



NEW NIAGARA OFFICIAL PLAN

Natural Environment Work Program: Technical Report #2: Identification and Evaluation of Options for Regional Natural Environment System(s)

Niagara Region
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SUSTAINABLE REGION



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1.0 Introduction

An important component of the new Niagara Official Plan (N.O.P.) is the development of new policies and mapping for the Region’s natural environment system(s). This work is essential for the preservation of the Region’s natural heritage and water resources, and to bring the Region in conformance the recent provincial plans and mapping. These systems include both the natural heritage system (N.H.S.) and the water resource system (W.R.S.). While the N.H.S. and the W.R.S. are discussed in Provincial documents as two distinct systems with specific policies related to each, they include some of the same features (e.g., wetlands, etc.), are ecologically interconnected, and thus are collectively considered the natural environment system.

In order to inform the development of options for the policies and mapping of the natural environment system, two discussion papers and one technical report were completed in Phase 2 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

The two discussion papers and Technical Report #1 include information related to the identification of the natural environment system and options for mapping and policy. A brief overview of these documents is provided in **Section 2.0** below.

The topics reviewed in these documents were discussed through consultation with stakeholders and members of the public as part of the 1st Point of Engagement completed in Phase 3 of the Natural Environment Work Program. The feedback and comments received through consultation informed the development of the discussion papers and technical report and documented in the Consultation Summary Report. A summary of the key takeaways from the 1st Point of Engagement is also provided in **Section 2.0**.

1.1 Purpose of this Report

The purpose of this technical report is to develop and evaluate options for Niagara Region’s natural environment system, including policies and mapping and to identify preliminary preferred options for the N.H.S. and W.R.S. A key element of developing options will be incorporating Provincial requirements for natural environment planning as reviewed in the discussion papers and Natural Environment Background Study.

2.0 Overview of Discussion Papers, the Natural Environment Background Study and the 1st Point of Engagement

The following provides a brief overview of the Mapping Discussion Paper, Watershed Planning Discussion Paper, Natural Environment Background Study and key takeaways from the 1st Point of Engagement. These reports inform the various options for the design and implementation of a regional natural environment system that meets Provincial requirements and the Region's vision for the natural environment.

2.1 Overview of Mapping Discussion Paper

As a first step in the overall work program a Mapping Discussion Paper was prepared. The purpose of the Mapping Discussion Paper was to review relevant provincial guidance for natural environment mapping, review the Region's existing mapping data, and provide preliminary input towards the development of mapping options. The Mapping Discussion Paper included:

- An evaluation of current regional natural environment mapping to assess the age, quality, accuracy, and sources of information
- Considerations for mapping the natural environment system at a Regional scale
- A review of comparator municipalities
- Consideration of how the natural environment system should be reflected and refined in local Official Plans.
- Recommendations related to what features to map, what datasets required updating and further study (e.g., field verification), what features should be addressed through policy rather than be mapped, and estimated costs for updating datasets of components recommended for mapping as part of the natural environment system(s)

The findings and recommendations from the Mapping Discussion Paper which inform the identification and evaluation of options have been carried forward into this report.

2.2 Overview of the Watershed Planning Discussion Paper

The purpose of the Watershed Planning Discussion Paper was to provide the Region with further understanding of the Provincial watershed planning requirements to inform development of the new N.O.P. This discussion paper reviewed the following topics:

- History and background to watershed planning and its relevance to development of the new N.O.P.
- Summary of provincial draft watershed planning requirements/guidance
- Review of provincial policies, guidelines, and direction with respect to watershed planning that need to be considered and addressed through the new N.O.P.

- Equivalency of Watershed Planning Documents - the equivalency of existing watershed planning documents to the 2018 Draft Watershed Planning guidance document. Gaps and data deficiencies were identified and reviewed with respect to incorporating into the natural systems work program or additional work
- Considerations for policies to reflect watershed planning requirements

The Watershed Planning Discussion Paper also provided recommendations for a watershed planning framework for Niagara Region; an approach was proposed that considered geographical scale, hierarchy of stakeholders and respective responsibilities within the Region, triggers and timelines for study initiation, and inter-relationships for completion of cross-jurisdictional studies.

The findings and recommendations from the Watershed Planning Discussion Paper which inform the identification and evaluation of options for the W.R.S. have been carried forward into this report.

2.3 Overview of Natural Environment Background Study

The Natural Environment Background Study provides an unbiased, fact-based discussion and analysis, and where appropriate provides recommendations related to a list of specific topics that were either of interest to the public and stakeholders, and/or necessary to inform decisions related to the options for the Region's natural environment system. The background study includes:

- A review of relevant Provincial legislation, policies, guidelines and technical criteria related to natural environment planning
- Definitions of key terms and concepts of relevance to natural environment planning
- A review and discussion of Provincial Plans, (i.e. Growth Plan, Greenbelt Plan, and Niagara Escarpment Plan) including a discussion on key changes that inform Niagara's natural environment system. Specific discussion was provided on the implications of the new Growth Plan N.H.S. and Growth Plan Agricultural System on the development of the Region's natural environment systems
- A review and discussion of the range of natural environment work completed by the Niagara Peninsula Conservation Authority (N.P.C.A.) that could inform the Region's natural environment systems
- A review of industry guidance and best management practices related to the identification of the natural environment systems
- A detailed review of the natural environment planning, mapping, and policies of three comparator municipalities
- A review of the connection between climate change and natural environment planning
- A review and discussion of invasive species and natural environment planning
- A review and discussion of shorelines and the role of the Region in shoreline planning and management

- A discussion on natural hazards with direction on if and how natural hazards should be addressed as part of the Region's natural environment systems
- A review of current Provincial direction and best-practices related to offsetting/natural area enhancements in natural environment planning
- A detailed discussion on definitions and criteria for woodlands as they relate to natural environment planning. In addition, this discussion reviewed issues associated with impacts from emerald ash borer, best practices for mapping and refinements, relationship with municipal tree by-laws, illegal cutting, and consideration of silviculture and other planted woodlands
- A review and discussion of fish habitat, including requirements at a Provincial and Federal level
- A review and discussion of linkages, riparian vegetation, and vegetation protection zones
- A review and discussion of the work completed by the Region on watercourse identification and mapping
- A review of the current Regional system and natural environment policies including a gap analysis related to current Provincial requirements
- Identification of trends, issues, and key policy directions for natural environment planning
- A discussion of a suggested framework for new Regional Official Plan policies
- Recommendations for consideration in the design of the Regional natural environment systems, mapping, and policy development
- Preliminary recommendations for criteria that could be used to evaluate various options for Regional natural environment systems

The findings and recommendations from the Natural Environment Background Study which inform the identification and evaluation of options have been carried forward into this report.

2.4 Key Considerations from 1st Point of Engagement

The purpose of the 1st Point of Engagement was to inform the public and stakeholders on the discussion papers and background study and to seek input for the development of options for evaluation in the next phase of the Natural Environment Work Program. In total, nine key themes emerged through the 1st Point of Engagement. The following six themes are considered directly relevant to informing the development of the options for mapping and policies for the natural environment systems:

- **Develop Consistent and Clear Policies** - Developing policies that are consistent with Provincial and Federal legislation and Provincial policies; are clear and defensible; provide the appropriate level of flexibility, and include definitions for key terms to ensure objectives for the natural environment are met and policies are implemented as intended.
- **Take a Systems Approach to Natural Environment Planning** - Watershed planning should form the basis for land use planning. The natural environment

component of the new N.O.P. should take a holistic approach with consideration of the inter-relationships between multiple issues and their cumulative impacts.

- **Recognize the Uniqueness of Niagara's Geography, Natural Environment and Agriculture** - Niagara Region is rich in natural beauty and has a thriving agricultural community that both relies on and supports the natural environment. The approach to natural environment planning needs to recognize this and other important industries and find a balance that achieves the goals and objectives for the natural environment system.
- **Accurately Map the Natural Environment** - The mapping of the natural environment system should ensure a level of accuracy that supports land use planning and includes the best available data; this includes working with agency partners and the community to ensure data is accurate and recent. Available natural environment mapping data should also be accessible in a user-friendly on-line mapping tool.
- **Protect the Natural Environment** - Future natural environment planning in Niagara needs to reflect multiple focuses: protecting existing important natural environment features and restoring/enhancing others. Tools and guidelines will need to be developed to ensure policies are interpreted and implemented as intended.
- **Develop Forward Thinking Natural Environment Policies** - The new N.O.P. should recognize trends and issues in environment planning and provide clear policies to achieve the vision, goals, and objectives for the Region's natural environment.

The themes identified through the 1st Point of Engagement can be summarized into the following statement:

The Region's natural environment system planning framework should be forward thinking, following a systems approach that accurately identifies and protects the natural environment, recognizes the uniqueness of Niagara's geography, and important agricultural system, and is implemented through a clear and consistent set of policies, with roles and responsibilities clearly identified.

This statement will be considered when evaluating the options to determine if they meet the intent of this statement.

3.0 Options for the Natural Environment Systems

The Region's natural environment system will include a N.H.S. and a W.R.S. The minimum policy requirements for each system are set out in Provincial policy documents including the Provincial Policy Statement (P.P.S), the Greenbelt Plan, the Niagara Escarpment Plan and the Growth Plan. These documents have been reviewed

in the Mapping Discussion Paper and set the direction for developing policies for the new N.O.P.

The Province has given municipalities the discretion to develop natural environment systems that exceed minimum Provincial policy requirements so long as they do not conflict with the P.P.S. and other Provincial plans. Therefore, developing the Regional natural environment system should consider a range of options that meet minimum policy requirements/standards, and provide alternatives that include the protection of additional features and areas that are important at the Regional scale and/or provide a system with enhanced ecological integrity and biological diversity. The options also need to address preliminary policy directions relating to the protection of the components of the natural environment system, as informed from the recommendations put forward in the discussion papers, Natural Environment Background Study and from feedback received during the 1st Point of Engagement.

3.1 Policy Direction for the new Niagara Official Plan

The existing Regional Official Plan (R.O.P) policy framework on the natural environment was initially developed in the 1970s and then refined and updated as required. The establishment of a Core N.H.S. on Schedule C in the R.O.P (which is divided into Environmental Protection and Environmental Conservation) was very commonplace in Ontario between the 1970's and the 2000's. It is recognized that in the case of Niagara, there was also an effort made to identify potential natural heritage corridors.

Significant changes have been made to Provincial policy, notably in 2017 with a new Growth Plan and updated Greenbelt and Niagara Escarpment Plans. There is now a need for a very different approach in the new N.O.P. with that approach being based on the establishment of a N.H.S. and a W.R.S. In this regard, Section 18 of the Natural Environment Background Study reviewed a number of considerations, the primary of which are the requirements of the Province with respect to the contents of an upper-tier Official Plan as it relates to N.H.S. and W.R.S. mapping and policies.

In this regard, the P.P.S. (2020) indicates the following in part with respect to Official Plans in general in the Preamble:

“Official plans should also coordinate cross-boundary matters to complement the actions of other planning authorities and promote mutually beneficial solutions. Official plans shall provide clear, reasonable and attainable policies to protect provincial interests and direct development to suitable areas.”

There is also reference in the above to cross boundary issues, which is dealt with as well by Section 1.2.4 of the P.P.S. (2020), which states the following:

“Where planning is conducted by an upper-tier municipality, the upper-tier municipality in consultation with the lower-tier municipalities shall:

e) identify and provide policy direction for the lower-tier municipalities on matters that cross municipal boundaries."

Section 1.2.1 of the P.P.S. (2020) provides some insight into what those matters that cross municipal boundaries may be and they include items c), e), and f) below:

- "c) Managing natural heritage, water, agricultural, mineral, and cultural heritage and archaeological resources;
- e) Ecosystem, shoreline, watershed, and Great Lakes related issues;
- f) Natural and human-made hazards;"

As per the above, there is an expectation in the P.P.S. that upper-tier Official Plans 'identify and provide policy direction for the lower-tier municipalities on' managing natural heritage and water resources and ecosystem, shoreline, watershed, and Great Lakes related issues. It is noted that Section 2.1.3 of the P.P.S. (2020) requires that N.H.S.s be identified. While there is no specific requirement in the P.P.S. that such a system be identified in an upper-tier Official Plan, it is common practice for upper-tier municipalities to establish and map N.H.S.s in their Official Plans.

