maintenance concerns and costs. They are not widespread, but are used in areas where land is very expensive. |

# APPENDIX

# E MODIFIED RATIONAL METHOD EXAMPLE

## Modified Rational Method

5 Year Rainfall
IDF Parameters

| | |
|---|---|
| a | 1349.0 |
| b | 8.00 |
| c | 0.8400 |

Site Parameters

| | | |
|---|---|---|
| C = | 0.61 | |
| $Q_{Allow}$ = | 0.022 | $m^3/s$ |
| A = | 0.3662 | ha |
| $T_c$ = | 10 | min |

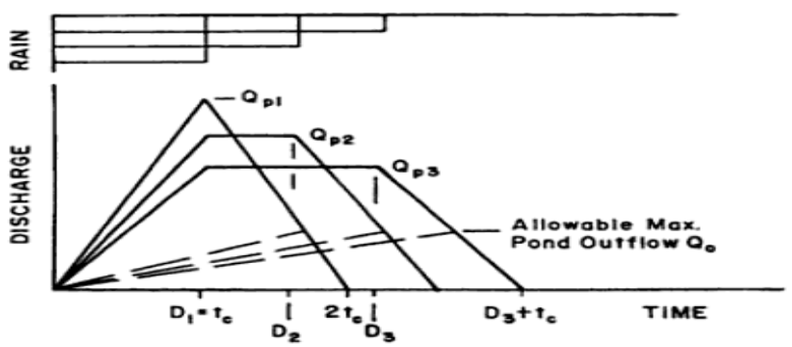
| | | | Runoff Volume | Release Volume | Required |
|---|---|---|---|---|---|
| **Time** | **Intensity** | **Peak Discharge** | **Trapezoidal Hydrograph Vol.** | **Triangular Hydrograph Vol.** | **Storage Volume** |
| $T_d$ | $I_{(Td)}$ | $Q_{post}$ | (Td -Tc)Qpost +TcQpost | $Q_{Allow}$ x ($T_d$+$T_c$) /2 | S |
| (min) | (mm/hr) | ($m^3/s$) | ($m^3$) | ($m^3$) | ($m^3$) |
| 5 | 156.4 | 0.097 | 29.1 | 9.9 | 19.22 |
| 10 | 119.0 | 0.074 | 44.3 | 13.2 | 31.11 |
| 15 | 96.9 | 0.060 | 54.1 | 16.5 | 37.59 |
| 20 | 82.1 | 0.051 | 61.1 | 19.8 | 41.34 |
| 25 | 71.5 | 0.044 | 66.6 | 23.1 | 43.47 |
| 30 | 63.5 | 0.039 | 71.0 | 26.4 | 44.56 |
| 35 | 57.3 | 0.036 | 74.6 | 29.7 | 44.92 |
| 40 | 52.2 | 0.032 | 77.8 | 33.0 | 44.75 |
| 45 | 48.0 | 0.030 | 80.5 | 36.3 | 44.19 |
| 50 | 44.5 | 0.028 | 82.9 | 39.6 | 43.31 |
| 55 | 41.5 | 0.026 | 85.1 | 42.9 | 42.18 |
| 60 | 39.0 | 0.024 | 87.0 | 46.2 | 40.85 |
| 65 | 36.7 | 0.023 | 88.8 | 49.5 | 39.34 |
| 70 | 34.7 | 0.022 | 90.5 | 52.8 | 37.70 |
| 75 | 33.0 | 0.020 | 92.0 | 56.1 | 35.93 |
| 80 | 31.4 | 0.019 | 93.5 | 59.4 | 34.06 |
| 85 | 30.0 | 0.019 | 94.8 | 62.7 | 32.10 |
| | **Max. Required Storage:** | | | | 44.9 $m^3$ |

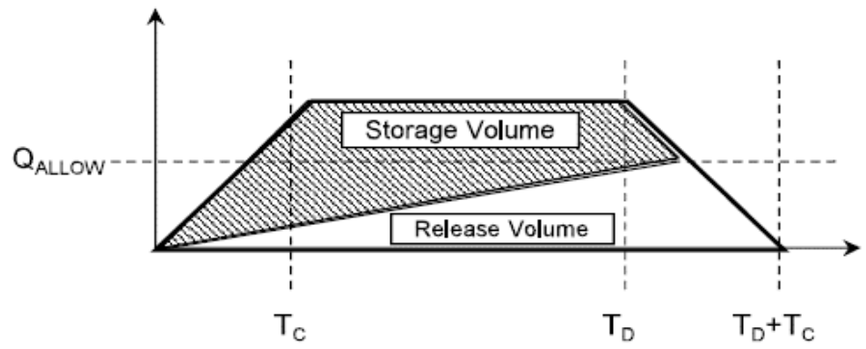
Peak Flow
$Q_{post}$ = 0.00278 x (C i A)
(Rational Method)

