Technical Memorandum

To: Sean Norman, Senior Planner, Niagara Region

From: North-South Environmental Inc. and Meridian Planning Consultants

Date: April 12, 2021

File: Niagara Region Natural Environment Work Program

Re: Preliminary Policy Intent for the Natural Environment System in the Region's Settlement Areas & Discussion on Implications

Introduction

As part of the new Niagara Official Plan (N.O.P.) the Region will be developing new policies and mapping for the Region's natural environment systems (N.E.S.). The N.E.S. is made up of the natural heritage system (N.H.S.) and the water resource system (W.R.S.); these systems rely on and support each other and have overlapping components (e.g., provincially significant wetlands) that collectively form the integrated N.E.S. The N.E.S. provides a holistic systems-based approach to natural environment planning and protection of environmental features and areas.

In order to inform the development of options for the policies and mapping of the N.E.S., two discussion papers and two technical reports were completed in Phases 2 and 4 of the Natural Environment Work Program:

- Mapping Discussion Paper – September 2019
- Watershed Planning Discussion Paper– September 2019
- Technical Report #1: Natural Environment Background Study – September 2019
- Technical Report #2: Identification and Evaluation of Options for Regional Natural Environment Systems(s) – June 2020.

Through consultation with stakeholders and members of the public as part of the 1st and 2nd Point of Engagement, completed in Phase 3 and 5 respectively, the topics reviewed in these documents and the options developed for the N.E.S. were discussed. The identification and

review of options prepared as part of Technical Report #2 was intended to allow for an evaluation of the options at a conceptual–level in order to engage with stakeholders and the public through the 2nd Point of Engagement and received feedback and direction on a preferred option. Technical Report #2 and the 2nd Point of Engagement were intended to set the direction for the N.H.S. and W.R.S. This is a fundamental step to ensure staff have the direction and general intent of the N.H.S. and W.R.S. established and supported by Council before the detailed mapping and policy development occurs.

However, after the 2nd Point of Engagement it became clear that Council and other stakeholders were seeking additional details on each of the options to assist with making a decision on which option should be selected, as it relates to settlement areas, which is where Provincial policy also directs the majority of expected growth to occur.

To satisfy this request, the Region has engaged the consultant team to assist in completing additional analysis on each of the options for the N.H.S. and W.R.S. This additional work includes identifying a policy intent for the options of the N.H.S. and W.R.S., establishing a preliminary methodology and criteria for to identify each feature-type (Appendix A) and providing mapping and detailed statistics for comparison of each option as they apply to urban areas.

The policy intent of each option is intended to further inform Council on the differences between the options. It is intended that the results of the more detailed mapping, statistics and policy intent for each option will be presented to the Planning and Economic Development Committee (P.E.D.C.) in early 2021 to support the selection of the preferred N.H.S. and W.R.S. options.

The purpose of this Technical Memorandum is to review a number of policy approaches to protecting ‘natural heritage features and areas’ of the N.H.S. and components of the W.R.S. in the Region's settlement areas (which includes the Urban Areas) for consideration as part of the policy framework for the new Niagara Official Plan (N.O.P.).

In developing these options, guidance is provided in Provincial policy documents including the Provincial Policy Statement (P.P.S.), the Greenbelt Plan and the Growth Plan. The policies in these documents establish direction for the identification and protection of ‘required’ components and the identification of ‘optional’ components; based on this direction Technical Report #2: Identification and Evaluation of Options for Regional Natural Environment System(s), identified options for the N.H.S. and W.R.S. with a general policy framework. This Technical Memorandum provides more specific policy intent for the protection of components of the N.H.S. and the W.R.S. within each of the options identified in Technical Report #2 for the Region's settlement areas.

Natural Heritage System Policy Intent

Technical Report #2 identified three main options for the N.H.S. across the Region:

- Option 1 – Required Standards – Overlay
- Option 2 – Required Standards – Designation
- Option 3 – Going Beyond the Required Standards

Option 1 implements Provincial Policy in a manner that achieves Provincial standards. This option treats 'natural heritage features and areas' throughout the Region as an overlay. Linkages would not extend beyond the two Provincial N.H.S.s.

Option 2 is similar to Option 1, but designates the same 'natural heritage features and areas' in an exclusive land use designation.

Option 3 exceeds Provincial standards (per the P.P.S.) by including sub-options (3A, 3B and 3C) which provide greater protections for significant woodlands and which includes an increasing number of optional components, linkages, and enhancements.

One of the optional components in some of the N.H.S. options identified in Technical Report #2 was 'other wetlands' (i.e., evaluated non-provincially significant wetlands and unevaluated wetlands). All wetlands (i.e., Provincially Significant Wetlands, evaluated non-provincially significant wetlands and unevaluated wetlands) are identified as key hydrologic features in the Growth Plan and a required component of the W.R.S. The N.H.S. and W.R.S. collectively make up the N.E.S., as such, the required component of one system cannot be considered an optional component to another system; when taken together, the required components of the N.E.S. should reflect the required components of both systems as a minimum standard. Therefore, to more accurately reflect minimum requirements of the N.E.S., 'other wetlands' are no longer included as an 'optional' component of the N.H.S. since they are a required component of the W.R.S. It is noted however that there is more flexibility in how evaluated non-provincially significant wetlands and unevaluated wetlands are dealt with from a development and site alteration perspective within settlement areas than outside settlement areas, where development and site alteration is prohibited in all wetlands by the Growth Plan. This is reflected in the policy discussion related to 'other wetlands'.

Common Base Assumptions for N.H.S. Options 1, 2, 3A, 3B and 3C in Settlement Areas

1. Growth Plan N.H.S. policy framework and mapping does not apply.
2. Greenbelt Plan N.H.S. policy framework and mapping does not apply.

3. Key hydrological features policies in Growth Plan do not apply.
4. Development and site alteration policies of the P.P.S. apply to identified ‘natural heritage features and areas’ and apply in settlement areas.
5. Development and site alteration within fish habitat and the habitat of endangered and threatened species would be in accordance with provincial and federal requirements.
6. Provincially Significant Wetlands (P.S.W.s), which are a natural heritage feature and areas as defined by the P.P.S., and key hydrologic features as defined by the Growth Plan, are also regulated by the Niagara Peninsula Conservation Authority (N.P.C.A.) and protected from development.
7. N.P.C.A. policies currently restrict most forms of development within 30 metres of P.S.W.s; however, exceptions can be considered and reliance will be placed on the N.P.C.A. policy framework (with the exception of the off-setting permissions) to determine buffer requirements.
8. Buffers could be required to demonstrate no negative impact and there would still be a need to determine 'adjacent lands' width to satisfy P.P.S. no negative impact policy on adjacent lands as it relates to all ‘natural heritage features and areas’ that are subject to the P.P.S.

Common Base Policy Intents for N.H.S. Options 1, 2, 3A, 3B and 3C

1. To ensure that ‘natural heritage features and areas’ identified in P.P.S. are protected.
2. To ensure that P.P.S. policies on where development and site alteration is not permitted is implemented in the new N.O.P.
3. To ensure that N.O.P. policies on development and site alteration within and adjacent to all wetlands are aligned with N.P.C.A. policies and regulations (with the exception of offsetting, which will not be permitted in the new N.O.P.).

N.H.S. Option 1 - Required Standards – Overlay in Settlement Areas

Assumptions

1. Identifies ‘natural heritage features and areas’ as an “overlay” to a land use designation. The “overlay” would prohibit development affecting certain features and would require the 'no negative impact test' be satisfied for certain other features and areas.

Policy Intent

1. To protect significant features and areas where development is restricted in accordance with the P.P.S.

2. To ensure consistency with P.P.S. policies on where development and site alteration is permitted (feature and adjacent lands) subject to the no negative impact test.
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an overlay designation to provide flexibility on study requirements and to recognize the underlying land use designation.

Components of the N.H.S. within Settlement Areas

The following features would be considered 'natural heritage features and areas':

- Significant wetlands;
- Significant coastal wetlands;
- Habitat of endangered species and threatened species;
- Fish habitat;
- Significant areas of natural and scientific interest;
- Significant valleylands;
- Significant woodlands; and
- Significant wildlife habitat.

Development and site alteration within fish habitat and the habitat of endangered and threatened species would be in accordance with provincial and federal requirements. There is a small area of Niagara Escarpment Plan (N.E.P.) Escarpment Natural Area that is located on the escarpment in St. Catharines. Within the Escarpment Natural Area and Escarpment Protection Area designations, Habitat of Special Concern Species would also be considered a natural heritage feature and area. In addition, wetlands (including Provincially significant wetlands and non-Provincially significant wetlands), life and earth science areas of natural and scientific interest (A.N.S.I.s) and significant woodlands would be identified on lands subject to the N.E.P.

Buffers of any kind adjacent to 'natural heritage features and areas' in settlement areas would not be mapped, since there are no standard buffer requirements in the P.P.S. nor the N.E.P. Instead, it is anticipated that through the completion of an impact study, buffers may be required to demonstrate no negative impact in accordance with the P.P.S. In addition, it is also recognized that the N.P.C.A. may require setbacks from Provincially significant wetlands (among other regulated features and areas included in the W.R.S.) in accordance with their policies.

N.H.S. Option 2 – Required Standards - Designation in Settlement Areas

Assumptions

1. Include features and areas in an exclusive land use designation. The designation would prohibit development within certain features and would require the 'no negative impact test' be satisfied for other features and areas.

Policy Intent

1. To protect significant features and areas where development is restricted in accordance with the P.P.S.
2. To ensure consistency with P.P.S. policies on where development and site alteration is permitted (feature and adjacent lands) subject to the no negative impact test.
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an exclusive land use designation.

Components of the N.H.S. within Settlement Areas

This option would include the same natural features and areas as Option 1. The only difference between Options 1 and 2 is that the natural features and areas within Option 1 would be included within an overlay designation whereas they would be included in an exclusive land use designation in Option 2.

Natural Heritage System Options 3A, 3B and 3C in Settlement Areas

N.H.S. Option 3 builds on N.H.S. Option 2 by establishing three scenarios that progressively exceed standard provincial requirements. Within settlement areas in Options 3A, 3B and 3C, development would be prohibited in significant woodlands as it is for significant wetlands (see a discussion on woodlands and rationale for the policy prohibition for significant woodlands in **Appendix B**). Additional areas are added in Option 3B and both additional component features and areas and small linkages are added in Option 3C.

N.H.S. Option 3A

Assumptions

1. Include features and areas in an exclusive land use designation. The designation would prohibit development within certain features and would require the 'no negative impact test' be satisfied for other features and areas (same as Option 2).

2. Development and site alteration would also be prohibited in significant woodlands as it would be for P.S.W.s (more restrictive than Options 1 and 2).

Policy Intent

1. To protect significant features and areas where development is restricted in accordance with the P.P.S. (same as Options 1 and 2).
2. To ensure consistency with P.P.S. policies on where development and site alteration is permitted (feature and adjacent lands) subject to the no negative impact test (same as Options 1 and 2).
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an exclusive land use designation (more restrictive than Option 1 but same as Option 2).
4. To protect significant woodlands from development and site alteration and restrict any modifications to their boundaries (more restrictive than Options 1 and 2).

Components of the N.H.S. within Settlement Areas

Option 3A would include the same natural features and areas as Option 1 and 2. The primary difference is that development is prohibited in significant woodlands as opposed to meeting the test of no negative impact, which is how significant woodlands are dealt with in Options 1 and 2.

N.H.S. Option 3B

Assumptions

1. Include features and areas in an exclusive land use designation. The designation would prohibit development within certain features and would require the 'no negative impact test' be satisfied for other features and areas (same as Options 2 and 3A).
2. Development and site alteration would also be prohibited in significant woodlands as it would be for P.S.W.s (more restrictive than Options 1 and 2 but the same as Option 3A).
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an exclusive land use designation (same as Option 2 and 3A).
4. Certain 'other natural heritage features and areas' (restricted to 'other woodlands') would be identified in an exclusive land use designation and would be subject to the no negative impact test (more restrictive than Options 1, 2 and 3A).

Policy Intent

1. To protect significant features and areas where development is restricted in accordance with the P.P.S. (same as Options 1, 2 and 3A).
2. To ensure consistency with P.P.S. policies on where development and site alteration is permitted (feature and adjacent lands) subject to the no negative impact test (same as Options 1, 2 and 3A).
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an exclusive land use designation (more restrictive than Option 1 but same as Options 2 and 3A).
4. To protect significant woodlands from development and site alteration and restrict any modifications to their boundaries (more restrictive than Options 1 and 2 but same as Option 3A).
5. To identify certain 'other natural heritage features and areas' (restricted to 'other woodlands'), include them in an exclusive land use designation and require that the no negative impact test be applied to recognize the role these features and areas play in supporting a resilient N.H.S. (more restrictive than Options 1, 2 and 3A).

Components of the N.H.S. within Settlement Areas

Option 3B would include the same natural features and areas as Option 1 and 2 and 3A, with the addition of 'other woodlands' (see discussion of woodlands in **Appendix B**).

Note: 'Other woodlands' have been moved from the category of 'supporting features and areas' into the category of 'other natural heritage features and areas' following a review of, and recommended changes to, the definition of woodland and criteria related to the identification of significant woodlands in Niagara Region. The review of the woodland definition, recommendations for revisions and the rationale for making these revisions, and the discussion of significant woodlands is provided **Appendix B** of this Technical Memorandum. As a result, 'other woodlands' are now introduced in Option 3B as opposed to Option 3C as they were previously.

N.H.S. Option 3C

Assumptions

1. Include features and areas in an exclusive land use designation. The designation would prohibit development within certain features and would require the 'no negative impact test' be satisfied for other features and areas (same as Options 2, 3A and 3B).

2. Development and site alteration would also be prohibited in significant woodlands as it would be for P.S.W.s (more restrictive than Options 1 and 2 but the same as Options 3A and 3B).
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an exclusive land use designation (same as Options 2, 3A and 3B).
4. Certain 'other natural heritage features and areas' (restricted to 'other woodlands') would be identified in an exclusive land use designation and would be subject to the no negative impact test (more restrictive than Options 1, 2 and 3A but same as Option 3B).
5. 'Supporting features and areas' would be included as components of the N.H.S. (more restrictive than Options 1, 2, 3A and 3B).
6. Small linkages that are in a natural state would be identified and included in an overlay designation (more restrictive than Options 1, 2, 3A and 3B).
7. Enhancement areas would be required in policy (more restrictive than Options 1, 2, 3A and 3B) but not mapped in a schedule to the new N.O.P. since their identification within a settlement area is more appropriately determined through a site-specific study.
8. A buffer will be required in policy adjacent to 'natural heritage features and areas' including 'other woodlands' but the buffer width would not be specified (more restrictive than Options 1, 2, 3A and 3B). Buffers would not be mapped as part of the schedule to the new N.O.P. since their width would not be prescribed in advance. They would be identified as policy only. It is recognized that the N.P.C.A. will require buffers/setbacks from P.S.W.s.

Policy Intent

1. To protect significant features and areas where development is restricted in accordance with the P.P.S. (same as Options 1, 2, 3A and 3B).
2. To ensure consistency with P.P.S. policies on where development and site alteration is permitted (feature and adjacent lands) subject to the no negative impact test (same as Options 1, 2, 3A and 3B).
3. To include the 'natural heritage features and areas' identified in Sections 2.1.4 and 2.1.5 of the P.P.S. in an exclusive land use designation (more restrictive than Option 1 but same as Options 2, 3A and 3B).
4. To protect significant woodlands from development and site alteration and restrict any modifications to their boundaries (more restrictive than Options 1 and 2 but same as Options 3A and 3B).
5. To identify certain 'other natural heritage features and areas' (restricted to 'other woodlands'), include them in an exclusive land use designation and require that the no

negative impact test be applied (more restrictive than Options 1, 2 and 3A but same as Option 3B).

6. To require further study of ‘supporting features and areas’, including enhancement areas, to determine their form and function as part of the N.H.S., with consideration of compatible uses within ‘supporting features and areas’ (more restrictive than Options 1, 2, 3A and 3B).
7. To protect small linkages that they can form part of an overall settlement area N.H.S., with the intent of providing ecological connectivity between natural features and areas, with consideration of compatible land uses within linkages (more restrictive than Options 1, 2, 3A and 3B).
8. To require in policy buffers adjacent to all ‘natural heritage features and areas’ including 'other woodlands' (more restrictive than Options 1, 2, 3A and 3B).

Components of the N.H.S. within Settlement Areas

Option 3C would include the same natural features and areas as Option 1, 2, 3A and 3B, with 'supporting features and areas' (which include enhancement areas) and linkages being added into the N.H.S., as determined through future study. Given the addition of these components in Option 3C, a discussion is provided on policy intent below.

Supporting Features and Areas

These policies would apply to grasslands/meadows, other valleylands and other wildlife habitat. It is noted that some of the other valleylands may also be regulated by the N.P.C.A if it contains a permanent or intermittent watercourse. Policies for enhancement areas, which are also a ‘supporting feature and area’, are addressed separately below. following this section. Linkages are not considered to be a ‘supporting feature or area’, rather they are considered a separate component of the N.H.S.

As mentioned above, 'supporting features and areas' would not be mapped. As a result, they may be identified when an environmental study is completed in support of a secondary plan or through the development approvals process.

In this regard, and if Option 3C is selected, it is anticipated that new N.O.P. policies would indicate that ‘supporting features and areas’ be identified early on through a screening process and when identified, an environmental evaluation would be completed that assesses and determines:

- Whether the ‘supporting feature or area’ is a ‘natural heritage feature or area’ or an 'other natural heritage feature or area' that should be protected;
- The boundary of the ‘supporting feature or area’ along with its ecological functions and relationship to nearby natural heritage features or areas; and
- What conditions should be attached to the approval of the proposed development to enhance the ‘supporting feature or area’ where possible.

Note: The above policies get triggered when there is a Planning Act application. Until such a Planning Act application is triggered, uses permitted in both the land use designation and the zoning by-law can be developed. For example, development on existing lots of record would be permitted if the approval required was only a building permit. However, an application to create a new lot on which permission would be sought later to build a new house would trigger the need for an environmental evaluation.

Enhancement Areas

Like other ‘supporting features and areas’, enhancement areas will not be mapped, which means that they would only be identified when an environmental study is completed in support of a large scale secondary plan or through the development approvals process. In this regard, the policies would indicate that enhancement areas should be identified early on through a screening process, with the principle being that enhancement areas are intended to consist of natural self-sustaining vegetation and increase the ecological resilience and function of individual natural features or groups of natural features by:

- Increasing the size of natural features;
- Connecting key natural features and significant features to create larger contiguous natural areas;
- Improving the shape of natural features to increase interior habitat conditions; and
- Including critical function zones and important catchment areas critical to sustaining ecological functions.

When carrying out an environmental evaluation, it should:

- Assess the ecological benefit of an enhancement to the nearby natural heritage feature or area (e.g., does it fill a gap, close in an indent, connect two separate features, etc.);
- Consider the most appropriate shape/extent of an enhancement area so that the ecological functions of the nearby natural heritage feature or area are enhanced;
- Consider how the function and spatial extent of an enhancement area can be incorporated into the design and layout of the proposed development; and

- Assess 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.

In a case where an enhancement area is identified as per the above, the lands within the enhancement area would be planted and left as natural self-sustaining vegetation. The enhancement area could 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.

Note: The above policies get triggered when there is a Planning Act application as there would be for other 'supporting areas and features' as discussed above.

Linkages

Linkages will be mapped as an overlay designation in the N.O.P. if Option 3C is selected. Over time and if a linkage is retained, as determined through a site-specific study, the area within the linkage should consist of natural self-sustaining vegetation and support the movement of target wildlife species between ‘natural heritage features and areas’.

When development or site alteration that is permitted by the underlying land use designation is proposed within a mapped linkage shown on a schedule to the new N.O.P., the required environmental evaluation should:

- Assess the ecological features and functions of a linkage, including its vegetative, wildlife, and/or landscape features or functions;
- Identify appropriate boundaries/widths that permit the movement of wildlife between nearby ‘natural heritage features and areas’ (including ‘other woodlands’);
- Describe the ecological functions the linkage is intended to provide and identifies how these ecological functions can be maintained or enhanced within a development proposal;
- Assess the potential for compatible uses such as 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;
- Assess potential impacts on the linkage as a result of the development; and
- Make recommendations on how to protect, enhance, or mitigate impacts on the linkage and its ecological functions through avoidance and planning, design and construction practices.