In addition, there is also a requirement in the P.P.S. for 'planning authorities' to implement certain planning tools, with a 'planning authority' being either an upper tier, single tier or lower tier municipality. With respect to water resources in particular, Section 2.2.1 of the P.P.S. requires that planning authorities 'protect, improve or restore the quality and quantity of water' by doing certain things. In this regard, there is a specific requirement for a planning authority to:

1. Use the watershed as the ecologically meaningful scale for integrated and long-term planning. Given that watersheds typically extend beyond local municipal boundaries, this implies that there is a need for an upper-tier policy framework and oversight when it comes to watershed planning;
2. Identify water resource systems, which consist of ground water features, hydrologic functions, natural heritage features and areas, and surface water features including shoreline areas, which implies that these areas need to be mapped in an upper-tier Official Plan, if information is available;
3. Maintain linkages and related functions among ground water features, hydrologic functions, natural heritage features and areas, and surface water features including shoreline areas. This implies that there is a need for an upper-tier policy framework on linkages and possibly mapping showing linkages; and,
4. Implement necessary restrictions on development and site alteration to protect all municipal drinking water supplies and designated vulnerable areas and protect, improve or restore vulnerable surface and ground water, sensitive surface water features and sensitive ground water features, and their hydrologic functions. This implies that there is a need for an upper-tier Official Plan to map these features,

where known, and include policies that establish restrictions on development within and adjacent to these features.

Similar to Section 1.2.4 e) of the P.P.S. (2014), Section 5.2.3.2 f) of the Growth Plan (2019) states the following:

“Upper-tier municipalities, in consultation with lower-tier municipalities, will, through a municipal comprehensive review, provide policy direction to implement this Plan, including:

f) addressing matters that cross municipal boundaries.”

The difference between the P.P.S. policy and the Growth Plan policy is that the Growth Plan policy requires that matters that cross municipal boundaries be addressed through a municipal comprehensive review, which is defined as a new Official Plan, or an Official Plan Amendment (O.P.A.). This process would be initiated by an upper-or single-tier municipality under section 26 of the Planning Act to comprehensively apply the policies and schedules of Growth Plan. It is noted, as per the above that there is a requirement to 'comprehensively apply the policies' of the Growth Plan through such a process, which Niagara Region is currently engaged in.

Section 2.2.1.3 of the Growth Plan (2019) provides additional direction to upper-tier municipalities and it indicates in sub-section d) the following:

“Upper- and single-tier municipalities will undertake integrated planning to manage forecasted growth to the horizon of this Plan, which will:

d) support the environmental and agricultural protection and conservation objectives of this Plan;”

Sub-section d) above speaks to the requirement to support the environmental and agricultural protection and conservation objectives of this Plan, which implies that the objectives are to be implemented in some way. Section 4.2.10.1 of the Growth Plan (2019) provides further direction on what upper and single tier Official Plans shall contain, with sub-sections e) and f) being particularly relevant:

“Upper- and single-tier municipalities will develop policies in their official plans to identify actions that will reduce greenhouse gas emissions and address climate change adaptation goals, aligned with other provincial plans and policies for environmental protection, that will include:

e) Recognizing the importance of watershed planning for the protection of the quality and quantity of water and the identification and protection of hydrologic features and areas;

f) Protecting the Natural Heritage System for the Growth Plan and water resource systems;”

With respect to the N.H.S., Section 4.2.2.2 of the Growth Plan (2019) states the following:

"Municipalities will incorporate the Natural Heritage System for the Growth Plan as an overlay in official plans, and will apply appropriate policies to maintain, restore, or enhance the diversity and connectivity of the system and the long-term ecological or hydrologic functions of the features and areas as set out in the policies in this subsection and the policies in subsections 4.2.3 and 4.2.4."

The above policy does not specify what type of municipality is required to identify the N.H.S. as an overlay in their Official Plan - however, incorporating the N.H.S. as an overlay in both upper-tier and lower-tier Official Plans allows for a consistent approach. At a minimum, section 4.2.10.1 f) of the Growth Plan requires that single- and upper-tier municipalities protect this system through the development of policies in their Official Plans. A similar policy requirement also applies to the agricultural system. Section 4.2.2.5 of the Growth Plan (2019) also references single- and upper tier municipalities:

"Upper- and single-tier municipalities may refine provincial mapping of the Natural Heritage System for the Growth Plan at the time of initial implementation of their official plans. For upper-tier municipalities, the initial implementation of provincial mapping may be done separately for each lower-tier municipality. After the Natural Heritage System for the Growth Plan has been implemented in official plans, further refinements may only occur through a municipal comprehensive review."

The above means that only single- and upper-tier municipalities can modify the boundaries of the N.H.S. established by the Province. In addition, once the N.H.S. has been incorporated in Official Plans, only an upper tier or single tier municipality can consider refinements through the municipal comprehensive review process.

With respect to lands outside of the N.H.S. for the Growth Plan (2019), Section 4.2.2.6 states the following:

"Beyond the Natural Heritage System for the Growth Plan, including within settlement areas, the municipality:

- a) will continue to protect any other natural heritage features and areas in a manner that is consistent with the PPS; and
- b) may continue to protect any other natural heritage system or identify new systems in a manner that is consistent with the P.P.S."

This implies that there is some discretion by the municipality for how, in what form and where the N.H.S. will be identified outside of the Growth Plan N.H.S. (and including within settlement areas), so long as it is consistent with the P.P.S.

The above Growth Plan policy supports the consideration of different approaches outside of the provincial N.H.S.s including within settlement areas, provided such approaches are consistent with the P.P.S. It is also noted that the above policy requires that features and other natural heritage features and areas be protected, however, the identification and protection of any other natural heritage system is optional.

In this regard, there is no requirement to establish a natural heritage system outside of provincial N.H.S.s including within settlement areas as long as features are protected in a manner that is consistent with the P.P.S. That said, the Growth Plan Regional N.H.S. Mapping – Technical Report notes the following:

“...that the scale of the NHS is important. Given that NHS mapping for the Growth Plan for the Greater Golden Horseshoe is on a broad, regional scale, it is focused on identifying larger core areas and broad linkages. The mapping was not intended to identify all areas and connect features that may be important to consider at a local or smaller scale...” (O.M.N.R.F. 2018, p. 4).

This statement acknowledges that there may be other features or connections (i.e., linkages) not identified in the Growth Plan N.H.S. that are important for Niagara Region that could be identified as part of Niagara’s N.H.S.

With respect to the W.R.S., Section 4.2.1.1 of the Growth Plan (2019) states the following:

"Upper- and single-tier municipalities, partnering with lower-tier municipalities and conservation authorities as appropriate, will ensure that watershed planning is undertaken to support a comprehensive, integrated, and long-term approach to the protection, enhancement, or restoration of the quality and quantity of water within a watershed."

The above section is similar to Section 2.2.1 of the P.P.S. and applies to all municipalities.

Section 4.2.1.2 of the Growth Plan (2019) then states the following:

"Water resource systems will be identified to provide for the long-term protection of key hydrologic features, key hydrologic areas, and their functions."

The above implies that W.R.S.’s are to be identified in all Official Plans and that designations and policies will be required. This policy direction is also consistent with Section 2.2.1 of the P.P.S.

The Greenbelt Plan contains extensive N.H.S. policies and identifies the spatial extent of the Greenbelt Plan N.H.S.; however, like the Growth Plan, it does not map a W.R.S. With respect to implementation, Section 5.3 of the Greenbelt Plan states the following with respect to the N.H.S.:

“Official plans shall contain policies that reflect the requirements of this Plan together with a map(s) showing the boundaries of the Greenbelt Area, the Protected Countryside, the Natural Heritage System and the agricultural land base. Municipalities shall provide a map showing known key natural heritage features and key hydrologic features and any associated minimum vegetation protection zones identified in this Plan. The identification of the Natural Heritage System boundary will form the basis for applying the policies of section 3.2.”

The above clearly requires that all Official Plans show the boundary of the Greenbelt Area, the Protected Countryside, and the Greenbelt Plan N.H.S. The section goes further to require the preparation of a map showing 'known key natural heritage features and key hydrologic features and any associated minimum vegetation protection zones'.

Section 5.3 of the Greenbelt Plan states the following with respect to components of the W.R.S. (with the second paragraph being directly applicable to Niagara Region):

“Municipalities should also include a map of wellhead protection areas together with associated policies for these areas within their official plans as appropriate and in accordance with any provincial directives on source water protection.

Building on watershed planning, key hydrologic areas shall be identified and the appropriate designations and policies will be applied in official plans to provide for their long-term protection.”

Unlike the P.P.S., Growth Plan and Greenbelt Plan, there are no specific policies in the N.E.P. requiring the mapping of the N.H.S. in an Official Plan, because the N.E.P. does not include nor map a N.H.S.

Section 18.3.4 of the Natural Environment Background Study provides a summary of the Provincial requirements discussed above.

3.1.1 Issues and Trends in Natural Environment Planning

The Natural Environment Background Study reviewed several topics of relevance to current issues and trends in natural environment planning. For example, there is more recognition through legislation and policy to mitigating impacts of climate change and managing invasive species. In addition, there has been significant discussion on the topic of biodiversity offsetting related to other files in the Region. These topics are further discussed below as they may or may not inform the development of the options for the Region’s natural environment systems.

Climate Change

It is widely acknowledged that a more robust natural environment system is more resilient to impacts from climate change, and larger areas of natural cover and impervious surfaces can help to mitigate the impacts of climate change. The Natural Environment Background Study provided recommendations on the types of policies that should be considered for the new N.O.P. It was also recommended that the options ensure connectivity (linkages) between features to be maintained or enhanced. These approaches to addressing the challenges associated with climate change have been carried forward in developing the options for the natural environment systems (see **Section 3.3** and **3.4**) and are further discussed in the evaluation of the options (see **Section 4**).

Invasive Species

Invasive species pose a major threat to the natural environment, where the impacts of invasive species result in changes to vegetation community composition, classification

of a feature and ultimately the protection of the feature and natural environment system as a whole. An example of this is the combined impact to the canopy and understory of woodlands where the canopy trees are dying from invasive insects leaving an understory dominated by invasive shrubs. Under the current woodland definitions and policies, these woodlands may lose their status as significant, therefore the policies that protect significant woodlands may no longer apply to them, resulting in a loss of woodland cover – this is thoroughly discussed in **Section 12.3** of the Natural Environment Background Study. In order to recognize the impacts of invasive species on natural features and their status, and ensure woodland (and natural area cover) in the Region does not decline, either the definition of woodland should account for this change in woodland cover, or policies should be developed that ensure protection of woodlands and natural cover regardless of change in status. For example, Niagara Region could include a policy similar to the Region of Peel, as follows:

“In the event that portions of the significant woodland are damaged or destroyed, either through anthropogenic or natural causes, there shall be no adjustment to the boundary or re-designation of these areas in the area municipal official plans and the Region will require replacement or rehabilitation of the ecological features, functions and/or landforms” (Policy 2.3.2.7, Peel Official Plan).

Another important consideration beyond the policies related to classification and protection of features is the development and implementation of a region-wide invasive species management program. Due to the wide-spread prevalence of invasive species in the Region and their ability to continue to spread and further reduce the natural environment, including ecosystem services, the Natural Environment Background Study recommended the Region develop a coordinated invasive species management plan in conjunction with the area municipalities and/or the Niagara Peninsula Conservation Authority.

Offsetting

There is a recent and controversial history related to the concept of offsetting in Niagara. As a result of this, during early consultation on the Natural Environment Work Program, there were many questions on the topic. Stakeholders requested more information about the concept, and clarification on its application in land use planning in Ontario. The Natural Environment Background Study (**Section 11**) provided an objective review of the current knowledge, best practices and review of existing guidelines for offsetting.