Runoff Volume = (Td -Tc)$Q_{post}$ +Tc$Q_{post}$
(Area under trapezoidal hydrograph)

Release Volume = 1/2 (Td +Tc) $Q_{Allow}$
(Area under triangular outflow hydrograph)

Required Storage Volume
S = Runoff Volume - Relase Volume



# APPENDIX

F

# BACKGROUND REVIEW FOR CHLORIDES, PHOSPHORUS AND WATER BUDGET

## Introduction

Stormwater management (SWM) includes elements of quantity, quality and erosion control in order to preserve and maintain the safety, ecological integrity and function of local watersheds. A vital component of maintaining sufficient water quality, is the management and control of urban stormwater runoff and the associated contaminants, such as chlorides (i.e. winter road salt) and phosphorous. These contaminants are known to be a threat to aquatic ecosystems and degrade drinking water sources.

In order to better understand how these contaminants can be managed and controlled, a background review of existing policy and guidelines within Southern Ontario has been completed. This includes a review of municipal and conservation authority SWM guidelines, with a focus on defined contaminant management strategies and targets (chlorides and phosphorous). The following sections include excerpts and links to the relevant documents.

## Chlorides

### Environment Canada. 2004. Best Management Practices for Salt Use on Private Roads, Parking Lots and Sidewalks

It is recommended that best management practices be selected according to the following objectives:

- Salt Storage: The objective is the prevention or control of releases from existing and new sites. In pursuing this objective, the following practices should be considered: coverage of salt piles and blended salt-sand piles, handling practices that avoid uncontrolled releases, drainage management, wash water collection and treatment, training of personnel, and monitoring of the effectiveness of the facility.
- Snow Disposal: The objective is the control of releases from existing and new sites. In pursuing this objective, the following practices should be considered: location and construction of the sites to take into account operational and environmental factors, drainage management, training of personnel and monitoring of the effectiveness of the facility.
- Salt Application: The objective is the reduction of the negative impacts of road salts by delivering the right amount of road salts in the right place at the right time. In pursuing this objective, consideration should be given to using the most recent advancements in the application of winter maintenance anti-icing and de-icing materials, winter maintenance equipment, and road weather information and other decision support systems. As well, the training of personnel and the monitoring of the effectiveness of road salt application techniques should be considered.

https://www.canada.ca/en/environment-climate-change/services/pollutants/road-salts/code-practice-environmental-management.html#s04

**Guidelines on Snow Disposal and De-icing Operations in Ontario, Government of Ontario, (Publication PIBS8271e), February 2011.**

The Ministry promotes the sensible and conservative use of road salt and concur with the following operational guidelines, which have been designed after practices in a number of Ontario municipalities:

- Reduce salt application rates to the minimum amount necessary to successfully do the job.
- Employ rate-controlled salt distribution equipment which operates independently of the vehicle's speed.
- Salt only main thoroughfares and critical sections of other roadways, such as inclines, intersections, crosswalks, etc.
- Where salt and sand mixtures are applied (usually in northern municipalities and on rural roads) incorporate into the admixture only enough salt to achieve the desired results.

https://www.ontario.ca/page/guidelines-snow-disposal-and-de-icing-operations-ontario

**Lake Simcoe Region Conservation Authority**

***Technical Guidelines for Stormwater Management (SWM) Submissions***

Winter salt is detrimental to freshwater aquatic species, in particular, Redside Dace (Clinostomus elongatus) which have endangered species status the Ontario Endangered Species Act, 2007. The South Georgina Bay Lake Simcoe Source Protection Plan (January 26, 2015) has also identified road salt as a prescribed drinking water threat.

Winter salt dissolves in water and enters natural water systems via infiltration to groundwater, runoff to surface water and through stormdrains. The salt remains in solution and there are currently no viable options for removal from stormwater.