Note: The above policies get triggered when there is a Planning Act application. Until such a Planning Act application is triggered, uses permitted in both the underlying land use designation and the zoning by-law can be developed. For example, development on existing lots of record would be permitted if the approval required was a building permit. However, an application to create a new lot on which permission would be sought later to build a new house would trigger the need for an environmental evaluation.

If a Planning Act application is submitted, possible outcomes include:

- The elimination of the linkage area based on site specific analysis and confirmation that maintaining a linkage area in this location is not necessary for ecological reasons;
- The refinement of the form (i.e., width) and ecological function (i.e., vegetation and wildlife habitat features) of the linkage based on a site-specific environmental evaluation; or
- The incorporation of the linkage area as is into the development plan, such that development would not occur on those lands.

In a case where all or part of a linkage area is retained as per the above, the lands within the linkage area would be planted and left as natural self-sustaining vegetation. The linkage could also be designed to permit trails and other passive recreational purposes so long as the ecological function of the linkage was not impacted. Furthermore, other compatible land uses such as stormwater management ponds could be considered in linkage areas if it can be demonstrated that the long-term ecological function of the linkage area would be retained.

Buffers, Setbacks and Vegetation Protection Zones

Up until this point and because this technical memorandum is focused on settlement areas, the term ‘buffer’ has been used to describe the area that may need to be protected adjacent to natural features and areas in order to mitigate potential impacts to features and functions resulting from a change in adjacent land use. In this regard, buffers of any kind adjacent to ‘natural heritage features and areas’ in settlement areas would not be mapped in any of the options, since there are no standard buffer requirements in the P.P.S. However, since the P.P.S. requires that no negative impact be demonstrated when development is proposed adjacent to all features (i.e., P.P.S. policy 2.1.8), it is anticipated that a buffer of some width would be required in most cases, although the potential exists for no buffer to be required.

The options presented for the N.H.S. make recommendations for “mandatory (non-prescribed) buffers” and “minimum (prescribed)” buffers. The difference between mandatory (non-

prescribed) and minimum (prescribed) buffers is that for mandatory (non-prescribed) buffers, the policy would state that a buffer is required to the feature but would not state any minimum for the buffer width; that determination would be made through a site-specific study. For a minimum buffer, the policy would state the minimum buffer width required. As the term implies, the buffer width cannot be less than the required minimum, but may be larger as determined through a site-specific study. A minimum buffer does not provide any flexibility for a site-specific study to recommend a lesser width based on an analysis of the sensitivity of the feature and potential impacts to the feature and the ecological functions resulting from the proposed change in adjacent land use; this is generally considered more restrictive to development.

In the case of N.H.S. Option 3C within settlement areas, a mandatory (non-prescribed) buffer would be required from all ‘natural heritage features and areas’ and ‘other natural heritage features and areas’ as a precautionary approach to protect the long-term ecological function of the feature itself. The width of an ecologically appropriate buffer would be determined through study and be based on the sensitivity of the ecological functions from the change in adjacent land use, and the potential for impacts to the feature and ecological functions as a result of that change in land use.

When identifying ecologically appropriate buffers, it is important to recognize that the purpose of a buffer is to protect features and areas and their ecological functions from the impacts of the proposed land use or site alteration. A buffer is not intended to become part of the feature or area; however, a buffer should consist of natural self-sustaining vegetation as a condition of development (except where certain agricultural uses are exempt from the requirement of a buffer). Consideration can be given to including passive recreational uses such as trails in buffer areas as part of undertaking an environmental evaluation that determines the ecologically appropriate buffer width and what compatible uses may be considered within the buffer.

The buffer discussed above is a term that will only be used in the N.O.P. as it applies to ‘natural heritage features and areas’ outside of the N.H.S. for the Growth Plan, the Greenbelt Plan and outside of the Niagara Escarpment Plan area. The term buffer will apply to ‘other woodlands’ throughout the Region. Within the N.H.S. for the Growth Plan, the Greenbelt Plan, and within the N.E.P. area, the term ‘vegetation protection zone’ (V.P.Z.) will be used to be consistent with the use of that term in those plans (except for ‘other woodlands’, where buffers apply). Similarly, the term V.P.Z. will be used as they apply to key hydrologic features outside of settlement areas, whereas the term buffer will be used as it applies to key hydrologic features within settlement areas. This is also necessary since both the Growth Plan and Greenbelt Plan establish specific minimum V.P.Z. requirements for ‘natural heritage features and areas’ and key

hydrologic features where they apply. While the N.E.P. also uses the term V.P.Z., it does not establish a minimum vegetation protection zone requirement.

The N.P.C.A. policies require a buffer to watercourses based on a certain thermal regime, which is typically 15 metres from watercourse containing permanent flow, cool water or coldwater systems, or specialized aquatic or riparian habitat, and 10 metres from intermittent watercourses, warmwater systems or general aquatic or riparian habitat. Reductions to this buffer may be considered by the N.P.C.A. in special circumstances as outlined in their policies.

The N.P.C.A. also require setbacks from features it regulates as natural hazards. The Conservation Authority Act regulations and N.P.C.A. policies requiring setbacks are intended to manage and minimize the potential for risk of harm to people and property resulting from the hazards associated with flooding, erosion and slope instability. It is important to note that the purpose of setbacks to hazard lands regulated by the N.P.C.A. is different than the purpose and function of a buffer to 'natural features and areas' as previously described. In this regard, N.P.C.A. policies provide some direction on what this setback to natural hazards should be with regard to site specific considerations.

It is important to note that the P.P.S. requires that the no negative impact test be applied whenever a Planning Act application is being considered, with the final determination being made by the municipality. As a result, and in the case of P.S.W.s, it is anticipated that the determination of an ecologically appropriate buffer width would be made by the municipality making a decision on the Planning Act application with input from the N.P.C.A. In all other cases (such as for 'other wetlands', watercourses and natural hazards) reliance would more be placed on the N.P.C.A. policy and regulatory framework.

Policy Approaches to Protect the N.H.S.

With multiple features and areas and different policies for each, it is often challenging to determine the implications of the policies that apply to these features, particularly in settlement areas where growth is directed. Furthermore, it is challenging to understand how these options for the N.H.S. protect features and areas, and conversely, how the options impact development requiring a Planning Act approval. The purpose of this section is to highlight the differences in the level of protection afforded to each component of the N.H.S.; in this regard, there are four categories, as discussed below.

Protection of Features and Areas Determined by the Federal or Provincial Governments

In the case of fish habitat and the habitat of endangered and threatened species (both of which are 'natural features and areas' by the P.P.S.), decisions affecting these features are made in accordance with provincial and federal requirements. For the habitat of endangered and threatened species, the responsibility for making decisions in this regard is the Ministry of Environment, Conservation and Parks. For fish habitat, the responsibility lies with the Department of Fisheries and Oceans (D.F.O.). This is consistently the case in Options 1, 2, 3A, 3B and 3C.

Protection of Features and Areas

For certain features, they are afforded a high-level of protection where development is prohibited as set out in Section 2.1.4 of the P.P.S. This applies to P.S.W.s in all options, and also applies to significant woodlands in Options 3A, 3B and 3C.

For these features, it is anticipated that only the following would be permitted:

a) Forest, fish, and wildlife management;
b) Conservation and flood or erosion control projects, if they have been demonstrated to be necessary in the public interest and after all alternatives have been considered;
c) Activities that create or maintain infrastructure authorized under an environmental assessment process; and
d) Small-scale structures for recreational uses, including boardwalks, footbridges, fences, docks, and picnic facilities, if measures are taken to minimize the number of such structures and their negative impacts.

For significant woodlands in Options 3A, 3B and 3C, the following additional permissions could be considered:

a) Expansions to existing buildings and structures, accessory structures and uses, and conversions of legally existing uses which bring the use more into conformity with this Plan, subject to demonstration that the use does not expand into the natural heritage features or their buffers, 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;
b) 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 buffer, 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.

In addition to the above, development and site alteration would not be permitted on adjacent lands to the 'natural heritage features and areas' unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

Lastly, it is noted that the N.H.S. policies would not limit the ability of existing agricultural uses to continue.

Protection of the Health and Integrity of Features and Ecological Functions

In this case, development is also prohibited, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, in accordance with Section 2.1.5 of the P.P.S., where negative impact to 'natural heritage features and areas' (and 'other woodlands' where they are included in the system) is defined as "degradation that threatens the health and integrity of the natural features or ecological functions for which an area is identified due to single, multiple or successive development or site alteration activities" (P.P.S. 2020). This policy would apply to the following features and areas:

a) significant woodlands (in Options 1 and 2);
b) significant valleylands (in Options 1, 2, 3A, 3B and 3C);
c) significant wildlife habitat (in Options 1, 2, 3A, 3B and 3C); and
d) significant areas of natural and scientific interest (in Options 1, 2, 3A, 3B and 3C).

'Other woodlands', which are included in Options 3B and 3C in settlement areas, would also be subject to the above policy.

In addition to the above, development and site alteration would not be permitted on adjacent lands to the 'natural heritage features and areas' unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

Opportunities to Enhance Features and Areas

This category applies to the following, which is a component of Option 3C in settlement areas:

- ‘Supporting features and areas’ including:
    - Grasslands/meadows/thickets not meeting the criteria as Significant Wildlife Habitat that are continuous with ‘natural heritage features and areas’ and ‘other natural heritage features and areas’ (not proposed to be mapped in the new N.O.P.);
    - Other valleylands (not proposed to be mapped in the new N.O.P.);
    - Other wildlife habitat (not proposed to be mapped in the new N.O.P.); and
    - Enhancement Areas (not proposed to be mapped in the new N.O.P.).
- Linkages (to be included in overlay designation).

- Since ‘supporting features and areas’ will not be mapped, they would only be identified when an environmental study is completed in support of a large-scale secondary plan or through the development approvals process. For linkages, which will be mapped, the policies on linkages would only be triggered when a Planning Act application is submitted, which means that an evaluation would then need to be completed. In this regard, possible outcomes include:

- The incorporation of the linkage area as is into the development plan, such that development would not occur on those lands;
- The refinement of the form (i.e., width) and ecological function (i.e., vegetation and wildlife habitat features) of the linkage based on a site-specific environmental evaluation; or
- The elimination of the linkage area based on site specific analysis and confirmation that maintaining a linkage area in this location is not necessary for ecological reasons.

Water Resource System Policy Intent

Technical Report #2 recommended two options for a W.R.S. framework including the following:

- W.R.S. Option 1 – required standards related to Provincial planning requirements.
- W.R.S. Option 2 – going beyond required standards including an increasing number of components and potential connections.
    - W.R.S. Option 2 was further subdivided into Option 2A and 2B.

Following an additional review of the required standards of a W.R.S. as directed by the P.P.S. and the Growth Plan, and based on stakeholder feedback, one option has been identified for the

W.R.S.; this option includes the standard requirements as informed from provincial direction and best practices, where refinements to the system would be informed by watershed planning or equivalent.

To be consistent with the approach of the N.H.S. to provide an option for an overlay designation (N.H.S. Option 1) and an exclusive land use designation (N.H.S. Option 2), all wetlands would be identified in an exclusive land use designation in conjunction with N.H.S. Options 2 and 3.

Base Assumptions for the W.R.S.

1. Growth Plan requires that a W.R.S. that protects key hydrologic features, key hydrologic areas and their functions be protected - this is the Growth Plan required standard and applies both inside and outside settlement areas and is mandatory. However, Growth Plan policies that prohibit development and site alteration within and adjacent to key hydrological features do not apply in settlement areas. This means that the potential exists for more flexibility to be afforded to evaluated non-Provincially significant wetlands and unevaluated wetlands in settlement areas when development and site alteration is proposed within and adjacent to these wetlands in settlement areas.
2. The Growth Plan requires that planning for large-scale development in designated greenfield areas in settlement areas (including secondary plans) be informed by a subwatershed plan or its equivalent. The subwatershed plan should consider existing development and evaluate impacts of any potential or proposed land uses and development; identify hydrologic features, areas, linkages, and functions; identify natural features, areas, and related hydrologic functions; and provide for protecting, improving, or restoring the quality and quantity of water within a subwatershed.
3. One of the features typically considered in sub-watershed plans or its equivalent are headwater drainage features; for the purposes of the W.R.S., headwater drainage features classified as ‘protection’ or ‘conservation’ are considered required components.
4. The Greenbelt Plan also indicates that W.R.S. shall be identified in settlement areas and be informed by watershed planning and other available information, and the appropriate designations and policies shall be applied in official plans to provide for the long-term protection of key hydrologic features, key hydrologic areas and their functions. However, Greenbelt Plan policies on development and site alteration within and adjacent to key hydrologic areas and key hydrologic features do not apply in settlement areas.
5. The P.P.S. requires that planning authorities protect, improve or restore the quality of water by identifying W.R.S.s consisting of ground water features, hydrologic functions, ‘natural heritage features and areas’, and surface water features including shoreline

areas, which are necessary for the ecological and hydrological integrity of the watershed and this mandatory requirement applies to lands within settlement areas as well.

6. The P.P.S. also requires that sensitive surface water and ground water features and their hydrologic functions be protected, improved or restored, provided they are sensitive.
7. P.S.W.s are also a 'natural heritage feature and area', and as such are subject to the policies of the P.P.S. that prohibit development in P.S.W.s and require the test of no negative impact be met for developed proposed on adjacent lands to 'natural heritage features and areas'.
8. Components of the W.R.S. (most notably wetlands and watercourses) are also protected in accordance with Conservation Authority Regulations and are subject to N.P.C.A. regulation and policies.

Policy Intent

1. To include the location of readily identifiable surface water components (most notably all wetlands) of the W.R.S. in an overlay designation or an exclusive land use designation depending on whether N.H.S. Option 1 or either of N.H.S. Options 2, 3A, 3B or 3C is selected;
2. To include policies in the N.O.P. that build upon and support N.P.C.A. policies on wetlands and watercourses, except that N.P.C.A. policies on off-setting will not be carried forward into the N.O.P;
3. To provide some flexibility in how development and site alteration applications are assessed in and adjacent to evaluated non-Provincially significant wetlands and unevaluated wetlands in settlement areas (referred to as 'other wetlands');
4. To ensure that a W.R.S. with all of the components listed in the Growth Plan, Greenbelt Plan and the P.P.S. is identified through policy as a system that needs to be protected and where possible, enhanced or restored;
5. To indicate that other components of the W.R.S. that cannot be mapped be prioritized for identification through watershed planning exercises;
6. To require the identification of W.R.S. components through urban Secondary Plan exercises that also make recommendations on how components of the W.R.S. will be protected, enhanced or restored;
7. To ensure policies are consistent for those components included in the W.R.S. that are also regulated by the Conservation Authority regulations and N.P.C.A. policies; and,
8. To allow appropriate flexibility for refinement of hydrological features through future study, being mindful that a systems-based approach must be preserved, and features and functions must be maintained and/or enhanced.

Components of W.R.S.

At a minimum, the following would comprise the W.R.S.:

- The following features would be included as key hydrologic features in the W.R.S.:
    - Permanent streams and intermittent streams (these will be mapped in the new N.O.P.);
    - Inland lakes and their littoral zones (these will be mapped in the new N.O.P.);
    - Seepage areas and springs (these will not be mapped in the new N.O.P.); and
    - Wetlands (these will be mapped in the new N.O.P.).
- The following areas would be included as key hydrologic areas in the W.R.S.:
    - Significant groundwater recharge areas (these will be mapped in the new N.O.P. and included in an overlay designation regardless of which N.H.S. option is selected);
    - Highly vulnerable aquifers (these will be mapped in the new N.O.P. and included in an overlay designation regardless of which N.H.S. option is selected); and
    - Significant surface water contribution areas (these will not be mapped in the new N.O.P.)
        - These include headwater drainage features classified as “protection” and “conservation”;
- Floodplains, flooding hazards, floodways (these will be mapped in the new N.O.P. and included in an overlay designation regardless of which N.H.S. option is selected.); and
- Shoreline areas (these will be mapped in the new N.O.P. and included in an overlay designation regardless of which N.H.S. option is selected)

The following components are included as part of the W.R.S. It is anticipated that they would be identified through subwatershed studies completed as part of future secondary planning exercises, where they are considered “necessary to sustain healthy aquatic and terrestrial ecosystems and human water consumption” (Growth Plan Section 4.2.1.3), or “are necessary for the ecological and hydrological integrity of the watershed” (P.P.S. 2.1.1):

- Ground water features:
    - recharge/discharge areas;
    - water tables; and
    - aquifers and unsaturated zones.
- Surface water features:

    - headwaters;
    - recharge/discharge areas; and
    - associated riparian lands that can be defined by their soil moisture, soil type, vegetation, or topographic characteristics.
- Hydrologic functions

Policy Approaches to Protect the W.R.S

The requirement to identify a W.R.S. is relatively new in natural environment planning; as such, there is little direction in Provincial plans or other guidance documents to inform policy approaches to protect the W.R.S. With the direction provided in the Growth Plan and P.P.S. related to the intention of the W.R.S. to "provide for the long-term protection of key hydrologic features, key hydrologic areas, and their functions" (Growth Plan, policy 4.2.1.2), as well as the policies of the N.P.C.A. related to regulated features, policy approaches have been developed to protect the W.R.S. The purpose of this section is to highlight the proposed policy approaches in order to highlight the differences in the level of protection afforded to each component of the W.R.S. according to Provincial policy and the policies of the N.P.C.A. In this regard, there are three categories, as discussed below.

Protection of Key Hydrologic Features

Wetlands

Outside of settlement areas, all wetlands (i.e., P.S.W.'s and non-P.S.W.'s) are prohibited from development in accordance with the Growth Plan policies on key hydrologic features, which also requires a minimum V.P.Z. be applied to key hydrologic features. In addition, the P.P.S. prohibits development in P.S.W.s. both outside and inside settlement areas.

Watercourses

The Greenbelt Plan prohibits development within key hydrologic features within the N.H.S., including watercourses. The Growth Plan also prohibits development within key hydrologic features, including permanent and intermittent streams; however, this policy only applies outside of settlement areas. The Growth Plan and Greenbelt Plan both require a 30 m V.P.Z.s be provided to watercourses, which would apply outside of settlement areas. However, within the Greenbelt Plan there is a Niagara-specific policy that reduces the required V.P.Z. to 15m for certain permanent and intermittent streams when the proposed adjacent land use will be for agricultural purpose (subject to certain tests being met).

In general, interference with a watercourse is not permitted by N.P.C.A. policies and this also means that development is therefore prohibited within watercourses. This prohibition should

also be included in the N.O.P. Given that the N.P.C.A prohibits development within a watercourse anywhere in the Region, this prohibition should apply within settlement areas.

Inland Lakes and Their Littoral Zones

As a key hydrologic feature, it is also recommended the N.O.P. prohibit development and site alteration within inland lakes and their littoral zones. Outside of settlement areas the Growth Plan requires V.P.Z.s be applied to key hydrologic features, including inland lakes. Inside of settlement areas buffers consistent with those applied to watercourses should be applied as well, where supported by a site-specific study considered acceptable to the Region and subject to input from the N.P.C.A.

Seepage Areas and Springs

Outside of settlement area, development and site alteration within and adjacent to seepage areas and springs and inland lakes and their littoral zones is not permitted according to the Growth Plan and Greenbelt Plan. As with all key hydrologic features, a minimum V.P.Z. of 30 m is required outside of settlement areas. This policy will need to be incorporated within the N.O.P.

Protection of the Health and Integrity of Features and Hydrologic Functions

Wetlands

The N.P.C.A. generally restricts development and/or site alteration within a wetland (policy 8.2.2.1) as defined by the N.P.C.A. With the intent to align policies in the new N.O.P. with those of the N.P.C.A., in particular with regulated non-P.S.W.s in settlement areas (i.e., 'other wetlands'), it is anticipated that only the following would be permitted within 'other wetlands' by the N.O.P.:

a) Forest, fish, and wildlife management;
b) Conservation and flood or erosion control projects, if they have been demonstrated to be necessary in the public interest and after all alternatives have been considered
c) Activities that create or maintain infrastructure authorized under an environmental assessment process; and
d) Small-scale structures for recreational uses, including boardwalks, footbridges, fences, docks, and picnic facilities, if measures are taken to minimize the number of such structures and their negative impacts.

It is noted that N.P.C.A. policies also permit replacement of structures in wetlands subject to a number of criteria. It is also noted that N.P.C.A. policies allow for offsetting (policy 8.2.2.8) which will not be permitted in accordance with the new N.O.P.