The development of options for the natural environment systems has carefully reviewed and considered requirements for natural environment planning as determined by the P.P.S. and provincial plans, which do not contemplate offsetting as an approach to support natural environment planning. Furthermore, based on the review of best practices and current knowledge of the challenges associated with offsetting as described in the Natural Environment Background Study, and feedback received through the 1st Point of Engagement, it is recommended that offsetting not be an approach the Region consider as part of the natural environment planning framework.

As such, offsetting is not being proposed as part of the policy framework or implementation tools recommended for the Region's natural environment systems.

3.1.2 Impact of Provincial Requirement to Map the Agricultural System

In recognition of the overlap between the Provincial Agricultural System and N.H.S. mapping, the Province has identified four options with respect to mapping in a document entitled 'Implementation Procedures for the Agricultural System in the Greater Golden Horseshoe' dated March 2020. In this regard, the following is stated:

"For clarity and consistency across the GGH, it is recommended that as a best practice, one of four options be used by municipalities for official plan mapping where prime agricultural areas overlap with key natural heritage features and key hydrologic features. In all four options, the Natural Heritage System in the Growth Plan / Greenbelt Plan would be an overlay. As well, permissions for new agricultural uses, agriculture-related uses and on-farm diversified uses where features and prime agricultural areas overlap would be restricted by protective policies (i.e., no development or site alteration)."

It is noted as per the above that the N.H.S. would be an overlay in each of the four identified options. However, key natural heritage features and key hydrologic features within the N.H.S. could be designated within a mutually exclusive land use designation in an Official Plan. Variations of options identified by the Province could be considered as long as prime agricultural areas are clearly delineated, this is further discussed in **Section 3.1.6.**

3.1.3 Implementing the Niagara Escarpment Plan in the New N.O.P.

At the present time, Schedule C of the R.O.P. includes certain lands within the N.E.P. within the Environmental Protection Area and Environmental Conservation Area and also identifies fish habitat, Earth Science Areas of Natural and Scientific Interest and Potential Natural Heritage Corridors.

The N.E.P. is implemented to varying degrees in upper- and lower-tier Official Plans, but not through the application of zoning by-laws pursuant to the Planning Act. Instead of zoning, the Niagara Escarpment Commission (N.E.C.) oversees the issuance of development permits for all development within the N.E.P. area. In addition, the N.E.C. also is responsible for processing applications to amend the N.E.P. and for commenting on applications to amend the Regional and Local Official Plans as required. In addition, the development permit process administered by the N.E.C. also allows for conditions to be included and attached to development permits. To a very large extent, the development permit system relied upon by the N.E.C. is very similar to the development permit process established by the Province through amendments to the Planning Act (now known as the Community Planning Permit System).

It is noted that since N.E.C. implements the N.E.P., some municipalities simply indicate that the N.E.P. applies and direct the reader to the N.E.P. to determine what is permitted and under what conditions. Others repeat the policy framework word-for-word,

or translate the policy framework into the language of the Official Plan. Both of these options would conform to the N.E.P.

3.1.4 Natural Heritage Systems within Settlement Areas

Section 2.1.3 of the P.P.S. states the following:

"Natural heritage systems shall be identified in Ecoregions 6E & 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas."

The above section implies that the 'size and form' of N.H.S.s can vary based on land use considerations. Given the use of the words 'size and form', this also implies that the criteria relied upon to determine whether a feature is significant could be different if the feature is in a settlement area with the selected criteria recognizing that there are a number of other Provincial policies supporting more compact development forms.

Furthermore, in recognition of the desire for more efficient development patterns in settlement areas, the Region could establish different criteria for determining when a feature is significant in settlement areas and determining whether the identification of enhancements and linkages in settlement areas is appropriate. The approach to minimum vegetation protection zone (V.P.Z.) width could also be different in settlement areas. These options are presented in the **Section 3.2**.

3.1.5 Mapping Options for the Identification of Features in the New N.O.P.

Section 5.2.1 of the Mapping Discussion Paper reviewed five basic approaches to identifying known key natural heritage features, key hydrologic features and natural heritage features and areas (referred to as key features and areas below) in an Official Plan as set out below:

Mapping Option 1 - Designate key features and areas in a separate mutually exclusive land use designation that is shown on an operative Official Plan schedule. Allow for refinements to boundaries and the addition of new key features and areas and the deletion of key features and areas without requiring an Official Plan Amendment;

Mapping Option 2 - Designate key features and areas in a separate mutually exclusive land use designation that is shown on an operative Official Plan schedule. Allow for only 'minor' refinements to boundaries without an Official Plan Amendment and require an Official Plan Amendment for the addition of new key features and areas and the deletion of key features and areas;

Mapping Option 3 - Identify key features and areas as a potential 'constraint to development' on an operative Official Plan schedule and allow for refinements without requiring an Official Plan Amendment (meaning that the features would be an overlay designation that 'sits on top' of other designations);

Mapping Option 4 - Identify key features and areas as a potential 'constraint to development' in an appendix to the Official Plan and allow for refinements without requiring an Official Plan Amendment;

Mapping Option 5 - Identify key features and areas in a companion document that is not part of the Official Plan.

In all options, an Environmental Impact Study or other study approved by the Region would be needed to support refinements and the addition or deletion of key features.

Within the Mapping Discussion Paper, it was determined that mapping option 5 would not conform to Provincial policy since the key features and areas are not mapped in a statutory document. In considering the specific restrictions on development and site alteration within and adjacent to key natural heritage features, key hydrologic features and natural heritage features and areas in Provincial policy, it is concluded within this paper that mapping option 4 would also not conform to Provincial policy. Option 4 will not conform as these key features and areas are not mapped in an operative component of an Official Plan. This leaves mapping options 1 to 3, with option 3 involving the mapping of key features and areas in an overlay designation. These options are presented in **Section 3.2**.

Each of the above options were assessed in the Mapping Discussion Paper based on the following factors:

- Accuracy of information - a high degree of confidence would be required for Options 1 and 2 and less so with each option after Option 2;
- Ability to update information - new information comes into effect when known in all options except Option 2;
- Fairness and transparency when new N.O.P is developed - there is more fairness and transparency with Options 1 to 3 since information can be challenged because features are being mapped in a statutory document;
- Fairness and transparency after N.O.P is in effect - since changes can be made without an OPA in Options 1, 3, 4 and 5, there would be no public process required to consider those changes. However, the impact of the change lessens in Options 4 and 5 because features are not mapped in a statutory document;
- Impacts on planning process - since major refinements to feature boundaries would require an OPA in Option 2, the planning process may be longer as a consequence;
- Ease of access to information - Options 1 and 2 would provide for the greatest ease of access since information on features would be included on a schedule to the OP; and

- Defensibility of approach - Options 1 and 2 are the most defensible since features would be designated in a manner that prohibits development. Option 3 would also be defensible since the features are also mapped in a statutory document. Options 4 and 5 would not conform to Provincial policy since mapping of features is not included in statutory document.

On the basis of the above, the minimum standard option would involve the mapping of key natural heritage features, key hydrologic features and natural heritage features and areas in an overlay designation. It is noted that this overlay designation would be different than the N.H.S. itself, which would also be in an overlay designation as well, meaning that there would be two overlay designations. Prime agricultural areas would be designated and with both the N.H.S. and features included in overlay designations, this approach would be similar to the first option identified in the document entitled 'Implementation Procedures for the Agricultural System in the Greater Golden Horseshoe' dated March 2020.

It is noted that while the N.E.P. also contains policies on key natural heritage features and key hydrologic features, they do not have to be identified in the new N.O.P. to meet minimum standard requirements since the N.E.C., not the Region, administers the N.E.P. This means that key natural heritage features and key hydrologic features do not need to be identified or mapped within the N.E.P. area in the new N.O.P.

In addition to features, the Growth Plan and Greenbelt Plan N.H.S.s include linkages and V.P.Z.s. With respect to the linkages, these can be shown on the mapping as a different overlay that distinguishes the feature from the linkage (meaning that this would be the third overlay in the minimum standards approach). Policies on linkages should be consistent with policies related to the N.H.S. for the Growth Plan and Greenbelt Plan. Linkages in a minimum standard option would not be identified on the mapping or through policy outside of the Growth Plan and Greenbelt Plan N.H.S.

With respect to the V.P.Z.s, there are three mapping approaches. The first is to incorporate the 30-metre V.P.Z. requirement as part of the mapping of the feature itself, with policy text explaining the approach (it is noted that the V.P.Z. is reduced to 15 metres by the Greenbelt Plan within the Niagara Peninsula Tender Fruit and Grape Area for new buildings or structures for agricultural, agriculture-related and on-farm diversified uses from permanent and intermittent streams). The second is to establish a separate layer, in the form of another overlay, that goes around each of the features. The third is to not incorporate the mapping of the V.P.Z. at all and rely upon the policy document that indicates that a 30-metre wide (or 15 meters in the Niagara Peninsula Tender Fruit and Grape Area) V.P.Z. is required. V.P.Z.'s would not be identified on the mapping or through policy outside of the Growth Plan and Greenbelt Plan N.H.S.s, although there would be a policy requiring the establishment of a minimum V.P.Z. through a Planning Act process in accordance with the adjacent lands policies of the P.P.S.

3.2 Policy Framework Options for the Natural Heritage System

Given the previous discussion, there are a number of options that can be considered respecting how features and other elements of the N.H.S. are mapped in the new N.O.P. (designation versus overlay). In addition, the establishment of a N.H.S. beyond the N.H.S. established by the Growth Plan and Greenbelt Plan is optional. Lastly, different criteria for determining the significance of features can be applied in different parts of the Region (most notably within settlement areas).

Part III of the P.P.S. (2020), “How to Read the Provincial Policy Statement”, notes that the policies and direction provided in the P.P.S. “represent minimum standards” as described in the following statement:

“The policies of the Provincial Policy Statement represent minimum standards.

Within the framework of the provincial policy-led planning system, planning authorities and decision-makers may go beyond these minimum standards to address matters of importance to a specific community, unless doing so would conflict with any policy of the Provincial Policy Statement.”

Based on direction from the P.P.S. and Provincial plans and previous discussions related to policy considerations and approaches provided in **Section 3.1**, three N.H.S. options have been developed for consideration and evaluation. The first option involves implementing Provincial policy in a manner that achieves what is required to meet minimum standards. In Option 1 this option would treat the two Provincial N.H.S.s (Growth Plan and Greenbelt Plan) and key features and areas throughout the Region as an overlay, meaning that at least two overlays would be established. In this option, linkages would not extend beyond the two Provincial N.H.S.s, although significant features outside of the two Provincial N.H.S. systems would be included within an overlay. The second option includes the same as Option 1, but would designate the same key features and areas in a mutually exclusive land use designation, with the two Provincial N.H.S.s (Growth Plan and Greenbelt Plan) continuing to be an overlay.

Option 3 goes beyond the minimum standards (as permitted by the P.P.S.) by building upon Options 1 and 2, and includes sub-options with an increasing number of optional components, enhancements, and connections that would have the effect of establishing a spatially larger N.H.S that extends beyond the two Provincial N.H.S.s (Growth Plan and Greenbelt Plan).

In developing the options, the following were considered:

- Desire to have:
 - A complex, flexible system;
 - A more simple, prescriptive system; or
 - Options for both.

- Interest and support for meeting minimum provincial requirements or going beyond in developing the natural environment system.
- Land-use specific policy considerations:
 - Consistent across similar geographies; or
 - One or more distinct policy-groups for urban, rural, and/or agricultural.
- Treatment of the N.H.S. and W.R.S. (both the Provincial and local) as designated land-uses or as land-use overlays.
- Treatment of Buffers, Enhancement Areas and Linkages as:
 - Part of the N.H.S. / W.R.S.; or
 - Supplementary/other components.

3.2.1 N.H.S. Option 1 - Minimum Standards - Overlay

The Province has developed the N.H.S. for the Growth Plan and a N.H.S. for the Greenbelt Plan, which must be incorporated as an overlay in the new N.O.P. Although it addresses only part of the Region, it could be interpreted as providing the required N.H.S. for Niagara Region, thus fulfilling Section 2.1.3 of the P.P.S. that requires a N.H.S. be identified. This approach is also consistent with Section 4.2.2.6 of the Growth Plan which states that municipalities have the option of establishing a N.H.S. outside of the Growth Plan N.H.S. This is further supported by the statement in the document entitled 'Implementation Procedures for the Agricultural System in the Greater Golden Horseshoe' dated March 2020, that indicates that "if local natural heritage systems are identified outside of the Provincial natural heritage system for the Growth Plan / Greenbelt Plan natural heritage system ...".