Recent studies conducted within the LSRCA watershed have shown that, due to winter salting practices, SWM wet ponds can become stratified and the coolest water that is released from the bottom also has the highest salt concentration. Therefore, in order to minimize potential salt concentrations and provide some thermal mitigation, LSRCA requires the use of submerged outlets which are to be located approximately at the midpoint of the permanent pool depth, and a minimum of 0.6m from the bottom of the facility, and 1.0m below the surface of the permanent pool. A multiple outflow configuration that blends flow from the top and bottom of the permanent pool between the depths noted above is preferred.

Note: The outlet configuration is also subject to other agency approval.

In general, the design of roads and parking lots is to be done in such a manner that the need for excess salt use is minimized. This can be facilitated through the development of a salt management plan. A partial list of design practices includes proper location of snow storage, use of deciduous plants to reduce winter shading, permeable pavement, minimal road grades at intersections and rougher pavement. Infiltration systems are to be designed in accordance with applicable Source Water Protection requirements.

https://www.lsrca.on.ca/Shared%20Documents/permits/swm_guidelines.pdf

***Parking Lot Design Guidelines***

When parking lots are designed with winter maintenance in mind, they naturally require less salt application to maintain the same level of service without increasing liability. Using less salt in parking lots will help to mitigate anticipated chloride increases in local watercourses as urban development continues.

To assist with this goal, LSRCA and our partner agencies have developed 'Parking Lot Design Guidelines to Promote Salt Reduction'. They include design features, site plans, template municipal policies, and next steps intended for use by designers, regulatory agencies, owners, contractors, amongst others. The guidelines and associated documents and drawings are available for download.

https://www.lsrca.on.ca/Pages/Parking-Lot-Design-Guidelines.aspx

**Phosphorous**

**Lake Simcoe Region Conservation Authority (LSRCA)**

***Technical Guidelines for Stormwater Management (SWM) Submissions***

The high phosphorus levels in Lake Simcoe have led to excessive growth of plants and algae. Stormwater contributes a significant amount of phosphorus into the tributaries and the lake and therefore this loading needs to be controlled.

An application for ***major development*** shall be accompanied by a stormwater management plan that demonstrates through an evaluation of anticipated changes in phosphorus loadings, between ***pre-development*** and ***post-development***, how the loadings from the proposed ***development*** shall be minimized (Refer to the Lake Simcoe Protection Plan, 2009). An area load method kilogram per hectare per year (kg/ha/yr) is to be utilized to compare existing load under ***pre-development*** conditions versus the total ***post-development*** load with / without quality controls.

In addition to the above, the removal of 80% of the annual Total Phosphorus (TP) load from all ***major development*** areas will be required.

For the purposes of phosphorus loading calculations, the phosphorus removal rates recommended in the MOECC's Lake Simcoe Phosphorus Loading Development Tool, January 12 2012 (or subsequent versions) can be used. Typical MOECC accepted removal rates for commonly used end-of-pipe facilities in the January 2012 version are as follows: Wet Ponds = 63%, Constructed Wetlands = 77%. Additional removal rates are listed in Appendix E. If different phosphorus removal rates are used for the BMP's listed in the MOECC document as well as other stormwater quality control devices, not listed, these rates must be based on the results of third party field studies of the BMP, acceptable to the LSRCA.

**General LSRCA Approaches to Phosphorous:**

- ***Continued monitoring*** - We continue to monitor the phosphorus sources throughout our watershed. Monitoring helps better understand how wet and dry years impact our management plans and how we can adapt to new challenges.
- ***Phosphorus offsetting policy*** – This is a first-of-its-kind policy in Canada and was developed specifically to control phosphorus from new development. As of January 1, 2018, any new development in the watershed is required to control 100% of the phosphorus leaving the property.
    - If 100% of the phosphorus can't be managed on the site, then developers must pay a fee so that projects to "offset" the phosphorus can be completed elsewhere in the subwatershed. Fees collected for offsets are at a 2.5:1 ration, meaning, for every 1 kg. of phosphorus that can't be controlled, the property developer must pay for 2.5 kgs. to be controlled elsewhere. Over time, the restoration projects that are implemented with offset fees, will allow a greater reduction of phosphorus overall.
    - Some of the types of restoration projects to reduce phosphorus can include engineered wetlands and stormwater pond retrofits.
- ***Retrofitting stormwater management*** **-** We encourage retrofitting stormwater ponds because we now know how to incorporate retrofits that lessen their phosphorus contributions to the lake. Older stormwater management ponds were designed to address stormwater quantity, not quality. Retrofitting a pond like this would incorporate both water quantity and quality into the design.
- ***Low Impact Development*** - We promote better stormwater management through the use of sustainable low impact development (LID) practices which can be applied to new undeveloped lands as part of the subdivision process, and to existing developed lands through retrofitting. Low impact development techniques such as raingardens, bioswales, green roofs, permeable pavement and dry ponds can be used to manage a significant amount of phosphorus in new developments.