N.P.C.A. policies require that an area of interference be established within 120 metres of regulated wetlands that have an area of greater than 2 hectares and within 30 metres for wetlands smaller than 2 ha. This area of interference would be analogous to the 'adjacent lands' that is located adjacent to significant natural heritage features and areas according to the P.P.S. Within the area of interference and within 'adjacent lands', studies are typically required to determine the impacts of proposed development on the wetland. For P.S.W.'s, the P.P.S. requires that the 'no negative impact test' be demonstrated when development is proposed on 'adjacent lands.' For ‘other wetlands’, the N.P.C.A. policies do not require that the no negative impact test be satisfied; instead, a number of site-specific factors are taken into account when considering development adjacent to wetlands.

In terms of the approach going forward in the N.O.P. as it relates to the area of interference and 'adjacent lands' where development may be permitted, it is recommended that satisfying the no negative impact test be a requirement when development is proposed adjacent to P.S.W.'s. For all ‘other wetlands’ within settlement areas, it is recommended that N.P.C.A. policies that take context into account when development is proposed adjacent to ‘other wetlands’ be incorporated into the N.O.P.

The N.P.C.A policies do not specify the need for a vegetation protection zone from wetlands, nor do they specify that a buffer from wetlands is required. Instead, the N.P.C.A. policies simply state that no development is permitted within 30 metres of a wetland, and this would be considered a setback. However, within settlement areas the N.P.C.A. may consider the following within this 30-metre area:

a) Infrastructure;
b) Conservation and restoration projects;
c) Passive recreational uses
d) Replacement structures, accessory structures and minor additions
e) Other forms of development and site alteration which do not adversely impact the ecological and hydrological function of the wetland, and where the proposed development meets the five tests under the Conservation Authorities Act

It is recommended that a similar policy be incorporated in the new N.O.P. N.P.C.A policies also deal with lot creation through the consent and plan of subdivision processes and these policies also indicate that new development should be 30 metres away from wetlands; however, exceptions are provided based on the characteristics of the wetland, the characteristics of the area adjacent to the wetland and the potential for impact resulting from the proposed development. It is recommended that similar polices be included within the N.O.P.

The above is intended to make a distinction between P.S.W.s and non-P.S.W.s (i.e., 'other wetlands') in policy such that while development and site alteration is clearly prohibited in P.S.W.s, there is some flexibility afforded with non-P.S.W.s, with a focus more on protecting hydrological functions.

It should also be noted that for non-P.S.W.s in settlement areas that do not meet the definition of 'other wetland' and to which the N.P.C.A. policies would not apply, but do meet the definition of 'wetland', the Region and/or the N.P.C.A. may require that an appropriate study (e.g., E.I.S., hydrologic evaluation) be undertaken to determine if the wetland should be protected in situ with appropriate buffers/setbacks or if the hydrologic function provided by the wetland should be maintained or managed as part of the design of the development. This is consistent with N.P.C.A. policies that also require that evaluations be carried out when development is proposed within a wetland that has not been evaluated in accordance with the Ontario Wetland Evaluation System; a similar policy should be included in the N.O.P.

Watercourses

N.P.C.A. policies also require a 10 to 15 metre buffer from watercourses depending on thermal regime, and it is recommended that the new N.O.P. also include a similar requirement from watercourses within settlement areas. However, N.P.C.A. policies do allow for a reduction in the size of the buffer. As a consequence, the policies in the N.O.P. should also allow for a reduction in the size of the buffer within settlement areas where supported by a site-specific study considered acceptable to the Region and subject to input from the N.P.C.A.

Floodplains, Flooding Hazards, Floodways and Shoreline Areas

It is recommended that the N.O.P. policies restrict development in flood hazards consistent with the policy concepts for flood hazards of the N.P.C.A. This includes the policies related to the 'One Zone Concept' and the 'Two Zone Concept' which provides varying degrees of restrictions to development within the floodway and flood fringe of the flooding hazard. The N.O.P. should also be consistent with identifying restricted and permitted uses within the food hazard that is consistent with the objectives of the Conservation Authorities Act and subject to the Regulation 155/06.

The new N.O.P. should also align policies related to shoreline hazards as they related to the identification of the shoreline areas of the W.R.S. This includes restricting development in the shoreline hazard area including the shoreline flooding hazard, shoreline erosion and slope stability hazard, and the dynamic beach hazard.

The N.P.C.A. policies (5.1.5.2) identify a generic setback for development along the Great Lakes shoreline as 30 metres from the limits of the shoreline food hazard. Consistent with the

N.P.C.A. policies, the extent of the setback can be refined based on a site-specific analysis completed by a qualified engineer to determine the extent of the dynamic beach hazard.

Protect, Enhance or Restore

There are a number of other key hydrologic features and key hydrologic areas that also require protection in accordance with Provincial policy. These include seepage areas and springs within settlement areas (a key hydrological feature), significant groundwater recharge (and discharge) areas, highly vulnerable aquifers and significant surface water contribution areas (which include headwater drainage features), all of which are key hydrological areas. Of these, significant groundwater recharge areas and highly vulnerable aquifers will be mapped in the N.O.P. and included within an overlay designation. The location of seepage areas and springs and significant surface water contribution areas can only be identified through future study.

For each of the above components of the W.R.S., there will be a need for policies in the N.O.P. that require the submission of appropriate studies that evaluate the impacts of the proposed development and which identify how the quality and quantity of water within a subwatershed can be protected, enhanced or restored. To inform the completion of studies considered acceptable to the Region, W.R.S. guidelines could be developed, similar to Environmental Impact Study Guidelines. The requirement that appropriate studies demonstrate that the quality and quantity of water within a subwatershed will be protected, enhanced or restored would be consistent Regional Council direction on the South Niagara Aquifer, which is considered a highly vulnerable aquifer. In this regard, Regional Council directed staff to consider the South Niagara highly vulnerable aquifer as an important vital source of water for rural residents and that specific N.O.P. policies be developed to reflect the importance and subsequent protection of this water source.

The above policy would only be triggered when a Planning Act application is submitted and would not apply to development that is already permitted as-of-right on a property. However, it is also recommended that consideration be given to requiring site plan approval for all development and redevelopment on private services in significant groundwater recharge (and discharge) areas, highly vulnerable aquifers and significant surface water contribution areas as well. Requiring site plan approval would allow the approval authority to require enhancements to existing septic systems through the establishment of on-site phosphorus management and impact mitigation measures.

In addition to the above, enhanced stormwater management policies could be included in the N.O.P. that would apply to significant groundwater recharge (and discharge) areas, highly vulnerable aquifers and significant surface water contribution areas. These enhanced policies would require all proposals to be designed based on a treatment train approach to address

requirements for water quality, erosion control, flood control, thermal mitigation and water budget. Low Impact Development Best Management Practices such as bioswales/biofilters with underdrains, infiltration trenches, rain gardens and perforated pipes would also be encouraged through policy in addition to wet end of pipe facilities to conserve water use and to manage stormwater on-site. These policies would also require that the approval authority be satisfied that:

a) New buildings are designed where possible to collect rainwater for irrigation on site, and reduce excess stormwater runoff, which carries pollutants into natural waterways and groundwater recharge areas, with these features allowing for the consideration of reduced sizes for stormwater management facilities;

b) Stormwater management features are strategically located to take advantage of the existing topography and drainage patterns and to minimize their footprint;

c) Stormwater management features are developed as naturalized facilities, and incorporate native planting to help support pollinator species, and enhance biodiversity;

d) Stormwater management facilities are designed to support key features and ecological functions in the N.H.S.;

e) Rainwater harvesting systems, such as rain barrels and other simple cisterns, are installed where feasible to capture rainwater, which can be used for landscape irrigation, thereby reducing unnecessary use of potable water;

f) All buildings are designed for efficient water use using conventional methods, such as ultra-low flow fixtures and dual flush toilets and other innovative water saving measures like waterless urinals, and grey-water recycling systems;

g) Landscaped areas are located to optimize water infiltration potential;

h) The landscaping of public and private facilities utilizes drought tolerant native and non-invasive species that require minimal irrigation;

i) Surface parking areas minimize the use of impervious surface materials, such as through the incorporation of permeable pavers and trenches, where feasible;

j) Impermeable hard surfaced areas (i.e., driveways and parking areas) are reduced and opportunities for ground water infiltration are encouraged; and

k) Rain gardens, complete with native plant species and soil media, are developed to detain, infiltrate and filter runoff discharge from roof leaders, and/or are integrated into surface parking areas where feasible.

Natural Environment System Summary

As described in the introduction to this Technical Memorandum, the N.H.S. and the W.R.S. are ecologically interconnected and are thus collectively referred to as the N.E.S. While the policy framework for the N.H.S. and W.R.S. and the options developed for each system are reviewed independently because of the different Provincial policies that apply to each system, collectively these systems form the integrated N.E.S.

Through the exercise of mapping the N.H.S. and W.R.S. options in settlement areas and preparing policy intent for each of the options, refinements to those options have been made as noted in the preceding sections. Some of the changes to the original options proposed in Technical Report #2 include the following:

1. The definition of 'woodlands' was updated resulting in a smaller subset of woodlands being identified as 'significant' (many of the features previously identified as significant woodlands are P.S.W.s or 'other wetlands' which have a higher-level of protection currently afforded to significant woodlands – see discussion in Appendix B). The analysis in Appendix B concludes the change in definitions would not result in reduction in the area of treed vegetation communities included within the Region's N.E.S.s if Option 3B or 3C is selected.
2. Due to a smaller subset of woodlands being captured by the criteria for significant woodlands, the category of 'other woodlands' was moved from N.H.S. Option 3C to 3B in settlement areas, and moved from N.H.S. Option 3B to 3A outside of settlement areas.
3. Components that are required to be included in the W.R.S. but were identified as optional components of the N.H.S. (e.g., 'other wetlands', permanent and intermittent streams, seepage areas and springs, and inland lakes and their littoral zones) are no longer discussed as optional components of the N.H.S. options. Rather, these components are considered a required component of the integrated N.E.S.
4. Following an additional review of the minimum requirements of a W.R.S. as directed by the P.P.S. and the Growth Plan, and based on stakeholder feedback, headwater drainage features that would be classified as "protection" and "conservation" are included as a required component of the N.E.S.
5. Lastly, only one option for the W.R.S. is being proposed based on what are considered standard requirements as informed from provincial direction and best practices, where refinements to the system would be informed by watershed planning or equivalent.

Based on the updated approach to identifying options for the N.E.S., the following standard required components have been identified for the integrated N.E.S.:

- 'natural heritage features and areas'
    - Provincially significant wetlands
    - Significant coastal wetlands
    - Habitat of endangered species and threatened species
    - Fish habitat
    - Significant areas of natural and scientific interest
    - Significant valleylands
    - Significant woodlands
    - Significant wildlife habitat
- Key hydrologic features
    - Permanent streams and intermittent streams
    - Inland lakes and their littoral zones
    - Seepage areas and springs
    - Wetlands (both P.S.W. non-P.S.W.)
- Key hydrologic areas
    - Significant groundwater recharge areas
    - Highly vulnerable aquifers
    - Significant surface water contribution areas (including headwater drainage features classified as "protection" and "conservation")
- Ground water features
- Surface water features
- Hydrologic functions;
- Shoreline areas
- Hydrologic functions
    - Floodplains, flooding hazards, floodways
- Vegetation Protection Zones
    - to 'natural heritage features and areas' in the Growth Plan N.H.S. and Greenbelt Plan N.H.S.
    - to key hydrologic features outside of settlement areas; and
- Setbacks/buffers to regulated features and areas in accordance with N.P.C.A. policies.

The policy intent for each of the options for the N.H.S. and W.R.S. as described above would apply to the integrated N.E.S., including policies for Significant Woodlands (recall the prohibition to development in N.H.S. Option 3), and the addition of 'other natural heritage features and areas' (previously identified in N.H.S. Option 3B, now identified in N.H.S. Option 3A). **Table 1**

provides an overview of the options for the N.E.S. which is consistent with the approach to identifying the options for the N.H.S. and W.R.S identified in Technical Report #2.

The approach to an overlay vs. designation described previously in N.H.S. Options 1 and 2 would be similarly applied where the following features would be identified in an exclusive land use designation in N.H.S. Options 2, 3A, 3B and 3C and the Option for the W.R.S. within settlement areas:

- Wetlands (including P.S.W.s and 'other wetlands')
- Inland lakes and their littoral zones1
- Significant Areas of Natural and Scientific Interest
- Significant Woodlands
- 'Other woodlands' (where introduced in N.H.S. Option 3B and 3C)

[1] Through applying the criteria established for inland lakes as part of the exercise to map the N.E.S. in urban areas it was determined that there are no inland lakes in urban areas. Therefore while inland lakes are not identified in the mapping of the N.E.S. in urban areas, they are part of the N.E.S. and would be identified in mapping of the N.E.S. outside of urban areas.

Table 1. Overview of the options for the N.E.S. both inside and outside of settlement areas - Note: Not all of the features on this table will be mapped.

	N.H.S. Option 1 and 2 + W.R.S.	N.H.S. Option 3A + W.R.S.	N.H.S. Option 3B + W.R.S.	N.H.S. Option 3C + W.R.S.
Component Features and Areas	• Natural heritage features and areas • Key hydrologic features • Key hydrologic areas • Ground water features • Surface water features • Hydrologic functions • Shoreline areas	• Same as N.H.S. Option 2, plus: ○ 'Other woodlands' outside of settlement areas	• Same as N.H.S. Option 3A, plus: ○ 'Other woodlands' Region-wide (i.e., added in settlement areas) ○ 'Supporting Features and Areas' outside of settlement areas	• Same as N.H.S Option 3B, plus: ○ 'Supporting features and areas' Region-wide (i.e., added in settlement areas)

Connecting the System (linkages)	• None in addition to those identified in the Growth Plan N.H.S. and Greenbelt Plan N.H.S.	• Large linkages only between 'natural heritage features and areas' (including 'other woodlands') outside of settlement areas • None in settlement areas	• Large and medium linkages between 'natural heritage features and areas' (including 'other woodlands') outside of settlement areas • None in settlement areas	• Large and medium linkages between 'natural heritage features and areas' (including 'other woodlands') outside of settlement areas • Small linkages between 'natural heritage features and areas' (including 'other woodlands') Region-wide (including within settlement areas)
	N.H.S. Option 1 and 2 + W.R.S.	**N.H.S. Option 3A + W.R.S.**	**N.H.S. Option 3B + W.R.S.**	**N.H.S. Option 3C + W.R.S.**
Buffers, Setbacks, and Vegetation Protection Zones (V.P.Z.)	• No mandatory or minimum buffers to 'natural heritage features and areas' outside of the Growth Plan and Greenbelt Plan N.H.S. (except for P.S.W.s in accordance with N.P.C.A. policies)	• Same as N.H.S. Options 1 and 2 plus: ○ Mandatory (non-prescribed) buffers to 'natural heritage features and areas' and 'other woodlands' outside of provincial	• Same as N.H.S. Options 1 and 2 plus: ○ Minimum (prescribed) buffers to 'natural features and areas' and 'other woodlands' outside of provincial N.H.S.s,	• Same as N.H.S. Option 3B, plus: ○ Mandatory (non-prescribed) buffers to 'natural heritage features and areas' and 'other woodlands' inside of settlement areas

	• Buffers to watercourses as per N.P.C.A. policies • Setbacks to regulated features and areas as per N.P.C.A. policies • Minimum V.P.Z.s to 'natural heritage features and areas' inside of the Growth Plan NHS and Greenbelt Plan NHS • Minimum V.P.Z.s to Key Hydrologic Features outside of settlement areas as required by the Growth Plan	N.H.S.s and outside of settlement areas	outside of settlement areas	

Review of Policy Implications Related to Natural Environment System Options in Settlement Areas

Niagara Region staff have prepared mapping of the options of the integrated N.E.S. in the 27 urban areas based on direction provided by the consultant team (**Appendix C**). In addition, the Region has prepared statistics related to the mappable components in each of the options within each urban area (**Appendix D**). The purpose of preparing the mapping and statistics for each of the options within the 27 urban areas is to provide a visual and quantitative comparison of the options within each urban area. For the purpose of evaluating the implications of N.E.S. policies, the mapping of features and areas previously identified as suitable for mapping in Technical Report #2, and statistics related to natural area cover for each of the options has been combined to review natural features and areas and key hydrologic features in a series of maps with related statistics into three main groups:

- Map A - N.H.S. Option 1/2/3A + Key Hydrologic Features
- Map B - N.H.S. Option 3B + Key Hydrologic Features
- Map C - N.H.S. Option 3C + Key Hydrologic Features

Map A (**Appendix D**) includes N.H.S. Options 1, 2 and 3A because the 'natural heritage features and areas' in each are the same (within settlement areas). Map B is different because of the addition of 'other woodlands' in N.H.S. Option 3B, and then Map C (**Appendix D**) is different because of the addition of linkage areas and buffers (buffers shown for comparison purposes only). The same key hydrological features (most notably 'other wetlands') are shown on each map.

An additional map (Map D, **Appendix B**) with related statistics was prepared for each settlement area that identifies the following hydrologic areas of the W.R.S.:

- Key Hydrologic Areas
    - Significant Groundwater Recharge Areas
    - Highly Vulnerable Aquifers
- Shoreline Areas
- Floodplains, Flooding Hazards

For information purposes, the Core N.H.S. from the existing Regional Official Plan was mapped (Map E, **Appendix D**) in each settlement area with accompanying statistics. This is being provided for information purposes only and is not being compared to mapping presented in Maps A, B and C because it would not be an appropriate comparison. This is because the

current Core N.H.S. mapping contains a different set of components (e.g., valleylands are not mapped in options prepared for consideration in the new N.O.P.), and the current N.O.P is not reflective of current required Provincial standards for the identification and protection of the N.E.S. The current Core N.H.S. does not include all of the key hydrological features (most notably non-Provincially significant wetlands) that are regulated by the N.P.C.A. The following section provides an overview of the statistics generated for each option within each urban area.

Grimsby – Review of N.E.S. Options

Grimsby has a total land area of 1,323 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 60.4 ha (4.6%), 70.8 ha (5.3%) and 87.9 ha (6.6%) of Grimsby respectively (**Appendix D**, Table 1A). When comparing the options, the increase in cover occurs as result of the addition of 'other woodlands' in N.H.S. Option 3B which adds 13 ha (1%) of natural features, followed by an additional 14.8 ha (1.1%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. This means that the size of the N.E.S. increases by 27.3 ha (2%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 1,201.8 ha (90.8%) of the urban area, which consists of 1,174.7 ha of highly vulnerable aquifers, 8.4 ha of significant groundwater recharge areas, 28.7 ha of shoreline areas, and 33.0 ha of floodplains and flooding hazards (**Appendix D**, Table 1B).

Beamsville – Review of N.E.S. Options

Beamsville has a total land area of 660 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 62.9 ha (9.5%), 68.9 ha (10.4%) and 75.3 ha (11.4%) of Beamsville respectively (**Appendix D**, Table 2A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 8.6 ha (1.3%) of natural features followed by an additional 3.8 ha (0.6%) of buffers in N.H.S. Option 3C when compared with N.H.S. Option 3A. This means that the size of the N.E.S. increases by 12.4 ha (1.9%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 404.5 ha (61.3%) of the urban area, which consists of 324.5 ha of highly vulnerable aquifers, 158.5 ha of significant groundwater recharge areas, 17.3 ha of shoreline areas, and 17.3 ha of floodplains and flooding hazards (**Appendix D**, Table 2B).

Campden – Review of N.E.S. Options

Campden has a total land area of 47.8 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 9.9 ha (20.7%), 10.8 ha (22.5%) and 11.9 ha (24.8%) of the urban area respectively (**Appendix D**, Table 3A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 1.1 ha (2.4%) of natural features followed by an additional 0.8 ha (1.9%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. This means that the size of the N.E.S. increases by 2.0 ha (4.2%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 32.7 ha (68.4%) of the urban area, which consists of 27.6.5 ha of highly vulnerable aquifers, 2.0 ha of shoreline areas, and 6.0 ha of floodplains and flooding hazards (**Appendix D**, Table 3B).

Jordan – Review of N.E.S. Options

Jordan has a total land area of 39.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 2.1 ha (5.3%), 2.1 ha (5.3%) and 4.1 ha (10.5%) of the urban area respectively (**Appendix D**, Table 4A). The increase in cover that is observed in N.H.S. Option 3C occurs solely as a result of adding buffers to significant woodlands, which adds 2.1 ha, or an additional 2% of cover of N.H.S. to the urban area.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 2.0 (5.1%) of the urban area, which consists of 2.0 ha of highly vulnerable aquifers and 0.1 ha of significant groundwater recharge areas (**Appendix D**, Table 4B).