The above implies that while features and areas beyond the N.H.S. for the Growth Plan and Greenbelt Plan must be protected according to policies of the P.P.S., there is discretion as to if and how the municipality will identify a local N.H.S. beyond the Growth Plan and Greenbelt Plan N.H.S.s. As a result, minimum standards in this case would mean that a local N.H.S. outside of the Growth Plan and Greenbelt Plan N.H.S.s would not be required.

The N.H.S. for the Growth Plan does not apply to lands that are subject to the N.E.P. However, the N.E.P. does not include a N.H.S. and nor is there a requirement in the N.E.P. for a N.H.S. to be mapped in Official Plans.

In addition to identifying the two Provincial N.H.S.s as overlays, Section 5.3 of the Greenbelt Plan specifically requires that key natural heritage features, key hydrologic features and any associated minimum vegetation protection zones be mapped. While there is no direction in this section on whether this mapping is to be in an Official Plan, it is our opinion that this option would identify key features and minimum vegetation protection zones in the Greenbelt Plan N.H.S. also as an overlay on an operative schedule to the Official Plan.

There is no similar explicit requirement in the Growth Plan to map key features. As there are specific restrictions on development and site alteration within and adjacent to key natural heritage features and key hydrologic features in the Growth Plan N.H.S. and within and adjacent to key hydrologic features outside of settlement areas, it is our

opinion that they should also be identified as an overlay on an operative schedule to the Official Plan. With respect to vegetation protection zones and linkages within the Growth Plan, they have already been included as part of the N.H.S. mapping for the Growth Plan. That said, mapping of vegetation protection zones for those Key Natural Heritage Features and Key Hydrologic Features within the Growth Plan that require a vegetation protection zone should be illustrated as an overlay. Outside of the Growth Plan and Greenbelt N.H.S.'s, it is also our opinion that including significant natural heritage features in an overlay would be appropriate, because of the specific restrictions on development and site alteration in the P.P.S (2020) and to support implementation of these policies.

On the basis of the above, N.H.S. Option 1 would include the following:

- The N.H.S. for the Growth Plan and the N.H.S. for the Greenbelt Plan.
- Key natural heritage features within the Greenbelt Plan and Growth Plan N.H.S.
- Key hydrologic features outside of settlement areas
- Significant Natural Heritage Features outside of the Growth Plan and Greenbelt Plan N.H.S.s, as identified in the P.P.S.

Figure 1 shows a conceptual representation of N.H.S. Option 1 of the N.H.S. within a representative area of Niagara Region. It should be recognized that the mapping represents a conceptual approach to mapping N.H.S. Option 1, and includes datasets that will be updated prior to the completion of the final mapping for the Region's N.H.S.

Details of N.H.S. Option 1 - Components

Growth Plan

On lands subject to the Growth Plan, the following would need to be incorporated in the new N.O.P.:

- The **N.H.S. for the Growth Plan** is included as an overlay designation. This N.H.S. would not extend into lands within settlement areas.
- The following features would be identified as key natural heritage features in the N.H.S. for the Growth Plan:
 - Habitat of endangered species and threatened species;
 - Fish habitat;
 - Wetlands (also considered to be a key hydrologic feature by the Growth Plan and the Greenbelt Plan);
 - Life science areas of natural and scientific interest (A.N.S.I.'s);
 - Significant valleylands;
 - Significant woodlands;
 - Significant wildlife habitat (including habitat of special concern species);
 - Sand barrens, savannahs, and tallgrass prairies; and
 - Alvars.

(Note: these key features are the same in the Greenbelt Plan but differ from the features identified in the N.E.P. and the P.P.S.).

- Of the above key natural heritage features, wetlands (including Provincially significant wetlands and non-Provincially significant wetlands), life science A.N.S.I.s, and significant woodlands, would be included in a separate overlay designation the new N.O.P. on the same schedule, or on a different schedule if required, since there is only so much that can be adequately shown on the same schedule.
- For those features that are not included in the overlay, policies would be required to ensure that appropriate studies be completed to verify their presence and extent, as necessary.
- The policies in Section 4.2.2.3 of the Growth Plan dealing with negative impacts, connectivity, the removal of features, the amount of disturbed area permitted, and agricultural uses within the N.H.S. for the Growth Plan would be incorporated within the new N.O.P. as is.
- The restrictive development and site alteration policies that apply to key natural heritage features within the N.H.S. for the Growth Plan in Section 4.2.3 of the Growth Plan would be incorporated within the new N.O.P. as is.
- The restrictive development and site alteration policies that apply to lands within 120 meters of key natural heritage features within the N.H.S. for the Growth Plan in Section 4.2.4 of the Growth Plan would be incorporated within the new N.O.P. as is.
- For fish habitat, and significant woodlands, a V.P.Z. of no less than 30 metres, measured from the outside boundary of the key natural heritage feature is required. Other key natural heritage features and areas will require a V.P.Z. as determined through an approved study. The restrictions and exemptions related to development or site alteration in V.P.Z.'s, as noted in Section 4.2.4.3, would apply and these restrictions would also be included in the new N.O.P. as is.

Greenbelt Plan

On lands subject to the Greenbelt Plan, the following would need to be incorporated in the new N.O.P.:

- The Greenbelt N.H.S. is included as an overlay designation.
- The following features would be identified as key natural heritage features in the Greenbelt N.H.S.:
 - Habitat of endangered species and threatened species;
 - Fish habitat;
 - Wetlands;

- Life science A.N.S.I.s;
 - Significant valleylands;
 - Significant woodlands;
 - Significant wildlife habitat (including habitat of special concern species);
 - Sand barrens, savannahs, and tallgrass prairies; and
 - Alvars.
- Of the above features, wetlands (including Provincially significant wetlands and non-Provincially significant wetlands), life science A.N.S.I.s, and significant woodlands and related minimum V.P.Z.s would be included in a separate overlay designation the new N.O.P. on the same schedule, or on a different schedule if required, since there is only so much that can be shown adequately on the same schedule.
 - For those features that are not within the overlay, policies would be required that ensure that appropriate studies be completed to verify the presence and extent of these features, and to ensure that the policies are applied as necessary.
 - The restrictive development and site alteration policies that apply to lands within and adjacent to key natural heritage features within the Greenbelt Plan N.H.S. in Section 3.2.5 of the Greenbelt Plan would be incorporated within the new N.O.P. as is. The policies affecting key natural heritage features are similar, but not the same as the policies affecting key natural heritage features in the Growth Plan.
 - In the case of wetlands, fish habitat, and significant woodlands, a minimum 30 metre V.P.Z., measured from the outside boundary of the key natural heritage feature is required (the V.P.Z. is reduced to 15 metres for agricultural buildings in the Niagara Peninsula Tender Fruit and Grape Area). A V.P.Z. will be required for other key natural heritage features within the N.H.S. or key hydrologic features anywhere within the Protected Countryside as determined through a natural heritage evaluation or a hydrological evaluation, where development is proposed within 120 metres of a feature. The restrictions and exemptions related to development or site alteration in vegetation protection zones, as noted in Section 3.2.5.1, shall apply.

Provincial Policy Statement

On lands that are outside of the N.H.S. for the Growth Plan and the Greenbelt Plan N.H.S., outside of the N.E.P., and within settlement areas, the following would need to be incorporated in the new N.O.P.:

- In this minimum standards option, linkages and enhancement areas would not be established on lands that are outside of the N.H.S for the Growth Plan and the Greenbelt N.H.S.
- The following features would be identified as natural heritage features and areas and subject to the development and site alteration policies of the P.P.S.:

- 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.
- Of the above features, significant wetlands, significant areas of natural and scientific interest and significant woodlands would be included in an overlay designation the new N.O.P. on the same schedule, or on a different schedule if required, since there is only so much that can be shown on the same schedule. Natural heritage features and areas that are present in settlement areas would also be included as an overlay.
 - For those features that are not within the overlay, policies would be required that ensure that appropriate studies be completed to verify the presence and extent of these features, and to ensure that the policies are applied as necessary.
 - The restrictive development and site alteration policies that apply to lands within and adjacent to features dealt with by the P.P.S. in Sections 2.1.4 to 2.1.8 would be incorporated within the new N.O.P. as is.
 - Mandatory buffers or V.P.Z.s of any kind adjacent to significant natural heritage features would not be identified through policy, since there are no mandatory buffer or V.P.Z. requirements in the P.P.S. (2020). Instead, the policies would require an environmental impact study to support the establishment of a buffer or V.P.Z. through a Planning Act process only.

3.2.2 N.H.S. Option 2 – Minimum Standards - Designation

This option would be similar to N.H.S. Option 1 except that key features would be designated in a mutually exclusive land use designation instead of being in an overlay. There are no policy differences in N.H.S. Options 1 and 2 since policies would be included in the new N.O.P. that prohibit development and site alteration within and adjacent to features, regardless of whether they were included in an overlay or a designation. As a result, the only difference in the approach is how the features are mapped. This also means that the prime agricultural area and the key features would be in mutually exclusive designations, as opposed to key features being in an overlay on top of the prime agricultural area designation in Option 1.

3.2.3 N.H.S. Option 3 – Going Beyond Minimum Standards

N.H.S. Option 3 builds on N.H.S. 1 and N.H.S. 2 by establishing a local N.H.S. that includes linkages and enhancement areas, extending beyond the Growth Plan and Greenbelt Plan N.H.S.'s. Option 3 also establishes three scenarios (as summarized in **Table 1**) that progressively exceed minimum standards (i.e. minimum provincial requirements). In this regard, all of the key natural heritage features, key hydrologic

features and significant natural heritage features that are designated in Option 2 would also be designated in each of N.H.S. Options 3A, 3B and 3C. The restrictive Provincial policies on development and site alteration would also be incorporated in the new N.O.P. as per Options 1 and 2. Additional linkages and component features and areas are added as per Options 3A, 3B and 3C, although linkages are not included in settlement areas in Options 3A and 3B.

Table 1. Overview of Natural Heritage System Options: 3A, 3B and 3C.

	N.H.S. 3A	N.H.S. 3B	N.H.S. 3C
Component Features and Areas	<ul style="list-style-type: none"> • Key Natural Heritage Features within the N.E.P. • Other Key Natural Features and Areas outside of provincial N.H.S.s, but only outside of settlement areas 	<ul style="list-style-type: none"> • Key Natural Heritage Features within the N.E.P. as per Option 3A • Other Key Natural Features and Areas outside of provincial N.H.S.s both outside and in settlement areas • Supporting Features and Areas outside of settlement areas 	<ul style="list-style-type: none"> • Key Natural Heritage Features within the N.E.P. as per Options 3A and 3B • Other Key Natural Features and Areas outside of provincial N.H.S.s both outside and in settlement areas as per Option 3B • Supporting Features and Areas in all of the Region, including both outside and within settlement areas
Connecting the System (linkages)	<ul style="list-style-type: none"> • Large Linkages only between Key Natural Features and Areas outside of settlement areas 	<ul style="list-style-type: none"> • Large and Medium Linkages between Key Natural Features and Areas outside of settlement areas 	<ul style="list-style-type: none"> • Large, Medium and Small Linkages between Key Natural Features and Areas outside of settlement areas • Small Linkages between Key Natural Features and Areas in settlement areas where the potential linkage area is in a natural state
Buffers/ Vegetation Protection Zones (to Key Natural Features and Areas)	<ul style="list-style-type: none"> • Suggested policy minimums outside of provincial N.H.S.s and outside of settlement areas 	<ul style="list-style-type: none"> • Suggested policy minimums outside of provincial N.H.S.s, both inside and outside of settlement areas 	<ul style="list-style-type: none"> • Mandatory buffers outside of settlement areas (that can be reduced through study) with suggested policy minimums inside settlement areas

N.H.S. in the Niagara Escarpment Plan Area

In addition to the above, the following key natural heritage features in the N.E.P. area would also be designated in each of Options 3A, 3B and 3C:

- Wetlands;
 - Habitat of endangered species and threatened species;
 - Fish habitat;
 - Life science A.N.S.I.;
 - Earth science A.N.S.I.;
 - Significant valleylands;
 - Significant woodlands;
 - Significant wildlife habitat; and
 - Habitat of special concern species in escarpment natural and escarpment protection areas.
- Of the above features, 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 designated within the N.E.P.
 - For those features that are not designated, policies would be required that ensure that appropriate studies be completed to verify the presence and extent of these features, and to ensure that the policies are applied as necessary.
 - The restrictive development and site alteration policies that apply to lands within and adjacent to key natural heritage features within the N.E.P. area in Section 2.7 would be incorporated within the new N.O.P. as is. The policies affecting key natural heritage features are similar, but not the same as the policies affecting key natural heritage features in the Growth Plan and Greenbelt Plan. In this regard, a mandatory minimum V.P.Z. is not included in the N.E.P.