- ***Plantings*** - We plant trees along streambanks to prevent erosion. This keeps the soil intact, slows water velocity which reduces erosion and allows a portion of the water to infiltrate into the ground rather than run-off directly in the stream.

**LSRCA – Phosphorous Offsetting Policy (LSPOP) Summary**

- LSPOP requires that all new development must control 100% of the phosphorus from leaving their property. This is referred to as the Zero Export Target, a key component of the LSPOP that ensures new development or redevelopment activities do not continue to contribute to phosphorus loading to Lake Simcoe.
- Under this Policy, as new urban growth occurs phosphorus loads will be controlled to the maximum extent possible using the best available control technology within the development itself in compliance with the MOECC Stormwater Guidelines and the LSRCA Watershed Development Guidelines, whichever is most stringent.
- Any remaining stormwater phosphorus load that cannot be controlled would trigger the need for a financial offset to achieve a net zero target through water quality improvements elsewhere in the watershed. An offset ratio of 2.5:1 would be applied meaning that 2.5 kg of phosphorus per year would be removed for every 1 kg required to be offset from the development site.
- The offset measures would consist of phosphorus load reduction through the use of Low Impact Development (LID) techniques and the retrofit of existing stormwater discharges elsewhere in a sub-watershed or in adjacent sub-watersheds.

https://www.lsrca.on.ca/Shared%20Documents/Phosphorus_Offsetting_Policy.pdf

**City of Barrie – Storm Drainage and Stormwater Management Policies and Design Guidelines**

In accordance with the aforementioned LSRCA Guidelines:

- As per Ontario Regulation 219/09 regarding water quality and phosphorus loading to Lake Simcoe, all new SWM facilities shall provide as a minimum the Enhanced level of protection as specified in the Stormwater Management Planning and Design Manual (MOE, 2003)
- In addition, it shall be demonstrated that through an evaluation of anticipated changes in phosphorus loadings between pre-development and post-development conditions how the phosphorus loadings shall be minimized.
- Emerging Technologies in Stormwater Management (Phosphorous Control):
  - Dead Storage/Quiescent Treatment Ponds
  - Submerged Aquatic Vegetation (SAV) Dominated Treatment Wetlands
  - Phoslock™

https://www.barrie.ca/City%20Hall/Planning-and-Development/Engineering-Resources/Documents/City-Standards/Storm-Drainage-and-Stormwater-Management-Policies-and-Design-Guidelines.pdf

**City of London – Stormwater Management Guidelines**

- The City of London is committed to the Lake Erie Action Plan aiming to reduce phosphorus loadings to Lake Erie by 40% before 2025 and a 20% phosphorus loading reduction by 2020. Stormwater systems, including but not limited to, at source controls, are recommended to be considered and included in the planning and design of stormwater management systems for their role in trapping, storing and processing phosphorus
- Stormwater activities with the potential to adversely affect groundwater may require provincial approval. Infiltration based stormwater features shall not be used to infiltrate runoff from high risk site activity area or within a contaminated site. For runoff from areas with high chloride loading, consideration for the potential salt loading to the downstream receiver should be considered to mitigate degradation of both surface water and groundwater quality

https://www.london.ca/business/Resources/Consultant-Resources/Documents/2019-Specs-and-Reqs/06-StormwaterManagement.pdf

**Domestic Action Plan (DAP) – City of London**

***A Proposal for Phosphorous Reduction***

Excessive phosphorous loading into Lake Erie can significantly degrade overall water quality and cause undesirable outcomes such as low oxygen zones and excessive plant growth which ultimately trigger toxic and nuisance algal blooms in the lake. To overcome these negative outcomes and improve the health of the Lake Erie Basin, important targets, including a 40% reduction in spring loads of total phosphorous and soluble reactive phosphorous for priority tributaries has been set. The Thames River is one of the largest tributaries which feeds into Lake St. Clair and ultimately, into Lake Erie. The City of London is the largest municipality within the Thames River Watershed.

Along the Thames River, approx. 15% of the phosphorous loads are thought to originate from urban sources. Point sources, such as treated wastewater effluence, have a higher soluble reactive phosphorous content than non-point sources (i.e. agricultural), which is a primary driver for algae growth. These point sources are also easier to quantify and implement technologies to help mitigate or reduce phosphorus loadings; however, improvements to these point sources are generally only achieved at a high cost.