Jordan Station– Review of N.E.S. Options

Jordan Station has a total land area of 36.5 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 1.0 ha (2.7%), 1.0 ha (2.7%) and 1.8 ha (5.0%) of the urban area respectively (**Appendix D**, Table 5A).

The increase in N.H.S. cover between N.H.S. Options 3A and 3B with N.H.S. Option 3C is a result of the addition of mapped buffers to the significant woodlands.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 33.6 ha (92.2%) of the urban area, which consists of 33.2 ha of highly vulnerable aquifers, 10.1 ha of significant groundwater recharge areas, and 0.1 ha of shoreline areas (**Appendix D**, Table 5B).

Prudhommes – Review of N.E.S. Options

Prudhommes has a total land area of 52.7 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 10.5 ha (19.9%), 12.1 ha (23.1%) and 14.3 ha (27.1%) of the urban area respectively (**Appendix D**, Table 6A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 1.7 ha (3.1%) of natural features followed by an additional 2.1 ha (4.0%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. This means that the size of the N.E.S. increases by 3.8 ha (7.2%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 43.3 ha (82.1%) of the urban area, which consists of 41.4 ha of highly vulnerable aquifers, 13.4 ha of shoreline areas, and 1.0 ha of floodplains and flooding hazards (**Appendix D**, Table 6B).

Vineland – Review of N.E.S. Options

Vineland has a total land area of 144.9 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 4.4 ha (3.1%), 6.7 ha (4.6%) and 9.0 ha (6.2%) of the urban area respectively (**Appendix D**, Table 7A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 2.3 ha (1.6%) of natural cover followed by an additional 2.4 ha (1.7%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. This means that the size of the N.E.S. increases by 4.6 ha (3.1%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 96.9 ha (66.9%) of the urban area, which consists of 96.0 ha of highly vulnerable aquifers, 32.5 ha of significant groundwater recharge areas, 0.5 ha of shoreline areas, and 1.0 ha of floodplains and flooding hazards (**Appendix D**, Table 7B).

Vineland South – Review of N.E.S. Options

Vineland South has a total land area of 17.0 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 1.5 ha (8.7%), 1.5 ha (8.7%) and 3.3 ha (19.7%) of the urban area respectively (**Appendix D**, Table 8A). The total cover of the N.H.S. as identified in N.H.S. Option 3C is greater than N.H.S. Options 3A and 3B as a result of mapping of buffers to woodlands (1.9 ha; 11.0%).

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 1.0 ha (5.8%) of the urban area, which consists of 1.0 ha of highly vulnerable aquifers (**Appendix D**, Table 8B).

St. Catharines – Review of N.E.S. Options

St. Catharines has a total land area of 6,852.0 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 911.8 ha (13.3%), 963.0 ha (14.1%) and 1,106.5 ha (16.1%) of the urban area respectively (**Appendix D**, Table 9A).

The increase in cover observed in the mapping of N.H.S. Options 3B and 3C is combination of mapping of 'other woodlands' (67.4 ha; 1.0%), and mapping of buffers to woodlands (128.1 ha; 1.9%).

This means that the size of the N.E.S. increases by 194.7 ha (2.8%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 4,061.9 ha (59.3%) of the urban area, which consists of 3,916.0 ha of highly vulnerable aquifers, 4.6 ha of significant groundwater recharge areas, 211.9 ha of shoreline areas, and 135.5 ha of floodplains and flooding hazards (**Appendix D**, Table 9B).

Glendale – Review of N.E.S. Options

Glendale has a total land area of 370.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 76.3 ha (20.6%), 77.2 ha (20.8%) and 84.6 ha (22.8%) of the urban area respectively (**Appendix D**, Table 10A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 0.9 ha (0.3%) of natural cover followed by an additional 7.5 ha (2.0%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 8.3 ha (2.2%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 37.1 ha (10.0%) of the urban area, which consists of 4.7 ha of highly vulnerable aquifers, 17.8 ha of significant groundwater recharge areas, 19.5 ha of shoreline areas, and 7.6 ha of floodplains and flooding hazards (**Appendix D**, Table 10B).

Niagara-on-the-Lake – Review of N.E.S. Options

Niagara-on-the-Lake (Old Town) has a total land area of 461.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 36.9 ha (8.0%), 43.1 ha (9.3%) and 49.3 ha (10.7%) of the urban area respectively (**Appendix D**, Table 11A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 6.7 ha (1.5%) of natural cover followed by an additional 5.7 ha (1.2%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 12.4 ha (2.7%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 117.0 ha (25.3%) of the urban area, which consists of 94.3 ha of highly vulnerable aquifers, 10.9 ha of shoreline areas, and 21.6 ha of floodplains and flooding hazards (**Appendix D**, Table 111B.

Queenston – Review of N.E.S. Options

Queenston has a total land area of 63.9 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 10.2 ha (16.0%), 10.2 ha (16.0%) and 14.9 ha (23.3%) of the urban area respectively (**Appendix D**, Table 12A).

When comparing the options, the increase in cover occurs is a result of the addition of buffers to woodlands in N.H.S. Option 3C, which adds 5 ha (7.8%) to the N.H.S. compared with N.H.S. Option 3A.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 52.8 ha (82.7%) of the urban area, which consists of 52.4 ha of highly

vulnerable aquifers, 0.5 ha of significant groundwater recharge areas, and 1.7 ha of shoreline areas (**Appendix D**, Table 12B).

St. Davids – Review of N.E.S. Options

St. Davids has a total land area of 245.4 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 31.7 ha (12.9%), 32.4 ha (13.2%) and 40.9 ha (16.7%) of the urban area respectively (**Appendix D**, Table 13A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 1.0 ha (0.4%) of natural cover followed by an additional 8.2 ha (3.3%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 9.2 ha (3.7%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 178.5 ha (72.7%) of the urban area, which consists of 162.6 ha of highly vulnerable aquifers, 33.6 ha of significant groundwater recharge areas, 4.5 ha of shoreline areas, and 3.2 ha of floodplains and flooding hazards (**Appendix D**, Table 13B).

Virgil – Review of N.E.S. Options

Virgil has a total land area of 253.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 19.1 ha (7.5%), 20.6 ha (8.1%) and 21.9 ha (8.6%) of the urban area respectively (**Appendix D**, Table 14A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 2.0 ha (0.8%) of natural cover followed by an additional 0.7 ha (0.3%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 2.8 ha (1.1%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 169.5 ha (66.8%) of the urban area, which consists of 150.3 ha of highly vulnerable aquifers, 44.4 ha of significant groundwater recharge areas, 7.3 ha of shoreline areas, and 12.0 ha of floodplains and flooding hazards (**Appendix D**, Table 14B).

Smithville – Review of N.E.S. Options

Smithville has a total land area of 565.0 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 76.3 ha (13.5%), 77.0 ha (13.6%) and 82.3 ha (14.6%) of the urban area respectively (**Appendix D**, Table 15A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 0.9 ha (0.2%) of natural cover followed by an additional 5.1 ha (0.9%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 6.0 ha (1.1%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 296.9 ha (52.6%) of the urban area, which consists of 283.1 ha of highly vulnerable aquifers, 23.7 ha of shoreline areas, and 48.5 ha of floodplains and flooding hazards (**Appendix D**, Table 15B).

Fenwick – Review of N.E.S. Options

Fenwick has a total land area of 251.3 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 38.0 ha (15.1%), 48.0 ha (19.1%) and 55.4 ha (22.0%) of the urban area respectively (**Appendix D**, Table 16A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 11.3 ha (4.5%) of natural cover followed by an additional 6 ha (2.4%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 17.4 ha (6.9%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 232.6 ha (92.5%) of the urban area, which consists of 232.3 ha of highly vulnerable aquifers, 169.7 ha of significant groundwater recharge areas, and 1.9 ha of shoreline areas (**Appendix D**, Table 16B).

Fonthill – Review of N.E.S. Options

Fonthill has a total land area of 788.3 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 120.4 ha (15.3%), 128.2 ha (16.3%) and 144.3 ha (18.3%) of the urban area respectively (**Appendix D**, Table 17A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 8.9 ha (1.1%) of natural cover followed by an additional 15.7 ha (2.0%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 23.9 ha (3.0%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 775.2 ha (98.3%) of the urban area, which consists of 715.2 ha of highly vulnerable aquifers, 341.9 ha of significant groundwater recharge areas, and 5.3 ha of shoreline areas (**Appendix D**, Table 17B).

Port Robinson – Review of N.E.S. Options

Port Robinson has a total land area of 597.4 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 242.6 ha (40.6%), 244.9 ha (41.0%) and 259.0 ha (43.4%) of the urban area respectively (**Appendix D**, Table 18A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 3.1 ha (0.5%) of natural cover followed by an additional 9.3 ha (1.6%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. The addition of a small linkage in N.H.S. Option 3C also resulted in an increase of 3.5 ha (0.6%) of the N.E.S.

This means that the size of the N.E.S. increases by 16.4 ha (2.7%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 260.5 ha (43.6%) of the urban area, which consists of 70.8 ha of highly vulnerable aquifers, 265.1 ha of significant groundwater recharge areas, 11.9 ha of shoreline areas, and 42.4 ha of floodplains and flooding hazards (**Appendix D**, Table 18B).

Thorold North – Review of N.E.S. Options

Thorold North has a total land area of 778.2 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 32.7 ha (4.2%), 32.7 ha (4.2%) and 35.8 ha (4.6%) of the urban area respectively (**Appendix D**, Table 19A).

When comparing the options, there is a minor increase in cover resulting from the addition of buffers to woodlands in N.H.S. Option 3C, which adds 3.1 ha (0.4 %).

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 290.7 ha (37.4%) of the urban area, which consists of 291.3 ha of highly vulnerable aquifers and 3.6 ha of shoreline areas (**Appendix D**, Table 19B).

Thorold South – Review of N.E.S. Options

Thorold South has a total land area of 1,073.0 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 184.8 ha (17.2%), 189.1 ha (17.6%) and 204.1 ha (19.0%) of the urban area respectively (**Appendix D**, Table 20A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 5.6 ha (0.5%) of natural cover followed by an additional 13.6 ha (1.3%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 19.3 ha (1.8%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 214.5 ha (20.0%) of the urban area, which consists of 202.4 ha of highly vulnerable aquifers and 23.7 ha of shoreline areas (**Appendix D**, Table 20B).

Welland – Review of N.E.S. Options

Welland has a total land area of 4,994.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 1,494.1 ha (29.9%), 1,542.3 ha (30.9%) and 1,567.6 ha (31.4%) of the urban area respectively (**Appendix D**, Table 21A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 60.9 ha (1.2%) of natural cover followed by an additional 3.2 ha (0.07%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. The addition of a small linkage in N.H.S. Option 3C also resulted in an increase of 9.6 ha (0.2%) of the N.E.S.

This means that the size of the N.E.S. increases by 73.5 ha (1.5%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 452.5 ha (9.1%) of the urban area, which consists of 223.8 ha of highly vulnerable aquifers, 23.7 ha of significant groundwater recharge areas, 141.0 ha of shoreline areas, and 141.3 ha of floodplains and flooding hazards (**Appendix D**, Table 21B).

Niagara Falls – Review of N.E.S. Options

Niagara Falls has a total land area of 8,221.4 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 1,893.8 ha (23.0%), 2,037.2 ha (24.8%) and 2,196.3 ha (26.7%) of the urban area respectively (**Appendix D**, Table 22A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 3B which adds 199.6 ha (2.4%) of natural cover followed by an additional 121.7 ha (1.5%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. The addition of a small linkage in N.H.S. Option 3C also resulted in an increase of 11.7 ha (0.1%) of the N.E.S.

This means that the size of the N.E.S. increases by 302.5 ha (3.7%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 2,947.6 ha (35.9%) of the urban area, which consists of 2,611.2 ha of highly vulnerable aquifers, 2.7 ha of significant groundwater recharge areas, 193.8 ha of shoreline areas, and 296.3 ha of floodplains and flooding hazards (**Appendix D**, Table 22B).

Port Colborne – Review of N.E.S. Options

Port Colborne has a total land area of 2,378.1 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 607.4 ha (25.5%), 678.8 ha (28.5%) and 707.1 ha (29.7%) of the urban area respectively (**Appendix D**, Table 23A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 85.4 ha (3.6%) of natural cover followed by an additional 5.8 ha (0.2%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A. The addition of a small linkage in N.H.S. Option 3C also resulted in an increase of 9.3 ha (0.4%) of the N.E.S.

This means that the size of the N.E.S. increases by 99.7 ha (4.2%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 2,227.4 ha (93.7%) of the urban area, which consists of 2,212.9 ha of highly vulnerable aquifers, 0.7 ha of significant groundwater recharge areas, 62.2 ha of shoreline areas, and 72.1 ha of floodplains and flooding hazards (**Appendix D**, Table 23B).

Crystal Beach – Review of N.E.S. Options

Crystal Beach has a total land area of 882.8 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 135.2 ha (15.3%), 140.2 ha (15.9%) and 151.1 ha (17.1%) of the urban area respectively (**Appendix D**, Table 24A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 5.4 ha (0.6%) of natural cover followed by an additional 10.5 ha (1.2%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 15.9 ha (1.8%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 704.8 ha (79.8%) of the urban area, which consists of 693.2 ha of highly vulnerable aquifers, 22.7 ha of significant groundwater recharge areas, 82.0 ha of shoreline areas, and 28.7 ha of floodplains and flooding hazards (**Appendix D**, Table 24B).

Douglastown – Review of N.E.S. Options

Douglastown has a total land area of 179.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 46.7 ha (26.0%), 56.4 ha (31.4%) and 57.6 ha (32.1%) of the urban area respectively (**Appendix D**, Table 25A).

When comparing the options, the increase in cover occurs is a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 9.7 ha (5.4%) of natural cover followed by an additional 1.1 ha (0.6%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 10.9 ha (6.1%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 25.1 ha (14.0%) of the urban area, which consists of 3.1 ha of highly vulnerable aquifers, 14.6 ha of shoreline areas, and 20.7 ha of floodplains and flooding hazards (**Appendix D**, Table 25B).

Fort Erie – Review of N.E.S. Options

Fort Erie has a total land area of 2,855.9 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 1,071.5 ha (37.5%), 1,114.1 ha (39.0%) and 1,139.2 ha (39.9%) of the urban area respectively (**Appendix D**, Table 26A).

When comparing the options, the increase in cover occurs as a result of the addition of 'other woodlands' in N.H.S. Option 2B which adds 52.6 ha (1.8%) of natural cover followed by an additional 15.1 ha (0.5%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

This means that the size of the N.E.S. increases by 67.7 ha (2.4%) in Option 3C over the Provincial standard requirements in N.H.S. Options 1, 2 and 3A as more components are added in each of Options 3B and 3C.

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 2,009.5 ha (70.4%) of the urban area, which consists of 1,990.6 ha of highly vulnerable aquifers, 17.3 ha of significant groundwater recharge areas, 75.1ha of shoreline areas, and 79.0 ha of floodplains and flooding hazards (**Appendix D**, Table 26B).

Stevensville – Review of N.E.S. Options

Stevensville has a total land area of 211.6 ha. The mapping of the three options in Maps A, B and C results in the N.E.S. covering 68.6 ha (32.4%), 68.6 ha (32.4%) and 69.2 ha (32.7%) of the urban area respectively (**Appendix D**, Table 27A).

When comparing the options, the increase in cover occurs as a result of the addition of 'other woodlands' in N.H.S. Option 3B which adds 0.1 ha (0.05%) of natural cover followed by an additional 0.5 ha (0.2%) of buffers in N.H.S. Option 3C compared with N.H.S. Option 3A.

There is a minor increase in environmentally protected lands between the minimum requirements and N.H.S. Option 3C (0.6 ha or 0.3%).

The mapping of the Key Hydrologic Areas, Shoreline Areas, and Areas that Support Hydrologic Functions (Map D) covers 39.8 ha (18.8%) of the urban area, which consists of 12.1 ha of highly vulnerable aquifers, 23.5 ha of significant groundwater recharge areas, 31.0 ha of shoreline areas, and 14.5 ha of floodplains and flooding hazards (**Appendix D**, Table 27B).

Discussion – Implications of Natural Environment System Options

As mentioned above, N.H.S. Options 1, 2 and 3A within settlement areas and the one W.R.S. Option reflect Provincial standards and are considered to be required standards in accordance with Provincial policy. Combined, the land areas that reflect Provincial standards are generally fixed. However, the boundaries of the 'natural heritage features and areas' (including 'other woodlands') and key hydrological features can be reviewed in more detail through the preparation of secondary plans, watershed studies and through the review of development applications.

It must first be recognized that there are a number of 'natural heritage features and areas' that have not been mapped including significant wildlife habitat and habitat of endangered and threatened species. Their identification through site-specific studies may have an impact on the amount of potentially developable land. That said, within settlement areas the majority of natural features where significant wildlife habitat and habitat of endangered and threatened species would mostly be located within natural features already included within the N.E.S. (e.g., woodlands and wetlands), so the impact on the amount of potentially developable land would likely be marginal.

The total amount of land within the urban areas that is comprised of mapped 'natural heritage features and areas' and key hydrologic features that is based on Provincial standards is 7,260 ha. Given that the total land area of the Region's urban areas is 34,346 ha, these components of the N.E.S. comprise about 21.1% of the Region's urban area. The amount of land available for new development within each urban area will depend on how much of the urban area is already developed and the size of the urban area. For example, while mapping of the 'natural heritage features and areas' and key hydrologic features amounts to 4.6% of Grimsby's urban area, much of the urban area is developed meaning any increase to the system beyond Provincial standards would have a relatively greater impact to the remaining area of developable land. In comparison, large undeveloped areas remain in Niagara Falls, even where 1,893.8 hectares or 23.0% of the urban area is comprised of required components of natural heritage features and key hydrologic features.

There is a distinction in natural cover and feature type throughout the Region depending on the topography of the urban area. For example, urban areas with relatively flat topography and poor draining soils support wetland communities include P.S.W.s and 'other wetlands', both required components of the W.R.S. In these urban areas, there is little change in spatial coverage of the N.E.S. across the options. However, in urban areas with more upland communities, there is a higher proportion of significant woodlands and 'other woodlands'. Since 'other woodlands' are considered an 'optional component' and not introduced in settlement areas until N.H.S. Option

3B, there tends to be a greater difference in spatial coverage between the options in urban areas with more upland vegetation communities. In this regard, the amount of land area that is occupied by 'other woodlands' added in Option 3B is very little in some cases such as 0.1 ha in Stevensville to 199.6 ha in Niagara Falls. However, while 199.6 hectares is a large amount of land on its own, it only adds 2.4% of the land in the Niagara Falls urban area to the N.E.S. This is due to the larger size of the Niagara Falls urban area, which is 8,221.4 ha. In total, the amount of 'other woodlands' added to the N.E.S. in all of the Region's urban areas is 548.2 ha, and results in 1.6% of the total combined area of the Region's urban area potentially being added into the N.E.S. as a result. To put this in perspective, 26,659.3 ha of land within the Region's urban areas remain outside of the N.E.S. if Option 3B is selected.

It is noted that buffers[2] are already required for wetlands and watercourses in accordance with N.P.C.A. policy and as a result 2,192.2 ha of land in buffer areas is included within Options 1, 2, 3A and 3B. The only buffers that are being added in Option 3C are to non-regulated features such as significant woodlands and 'other woodlands'. In this regard, the amount of land added to the N.E.S. for these buffers in Option 3C is directly proportional to the amount of land that is significant woodland or 'other woodlands' in the urban area. Again, taking Niagara Falls as an example, it contains 554.7 hectares of significant woodlands and 199.6 hectares of 'other woodlands' and as a consequence, 121.7 hectares in buffers are added as a result. For an urban area with less woodland, a correspondingly smaller area of land would be added as buffers.

In terms of the total amount of buffer lands being added in Option 3C compared with Option 3A, it is 394.8 ha which increases the percentage of the urban areas in the N.E.S. by 1.1%. It is noted that the extent of the buffer can be reviewed on a case-by-case basis, however; buffers would most likely be required for both significant woodlands and 'other woodlands' to satisfy the no negative impact test in accordance with the P.P.S. This means that it is very likely that the majority of the lands so identified would be required for buffers in any event, which to a very large extent neutralizes the impacts of adding buffers to significant woodlands and 'other woodlands' in Option 3C.