Other Features and Supporting Features and Areas

In addition to the above, items 1, 3 and 4 below could be included in each of Options 3A, 3B and 3C as individual overlays where mapping is available within the N.H.S.:

1. Key hydrologic features (note that these features are also considered to be part of the W.R.S. and two options - overlay versus designation are discussed in Section 3.3.1 of this report);
2. Federal and provincial parks and conservation reserves;
3. Other natural heritage features and areas (that are not defined as key natural heritage features);
4. Lands that have been restored or have the potential to be restored to a natural state;
5. Areas that support hydrologic functions; and
6. Working landscapes that enable ecological functions to continue.

Of the above, areas that support hydrologic functions (item 5) would be dealt with in the W.R.S. policy framework.

Provincial parks could be included for information purposes, however, it is not recommended that it be specifically included within the Region's N.H.S. because of the variety of uses that exist on these lands. There are no conservation reserves in Niagara Region but there are a number of conservation areas owned by the N.P.C.A. that could also be identified for information purposes.

This leaves other natural heritage features (item 3), lands that have been restored or have the potential of being restored (item 4) and areas and working landscapes (item 6). With working landscapes, these would be difficult to define and map, therefore it is recommended that they not be included as components of the N.H.S. Furthermore, they are often addressed through stewardship rather than policy that may unnecessarily restrict activities associated with other complementary uses. Other natural heritage features and areas could be shown as an overlay on an operative schedule. For Options 3A and 3B, these other natural features could be identified outside of settlement areas, where information is available. For Option 3C, such features would also be identified as an overlay in settlement areas.

Lands that have been restored or have the potential of being restored would be considered 'supporting features and areas' or 'enhancement areas'. Similar to the above, these areas could be identified as an overlay outside of settlement areas in Options 3A and 3B, where information is available. For Option 3C, such areas could also be identified as an overlay in settlement areas as well. Enhancement areas should be illustrated as an overlay as they may not entirely be comprised of an area in a natural state (i.e., they may contain developed areas or active recreational areas). A fulsome discussion of options for enhancement areas is provided in **Appendix 1, Section 1.10.1**. For illustrative purposes, figures representing the options for the N.H.S. where enhancements are proposed would include what is referred to as "enhancement area option 2".

Buffers/Vegetation Protection Zones in the N.H.S.

Lastly, while the Growth Plan and Greenbelt Plan prescribe minimum V.P.Z.s, there is no such prescribed width in the N.E.P. or P.P.S. On this basis, a flexible approach to V.P.Z.s outside of the Provincial N.H.S.s is suggested in Option 3A for features outside of settlement areas. In Option 3B, the flexible approach also applies to features in settlement areas as well. For Option 3C, mandatory V.P.Z.s are applied to features outside of settlement areas. Buffers and V.P.Z.s could be shown as an overlay on an operative schedule. For areas outside of Provincial Plan areas where a minimum V.P.Z. has been prescribed, recommended minimum and mandatory buffer widths have been proposed in **Appendix 1, Section 1.12**.

Figures 2a, 2b and 2c provide a visual for comparison of N.H.S. Options 3A, 3B and 3C within a representative area of Niagara Region based on the direction for mapping discussed in **Section 6.0** of this technical report. It should be recognized that the mapping represents a conceptual approach to mapping N.H.S. Option 3A, 3B and 3C,

and includes datasets that are anticipated to be updated prior to the completion of the final mapping for the Region's N.H.S. Once a preferred option is selected, detailed mapping for the entire Region would occur through Phase 7 and 8 of the Natural Environment Work Program

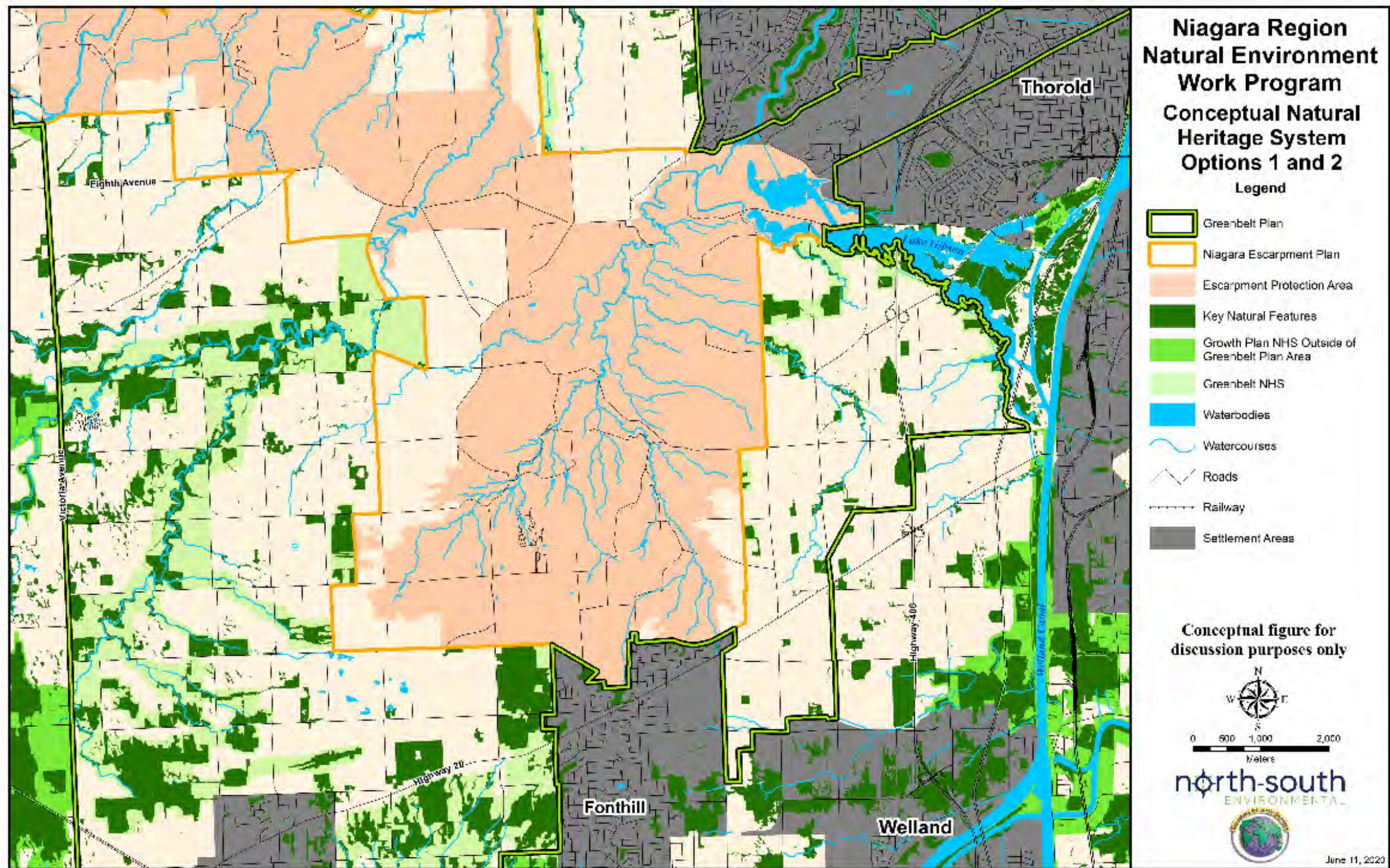


Figure 1. Conceptual illustration of N.H.S. Option 1 and 2.

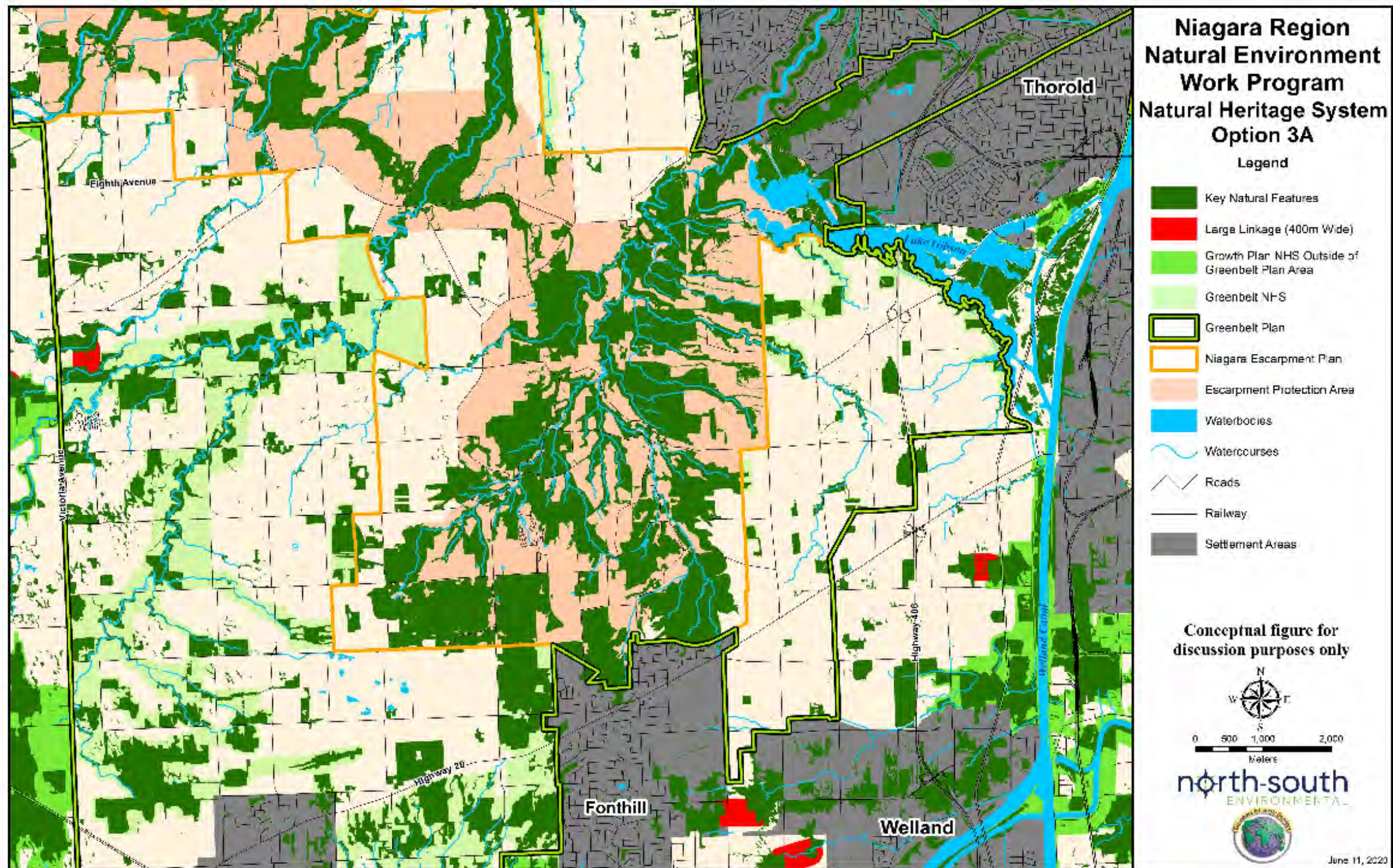


Figure 2a. Conceptual illustration of N.H.S. Option 3A.