The City of London has committed to a Domestic Action Plan (DAP) to implement several best practices in order to achieve an ambitious goal to reduce phosphorus loading by 40% from 2008 levels by 2025. The components of the DAP: London include the following management elements:

- Leader in Watershed Monitoring
- Enhanced Wastewater Treatment
- Combined Sewer Replacement
- Sewer System Overflow Reduction
- Low Impact Development Rollout
- Stormwater Management Facility Retrofits

https://www.london.ca/residents/Environment/environmental-initiatives/Pages/Lake-Erie-Action-Plan-.aspx

**Water Budget**

**Lake Simcoe Region Conservation Authority (LSRCA)**

***Technical Guidelines for Stormwater Management (SWM) Submissions***

Any works that meet the major development definition outlined in the Lake Simcoe Protection Plan or that results in site disturbance that creates 0.5 hectares of new impervious surface or fully reconstructs 0.5 hectare or more of impervious surface, should meet the following control requirements. If full compliance is not possible due to any of the factors listed at the end of Section 2.2.2.2, the site would be considered a “site with restrictions” and as such, the Flexible Treatment Alternatives referred to in Section 2.2.2.2 will apply.

Volume reduction techniques considered may include infiltration, reuse and rainwater harvesting, canopy interception, evapotranspiration and/or additional techniques. Higher priority shall be given to BMPs / LIDs that include volume reduction. Secondary preference is to employ filtration techniques, followed by rate control BMPs. The recommendations of hydrogeotechnical reports and environmental impact studies need to be considered as part of any design and may override the requirements listed in this section:

**New development volume control**

For new, nonlinear developments that create more than 0.5 hectares of new impervious surface on sites without restrictions, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be captured and retained / treated on site from a 25 mm rainfall event from the total impervious area.

**Redevelopment volume control**

Nonlinear redevelopment projects on sites without restrictions that create 0.5 or more hectares of new and/or fully reconstructed impervious surfaces shall capture and retain / treat on site the runoff from a 25 mm rainfall event from the new and/or fully reconstructed impervious surfaces.

**Linear development volume control**

Linear development on sites without restrictions that create 0.5 or greater hectares of new and/or fully reconstructed impervious surfaces, shall capture and retain / treat on site, the larger of the following:

i. The runoff from a 12.5 mm event from the fully reconstructed impervious surface and newly constructed impervious area.
ii. The runoff from a 25 mm event from the net increase in impervious area on the site.

If a proposed road is within a subdivision (i.e. future or proposed subdivision on at least one side of the road), it would be classified as being part of a major development such that the nonlinear criteria would apply. If it is a road that connects between two major developments (i.e. no proposed lots on either side of the road), the linear development criteria would apply.

https://www.lsrca.on.ca/Shared%20Documents/permits/swm_guidelines.pdf

**Conclusion**

Contaminant management policy and guidelines have been successfully adopted and implemented within Southern Ontario. With respect to chloride management, there is currently no viable option for removing chloride once it's been dissolved into stormwater. The preferred approach to managing chloride concentrations in local water resources, is through prevention via design (i.e. roadways and parking lots requiring less salt use) and best management practices for salt use. SWM facilities can provide benefits by diluting chlorine concentrations discharging to the receiving watercourse and can be designed to limit the release of chloride-laden water typically found at the bottom of a facility. Additionally, certain planting options can provide further benefit through nutrient uptake.

Phosphorous reduction policy is prevalent within watersheds for which lake eutrophication is a primary concern, which includes the regions of Lake Simcoe and Lake Erie. These agencies have explicit guidelines / requirements in order to achieve their respective phosphorous reduction targets, which can be achieved through extensive monitoring, wastewater treatment, LID source controls, and SWM facility retrofits.

The LSRCA has set a requirement for 100% control of phosphorous leaving a site for a net zero target, which may be supplemented through development fees to provide phosphorous control elsewhere in the watershed. The level of control provided by the design is required to be documented and supported through all SWM submissions. In addition to the phosphorous SWM criteria, the LSRCA also requires a 25 mm runoff volume capture, retention and treatment on-site for all new developments. Accommodations can be made to the required volume depending on the site conditions, however, these must be documented, supported and approved for the exemption.

We hope this background review of existing SWM contaminant management policy / guidelines can provide further insight into the available options and help to inform future SWM guidelines as appropriate for the Region of Niagara.