While Option 3C includes 'supporting features and areas', linkages and enhancement areas, only linkages will be mapped. It is anticipated that the policies in the N.O.P. will allow for some flexibility in how linkages are dealt with (size and location) when they are looked at comprehensively through future secondary planning and watershed planning exercises and

[2] Regarding buffers, it is first important to recognize that the statistics generated from the mapping are intended to inform the assessment of the implication of buffers. The actual width of buffers will be informed by site-specific study and may be wider or narrower than what has been mapped.

through the review of major development applications. The amount of land included within linkages in all of the urban areas is 34.2 ha (0.1%), which when compared to the amount of land within the urban areas is not substantial.

As a result of the above, the most significant change in the amount of land being added to the N.E.S. across urban areas occurs in Option 3B, when 548.2 ha of land is being added to the N.E.S. as a result of adding 'other woodlands'. While 'other woodlands' occupy a total area of 548.2 ha, they are often located adjacent to or abutting 'natural heritage features and areas' including significant woodlands and P.S.W.s. to which a buffer is mapped for the purposes of understanding the potential extent of the N.E.S. Therefore, with the overlap of 'other woodlands' on buffers to 'natural heritage features and areas', the net increase in total natural area cover of the N.E.S. resulting from the addition of 'other woodlands' in N.H.S. Option 3B is 427 ha.

Buffers to significant woodlands and 'other woodlands' adds 394.5 ha to the N.E.S. Buffers would most likely be required from these woodlands as part of demonstrating 'no negative impact'.

While other 'supporting features and areas' and enhancement areas are required to be considered in Option 3C, the amount of land included within these areas is expected to be limited in settlement areas due to the extent of developed area and limited opportunities for incorporate other natural areas into the N.E.S. The identification of 'supporting features and areas' is best determined through future study.

In terms of the impacts of the addition of 'other woodlands' in Option 3B within settlement areas, the location of these features may have an impact on the ability to efficiently lay out and service new development areas, particularly if the 'other woodland' areas are separate from other components of the N.E.S. and are isolated or if the addition of the 'other woodland' has the effect of creating smaller development areas that may be more costly and less efficient to develop as a result. However, a determination of the impacts in this regard can only be made after carrying out a review of the location of 'other woodlands' in each of the settlement areas and completing a more detailed analysis that takes into account a number of factors, most notably servicing feasibility.

Review of Hydrologic Areas of the Water Resource System in Urban Areas

As mentioned previously, Map D identifies the following hydrologic areas of the W.R.S.:

- Key Hydrologic Areas
    - Significant Groundwater Recharge Areas
    - Highly Vulnerable Aquifers

- Shoreline Areas
- Floodplains, Flooding Hazards

The intent of Map D is to illustrate other components of the W.R.S. (i.e., in addition to key hydrologic features) where additional constraints to development exist; while some of these hydrologic areas may be coincident with 'natural heritage features and areas' and 'other wetlands', these hydrologic areas will pose constraints to development in addition to the mapped components of the N.H.S. and key hydrologic features.

These hydrologic areas of the W.R.S. comprise a large proportion of some of the urban areas (e.g., 90.8% of Grimsby, 98.3% of Fonthill, 82.1% of Prudhommes, and 92.2% of Jordan Station). While these areas are required components of a W.R.S. according to Provincial policy, the policies related to these features are considerably different than policies for well-defined feature of the landscape, such as wetlands and significant woodlands that are generally protected in a way that restricts development. Groundwater systems are vast and cover significant portions of the Region and are protected in ways that do not necessarily restrict development. The policies and regulations used to protect these hydrologic areas are therefore different and consider the requirement to protect, enhance and restore water quality and quantity. These Provincial policies and regulations currently in place establish a framework for the protection and management of the water resources within the N.E.S. As such, the formal identification of a W.R.S. and components therein will not substantially increase the amount of land within the Region that is already the subject of Provincial policies that require that consideration of impacts be a part of the review of development applications and the preparation of Official Plans and secondary plans.

In addition to the above, there is now a requirement in the Growth Plan that requires that watershed planning or equivalent inform "a) the identification of water resource systems, b) the protection, enhancement, or restoration of the quality and quantity of water, c) decisions on allocation of growth, and d) planning for water, wastewater, and stormwater infrastructure" (Growth Plan policy 4.2.1.3). In addition, there is a requirement that "planning for large-scale development in designated greenfield areas, including secondary plans, will be informed by a subwatershed plan or equivalent" (Growth Plan policy 4.2.1.4). As such, there will be a need through future secondary planning and watershed planning exercises to identify components of the W.R.S, including those that cannot be mapped at this time, "which are necessary for the ecological and hydrological integrity of the watershed" (P.P.S. policy 2.2.1. d.). The identification of the components of the W.R.S. and applicable policies will also have an impact on the amount of land potentially available for development.

Implementation of the Natural Environment System

The implementation of one of the N.E.S. options presented in this technical memorandum will occur first through the preparation of updated policies and mapping in the N.O.P. Once this occurs, updates will then be required to each of the local Official Plans as well. The purpose of this section is to discuss implementation options.

Overlay and Mapping Implications

If N.E.S. Option 1A is selected, all of the mappable 'natural heritage features and areas' and key hydrological features would be included in an overlay designation on the schedules to the N.O.P. This means that decisions would need to be made on what the underlying land use designation would be. However, since the current N.O.P. does not currently establish separate land use designations within the settlement areas, those decisions would not need to be made at the Regional level; however, it is acknowledged that the Growth Plan now requires in Section 2.2.5.6 that upper-tier planning authorities such as Niagara Region designate employment areas to protect them for appropriate employment uses over the long term.

If the N.E.S. is included within an overlay designation in the N.O.P., modifications to the boundary of the N.E.S. would not require an amendment to the N.O.P.

If N.E.S. Option 1A is selected, the local municipalities will also include the same area on their Official Plan schedules as well and if they do so, it will then be up to each local municipality to determine what the underlying land use designation should be. However, this may not be appropriate for all of the 'natural heritage features and areas' within the N.E.S., particularly P.S.W.s, where development and site alteration is already prohibited by Provincial policy. In this case, designating these lands for development may not be appropriate and consistent with the P.P.S.

As a result, the local municipalities may need to include components of the N.E.S. in a land use designation that prohibits development and include the other components of the mapped N.E.S. in an overlay designation. For the component of the N.E.S. that is designated, it will be up to the local Official Plans to determine whether amendments are required, if modifications to the boundary of the designated area were proposed. For those components of the N.E.S. that are in the overlay, it is not anticipated that a local municipality would require an amendment to the Official Plan to facilitate changes in the boundaries of an overlay designation, as long as whatever was proposed conformed to the policies of the underlying land use designation.

In addition to updating the mapping as discussed above, updated N.H.S. and W.R.S. policies will need to be included in the N.O.P. and then in the local Official Plans as well. These policies would establish development permissions in each natural heritage feature or area and within each component of the W.R.S. Policies on land securement, existing uses and requirements for supporting studies (e.g., environmental impact studies) would also be included in the N.O.P. and the local Official Plans. It is also anticipated that the N.O.P. would provide direction on how natural heritage feature or areas and components of the W.R.S. would be zoned by the local municipalities. This direction will be required to ensure firstly that lands that are prohibiting from developing are zoned accordingly and secondly, to ensure that lands are not pre-zoned for development particularly in designated greenfield areas, where secondary plans and watershed studies or their equivalent will be required to support development.

Designation and Mapping Implications

If one of N.H.S. Options 2 or 3 are selected, 'natural heritage features and areas' (and 'other woodlands' in N.H.S. Option 3B and 3C within settlement areas), and 'other wetlands' would be included within an exclusive land use designation in the new N.O.P. The same would occur in the local Official Plans as well.

Given the strategic focus of upper tier Official Plans, it is recommended that consideration be given to not requiring an amendment to the N.O.P. provided the proposed change has been justified in accordance with criteria established with the N.O.P., with these criteria implementing Provincial policy requirements, such as demonstrating no negative impact in particular.

Given that several components of the N.E.S would be included as a designation in the N.O.P., these components would also be a designation in the local Official Plan in order to conform to the N.O.P. The local Official Plan would also include policies on whether local Official Plan Amendments would be required if boundary changes were proposed.

In addition, updated N.H.S. and W.R.S. policies will need to be included in the N.O.P. and then in the local Official Plans as well as already discussed. It is also anticipated that the N.O.P. would provide direction on how features and areas of the N.H.S. and W.R.S. would be zoned by the local municipalities.

Impacts of the Natural Environment System on Long-Term Planning

The Growth Plan requires that planning for large-scale development in designated greenfield areas in settlement areas (including secondary plans) be informed by a subwatershed plan or its equivalent. Such a subwatershed plan should consider existing development and evaluate

impacts of any potential or proposed land uses and development; identify hydrologic features, areas, linkages, and functions; identify natural features, areas, and related hydrologic functions; and provide for protecting, improving, or restoring the quality and quantity of water within a subwatershed. This requirement will need to be included in both the new N.O.P. and the local Official Plans.

Summary and Conclusions

This technical memorandum has had prepared in order to provide more details on the policy intent for each of the options for the N.H.S. and W.R.S. as identified in Technical Report #2. This additional work included establishing a preliminary methodology and criteria for each feature-type in order to prepare mapping within each urban area in the Region for each of the options and provide detailed statistics to allow for a comparison of each option as they apply to the mapped urban areas.

These options were informed by guidance provided in Provincial policy documents including the P.P.S., the Greenbelt Plan and the Growth Plan. The policies in these documents informed the identification of the options and policy intent for the N.E.S. in each option. The policy intent of each option is intended to further inform local area municipalities and Council on the differences between the options, including the required standards for the N.E.S.

The main differences between the Options for the N.E.S. in urban areas include:

- Overlay vs. designation
- Prohibition on development in significant woodlands in N.H.S. Option 3
- Addition of ‘other woodlands’ in N.H.S. Options 3B and 3C
- Addition of ‘supporting features and areas’ in N.H.S. Option 3C
- Policy requirement for mandatory buffers on ‘natural features and areas’ and ‘other woodlands’ in N.H.S. Option 3C
- Small linkages in urban areas added in N.H.S. Option 3C

Based on the review of the options for the N.E.S., the main difference in area between the options was a result of mapping ‘other woodlands’ and buffers to significant woodlands and ‘other woodlands’. The addition of ‘other woodlands’ has the most potential to impact developable land within urban areas, resulting in a net increase of 427 ha of natural cover to the N.E.S. or a 1.3% increase to the standard requirements of the N.E.S. While having a policy that requires buffers to be identified will result in a slightly larger increase in the mapping of the

N.E.S. than ‘other woodlands’, they are typically necessary in most cases to meet the test of no negative impact and are not expected to add an additional constraint to development.

This technical memorandum has also concluded that in fact there are no ‘optional’ components for the W.R.S. and therefore there is only one option for the W.R.S. There will be a need for the new N.O.P. to provide direction for large-scale development in designated greenfield areas, including secondary plans, to be informed by a subwatershed plan or equivalent to further refine and identify components of the W.R.S, including those that cannot be mapped at this time, in order to maintain or enhance the ecological and hydrological integrity of the watershed.

In summary, the options for the N.E.S. provide a standard requirement for the N.E.S. in settlement areas (N.H.S. Options 1, 2 and 3A) with increasing numbers of optional components and protection for components of the N.E.S. moving through N.H.S. Options 3B and 3C. The options were developed to ensure consistency with Provincial standard requirements, clarify and simplify a policy intent for the identification and protection of the features and areas of the system, and provide a range of options that exceed standard requirements that identify a Region-wide N.E.S. based on a systems-based approach to natural environment planning.

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Appendix A: Definitions and Criteria for Components of the N.H.S. and W.R.S and Methodology for Mapping

Preliminary Definitions and Criteria for Features and Areas

The two discussion papers, Technical Report #1 and Technical Report #2 provided a review of best practices for the identification of various components of the N.E.S., including definitions and criteria for the identification of some of the components. **Table 1** includes the proposed definitions for each component recommended for mapping in urban areas as well as the criteria for identifying the component or a reference to the agency responsible for creating the dataset.

Table 1. Preliminary definitions and criteria for features and areas proposed for mapping within settlement areas.

Feature and Area	Definition	Criteria
Natural Heritage System		
Provincially Significant Wetland	**Provincially Significant Wetlands** are those identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time (P.P.S. 2020)	The criteria for identifying Provincially Significant Wetlands are established by the Province. At the time of writing this report the Ontario Wetland Evaluation System, Southern Manual, 3rd Edition, Version 3.3. (M.N.R.F. 2014) is considered the document by which an evaluation should be undertaken. The MNRF is responsible for review and approval of a wetland evaluation.
Significant Woodland	**Woodlands** - treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels. Woodlands will be delineated according to the Province's Ecological Land Classification system definition for "forest" (P.P.S. 2020). For the purposes of this definition, forests include terrestrial vegetation communities as defined in accordance with the Province's Ecological Land Classification system, where the tree cover is greater than 60%. **Significant Woodlands** are woodlands that are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history. (P.P.S. 2020).	To be identified as significant a woodland must meet the definition of E.L.C. "forest" (as per the definition of 'woodland'), and a woodland must meet one or more of the following criteria: 1. Any woodland 2 ha or greater in size; 2. Any woodland 1 ha or greater in size meeting at least one of the following criteria: a. Naturally occurring (i.e., not planted) trees (as defined in the species list of Appendix D in the Greenbelt Technical Paper); b. 10 or more trees per ha greater than 100 years old or 50 cm or more in diameter; c. Any woodland wholly or partially within 30 m of a significant wetland; habitat of an endangered or threatened species; significant woodland; d. Any woodland overlapping or abutting one or more of the following features: i. Permanent streams or intermittent streams; ii. Fish habitat; iii. Significant valleylands; 3. Any woodland 0.5 ha or greater in size meeting at least one of the following criteria: a. A provincially rare treed vegetation community with an S1, S2 or S3 in its ranking by the M.N.R.'s N.H.I.C; b. Habitat of a woodland plant species with an S1, S2 or S3 in its ranking or an 8, 9, or 10 in its Southern Ontario Coefficient of Conservatism by the N.H.I.C., consisting of 10 or more individual stems or 100 or more sqm of leaf coverage; c. Any woodland overlapping or abutting one or more of the following features: i. Significant wildlife habitat; and ii. Habitat of threatened species and endangered species; iii. 'Other wetlands'

Feature and Area	Definition	Criteria
		4. Any woodland of any size overlapping or abutting one or more of the following features: a. P.S.W.s; and b. Life Science A.N.S.I. Woodlands that “abut” another feature are considered adjacent when located within 20 m of each other. Guidance for delineating the boundary of a ‘woodland’ as defined by the Region should follow those of Appendix B in the Greenbelt Plan 2005 – Technical Definitions and Criteria for Key Natural Heritage Features in the Natural heritage System of the Protected Countryside (Ontario Ministry of Natural Resources, 2012)
Linkages	**Linkage** means an area, that may or may not be associated with the presence of existing natural features and areas, that provides and maintains ecological connectivity between natural heritage features, and supports a range of community and ecosystem processes enabling plants and animals to move among natural heritage features, in some cases over multiple generations, thereby supporting the long-term sustainability of the overall N.H.S.	In urban areas, the following criteria are applied to identify small linkages: 1. consist of natural vegetation (e.g., water courses, valleylands, meadow, thicket, woodland, wetland, and hedgerows) or rural/agricultural lands without major barriers (i.e., developed areas or major roads greater than 30 m in width); 2. be 60-100 m in width, as confirmed through a site-specific study evaluating the ecological function of the features being connected and the need to maintain ecological connectivity between natural features; and 3. connect core areas (i.e., a group of natural features and areas within 30 m of each other) with a combined area of ≥4 ha in size. For mapping purposes of small linkages, a 100 m wide linkage should be illustrated as part of the N.H.S. recognizing that the width of the linkage will be reviewed and may be refined through site specific studies.
Life Science A.N.S.I.	**Life Science A.N.S.I.s** are identified as being high quality example(s) of ecological form and function in each Ecodistrict in the province (provincially significant) and the Region (regionally significant) and are generally defined by natural heritage features (e.g., a woodland, valley top of bank, etc.) and generally exclude anthropogenic land uses (e.g., residential areas / properties). Life Science A.N.S.I.s include areas identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time (P.P.S. 2020)	The identification of Life Science A.N.S.I.s is determined by the Province using criteria established by the Province.
Earth Science A.N.S.I.	**Earth Science A.N.S.I.s** represent the best examples of geologic and geomorphic landforms and areas (e.g., a moraine) in each Ecodistrict in the province (provincially significant) and the Region (regionally significant). They may encompass a single feature or a group of related features (e.g., a drumlin field). As geologic / geomorphic	The identification of Earth Science A.N.S.I.s is determined by the Province using criteria established by the Province.

Feature and Area	Definition	Criteria
	landforms, the overlying land use may include a composite of natural and anthropogenic uses (e.g., woodland, agricultural, rural residential, etc.). Earth Science A.N.S.I.s include areas identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time (P.P.S. 2020)	
Other Woodlands	**Other woodlands** are woodlands determined to be ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Other woodlands include all treed vegetation communities where the percent tree cover is >25%, in accordance with the 2nd Approximation of Ecological Land Classification for Southern Ontario (2008). Other woodlands would not include woodlands meeting the criteria as Significant Woodlands.	To be identified as an "other woodland", a treed area must have ≥ 25% tree cover and meet one or more of the following criteria: 1. The treed area has an average minimum width of 40 m and is ≥0.3 ha, measured to crown edges; or 2. Any treed area of any size abutting a significant woodland. Treed areas that "abut" a significant woodland or treed swamp are considered adjacent when located within 20 m of each other.
Water Resource System		
Wetlands	Wetlands are defined as "lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens. Periodically soaked or wet lands being used for agricultural purposes which no longer exhibit wetland characteristics are not considered to be wetlands for the purposes of this definition. Wetlands are further identified, by the Ministry of Natural Resources and Forestry or by any other person, according to evaluation procedures established by the Ministry of Natural Resources and Forestry, as amended from time to time."	Wetlands will be identified according to evaluation procedures established by the Ministry of Natural Resources and Forestry, as amended from time to time.
Other Wetlands	**Other wetlands** (i.e., non-P.S.W.s in settlement areas) are defined in accordance with the N.P.C.A. definition for wetland, as follows: "land that a) is seasonally or permanently covered by shallow water or has a water table close to or at its surface, b) directly contributes to the hydrological function of a watershed through connection with a surface watercourse, c) has hydric soils, the formation of which has been caused by the presence of abundant water, and d) has vegetation dominated by hydrophytic plants or water tolerant plants, the dominance of which has been favoured by the presence of abundant water, but does not include periodically soaked or wet land that is used for agricultural purposes and no longer exhibits a wetland characteristic referred to in clause c) or d)." It should also be noted that for non-P.S.W.s in settlement areas that do not meet the definition of 'other wetland' and to which the N.P.C.A. policies would not apply, but do meet the definition of 'wetland', the Region and/or the N.P.C.A. may require that an appropriate study (e.g., E.I.S., hydrologic evaluation) be undertaken to determine if	Wetlands meeting the definition as 'other wetlands' will be identified according to evaluation procedures established by the Ministry of Natural Resources and Forestry, as amended from time to time

Feature and Area	Definition	Criteria
	the wetland should be protected in situ with appropriate buffers/setbacks or if the hydrologic function provided by wetland should be maintained or managed as part of the design of the development.	
Inland Lakes	**Inland lakes** are considered any inland body of standing water larger than a pool or pond or a body of water filling a depression in the earth's surface, where their water levels and hydrologic functions are not directly influenced by either Lake Erie or Lake Ontario.	Inland lakes include any body of water larger than a pool or pond, except for storm water management ponds, ponds constructed for irrigation purposes, such as those on a golf course or used for agriculture, lakes that have been constructed and managed with the sole purpose of supporting essential infrastructure, and where their ecological function is not a consideration in their management.
Permanent and intermittent streams	**Permanent streams** are watercourses that contain water during all times of the year. **Intermittent streams** are stream-related watercourses that contain water or are dry at times of the year that are more or less predictable, generally flowing during wet seasons of the year but not the entire year, and where the water table is above the stream bottom during parts of the year." (Greenbelt Plan 2017)	Criteria for the identification of a permanent or intermittent stream should follow protocols established by the Province, such as the Ontario Stream Assessment Protocol.
Significant Groundwater Recharge Areas	"An area that has been identified as: a) a significant groundwater recharge area by any public body for the purposes of implementing the P.P.S.; b) a significant groundwater recharge area in the assessment report required under the Water Act, 2006; or c) an ecologically significant groundwater recharge area delineated in a subwatershed plan or equivalent in accordance with provincial guidelines. For the purposes of this definition, ecologically significant groundwater recharge areas are areas of land that are responsible for replenishing groundwater systems that directly support sensitive areas like cold water streams and wetlands. (Greenbelt Plan 2017) Groundwater recharge areas are classified as "significant" when they supply more water to an aquifer (which is used as a drinking water source) than the surrounding area (N.P.C.A., 2013). This method is recommended where recharge rates are fairly homogenous such as is generally the case for NPCA. In other words, a recharge area is considered significant when it helps to maintain the water level in an aquifer that supplies a community with drinking water, or supplies groundwater recharge to a coldwater ecosystem that is dependent on this recharge to maintain its ecological function (N.V.C.A., 2015b). S.G.R.A.s were identified where groundwater is recharged by a factor of 1.15 or more than the average recharge rate for the whole watershed (average recharge rate for NPCA is 46 mm/year). Significant groundwater recharge areas are subdivided by the groundwater vulnerability and assigned scores of 6, 4 or 2 for groundwater vulnerabilities of high, medium and low, respectively (N.P.C.A., 2009).	Significant Groundwater Recharge Areas have been delineated for the entire Niagara Peninsula Source Protection Area using methodology developed by the Niagara Peninsula Conservation Authority in consultation with the Ministry of Natural Resources (M.N.R.), and was based on the March 2007 Draft Guidance Module – Water Budget and Water Quantity Risk Assessment (Guidance Module). The identification of the Significant Groundwater Recharge Areas adheres to the Assessment Report Technical Rules (M.O.E., 2009), Regulation 287/07 and Technical Bulletin methodology descriptions (M.N.R., M.O.E., 2009).