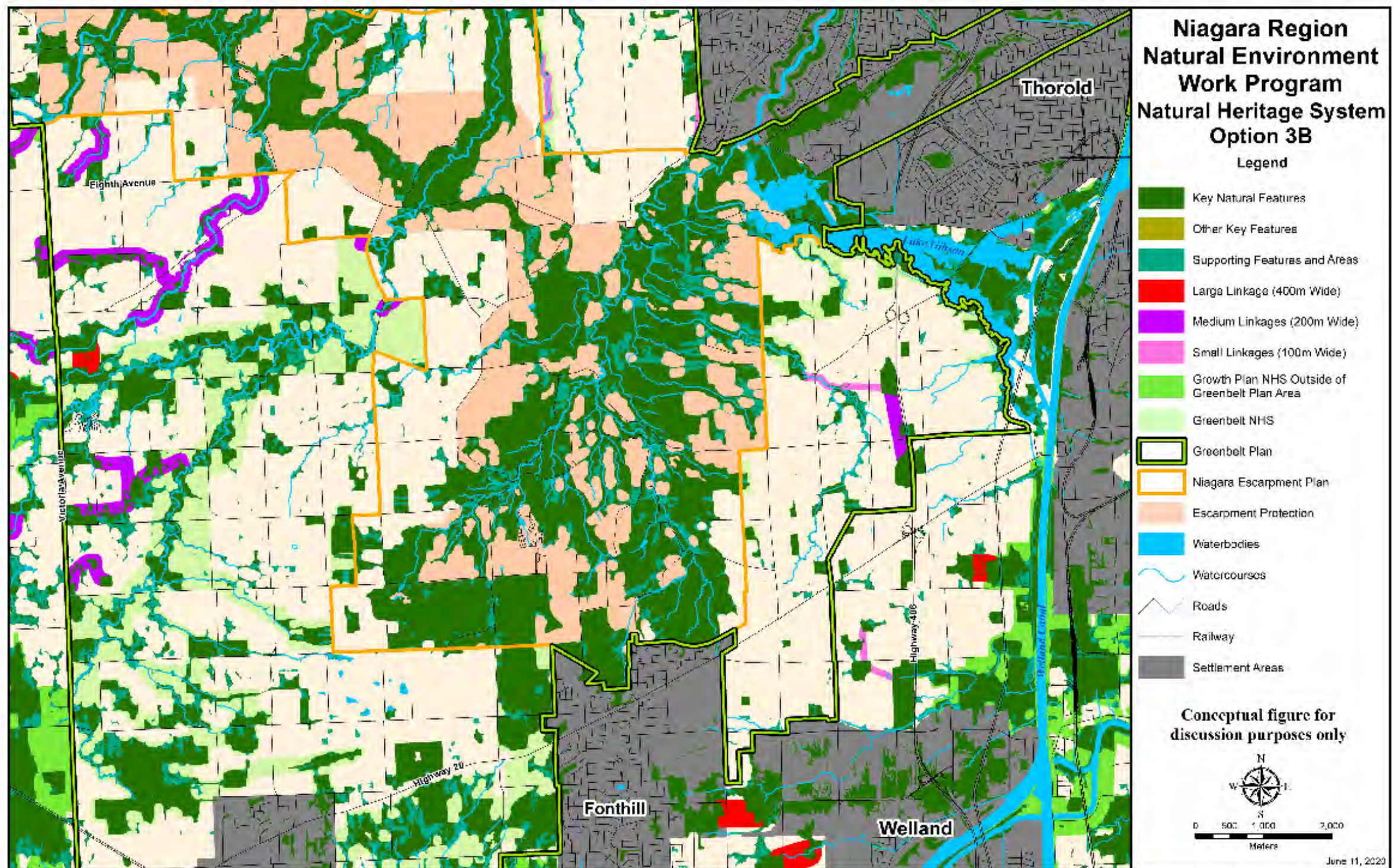


Figure 2b. Conceptual illustration of N.H.S. Option 3B.

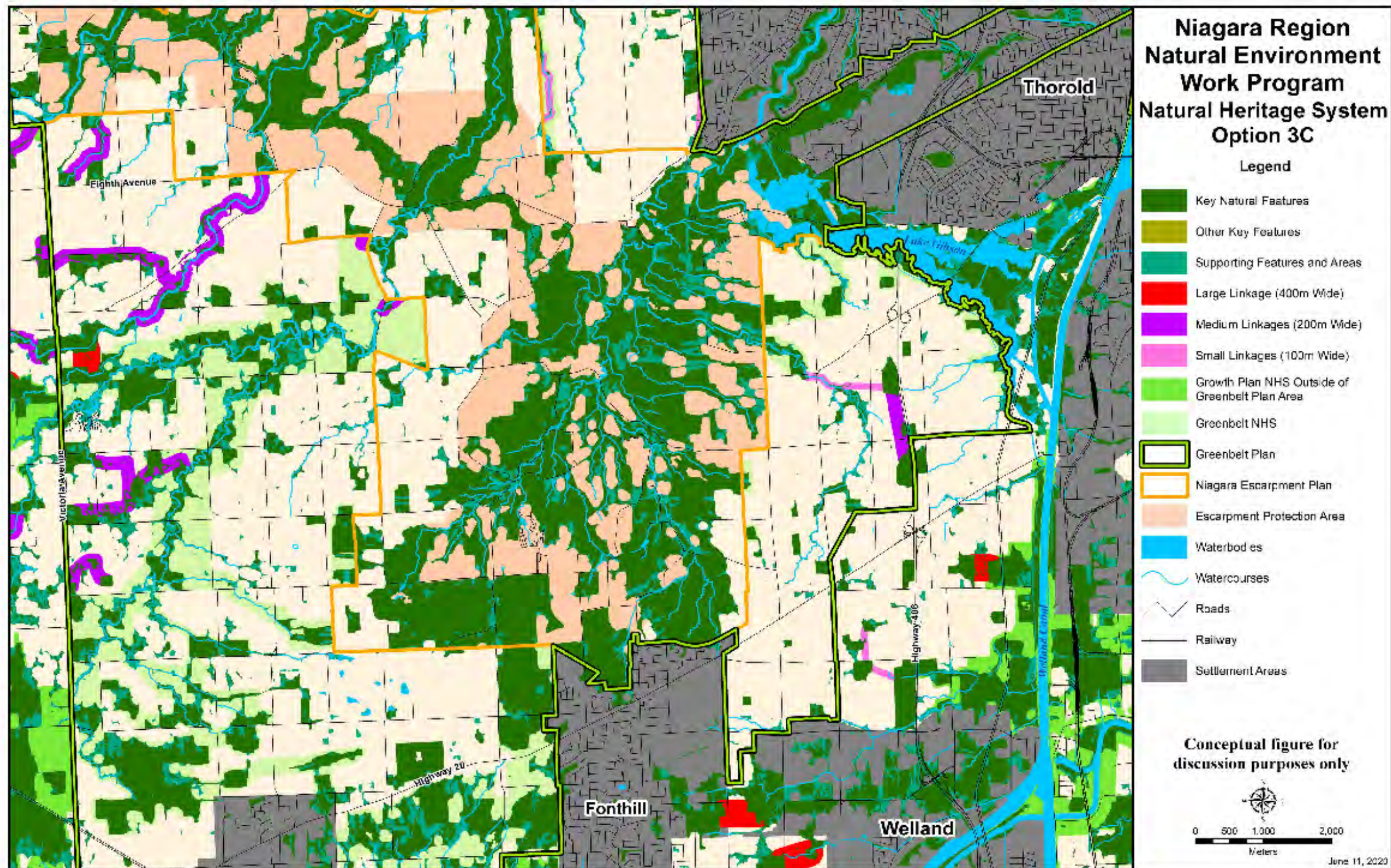


Figure 2c. Conceptual illustration of N.H.S. Option 3C.

3.2.4 Components of the Natural Heritage System

The above section described options for the N.H.S. that include various component features. The components of the N.H.S. have been grouped into the following categories:

- Key Features and Areas;
- Other Key Features (required in Greenbelt Plan N.H.S. and in W.R.S., but otherwise optional for N.H.S.);
- Supporting Features and Areas (considered optional components of the N.H.S.);
- Linkages (a required component of the N.H.S.); and
- Buffers/V.P.Z.s.

These categories are further expanded in **Table 2**. While there are some options and recommendations regarding criteria for component features (e.g., Significant Woodlands) as discussed in **Appendix 1**, the framework of options does not establish a final set of criteria for those components. Varying widths for linkages have been provided to enable evaluation of the options, but these are expected to be refined following consultation during the 2nd Point of Engagement and through the detailed design of the system in phase 7 and 8 of the Natural Environment Work Program. The review of definitions and potential criteria for other components have been discussed in **Appendix 1** of this technical report and will be further defined in subsequent phases of this work program.

Table 2. Components of the Natural Heritage System.

Category	Provincial Document	Components
Key Features and Areas	Natural heritage features and areas as per P.P.S.	<ul style="list-style-type: none"> • Provincially Significant Wetlands (P.S.W.s) and coastal wetlands • Significant woodlands • Significant Life Science A.N.S.I. • Significant Earth Science A.N.S.I. • Fish Habitat • Significant Valleylands • Significant Wildlife Habitat • Habitat of Threatened and Endangered Species
	Key Natural Heritage Features as per Growth Plan and Greenbelt Plan	<ul style="list-style-type: none"> • Wetlands (Provincially and non-Provincially Significant) • Significant woodlands • Life Science A.N.S.I. • Fish Habitat • Significant Valleylands • Significant Wildlife Habitat • Habitat of Threatened and Endangered Species • Sand barrens, savannahs, tallgrass prairies and alvars
	Key Natural Heritage Features as per the Niagara Escarpment Plan	<ul style="list-style-type: none"> • Wetlands (Provincially and non-Provincially Significant) • Significant woodlands • Life Science A.N.S.I. • Earth Science A.N.S.I. • Fish Habitat • Significant Valleylands • Significant Wildlife Habitat • Habitat of Threatened and Endangered Species • Habitat of special concern species in Escarpment Natural Area and Escarpment Protection Area designations
	Key Hydrologic Features as per Greenbelt Plan	<ul style="list-style-type: none"> • Wetlands (Provincially and non-Provincially Significant) • Permanent and intermittent streams • Inland lakes and their littoral zones • Seepage areas and springs
Other Key Features	Key Hydrologic Features as per the Growth Plan	<ul style="list-style-type: none"> • Permanent and intermittent streams • Inland lakes and their littoral zones • Seepage areas and springs

Category	Provincial Document	Components
		<ul style="list-style-type: none"> Wetlands (all wetlands outside of settlement areas)
Supporting Features and Areas	As per the definition of N.H.S. in the P.P.S, Growth Plan and Greenbelt Plan	<ul style="list-style-type: none"> Other natural heritage features and areas; this could include: <ul style="list-style-type: none"> Other woodlands (i.e., not meeting the criteria as Significant Woodland) Grasslands/meadows not meeting the criteria as Significant Wildlife Habitat that are continuous with Core Features and Areas Non- P.S.W.s in settlement areas Other valleylands Other wildlife habitat Lands that have been restored or have the potential to be restored to a natural state <ul style="list-style-type: none"> Enhancement areas
Linkages	Growth Plan, Greenbelt Plan, P.P.S.	<p>Types of Linkages (potential)</p> <ul style="list-style-type: none"> Large Linkages = Between large Core Areas (>50ha): 200-400m wide Medium Linkages = Between medium Core Areas (>20 ha): 100-200 m wide Small Linkages = Between small Core Areas (>10 ha): 50-100 m wide
Buffers/ Vegetation Protection Zone	As defined in the Provincial Plans and recommended in Section 1.12 of Appendix 1	<ul style="list-style-type: none"> Vegetation protection zone widths would be applied as defined in the Provincial plans for those plan areas The following buffers widths for areas outside of the Provincial Plans have been recommended (as described in Appendix 1, Section 1.12): <ul style="list-style-type: none"> If minimum buffers: <ul style="list-style-type: none"> Outside of settlement areas <ul style="list-style-type: none"> All features = 30 m Inside of settlement areas <ul style="list-style-type: none"> P.S.W.s = 30 m All other key natural features = 15 m If mandatory buffers: <ul style="list-style-type: none"> Inside and outside of settlement areas <ul style="list-style-type: none"> All features = 30 m

3.3 Policy Framework Options for the Water Resource System

3.3.1 Introduction to Identification of the Water Resource System

The identification of a W.R.S. is relatively new in Provincial planning. As such, there is limited guidance or existing examples in other jurisdictions that provide best practices.