Feature and Area	Definition	Criteria
Highly Vulnerable Aquifers	**Highly Vulnerable Aquifers** are "aquifers, including lands above the aquifers, on which external sources have or are likely to have a significant adverse effect." (Greenbelt Plan) According to the 'Groundwater Vulnerability Analysis, Niagara Peninsula Source Protection Areas' study completed by the N.P.C.A. (2009) Highly Vulnerable Aquifers (H.V.A.s) are areas of high groundwater vulnerability that "typically consist of granular aquifer materials or fractured rock that have a high permeability, are exposed near the ground surface, and have a relatively shallow water table" (N.P.C.A., 2009). Aquifer Vulnerability Index (A.V.I.) groundwater vulnerability assessments have been completed to improve the delineation of highly vulnerable aquifers. The A.V.I. groundwater vulnerability assessments were based on regional hydrostratigraphic interpretations (N.P.C.A., 2009). The H.V.A. delineation reflects the increased vulnerability of the shallowest identified aquifers by transport pathways. H.V.A are also defined as aquifers, including lands above the aquifers, on which external sources have or are likely to have a significant adverse effect (Greenbelt Plan, 2017).	Highly vulnerable aquifers are identified based primarily on vulnerability mapping completed as part of the 2005 N.P.C.A. Groundwater Study (Waterloo Hydrogeologic Inc., 2005). The mapping combined two vulnerability assessment methods: (i) intrinsic susceptibility index (I.S.I.) and (ii) aquifer vulnerability index (A.V.I.). Transport pathways, such as unused private wells, were also considered as they can increase groundwater vulnerability.
Shoreline Areas	**Shoreline areas** are the interface between terrestrial and aquatic environments, allowing for interactions between them, providing: specialized habitats (e.g., natural beach, overhanging cover, bird stopover or nesting, etc.), natural cover, areas of shoreline erosion or accretion, nutrient and sediment filtration / buffering, shading, foraging opportunities.	Shoreline areas include any natural vegetation community (as determined according to Ecological Land Classification) ≥ 0.1 ha in size, located within 30 m of the limits of the shoreline flood hazard associated with the Great Lakes, or within 15 m of a surface water feature, as defined by the P.P.S.
Floodplains, flooding hazards, floodways	**Floodplains** are defined "for river, stream and small inland lake systems, means the area, usually low lands adjoining a watercourse, which has been or may be subject to flooding hazards" (P.P.S. 2020). **Flooding hazard**: "means the inundation, under the conditions specified below, of areas adjacent to a shoreline or a river or stream system and not ordinarily covered by water: a) along the shorelines of the Great Lakes - St. Lawrence River System and large inland lakes, the flooding hazard limit is based on the one hundred year flood level plus an allowance for wave uprush and other water related hazards; b) along river, stream and small inland lake systems, the flooding hazard limit is the greater of: 1. the flood resulting from the rainfall actually experienced during a major storm such as the Hurricane Hazel storm (1954) or the Timmins storm (1961), transposed over a specific watershed and combined with the local conditions, where evidence suggests that the storm event could have potentially occurred over watersheds in the general area; 2. the one hundred year flood; and 3. a flood which is greater than 1. or 2. which was actually experienced in a particular watershed or portion thereof as a result of ice jams and	The floodplain, flooding hazard and floodway are identified in accordance with technical guidelines established by the Ministry of Natural Resources and Forestry (e.g., Understanding Natural Hazards (2001); Technical Guide - River & Stream Systems: Flooding Hazard Limit (2002); Hazardous Sites – Technical Guide (1996); Great Lakes-St. Lawrence River Shorelines, Flooding, Erosion and Dynamic Beaches (2001); Technical Guide for Large Inland Lakes Shorelines, Flooding, Erosion and Dynamic Beaches (1996); Technical Guide - River and Stream Systems: Erosion Hazard Limit (2002)).

Feature and Area	Definition	Criteria
	which has been approved as the standard for that specific area by the Minister of Natural Resources and Forestry; except where the use of the one hundred year flood or the actually experienced event has been approved by the Minister of Natural Resources and Forestry as the standard for a specific watershed (where the past history of flooding supports the lowering of the standard).” (P.P.S. 2020). **Floodway**: “for river, stream and small inland lake systems, means the portion of the flood plain where development and site alteration would cause a danger to public health and safety or property damage. Where the one zone concept is applied, the floodway is the entire contiguous flood plain. Where the two zone concept is applied, the floodway is the contiguous inner portion of the flood plain, representing that area required for the safe passage of flood flow and/or that area where flood depths and/or velocities are considered to be such that they pose a potential threat to life and/or property damage. Where the two zone concept applies, the outer portion of the flood plain is called the flood fringe.”	

Components Recommended for Mapping the Natural Environment System

The Mapping Discussion Paper provided a review of the P.P.S., Provincial plans and policies, and a review of comparable municipal approaches to mapping N.H.S.s. The review of mapping datasets recommended a subset of components that should be mapped based on a review of the age of data, accuracy, completeness (i.e., representation of the data across the entire Region) and the need to provide a visual representation of the feature to support policy implementation. The Mapping Discussion Paper also provided a review of existing datasets in Table 9 of that report and provided a recommendation on the suitability of datasets and preliminary considerations for use of each dataset. Through applying a set of criteria related to the age, accuracy and areal (i.e., geographic) coverage of the dataset recommendations, as well as considerations of options to update existing datasets or develop new datasets, recommendations for mapping components were provided in Section 8.3.1 of the Mapping Discussion Paper. Technical Report #2 further assessed the available mapping and made additional recommendations for which datasets to use or not, and how to create datasets based on currently available information.

Through the development of natural environment system options provided in Technical Report #2 and in consideration of the data that will obtained through studies currently being completed (i.e., Ecological Land Classification (E.L.C.) mapping for the Region and the Watershed Equivalency Study) the following components are recommended for mapping the N.H.S. and W.R.S. in urban areas:

Natural Heritage System

- P.S.W.s;
- Significant woodlands;
- Life Science A.N.S.I.s;
- Earth Science A.N.S.I.s;
- Other woodlands; and
- Linkages

Water Resource System

- Wetlands (P.S.W.s and non-P.S.W.s);
- Inland lakes;
- Permanent streams (including rivers) and intermittent streams;

- Significant groundwater recharge areas;
- Highly vulnerable aquifers;
- Shoreline areas; and
- Floodplains, flooding hazards, floodways.

It should be noted that Technical Report #2 had recommended enhancement areas be mapped as part of the N.H.S. However, it has been determined through the mapping exercise in urban areas that mapping of enhancement areas in settlement areas at the Regional-scale is not appropriate due to the built environment in urban areas and the level of information required to accurately identify potential enhancement areas in urban areas. The identification and configuration of enhancement areas in urban areas requires site-specific knowledge of the natural feature and the ecological functions to be enhanced, therefore mapping of enhancement areas within urban areas is not recommended. The determination of enhancement areas is better determined through site-specific studies, including those completed in support of secondary plans.

Sources of Mapping Data and Recommendations for Mapping

The Mapping Discussion Paper and Technical Report #2 provided a review of available mapping as well as recommendations for how datasets could be improved, acquired, or created. **Table 5** provides recommendations for datasets that should be used to produce preliminary mapping of the N.H.S. and W.R.S. options within urban areas. Appendix 1 includes a table of the 54 different classification types, including anthropogenic and natural areas, that are included in the Ecological Land Classification (E.L.C.) dataset, indicating what classification codes should be used to develop another dataset.

Table 2. Datasets and recommendations for improving or creating datasets for the components considered for mapping in the Region's Natural Environment Systems within Urban Areas.

Component Features and Areas	Existing Source of Data	Notes
Natural Heritage System		
Provincially Significant Wetland	Wetlands (M.N.R.F., last updated November 2020)	Ensure most recent Land Information Ontario (L.I.O.) dataset is obtained.
Significant Woodland	Niagara Region 2020 Ecological Land Classification	The Region's 2020 Ecological Land Classification dataset is current and should be the most accurate dataset available to identify woodlands. Apply criteria established for significant woodlands.
Linkages	Niagara Region 2020 Ecological Land Classification Contemporary Mapping of Watercourses (Niagara Region, 2016)	Apply criteria established for linkages.
Life Science A.N.S.I.	Areas of Natural and Scientific Interest (M.N.R.F., last updated July 2020)	Ensure most recent L.I.O. dataset is obtained.

Component Features and Areas	Existing Source of Data	Notes
Earth Science A.N.S.I.	Areas of Natural and Scientific Interest (M.N.R.F., last updated July 2020)	Ensure most recent L.I.O. dataset is obtained.
Other woodlands	Niagara Region 2020 Ecological Land Classification	Apply criteria established for other woodlands.
Water Resource System		
Provincially Significant Wetlands	Wetlands (M.N.R.F., last updated November 2020)	Ensure most recent Land Information Ontario (L.I.O.) dataset is obtained.
Other Wetlands	Niagara Region 2020 Ecological Land Classification Wetlands (M.N.R.F., last updated November 2020)	Apply criteria established for 'other wetlands'. Select wetlands that were either "evaluated-other" or not evaluated
Inland Lakes	Contemporary Mapping of Watercourses (Niagara Region, 2016)	Apply criteria established for inland lakes.

Component Features and Areas	Existing Source of Data	Notes
Permanent and Intermittent Streams	Contemporary Mapping of Watercourses (Niagara Region, 2016)	Use watercourse layers with attribute of 'permanent' or 'intermittent' flow regime.
Significant Groundwater Recharge Areas (S.G.R.A.s)	N.P.C.A. Groundwater Protection Quantity S.G.R.A.s (created 2010)	Existing dataset can be obtained through the N.P.C.A. open data portal. Other sources of data or mapping as identified through the Watershed Equivalency Planning Study.
Highly Vulnerable Aquifers	HighlyVulnerableAquifer_NPCA (created June 2010)	This mapping is based on the N.P.C.A. Groundwater Study Final Report (Waterloo Hydrogeologic Inc. 2005). The recommended scale for usage is 1:50,000. Other sources of data or mapping as identified through the Watershed Equivalency Planning Study.
Shoreline Areas	N.P.C.A. Regulated Shoreline Extent (last updated June 2019) Niagara Region 2020 Ecological Land Classification	Apply criteria established for shoreline areas.

Component Features and Areas	Existing Source of Data	Notes
	Contemporary Mapping of Watercourses (Niagara Region, 2016)	
Floodplain, flooding hazard, floodway	N.P.C.A. Regulated Floodplain Extent (last updated May 2020)	Apply criteria established for floodplain, flooding hazard, floodway. "The data currently includes both regulatory floodplains, and advisory floodplains. This dataset was developed by creating polygons from the polyline geometry of the flood lines in the Authority's Riverine Floodplain Mapping database. Please note most of the floodplains are based on the 100 year event but some systems in Niagara Falls specifically are still managed with the Regional Storm (Hurricane Hazel)" (description of metadata from https://maps.niagararegion.ca/Metadata/md/Explorer/1616.aspx, accessed December 2020).

Assumptions and Limitations

The Mapping Discussion Paper and Technical Report #2 provided a review of the datasets available to map components of the N.H.S. and W.R.S. Through the review of the available datasets recommendations were made on which components to map and not to map; these recommendations were based on several factors related to the confidence that the mapping provides an accurate and complete representation of the feature it is intended to capture. There will always be a level of inaccurately and incompleteness of a dataset - this results from the fact that a) mapping represents a 'point in time' of a feature or area (i.e., some datasets may be older), b) methods for identifying some features may have been updated more recently that would result in changes to the delineation of a feature or area, and c) some datasets may have been developed at a smaller scale (i.e., developed for a larger area) and may not translate well into a larger scale map (i.e., depicting the extent of features on a property). The assumptions and limitations for the use of datasets and the application of criteria to some datasets to represent the extent of a significant feature or areas is discussed below.

Highly Vulnerable Aquifers Dataset

There are some limitations related to the scale at which the H.V.A. dataset was produced. This dataset was developed at a scale of 1:50,000 and is appropriate for use at a local municipal scale (i.e., to be viewed when looking at the entire municipality). However, this is not considered accurate at a site-specific scale (e.g., individual property scale). While sufficient for the purposes of as part of the Region's W.R.S. mapping, policies will need to be developed to require site-specific studies to be completed in order to assess the sensitivity of the aquifer to changes in landuse and the potential for impacts on the aquifer.

Floodplains, Flooding Hazards, Floodways

The metadata for this dataset notes that the floodplain mapping may not be complete for the entire Region "(technical criteria from MNR dictate that surface water reaches draining greater than 125 hectares be considered as part of the riverine flood hazard) and only represents what floodplains are currently mapped. Therefore, there are regulatory floodplains that are not mapped but are covered by the text of the [N.P.C.A.] regulation" (https://maps.niagararegion.ca/Metadata/md/Explorer/1616.aspx, accessed in December 2020). Therefore, it should be acknowledged that mapping of floodplains, flooding hazards, and floodways may not be fully represented on mapping of the W.R.S. However, like other datasets, mapping is typically not complete; for the purposes of including floodplains on mapping of the W.R.S., and recognizing boundaries of features and areas can be refined through detailed studies, this dataset is still considered appropriate for use in mapping as part of the W.R.S.

Ecological Land Classification

The recent E.L.C. mapping project was undertaken to produce a more accurate and complete dataset of natural cover in Niagara Region. The dataset includes 54 different classification types, including anthropogenic and natural areas (**Table 3**, located at the end of this appendix). The primary methodology used to produce this dataset is orthoimage interpretation using new 2018 aerial imagery. While this methodology is acceptable in accordance with the industry recognized E.L.C. methodology, and the accuracy of this method can be high, there will inevitably be some vegetation communities that are missed, erroneously included, or mis-identified – this results from the fact that not every vegetation community or area within Niagara Region can be ground-truthed, either due to high lack of available resources (e.g., person time and available capital) or lack of landowner permission. Furthermore, the minimum mapping unit used for the E.L.C. dataset was 0.1 ha. Therefore, some vegetated areas that are less than 0.1 ha are not captured. It should be acknowledged that like most datasets where ground-truthing is not possible for every feature and limitations exist in available resources, there will be a need for future ground-truthing as part of site-specific studies to confirm and refine the mapping of natural features.

Proposed Methodology for Mapping the NHS and WRS

Creating Datasets for the Natural Environment System

The following describes methods that should be applied to create new preliminary datasets for natural features and areas within the Region's urban areas. It should be noted that this methodology is for the purpose of a preliminary analysis of the options in the Region's urban areas to support the generation of statistics and a comparative evaluation. A final methodology will be prepared as part of the third technical paper for the Natural Environment Work Program.

Significant Wetlands Dataset

1. Import the LIO Wetland Layer
2. Definition Query or use the SELECT BY ATTRIBUTE tool to select all woodlands under the attribute column "Wetland_SI" that are 'Evaluated-Provincial' from the Significance column.
3. SELECT by LOCATION from current selection all wetlands that intersect or overlap urban areas
4. Export the selected data into a new dataset entitled "Provincially_Significant_Wetlands"
5. Clear the Selection and create another selection for Wetlands within the LIO Wetland layer that are not provincially significant wetlands (PSW). Use the Definition Query or the

SELECT BY ATTRIBUTES tool to create a NOT function “NOT "WETLAND_SI" = 'Evaluated-Provincial'”. SELECT by LOCATION from the current selection these Non-PSWs that intersect or overlap urban areas. Export all selected features into a new dataset entitled “LIO_Other_Wetlands” (This will be used within the Other Wetlands Dataset)

Other Wetlands Dataset

1. Import the Region’s 2020 E.L.C. dataset, the ’LIO_Other_Wetlands’ dataset, and ‘Provincially_Significant_Wetlands (Previously created) dataset.
2. Select the following wetland codes from the Region’s 2020 E.L.C. dataset:
    i. SWT, SWD, SWM, SWC, BOS, BOT, MAM, MAS, SAS, SAM, SAF.
        i. SELECT by LOCATION from the current selection that intersect or overlap urban areas. Export this layer as “Niagara_ELC_Wetlands”
3. Use the UNION tool to join the geographies of the two wetland layers inputting “Niagara_ELC_Wetlands” and “LIO_Other_Wetlands”. Ensure the Niagara_ELC_Wetlands is set as the highest rank as the geometry and attributes take precedence over the LIO_Other_Wetlands layer. Call this new feature “Niagara_Union_Other_Wetlands”
4. Use the ERASE tool to clip the “Niagara_Union_Other_Wetlands” mapping with the “Provincially_Significant_Wetlands” layer to ensure no overlap between wetland features as P.S.W.s are already captured in the Significant Wetland layer. Call this layer “Niagara_Other_Wetlands”

Permanent and Intermittent Streams

1. Import the Contemporary Mapping of Watercourses (CMW) dataset.
2. Select all watercourses within settlement areas and then use the SELECT BY ATTRIBUTE tool to select all features that are identified as “Intermittent” or Permanent”.
3. Export these selected features and call the layer “Watercourses_perm_inter_Niagara”

Woodlands Dataset

In order to create a woodlands dataset that contains woodlands in accordance with the definition of woodland proposed to be used for Niagara Region, the E.L.C. data will be used to extract woodlands.

1. Import the E.L.C. layer and SELECT BY ATTRIBUTE the following ELC classes:
    i. FOD, FOM, FOC, HOC, HOD, SVC, SVD, SVM, WOC, WOD, WOM, TAG, BLT, BOT, CLT, RBT, SBT, SHT, and TAT.

2. SELECT by LOCATION from the current selection that intersect or overlap urban areas. Export these selected features and save as a separate dataset entitled "Niagara_Woodlands".

Significant Woodlands Dataset

In order to consider the 20m connection between woodlands a processing step to the woodland layer will be done to identify where woodlands should be joined due to proximity.

1. Import the "Niagara_Woodlands" layer and SELECT BY ATTRIBUTE these ELC classes: FOC, FOM, FOD and call this dataset "Niagara_Woodlands_Connectivity". Import the "Niagara_Woodlands_Connectivity" and Edit the features by joining consecutive features, these features should be adjacent with a shared border. Merging these together will eliminate any overlaps. Using the editing tool select all features, then merge all polygons together. From there use the advanced editing tools to 'EXPLODE MULTIPART FEATURES" to separate the polygons so that all polygons are separate from non-adjoining geometries.

2. Use the BUFFER tool to buffer "Niagara_Woodlands_Connectivity" layer by 10 m. Use the INTERSECT tool on the newly formed buffer layer to identify any intersecting polygons that fall within a buffer of another polygon and call this 'Woodlands_Intersect'.

3. These intersecting buffers are where the woodland should be joined together to form one continuous feature. Zoom to each polygon created in the "Woodlands_Intersect" layer and select the polygons that should be merged. Use the merge tool once polygons are selected.

4. Use the "Woodlands_Intersect" to navigate to areas where a polygon should be considered continuous. To join the geometry of these features in the "Niagara_Woodlands_Connectivity" dataset use the editing tool to merge polygons together that are considered continuous based on the 10 m buffer (i.e., where their buffers overlap, they are considered within 20 m of each other).

5. Re-Calculate the area of the features within "Niagara_Woodlands_Connectivity" so any connecting woodland should now be joined and have a cumulative area.

Applying criteria for Significant Woodlands:

1. Import the following data layers:
    i. Urban Area boundaries
    ii. Niagara_Woodlands_Connectivity

iii. Provincially Significant Wetlands
iv. Other Wetlands
v. Life Science ANSI; and
vi. Watercourse_Perm_Inter_Niagara.

2. Create an attribute column entitled “Significance” within the Woodlands dataset.
3. To apply criterion “1” in Table 6 of this memo.
    i. SELECT by LOCATION woodlands that intersect or overlap urban areas where the woodland is greater or equal to 2 ha in size.
    ii. Classify these as ‘Significant’ under the “Significance” attribute column.
4. To apply criterion “2c”
    i. SELECT by LOCATION woodlands that intersect or overlap urban areas SELECT BY ATTRIBUTE and make sure to select “select from current selection” to select all woodlands which are greater or equal to 1 ha.
    ii. SELECT BY LOCATION, “select from current selection” to select overlapping woodland features that fall within or from a distance of the Provincially Significant wetlands, set the distance as 30m.
    iii. Run the selection and classify any selected as ‘Significant’ under the “Significance” attribute column.
5. To apply criterion “2d”
    i. SELECT by LOCATION woodlands that intersect or overlap urban areas SELECT BY ATTRIBUTE and make sure to select “select from current selection” to select all woodlands which are greater or equal to 1 ha.
    ii. SELECT BY LOCATION, “select from current selection” to select overlapping woodland features that fall within or from a distance of (abutting) ‘Watercourses_Perm_Inter_Niagara’, set the distance as 20m.
    iii. Run the selection and classify any selected as ‘Significant’ under the “Significance” attribute column.
6. To apply criterion “3c”
    i. SELECT by LOCATION woodlands that intersect or overlap urban areas SELECT BY ATTRIBUTE and make sure to select “select from current selection” to select all woodlands which are greater or equal to 0.5 ha.
    ii. SELECT BY LOCATION, “select from current selection” to select overlapping woodland features that fall within or from a distance of (abutting) ‘Other_Wetlands’, set the distance as 20m.
    iii. Run the selection and classify any selected as ‘Significant’ under the “Significance” attribute column.
7. To apply criterion “4”

i. SELECT by LOCATION woodlands that intersect or overlap urban areas SELECT BY LOCATION and make sure to select “select from current selection” to select overlapping woodland features that fall within or from a distance of (abutting) P.S.W.s, set this distance as 20m.
ii. Classify any woodlands selected as ‘Significant’ under the “Significance” attribute column.
iii. Re-do these steps using the different datasets from criterion “4” using the Life Science ANSIs – LIO layer) as the intersecting feature and classify selections as ‘Significant’ under the “Significance” attribute column.

8. Create a layer named “Region_Significant_Woodland”. Update the Hectares column and select all woodlands that do not intersect PSWs or ANSIs. Select from this, the woodlands less than 4ha (roughly). Visually identify if these woodlands meet the 0.16ha and 40m average width criteria. If they do not, remove from layer. If a woodland patch has a long “finger” that results in the total average width to be < than 40m, the fingers should be applied against the 3:1 ratio.

Other Woodlands Dataset

1. Import the “Niagara_Woodlands” data previously created.
2. Assess Hedgerows:
   i. Export another woodlands layer from the “Niagara_Woodlands” and call it “NiagaraWoodlands_UA_Hedgerow_edits”. Definition query to select only hedgerows. Select by Location any hedgerow that intersects or is within 20m of Niagara_Woodlands.
   ii. Switch the selection to only select all isolated hedgerows (not that intersect or within 20m of a woodland) and those which are obviously single rowed tree lines.
   iii. Apply a 3:1 width to length ratio on remaining hedgerows where the fingered extension begins (this is a manual step that requires the polygons of hedgerows to be reshaped by editing tool).
   iv. Re-run the area calculation on the attribute table to recalculate area for edited features.
3. Import the dataset “Region_Significant_Woodland”.
   i. Use the ERASE tool to erase all Significant woodland features (Region_Significant_Woodland) from the “Niagara_Woodlands UA Hedgerow_edits” layer.
4. Export this to a new data set called “Niagara_Other_Woodlands”.
5. Edit the ‘Niagara_Other_Woodlands” layer.
   i. SELECT from “Niagara_Woodlands” those woodlands that are ≥ 0.16 ha in size.

ii. From these selections delete any polygons which do not “abut” (20m from other woodland polygons). Therefore, deleting small, isolated woodlands. Perform visual analysis on undersized woodlands that “abut” other wooded feature, roughly using these guides:
    - For woodlands that were only within the 20m “abut” threshold by slivers or fingers (that could technically have a 3:1 ratio applied) – they were removed.
    - For woodlands that were within the 20m “abut” threshold but were very clearly separate features within a highly developed area and not representative of aerial imagery – e.g., small patch of backyard trees – they were removed.
    - If it was adjacent to a significant woodland or other woodland feature – they were kept.

Linkages Dataset

Small linkages are to be placed between natural features and areas and are generally 60-100m wide. To identify the locations for linkages it will be necessary to identify ‘core areas’ (that consist of natural vegetation communities according to E.L.C.) within the landscape through area calculations.

Identifying Core Areas

1. To identify core areas, use the Niagara 2020 E.L.C. dataset and select all of the natural features (these natural features are identified in the ‘Natural Cover’ field within the E.L.C. Table found in Appendix 1). Export this data and call this dataset “Natural_Cover”
2. Edit the “Natural_Cover” features by joining consecutive features, these features should be adjacent with a shared border. Using the editing tool select all E.L.C. codes representing natural communities. Then merge all polygons together. From there use the advanced editing tools to ‘EXPLODE MULTIPART FEATURES” to separate the polygons so that all polygons are separate from non-adjoining geometries. Name this layer “Natural_Cover_UA_Exploded”.
3. Use the BUFFER tool to buffer these areas by 15 m. Use the INTERSECT tool on the newly formed buffer layer to identify any intersecting polygons that fall within a buffer of another polygon and call this ‘CoreAreas_Intersect’.
4. These intersecting buffers are where the core features should be joined together to form one continuous feature.
5. Use the “CoreAreas_Intersect” to navigate to areas where a polygon should be considered continuous. To join the geometry of these features in the “Natural_Cover_UA_Exploded” dataset use the editing tool to merge polygons together

that are considered continuous based on the 15 m buffer (i.e., where their buffers overlap, they are considered within 30 m of each other).

In order to refine and identify more specific core areas and identify priority core areas that will support biodiversity with linkages further methods are run on the core area layer. Some areas within the core area layer include long stretches of riparian zone or skinner long patches of natural cover that will not be enhanced by a linkage, therefore, to exclude them from the core areas the following methods were conducted:

6. Within the “Natural_Cover_UA_Exploded”” layer create a field called “Area_ha” make sure this field is a ‘short integer’ data type. Use the calculate geometry tool within the “Area_ha” attribute field to calculate the Area in hectares as an integer.
7. Use the Polygon to Raster tool to convert the “CoreAreas_Intersect” to a raster that only picks up 50% or more area covered by each 200x200m grid cell. Use the following parameters within the tool:
   – Input: CoreAreas_Intersect
   – Value Field: Area_ha
   - Output raster: Core_areas
   - Cell Assignment Type: Maximum Area (this will ensure that you are collecting cells with 50% or more cover.
   – Priority Field: NONE
   – Cellsize: 200 (this will ensure a 200x200m grid cell)
8. Use the Raster to Polygon tool to re-convert the Core_Areas raster to a vector in order to intersect the final core areas. Keep all defaults and call the vector layer “Core_areas_fromRaster”. Create an area field within the attribute column and populate it with the area.
9. Open the “Natural_Cover_UA” layer and intersect with “Natural_Cover_UA_Exploded” to select the polygons that were previously identified as core polygons. Once selected export to new layer and explode the polygons. Call new layer “Natural_Cover_UA_ExplodeForCores”. Use the Select by Location tool to select features from “Natural_Areas_UA_ExplodeForCores” layer that intersect the “Core_areas_fromRaster” layer. From this export the selected features from the “Core_areas_Intersect” and call this layer “CoreAreas_Final”.

Identifying Linkages

Linkages should be identified along corridors of natural areas or watercourses within settlement areas. This can be done through orthoimage interpretation or appropriate identification within the landscape where the linkage would promote landscape connectivity and biodiversity.

1. Create a new polyline Layer entitled ‘Small_Linkages’. Start editing the line feature to create the line that will be buffered to create the linkage.
2. Identify core areas that intersect from the previously created ‘CoreAreas_Final’. This layer identified core areas that were within 30m of each other. Use this layer to navigate to areas where a potential linkage could occur.
3. A linkage should occur from one natural heritage feature to another (not just a core area since it contains more than natural heritage features and areas); this includes significant woodlands, P.S.W.s, ‘other wetlands’, and LS-ANSI. Intersect the above noted natural heritage features layers on the “Core_Areas_Final” layer to determine which core areas should be considered for creating linkages.
4. Create the line features from the feature class ‘Small_Linkages’ to find the mid-area between features – these should either follow a watercourse, other natural cover types, or extend across agricultural lands. Create linear linkages between the core areas using this line feature.
5. Use the BUFFER tool and buffer the polyline “Small_Linkages” layer by 50m. For a total of 100m wide linkage entitled “Small_Linkages_100m”.
6. Edit the feature to CLIP the linkage to a key natural heritage feature (i.e., natural feature and area such as Significant Woodland or Significant Wetland).

Verify that linkages overlap with naturally vegetated areas and do not include developed areas (e.g., residential developments, industrial/commercial areas, roads wider than 20 m) or areas incompatible with ecological functions of a linkage.

1. Using the “Natural_cover” dataset, use the CLIP tool to clip out all the portions of the linkage features that overlap with built areas. Name this dataset “Small_Linkages_100m_nat_cover”.
2. Edit the “Small_Linkages_100m_nat_cover” dataset by using orthoimagery to identify where the linkages would not be ecologically function (i.e., where they are interrupted by developed areas or unachievable due to an incompatible use, or where the linkage narrows below a width that would provide a functional linkage). For example, where a linkage is entirely bisected by a road that is wider than 20 m, the potential to achieve a functional linkage (e.g., through future road work and installation of a wildlife passage) should be considered; if it is determined that the width of the road precludes current or future safe passage of wildlife, the linkage should be removed. Where the width of a segment of the linkage narrows to less than 20 m for a distance of 60 m or more, it should be removed. Edit the layer by deleting any linkages that would not be ecologically functionally.
3. Save the new edited layer as “Small_Linkages_100m_Final”

Shoreline Areas

1. Import the Natural_Cover dataset, Contemporary Mapping of Watercourses dataset and the N.P.C.A. Regulated Shoreline Extent dataset.
2. SELECT BY LOCATION any Natural Cover feature that is found within 15m of a Waterbody or permanent stream or intermittent stream.
3. Export these selected features and call the layer “natural_cover_water”
4. SELECT BY LOCATION any Natural Cover feature that is found within the N.P.C.A. Regulated Shoreline Extent.
5. Export these selected features and call the layer “natural_cover_reg_shoreline”
6. Merge the “natural_cover_water” dataset with the “natural_cover_reg_shoreline” dataset to create a new dataset to be labelled as “Niagara_Shoreline_Areas”
7. Create a buffer area that is 15m from a waterbody or permanent stream or intermittent stream, call this layer “Buffer_Watercourse_SL_15m” then merge this layer with the NPCA regulated shoreline extent dataset. Call this “Merged_Shoreline_Extent”. Clip the “Niagara_Shoreline_Areas” to this newly merged layer “Merged_Shoreline_Extent” and call this layer “Niagara_Shoreline_Areas_Clip”.
8. SELECT by LOCATION from “Niagara_Shoreline_Areas_Clip” that intersect or overlap urban areas. Export this data as “Niagara_Urban_Shoreline_Areas”.

Inland Lakes

1. Import the CMW permanent and intermittent shorelines polygon layer.
2. SELECT BY LOCATION all waterbody polygons within UAs and adjacent to UA boundaries by 100m.
3. Overlay the CMW permanent and intermittent flowlines polyline layer with a query to only show flowlines for the following feature types; ‘Lake’, ‘Pond-Other’, or ‘Reservoir’ (this will remove all agricultural and stormwater ponds, canals, rivers)
4. Select from the waterbody layer all polygons intersecting with the queried watercourse layer. Export and call “Inland_Lakes”.
5. Select all waterbodies that are physically connected to and within 30 m of the limits of the shoreline flood hazard associated with the Great Lakes. Delete these polygons from the Inland Lakes layer.
6. Visually assess remaining polygons using the following guides:
    i. If the waterbody is managed or maintained recreational or other related uses – delete
    ii. If the waterbody forms part of the reservoir/holding pond structure of the active Welland Canal – delete

iii. If the primary purpose and function of that water body is not natural or it does not contribute meaningfully to the functioning of the ecosystem and related water resource system – delete.

7. Assess remaining waterbodies and edit polygon with the "CUT POLYGON" tool to define exact extents of the inland lakes (i.e., separated the lake from the watercourse etc.).

Buffers

The mapping of the N.H.S. on the schedules of the new N.O.P. will not include buffers within urban areas. However, mandatory non-prescribed buffers are included as a component in N.H.S. Option 3C. While the width of these buffers is expected to be determined through site-specific studies, the purpose of the mapping and statistical analysis is to contrast and compare the options related to their ability to protect the natural environment systems, and the impact of the options on developable lands in urban areas. Therefore, for the purpose of allowing a fulsome comparison of the options, buffers will be mapped.

For the sake of generating statistics related to mapping N.H.S. Option 3C, the following buffer widths will be applied to the following features:

- significant woodlands = 10 m
- provincially significant wetlands = 30 m
- other woodlands = 5 m
- other wetlands = 15 m
- permanent and intermittent streams = 15 m
- inland lake = 15 m

Significant Woodlands buffer:

1. Use the BUFFER tool to produce a **10m** buffer on the 'Region_Significant_Woodland' dataset (Significant Woodland layer). Call this layer "Region_Significant_Woodland_Buffer".

Provincially Significant Wetland Buffer:

1. Use the BUFFER tool to produce a **30m** buffer on the 'Provincially_Significant_Wetlands' dataset. Call this layer "PSW_Buffer".

Other Woodlands Buffer:

1. Use the BUFFER tool to produce a **5m** buffer on the 'Niagara_Other_Woodlands' dataset (Other Woodlands layer). Call this layer "Other_Woodlands_Buffer".

Other Wetland Buffer:

1. Use the BUFFER tool to produce a **15m** buffer on the 'Niagara_Other_Wetlands' dataset (Other Wetlands layer). Call this layer "Other_Wetlands_Buffer".

Watercourse Buffer:

1. Use the BUFFER tool to produce a **15m** buffer on the 'Watercourses_perm_inter_Niagara dataset. Call this layer "Watercourses_perm_inter _Buffer".

Inland Lake Buffer:

8. Use the BUFFER tool to produce a **15m** buffer on the 'Inland_Lake_Niagara' dataset. Call this layer "Inland_Lake _Buffer".

Use the MERGE tool to merge all the buffers together (Region_Significant_Woodland_Buffer, PSW_Buffer, Other_Woodlands_Buffer, Other_Wetlands_Buffer, Watercourses_perm_inter _Buffer, Inland_Lake _Buffer). Call this layer "Natural_Feature_Buffers" It is recommended to select all the buffer features from 'Natural_Feature_Buffers' dataset and use the editing merge tool to merge all the features together to form one buffer as there may be overlapping features. After this is complete use the 'Explode multi-part feature' in advanced editing tools so all features that are separate from one another have their own buffer, but continuous features only have one buffered feature. Clip this layer to the Urban Area boundary and export as "Natural_Features_Buffer_UA".

Mapping the Natural Heritage System

The following describes the methods that should be applied to assemble the datasets for each of the N.H.S. options in the Region's urban areas (the source of the dataset has been identified in brackets).

N.H.S. Option 1

Bring into the map document the following natural features and areas:

- Provincially_Significant_Wetlands (L.I.O.)
- Region_Significant_Woodland (Niagara)
- Earth Science A.N.S.I.s (L.I.O.)
- Life Science A.N.S.I.s (L.I.O.)
- Watercourses_perm_inter_Niagara (Niagara)

N.H.S. Option 2

Map all of the natural features and areas from Option 1 – there is no difference in option 2 within settlement areas.

N.H.S. Option 3A

Map all of the natural features and areas from Option 1 – there is no difference in option 3A within settlement areas.

N.H.S. Option 3B

Map all natural heritage features and areas from Option 3A + **Other natural heritage features and areas**, including:

- Niagara_Other_Woodlands (Niagara)

N.H.S. Option 3C

Map all layers from Option 3B + **Buffers** + **Linkages**:

- Natural_Feature_Buffers (Niagara)
- Small_Linkages_100m_Final (Niagara)

Mapping the Water Resource System

The mapping discussion paper provided a review of available datasets and made recommendations for what should or should not be mapped. Technical Report #2 went further recommend mapping for the W.R.S. It was determined that at this time there is enough data to map many of the main components of the W.R.S. The following describes the methods that should be applied to assemble the datasets to map the W.R.S.

Bring into the map document the following components:

- Watercourses_perm_inter_Niagara (Niagara)
- Waterbodies (Niagara)
- Inland_Lake_Niagara (Niagara)
- Niagara_Other_Wetlands (Niagara)
- Provincially_Signficant_Wetlands (L.I.O.)
- Significant groundwater recharge areas (N.P.C.A)
- HighlyVulnerableAquifer_NPCA (N.P.C.A.)
- Niagara_Shoreline_Areas (Niagara)
- Floodplains, flooding hazards, floodways (N.P.C.A.)

Assumptions and Limitations

Through the review of the available mapping and application of criteria to develop some datasets (e.g., Significant Woodlands), it should be acknowledged that there are some limitations resulting from the lack of complete information and datasets. A few examples of these limitations are discussed below.

Significant Woodlands - The criteria developed for Significant Woodlands includes criterion that require site-specific information about the woodland, such as the age of the trees, vegetation type, or abundance of rare species or those with a high coefficient of conservatism. Since this information is mostly unknown, the application of the criteria can only include those related to size and proximity. This means that there will be some smaller woodlands (e.g., 0.5 ha ≥ 2 ha) that will not be identified as significant woodland but may otherwise qualify according to other criteria. Policies will therefore be required that require the completion of a site-specific study (e.g., Environmental Impact Study) as part of a development application when the woodland is ≥ 5 ha in size to undertake field studies to evaluate the significance of the woodland.

Linkages – Depending on the level of effort and time taken for identifying and reviewing linkages, there will be some linkages that may be mapped that are not be possible to achieve as they may contain essential infrastructure that prevents the establishment of vegetation that can be left in a ‘free-to-grow’ state (i.e., without regular maintenance), or where there is a recently approved development application, but natural vegetation still exists in orthoimagery.

Table 3. Classification of vegetation communities according to Ecological Land Classification prepared in November 2020 for Niagara Region.