The direction for the identification of a W.R.S, as noted in policy 4.2.1.3 of the Growth Plan states:

“Watershed planning or equivalent will inform:

- a) the identification of water resource systems.”

It is acknowledged in the Watershed Planning Discussion Paper that much of the information exists to develop the equivalent of a region-wide watershed plan, and makes reference to municipal and provincial databases on N.H.S.s, subwatershed plans, monitoring data, etc. More recently, the Region, in partnership with the N.P.C.A. developed the Contemporary Mapping of Watercourses dataset that contains a comprehensive, up-to-date and accurate geospatial dataset of watercourses. Subwatershed studies and other reports (e.g., N.P.C.A. Groundwater Study) include datasets and assessments of W.R.S. features. In particular, subwatershed studies identify key hydrologic functions and key hydrologic areas and consider existing conditions and future conditions associated with urban development and other impacts (e.g., climate change).

Subwatershed studies and other reports can also inform policy development, as they inherently apply current best practices in their characterization and management recommendations for W.R.S. features and areas. Through reviewing these existing studies, specific areas can be identified for mapping in the W.R.S. and policies can be developed based on the recommendations from these studies. It should be recognized that the data contained in subwatershed studies can be quite dated and the recommended methods and protocols may vary widely between subwatershed studies. These aspects need to be considered when assembling and vetting the data for use in mapping the W.R.S. That said, the existing studies, geospatial datasets and reports are considered equivalent to Regional watershed planning and sufficient to inform the identification of the W.R.S.

Two primary options have been proposed for the W.R.S., including the following:

- W.R.S. Option 1 –minimum standards related to Provincial planning requirements
- W.R.S. Option 2 –going beyond minimum standards including an increasing number of components and potential connections.

3.3.2 W.R.S. Option 1 – Minimum Standards

This option reiterates the policy direction for the W.R.S. established through policy in the P.P.S., Growth Plan and the Greenbelt Plan. There is no similar requirement in the N.E.P. to map a W.R.S. The basic elements of this policy framework are described below.

Growth Plan and Greenbelt Plan

As mentioned above, there is an expectation that watershed planning will inform the identification of a W.R.S. and inform how the quality and quantity of water will be protected, enhanced or restored. At a minimum, for lands subject to the Growth Plan and the Greenbelt Plan, the following would need to be incorporated in the new N.O.P.:

- The following features would be included as key hydrologic features in the W.R.S.:
 - Permanent streams and intermittent streams;
 - Inland lakes and their littoral zones;
 - Seepage areas and springs; and
 - Wetlands (which are also considered to be key natural heritage features by the Growth Plan and the Greenbelt Plan).
- The following areas would be included as key hydrologic areas in the W.R.S.:
 - Significant groundwater recharge areas;
 - Highly vulnerable aquifers; and
 - Significant surface water contribution areas.
- The inclusion of other components of the W.R.S. would be informed by watershed planning or equivalent. The following components would be included as part of the W.R.S., as informed by watershed planning or equivalent (Section 4.2.1.3), where they are considered “necessary to sustain healthy aquatic and terrestrial ecosystems and human water consumption”:
 - 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; and
 - Shoreline areas.
- The W.R.S. would be shown as an overlay designation on an operative schedule of the Official Plan. This overlay would extend into settlement areas. Given the

absence of information on the location and in particular the boundaries of elements of the W.R.S., only certain elements of the W.R.S. can be mapped at this time.

- Wetlands (which are both key natural heritage features and key hydrologic features) are also considered to be a component of the Growth Plan N.H.S. and the Greenbelt Plan N.H.S in this option; they would be identified as an overlay, as per N.H.S. Option 1.
- The policies in Section 4.2.2.3 of the Growth Plan and Section 3.2.2 of the Greenbelt Plan relating to key hydrologic features that deal with negative impacts, connectivity, removal of features, and agricultural uses within the N.H.S. for the Growth Plan and Greenbelt Plan would be incorporated within the new N.O.P. as is.
- The restrictive development and site alteration policies that apply to key hydrologic features anywhere in the Region except for settlement areas, the Greenbelt Plan area and the N.E.P. area, also in Section 4.2.3 of the Growth Plan and Section 3.2.4 of the Greenbelt Plan would be incorporated within the new N.O.P. as is.
- The restrictive development and site alteration policies that apply to lands within 120 m of key hydrologic features anywhere in the Region except for settlement areas and the N.E.P. Area, also in Section 4.2.4 of the Growth Plan and Section 3.2.5 of the Greenbelt Plan, would be incorporated within the new N.O.P. as is.
- For key hydrologic features, a V.P.Z. of no less than 30 metres, measured from the outside boundary of the key hydrologic feature, is required (the V.P.Z. is reduced to 15 metres for agricultural buildings in the Niagara Peninsula Tender Fruit and Grape Area. Evaluations will be required to identify any additional restrictions to be applied before, during, and after development to protect the hydrologic and ecological functions of the feature. The restrictions and exemptions related to development or site alteration in V.P.Z.s, as noted in both the Growth Plan and Greenbelt Plan would apply.

Provincial Policy Statement

Policy 2.2.1 of the P.P.S. notes the following:

“Planning authorities shall protect, improve or restore the quality and quantity of water by:

- a) identifying water resource systems 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.”
- The P.P.S. does not include any other policies related to the W.R.S. The Region would therefore have the ability to implement policies specific to settlement areas

that ensure adequate protection of the components of the W.R.S., while still directing appropriate development and infill within settlement areas.

- Similar to the direction provided in the Growth Plan, the identification of these components and the evaluation of their contribution to the ecological and hydrological integrity of the watershed is best determined through watershed planning or equivalent. Watershed Planning studies or the equivalent would also inform policy development. That said, it is expected the policies related to the W.R.S. in settlement areas would apply to the following, as informed through a review of existing watershed studies and geospatial datasets contained therein:
 - Ground water features;
 - Hydrologic functions;
 - Natural heritage features and areas; and
 - Surface water features, including shorelines.

Figure 3 provides a visual of W.R.S. Option 1 within a representative area of Niagara Region based on the direction for mapping discussed in **Section 6** of this technical report. It should be recognized that the mapping represents a conceptual approach to mapping the W.R.S. and includes datasets that are anticipated to be updated prior to the completion of the final mapping for the Region's W.R.S.

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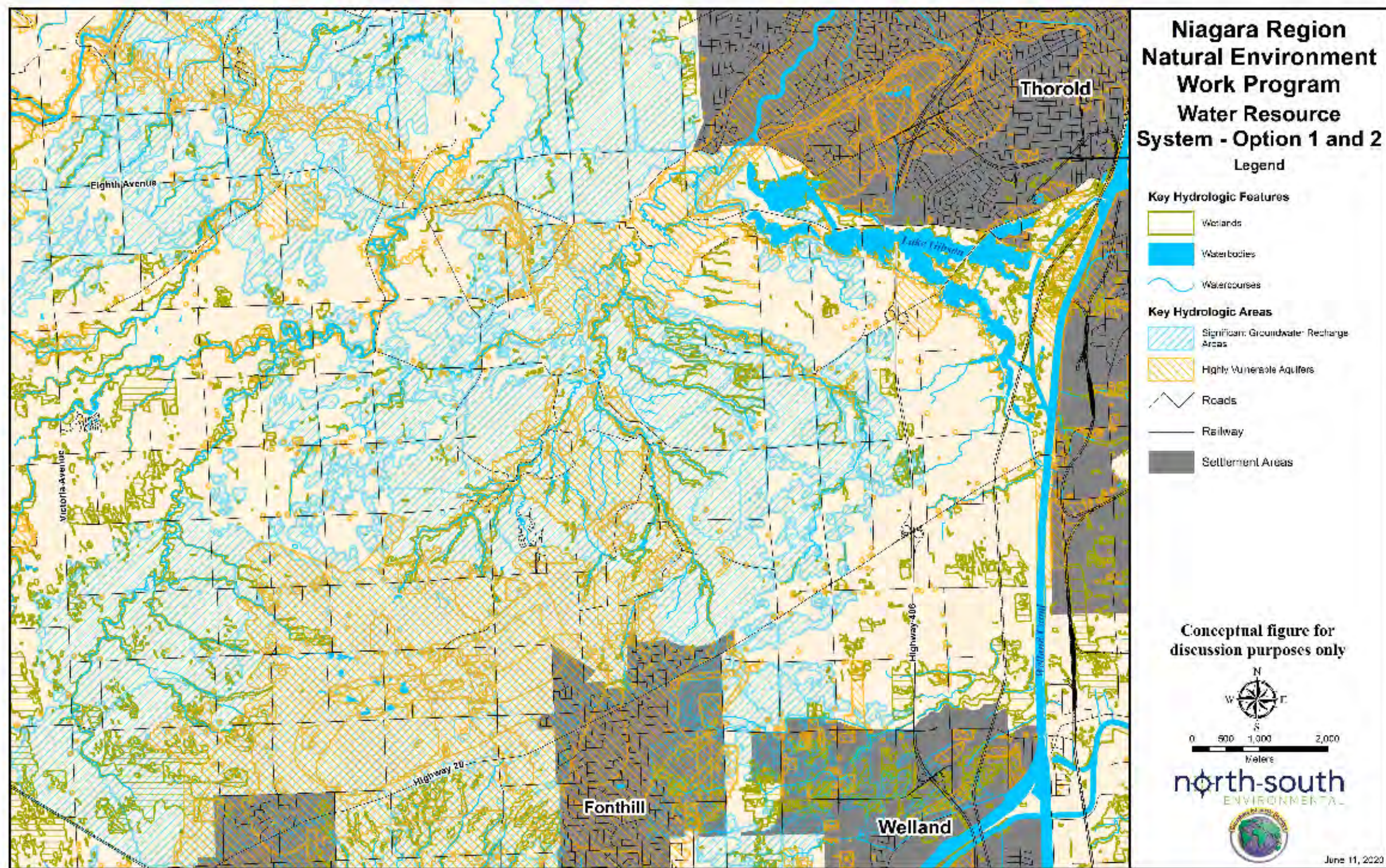


Figure 3. Conceptual illustration of Water Resource System Option 1.

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3.3.3 W.R.S. Option 2 – Going Beyond Minimum Standards

W.R.S. Option 2 includes all of the policy direction and components as identified in W.R.S. Option 1 as well as additional features and areas as informed through watershed planning or equivalent. The main difference between W.R.S. Option 1 and 2 would be the inclusion of additional components that goes beyond the required components of the W.R.S. Another difference would be that all key hydrologic features outside of settlement areas would be designated as per N.H.S. Option 2. Beyond this, the additional components may include:

- Headwater Drainage Features;
 - classified as “Protection”
 - classified as “Conservation”
- Ecologically Significant Groundwater Recharge Areas; or
- Hydrologic Functions;
 - Floodplain
 - Karst features.

W.R.S. Option 2 has been further divided into Options 2A and 2B where the main difference would be including or excluding these additional components in settlement areas:

- W.R.S. Option 2A – includes all of the components of W.R.S. plus the additional components listed above located outside of settlement areas only
- W.R.S. Option 2B - includes all of the components of W.R.S. plus the additional components listed above located region-wide, including within settlement areas

3.3.4 Components of the Water Resource System

The components of the W.R.S. (**Table 3**) have been grouped into required categories (Key Hydrologic Features and Key Hydrologic Areas) and those features or areas that are to be informed by watershed planning or equivalent. Definitions, and in some cases, preliminary criteria have been provided for the components of the W.R.S. described in **Appendix 2**.