ELC Code	ELC Full Name	woodland (>60% canopy)	other woodland (>25% canopy)	Natural Cover	Wetland
TAG	Treed Agriculture	x	x	x	
BOT	Treed Bog		x	x	x
HOC	Coniferous Hedgerow		x	x	
SVC	Coniferous Savanna		x	x	
WOC	Coniferous Woodland		x	x	
HOD	Deciduous Hedgerow		x	x	
SVD	Deciduous Savanna		x	x	
WOD	Deciduous Woodland		x	x	
SVM	Mixed Savanna		x	x	
WOM	Mixed Woodland		x	x	
BLT	Treed Bluff		x	x	
CLT	Treed Cliff		x	x	
RBT	Treed Rock Barren		x	x	
SBT	Treed Sand Barren and Dune		x	x	
SHT	Treed Shoreline		x	x	
TAT	Treed Talus		x	x	
FOC	Coniferous Forest	x	x	x	
FOD	Deciduous Forest	x	x	x	
FOM	Mixed Forest	x	x	x	

ELC Code	ELC Full Name	woodland (>60% canopy)	other woodland (>25% canopy)	Natural Cover	Wetland
SWC	Coniferous Swamp			x	x
SWD	Deciduous Swamp			x	x
SAF	Floating-leaved Shallow Aquatic			x	x
MAM	Meadow Marsh			x	x
SAM	Mixed Shallow Aquatic			x	x
SWM	Mixed Swamp			x	x
MAS	Shallow Marsh			x	x
SAS	Submerged Shallow Aquatic			x	x
SWT	Swamp Thicket			x	x
BOS	Shrub Bog			x	x
OAO	Open Aquatic			x	
IAG	Agricultural Infrastructure				
CVC	Commercial and Institutional				
THC	Coniferous Thicket			x	
THD	Deciduous Thicket			x	
MEF	Forb Meadow			x	
MEG	Graminoid Meadow			x	
CGL	Green lands			x	
MEM	Mixed Meadow			x	
THM	Mixed Thicket			x	
OAG	Open Agriculture			x	

ELC Code	ELC Full Name	woodland (>60% canopy)	other woodland (>25% canopy)	Natural Cover	Wetland
BLO	Open Bluff			x	
CLO	Open Cliff			x	
RBO	Open Rock Barren			x	
SHO	Open Shoreline			x	
TAO	Open Talus			x	
OAW	Open Water			x	
CVR	Residential				
SAG	Shrub Agriculture			x	
BLS	Shrub Bluff			x	
CLS	Shrub Cliff			x	
RBS	Shrub Rock Barren			x	
SHS	Shrub Shoreline			x	
TAS	Shrub Talus			x	
CVI	Transportation and Utilities				

Appendix B: Discussion on Woodlands in Niagara Region's Natural Heritage System

Discussion on Woodlands in Niagara Region's Natural Heritage System

The following discussion reviews the existing definition for woodlands in Niagara Region's Official Plan to inform an update to the woodland definition, and in turn criteria for determining significant woodlands and considerations for other components of the N.H.S. that contribute to maintaining and enhancing tree canopy cover in Niagara.

Definition for Woodlands

Current Definition of Woodland

Niagara Region currently defines woodlands as the following:

> "Woodland means a treed area that provides environmental and economic benefits to both the private landowner and the general public such as erosion prevention, hydrologic and nutrient cycling, provision of clean air and long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities and the sustainable harvest of woodland products. It does not include a cultivated fruit or nut orchard, or a plantation used for the purpose of producing Christmas trees."

Based on the above definition and in recognition of the value of the treed areas in Niagara, woodlands were considered treed vegetation communities where the treed canopy cover was greater than 35%.

Mapping of woodlands in Niagara Region was previously prepared through orthoimage interpretation to identify those treed vegetation communities with >35% tree cover. In order to update the mapping and improve accuracy, the Region recently had the Natural Areas Inventory (N.A.I.) mapping, originally completed by the Niagara Peninsula Conservation Authority (N.P.C.A.) from 2006-2009, updated using Ecological Land Classification (E.L.C.) to the community series level. The E.L.C. mapping provides a more current and accurate dataset of natural features that is appropriate to support mapping of the N.H.S. for the new Niagara Official Plan.

Based on the new E.L.C. dataset, the Region has approximately 35,663 ha (18.9%) of treed vegetation communities, where treed vegetation communities are considered those that have >25% tree cover (see discussion of treed vegetation communities in the 'Treed Terrestrial Vegetation Communities' section below).

Of the total treed area in the Region, there is approximately 4,155 ha occupying urban areas, representing approximately 12.1% of urban areas, or 2.2% of the Region.

Proposed Definition of Woodland

The Greenbelt Plan (2017), Growth Plan (2019) and Provincial Policy Statement (P.P.S.) (2020) have the same definition for woodlands, as follows:

> "Treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels. Woodlands may be delineated according to the Forestry Act definition or the Province's Ecological Land Classification system definition for "forest".

The main difference between the Region's definition for woodland and the definition for woodland in the Provincial Plans and the P.P.S. is the last sentence that provides direction for delineating woodlands based on the "Forestry Act definition or the Province's E.L.C. system for "forest"." The last sentence uses the word "may" indicating that other means of delineating a woodland would be acceptable, as determined by the municipality. Therefore, the definition could rely on, or not, the Forestry Act definition, or the E.L.C. definition for forest to identify woodlands. In that case, the Region's current definition is acceptable regarding the identification of woodlands. However, the current definition is not consistent with Provincial definitions and may lead to confusion with applying definitions and criteria across the Region. Furthermore, the current definition for woodland is not consistent with the Niagara Region Woodland Conservation By-law (January 2021) which applies the definition for woodland as identified in the Forestry Act. Since the Region will be responsible for incorporating the policies of the Provincial Plans into the new Niagara Official Plan for ease of implementation and be consistent with the definitions in the Provincial Plans and the P.P.S., it is recommended that the Provincial definition for woodland be adopted, with modifications, in the new Niagara Official Plan (N.O.P.).

The definition of woodland in the O.P. is intended to inform the application of criteria to identify significant woodlands as part of the N.H.S. The identification of a N.H.S. is intended to take an ecological systems-based approach to natural heritage protection. The Forestry Act definition of woodland is intended to identify woodland for the sake of applying the Forestry Act, which is focused on the wise use and sustainable management of woodlands. In comparison, the Province's Ecological Land Classification system definition for "forest" consider a broader scope of ecological functions associated with woodlands. Since the purpose of the definition of woodland should be more ecologically focused to support the identification of the N.H.S. and implementation of related policies, the Province's Ecological Land Classification will be used to delineate woodlands.

Proposed Modifications to the Province's Definition for Woodland

To be clear on the method to delineate woodlands, the word "may" will be replaced with the word "will", and reference to the Forestry Act definition will be removed, as follows:

"Woodlands will be delineated according to the Province's Ecological Land Classification system definition for "forest".

In addition, the following sentence will follow the definition:

"For the purposes of this definition, forests include terrestrial vegetation communities as defined in accordance with the Province's Ecological Land Classification system, where the tree cover is greater than 60%."

The proposed definition for woodland will then be:

> "Treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels. Woodlands will be delineated according to the Province's Ecological Land Classification system definition for "forest". For the purposes of this definition, forests include terrestrial vegetation communities as defined in accordance with the Province's Ecological Land Classification system, where the tree cover is greater than 60%."

Implications to Changing the Definition for Woodland

The implication of adopting the Provinces definition for woodland is that there would be a smaller geographical subset of tree vegetation communities which meet this definition. This definition would only include treed areas classified as forest according to E.L.C. According to the First Approximation for Ecological Land Classification for Southern Ontario (Lee et. al. 1998), forest is defined as "a terrestrial vegetation community with at least 60% tree cover". That would mean those terrestrial vegetation communities (e.g., the E.L.C. community of 'woodland' which has a tree cover of greater than 35%, but less than 60%) that were previously included in the definition would no longer be considered as woodland and would therefore no longer qualify as significant woodland and be protected as such, according to Official Plan policy. Some vegetation communities, such as swamp communities, which are not considered 'terrestrial' vegetation communities on account of their hydric soils, would also not be considered as woodlands when strictly applying the definition that restricts forests to terrestrial vegetation communities. By applying the updated definition for 'woodland', there is approximately 11,623 ha of E.L.C. vegetation community considered 'forest' in Niagara Region, representing

approximately 6.2% of Niagara; in urban areas there would be approximately 1,726 ha of 'forest', representing approximately 5.0% of urban areas. Considering an objective in the current Region Official Plan is to maintain or enhance treed area, it will be important to determine how the other treed vegetation communities will be identified and protected under the new N.O.P. The following discussion provides an overview of the other treed vegetation communities (i.e., those that would no longer be considered woodlands under the new definition), how much land area they would occupy, and how they would be identified and protected according to Provincial and Regional policy.

Treed Wetlands (Swamps)

A large proportion (21,999 ha, or 11.7%) of the treed vegetation communities in Niagara are found in swamps; of this, 1,909 ha is found in urban areas, representing 5.6% of urban areas. Swamps are "a mineral-rich wetland characterized by a cover of deciduous or coniferous trees" with > 25% tree canopy cover (Lee et. al. 1998). Swamps include SWD, SWM and SWC classes in accordance with E.L.C. for southern Ontario. Since swamps are currently considered a "woodland" according to the Region's Official Plan, changing the definition to only include 'terrestrial' vegetation communities with >60% canopy cover will mean swamps would no longer be included as woodlands and therefore not be subject to policies protecting significant woodlands. However, swamps are wetlands that that are considered key hydrologic features according to the Growth Plan and Greenbelt Plan; both plans prohibit development (with few exceptions) in wetlands outside of settlement areas. Furthermore, in accordance with the policies of the Growth Plan wetlands outside of settlement areas would be subjected to a 30 m vegetation protection zone (VPZ). In addition, development is prohibited within wetlands in the Niagara Escarpment Plan area and all Provincially Significant Wetlands across the Region in accordance with P.P.S. policy 2.1.4. Wetlands are also considered a standard required component of the W.R.S., which extends into settlement areas; policies for non-provincially significant wetlands (or 'other wetlands') will be developed to be consistent with the regulations and policies of the Niagara Peninsula Conservation Authority (N.P.C.A.). Therefore, while swamps would no longer be considered a 'woodland' and therefore no longer qualify as significant woodlands, they would be afforded with greater protection than is currently provided for significant woodlands outside of the N.H.S. for the Growth Plan.

The net result of the increased protection afforded to wetlands would result in a greater level of protection than is currently provided to these wetlands under the current policy regime in Niagara.

Treed Terrestrial Vegetation Communities

Treed terrestrial vegetation communities are those "with a tree cover greater than 10%" according to the E.L.C. definition (Lee et. al. 1998). However, E.L.C. vegetation where tree cover is less than 25% can include shrub vegetation communities, which are not considered

'treed' communities. In consideration of the ecological function of treed vegetation communities and the intent of including those vegetation communities that contain a higher proportion of tree cover in the Region's N.H.S., those terrestrial vegetation communities with a canopy cover of >25% will be considered treed vegetation communities. Treed terrestrial vegetation communities with a canopy cover >25% as classified according to the 2nd Approximately for E.L.C. in Southern Ontario (2008), would include the following:

- Treed agriculture (TAG) (e.g., plantations, hedgerows)
- Treed Rock Barren (RBT)
- Treed Sand Barren or Dune (SBT/SDT)
- Treed Shoreline (BBT)
- Treed Talus (TAT)
- Treed bluff (BLT)
- Treed bog (BOT)
- Treed cliff (CLT)
- Coniferous, mixed or deciduous woodland (WOC, WOM, WOD)
- Coniferous, mixed or deciduous savanna (SVC, SVM, SVD)
- Coniferous, mixed or deciduous forest (FOC, FOM, FOD)

These treed vegetation communities cover approximately 35,663 ha of Niagara Region (18.9 %), including 4,155 ha within urban areas (12.1% of urban areas). Changing the definition of woodland to only include 'forest' (i.e., FOC, FOM, FOD) would exclude the remaining treed vegetation communities, potentially resulting in a loss in protection for these vegetation communities that had previously qualified as significant woodland, and that did not qualify as another type of 'significant' feature (e.g., significant wildlife habitat). The total area of these treed vegetation communities (i.e., excluding FOC, FOM and FOD) is 3,556 ha (1.9%) across the Region, or 519 ha (1.5%) within urban areas. As part of ensuring the Region is able to maintain or enhance treed area, these other treed terrestrial vegetation communities will comprise the category of 'other woodland'. 'Other woodlands' would be defined as:

> "woodlands determined to be ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. 'Other woodlands' include all treed terrestrial vegetation communities, that have not been considered Significant Woodland, where the percent cover is >25%, as defined according to Ecological Land Classification for Southern Ontario."

In this case, 'other woodlands' would be considered a treed area with ≥ 25% tree cover and meet one or more of the following criteria:

1. The treed area has an average minimum width of 40 m and is ≥0.3 ha, measured to crown edges; or
2. Any treed area of any size abutting a significant woodland,

where, treed areas that "abut" a significant woodland or treed swamp are considered adjacent when located within 20 m of each other.

It is recommended a policy be developed that provides the following protection for 'other woodlands':

> "development and site alteration shall not be permitted" [in 'other woodlands'] "unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions" (P.P.S. policy 2.1.5).

This policy is currently in place for these 'other woodlands' that qualify as significant under the current Regional Official Plan. Therefore, the intent is to ensure these 'other woodlands' continue to be protected in the same manner as they are currently, while retaining flexibility in policy.

Definition of Significant Woodland and Criteria for Identifying Woodlands as Significant

The proposed definition for significant woodland is taken from the P.P.S., as follows:

> "woodlands that are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history."

Appendix A of Technical Report #2: Identification and Evaluation of Options for Regional Natural Environment System(s), provides a review and recommendations for criteria to identify a woodland as significant in Niagara Region. Re-defining the definition for woodland in Niagara Region requires revisiting the size criteria for identifying a woodland as significant since the criterion are based on a previously estimated 17.5% treed area. Under the proposed definition of woodland, 'forest' in Niagara covers 11,623 ha (6.2%) of the Region, and 1,726 ha (5%) in urban areas. According to the Natural Heritage Reference Manual (MNR 2010) [N.H.R.M.], where woodland cover is between 5 and 15%, woodlands 4 ha or larger should be considered significant. That said, where there is an absence of information related to ecological functions, uncommon characteristics, and economic and social functional values, the N.H.R.M. recommends the size threshold be reduced. Therefore, as this is the case in Niagara, the size threshold for significant woodlands should be 2 ha across the Region.

The proposed criteria are as follows:

"To be identified as significant, a woodland must the definition of E.L.C. "forest" (as per the definition of 'woodland') and meet one or more of the following criteria:

- Any woodland 2 ha or greater in size;
- Any woodland 1 ha or greater in size meeting at least one of the following criteria:
    - 10 or more trees per ha greater than 100 years old or 50 cm or more in diameter;
    - Any woodland wholly or partially within 30 m of a significant wetland; habitat of an endangered or threatened species; significant woodland;
    - Any woodland overlapping or abutting one or more of the following features:
        - Permanent streams or intermittent streams;
        - Fish habitat;
        - Significant valleylands;
- Any woodland 0.5 ha or greater in size meeting at least one of the following criteria:
    - A provincially rare treed vegetation community with an S1, S2 or S3 in its ranking by the M.N.R.'s N.H.I.C;
    - Habitat of a woodland plant species with an S1, S2 or S3 in its ranking or an 8, 9, or 10 in its Southern Ontario Coefficient of Conservatism by the N.H.I.C., consisting of 10 or more individual stems or 100 or more sqm of leaf coverage;
    - Any woodland overlapping or abutting one or more of the following features:
        - Significant wildlife habitat; and
        - Habitat of threatened species and endangered species;
        - 'Other wetlands'
- Any woodland of any size overlapping with one or more of the following features:
    a. P.S.W.s; and
    b. Life Science A.N.S.I.

Woodlands that "abut" another feature are considered adjacent when located within 20 m of each other.

Guidance for delineating the boundary of a 'woodland' as defined by the Region should follow that of Appendix B in the Greenbelt Plan 2005 – Technical Definitions and Criteria for Key Natural Heritage Features in the Natural heritage System of the Protected Countryside (Ontario Ministry of Natural Resources, 2012)"

Maintaining Treed Area in Niagara Region

If the Region aims to maintain or enhance treed area there are different policy approaches that could be considered to achieve the goal to maintain treed area as part of the new N.O.P. A policy approach to protect Significant Woodlands may include the following:

- Afford a higher level of protection for those woodlands that are found to be significant by prohibiting development in significant woodlands across the Region similar to the requirements for significant woodlands in the N.H.S. for the Growth Plan and Greenbelt Plan.
- Protect 'other woodlands' in accordance with the test for no negative impact, consistent with P.P.S. policy 2.1.5.

As noted previously, the recommended policy approach to protect 'other woodlands' can be to apply the policy from the P.P.S. that sates "development and site alteration shall not be permitted" [in 'other woodlands'] "unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions" (P.P.S. policy 2.1.5).

If one of the goals for the N.H.S. is to maintain treed area in Niagara Region, the above policy will allow for some treed area removal to occur as part of development applications when the test of no negative impact is met – while this policy is intended to provide flexibility, some removal can occur so long as the impact does not lead to "degradation that threatens the health and integrity of the natural features or ecological functions for which an area is identified". As part of achieving the goal to maintain treed areas in Niagara, an additional policy can be considered that requires a vegetation planting plan that demonstrates a "net gain" in treed area is achieved, when tree removal is proposed. As an example, the City of Guelph Official Plan, 2018 consolidated version (policy 4.1.4.3) requires a "vegetation compensation plan" be prepared that demonstrates a net gain is achieved when treed area removal is proposed.

There are also instances where the ecological functions of some woodlands may be "substantially compromised as a result of prior land use activity and would be difficult to restore and/or manage as a native woodland in an urban setting" (York Region 2010 Official Plan, policy 2.2.48). Policy 2.2.48 of the York Region 2010 Official Plan provides a series of tests that must be met to classify a woodland as a "Cultural and Regenerating Woodland":

> "An environmental impact study should assess these ecological functions with consideration of the following:

1. the woodland is regenerating, typically with a dominant proportion of woody species being invasive and non-native (e.g., Norway Maple, Manitoba Maple, Siberian Elm, Scots Pine, European Buckthorn, White Mulberry, Tree-of-heaven, Apple, White Poplar, etc.)

2. the area was not treed approximately 20 to 25 years ago as determined through air photo interpretation or other suitable technique
3. soils may be degraded, for example, soil may be compacted, the topsoil removed, or there may be substantial erosion from over-use and/or the woodland may be regenerating on fill
4. there is limited ability to maintain or restore self-sustaining ecological functions typical of native woodlands

   Woodlands (including plantations) established and/or managed for the purpose of restoring a native tree community are excluded from cultural and regenerating woodlands (e.g., naturalization or restoration projects)."

Policy 2.2.49 of the York Region 2010 Official Plan allows for removal of the treed area of a "Cultural and Regenerating Woodland" subject to preparing a "woodland compensation plan" that demonstrates a "net gain" in woodland area is achieved.

A similar policy requiring a vegetation planting plan that achieves a "net gain" in treed area cover could be considered in the new N.O.P. for where some tree removal is contemplated in 'other woodlands' where the test of no negative impact has been met, as well as for those woodlands that meet criteria such as those of "Cultural and Regenerating Woodlands" in York Region's O.P. It is important to note that a vegetation planting plan should not be used as part of demonstrating no negative impact when evaluating the impacts of removing treed areas.

Summary of Policy Recommendations for Treed Vegetation Communities

The change in definitions would not result in reduction in the area of treed vegetation communities included within the Region's N.E.S.s if the approach to identifying significant woodlands and 'other woodlands', and the proposed policy direction is implemented. Following the proposed approach, all treed vegetation communities captured as part of the Regions current definition for woodland would be included in the N.H.S. and/or W.R.S. (i.e., wetlands) under one category or another. The proposed policy approach provides both restrictive policies for Significant Woodlands and flexible policies for 'other woodlands', that aims to protect significant features and enhance treed area cover, thereby achieving the goal to maintain and enhance treed area cover in the Region.

Under the above recommended policy direction dealing with treed vegetation communities, the following could be applied:

- Development is prohibited in all significant woodlands in the Region consistent with policies for significant woodlands (i.e., a key natural heritage feature) in the N.H.S. for the Growth Plan and Greenbelt Plan;

- Development is prohibited in all wetlands (including treed wetlands) outside of settlement areas in accordance with the policies of the Growth Plan dealing with key hydrologic features, including the requirement for a 30 m VPZ and in alignment with N.P.C.A. regulations and policies;
- Development is prohibited in all P.S.W.s. (including treed P.S.W.s.) across the entire Region consistent with P.P.S. policy 2.1.4. and in alignment with N.P.C.A. regulations and policies;
- Development is prohibited in 'other woodlands' across the Region, consistent with P.P.S. policy 2.1.5 that prohibits development unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions;
- Protection of 'other wetlands' in settlement areas would be achieved in accordance with N.P.C.A. regulations and policies for wetlands; and
- A requirement for a vegetation planting plan that achieves a net gain in treed area cover and ecological function where a proposal for removal of treed areas that are part of 'other woodlands' has met the test of no negative impact.

The proposed policies would provide protection for Significant Woodlands beyond what is currently provided for in the Region's Official Plan, protect 'other woodlands' as provided under current R.O.P. policies, provide flexibility through policies permitting application of the test of no negative impact to 'other woodlands', and require a vegetation planting plan that achieves a net gain in treed area, where removal is proposed as part of a development application. These policies would be consistent with the intent of maintaining or enhancing the Region's total treed area.

Appendix C: Mapping of the Natural Environment System in Urban Areas

https://www.niagararegion.ca/official-plan/natural-environment-options.aspx

Appendix D: Statistics of Mapped Components of the Natural Environment System in Urban Areas

https://www.niagararegion.ca/official-plan/natural-environment-options.aspx