Table 3. Components of the Water Resource System.

Category	Components
Key Hydrologic Features (required)	<ul style="list-style-type: none"> • Permanent streams and intermittent streams • Inland lakes and their littoral zones • Seepage areas and springs • Wetlands
Key Hydrologic Areas (required)	<ul style="list-style-type: none"> • Significant groundwater recharge areas • Highly vulnerable aquifers • Significant surface water contribution areas

Category	Components
Ground water features (to be informed by watershed planning or equivalent)	<ul style="list-style-type: none"> • Recharge/discharge areas • Ecologically Significant Groundwater Recharge Areas • Water tables • Aquifers and unsaturated zones
Surface Water Features (to be informed by watershed planning or equivalent)	<ul style="list-style-type: none"> • Headwaters • Recharge/discharge areas • Associated riparian lands that can be defined by their soil moisture, soil type, vegetation or topographic characteristics.
Hydrologic functions (to be informed by watershed planning or equivalent)	<ul style="list-style-type: none"> • Floodplain • Karst
Shoreline areas	<ul style="list-style-type: none"> • Recommended to be defined as 30 m (98 ft) from the limits of the shoreline flood hazard
Vegetation Protection Zone	<ul style="list-style-type: none"> • For key hydrologic features, a vegetated protection zone of no less than 30 m, measured from the outside boundary of the key hydrologic feature, is required outside of settlement areas.

4.0 Approach to Evaluate Natural Environment System Options

Each of the options characterized in **Section 3** will be assessed using a set of criteria that represent the full range of considerations identified through the Natural Environment Background Study to assess how they perform in each area. The options are also compared against each under each set of criteria to identify which option best fulfills the criteria. An evaluation of the options against a set of criteria and each other will not only assist the Region in identifying the preferred option for the natural environment system, including mapping and policies, but provides a defensible, transparent process that responds to input from the consultation process.

4.1 Evaluation of Options for the Natural Environment Systems

Preliminary criteria were developed in the Natural Environment Background Study based on consultation with the Technical Advisory Group (T.A.G.), and with input from stakeholders and the public during the 1st Point of Engagement. The general themes of the preliminary criteria considered the following:

- Consistency;
- Balance;
- Defensibility;
- Effectiveness; and
- Effective use of resources.

The feedback received from the 1st Point of Engagement has been used to build on these themes and develop the criteria to evaluate the options. Furthermore, following the 1st Point of Engagement, several key themes emerged that have been summarized in the following statement:

“The Region’s natural environment system planning framework should be forward thinking, following a systems approach that accurately identifies and protects the natural environment, recognizes the uniqueness of Niagara’s geography, and important agricultural system, and is implemented through a clear and consistent set of policies, with roles and responsibilities clearly identified.”

This statement is considered when evaluating the options to determine if the options meet the intent of this statement.

It should be recognized that the evaluation of options is a relative qualitative comparison of how each option achieves the criteria. The evaluation is not a scoring, weighting or quantitative analysis of each option. The evaluation is largely a value-based exercise that is intended to identify the option(s) which best fulfill the criteria, and ultimately the desire of the Region, stakeholders, and the public to provide policies and mapping that will achieve the goals and objectives for the natural environment system.

It should be noted that the criteria related to ensuring consistency with legislative requirements was not carried forward in the evaluation, as this criterion is redundant since it is Provincial policy, not laws and legislation that require that certain features be protected. Specifically, it is recognized that the Endangered Species Act (E.S.A.) does apply to endangered and threatened species and there is a process specific to those species that would apply regardless of which natural environment system option were selected by the Region.

Likewise, the criterion related to ‘Conformity with Provincial Direction and Plans’ is not included in the evaluation because all of the options proposed have been developed to ensure they conform to the requirements of the policies of the P.P.S. and Provincial plans. However, it should be noted that N.H.S. Options 3A, 3B and 3C exceed minimum standards with respect to the number of components and areal extent of the system.

The results of the evaluation of options for the N.H.S. and W.R.S. against the criteria and each other are provided in **Table 4** and **Table 5** respectively. A visual representation of the extent to which each option fulfills the criteria is provided along with a discussion of how the options meet each criterion. For some of the categories

several options fulfill the criteria; however, the option that best fulfills the criteria was indicated by a green circle for the N.H.S. and a blue circle for the W.R.S.

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Table 4. Evaluation of options for the Natural Heritage System.

Evaluation Criteria	Ability of Option to Meet Criteria (full = ●, partial = ◐, minimal = ◑)					Comparison of Options
	1	2	3A	3B	3C	
Consistent						
Achieves the Vision, Goals and Objectives of the new N.O.P., with consideration of Regional Council's strategic priorities	◑	◑	◐	●	●	<p>The Region has not finalized a Vision, Goals and Objectives for the new N.O.P. However, through feedback received during the 1st Point of Engagement, the options have been reviewed against this statement:</p> <p>"The Region's natural environment system planning framework should be forward thinking, following a systems approach that accurately identifies and protects the natural environment, recognizes the uniqueness of Niagara's geography, and important agricultural system, and is implemented through a clear and consistent set of policies, with roles and responsibilities clearly identified".</p> <p>Nothing in any of the options imposes additional restrictions to normal farming practices as already identified in Provincial policy, as such, all of the options recognize the importance of the agricultural system.</p> <p>Both N.H.S. Options 3B and 3C meet the intent of the above noted statement. However, Option 3C best represents a forward thinking systems approach since it includes additional linkages and features.</p>
Balanced						
Considers stakeholder needs and interests	◑	◑	◐	◐	◑	<p>Agriculture - Generally speaking, Provincial policy recognizes and permits agricultural uses in and adjacent to key features within the two Provincial N.H.S.s and recognizes existing agricultural uses. As a result, while additional lands may be identified in Options 3A and 3B and 3C, the impacts of doing so would be negligible. As such, the agricultural communities' needs have been recognized in all options.</p> <p>Development and Growth - Potential impacts on efficient development patterns in urban areas increase in Option 3C in particular as a result of the inclusion of additional key features, supporting features and linkages, which may have an impact on the location and amount of net developable areas. The constraints on other land uses resulting from identifying additional land in the form of larger features, other features and linkages in Option 3C is a consideration, particularly in settlement areas, where there is a desire to support efficient and compact development. Impacts may also be felt with rural development as a result of applying Options 3A, 3B and 3C on rural residential lot creation and other forms of rural development.</p> <p>Environmental Protection – Moving from Options 3A through 3C, the system includes more features and supporting areas, and connectivity, thus N.H.S. Option 3C provides a relatively higher degree of confidence that the N.H.S. will provide a resilient, interconnected system that preserves and enhances natural features, ecological functions and native biodiversity.</p> <p>Option 3B would best provide a balanced option that considers stakeholder needs as it includes Supporting Features and Areas outside of provincial N.H.S.s that would increase the resiliency of the system, but only outside of settlement areas as not to encumber growth and intensification within settlement areas.</p>

Evaluation Criteria	Ability of Option to Meet Criteria (full = ●, partial = ◐, minimal = ◑)					Comparison of Options
	1	2	3A	3B	3C	
Provides flexibility to achieve balanced land use planning or provides clear direction with respect to how balanced land use planning will be achieved	◐	◑	◐	◐	◐	<p>Option 1 provides the most flexibility when considering the development of land uses since only the features are identified in an overlay designation. In Option 2, these same lands would be designated, meaning that there may be less flexibility when considering alternative land uses. It is noted however that the policy framework is the same in both options.</p> <p>In Options 3A, 3B and 3C, other lands having environmental value would be identified along with an increasing requirement to identify buffers, thus having an impact on the location and form of development.</p>
Defensible						
Policies and identification of systems are informed by best practices (i.e., supported by science)	◐	◐	◑	◐	●	<p>This criterion has more to do with the criteria relied upon to identify the components of the N.H.S. The ecological integrity of a system as a whole is more robust when linkages and enhancement areas are identified to support the resiliency of the system, particularly when they are identified region-wide. While the policy and mapping options have all been based on best practices, and follow a science-based approach to ensure defensible and rigorous policies and mapping, Option 3B applies the most balanced, defensible approach. The approach in Option 3B incorporates both an ecological approach to identifying a complete system which includes linkages and enhancement areas outside of settlement areas; this has the effect of limiting constraints on development in settlement areas. As such, N.H.S. Option 3B would be highly defensible at a Local Planning Appeal Tribunal (L.P.A.T.) hearing from an ecological and land use planning perspective.</p>
Policies follow a systems-based approach	◐	◐	◑	◑	◐	<p>While N.H.S. options 1 and 2 are representative of a systems approach, it does not apply across the Region.</p> <p>Options 3A, 3B apply across the Region (including lands within the NEP), except for identifying linkages in settlement areas, whereas Option 3C would include linkages in settlement areas. Option 3C includes the largest areal extent including additional linkages and enhancements, including within settlement areas.</p>
Effective						
Ensure protection of the natural environment system	◐	◐	◑	◑	◐	<p>Moving from N.H.S. Option 3A through 3C, the system includes more features and supporting areas and connectivity, thus providing an increasing degree of confidence that the N.H.S. will provide a resilient, interconnected system that preserves and enhances natural features, ecological functions, and native biodiversity. Furthermore, a larger more robust natural environment system is more resilient to the impacts from climate change, and larger areas of natural cover and impervious surfaces can help to mitigate impacts of climate change. Option 3C best ensures the protection of a region-wide N.H.S, including within settlement areas.</p>
The policies can be effectively implemented	●	◐	◑	◑	◐	<p>Provincial policy outlines in considerable detail how features are to be protected and under what conditions development may be considered. This would apply across all of the options.</p> <p>For the other supporting features, enhancement areas and linkages included in Options 3A, 3B and 3C, the Region has the ability and discretion to establish policies that are based on local context. However, moving beyond Provincial policy requires more consideration for how policies could be interpreted and implemented. Implementation tools may need to be developed to support the interpretation and implementation of some policies (e.g., buffer guidelines).</p> <p>Given the relative ease of implementing Provincial policy requirements compared with a more complex policy framework that would result through Options 3A, 3B and 3C, N.H.S. Option 1 and 2 would result in a simpler policy framework. However, by designating features, Option 2 ensures that policies protecting features can be more effectively implemented.</p>

Evaluation Criteria	Ability of Option to Meet Criteria (full = ●, partial = ◐, minimal = ◑)					Comparison of Options
	1	2	3A	3B	3C	
Directing development to desired locations that support the objectives of the Province with respect to the location of growth and development	●	●	◐	◐	◑	All of the options would support development in desired locations (e.g. infill / intensification, etc.) where appropriate, because each option provides additional flexibility in settlement areas. However, Option 3C may have the most impact on growth and development in settlement areas since linkages in the settlement areas are a component of Option 3C. This means that since Options 1, 2, and 3A do not identify other key features, enhancement or linkages in settlement areas, these options would impose the least amount of restrictions to development in settlement areas. Since Option 3A identifies a more complete system, including linkages and enhancement areas outside of settlement areas, development would also be more likely to occur in settlement areas, where growth is more desirable; as such, Option 3A best fulfills this criterion.
Time and Resourcing						
Anticipated timeline for approval	◑	◑	●	◐	◑	This criterion considers the timeline and resources required to implement both the policies of the natural environment system, as well as subsequent development applications that require implementation of the natural environment policies of the new N.O.P. Based on feedback received through the 1 st Point of Engagement, there is a desire to protect the N.H.S., while ensuring development is directed to appropriate locations. Option 3B best fulfills this criterion related to approval of the new N.O.P. and limiting constraints to development in settlement areas, which would not include linkages, while providing flexibility to permit appropriate development in settlement areas.
Anticipated timeline to develop implementation tools (e.g., mapping, screening tools, E.I.S. guidelines, water resource study guidelines, etc.)	◐	●	●	◐	◑	Compared with Options 1 and 2, moving through Options 3A, 3B and 3C would require a greater need for implementation tools to provide clear guidance and direction for implementing enhancement areas, linkages, identifying ecologically appropriate buffers, and applying criteria as defined in the new N.O.P. or updated Environmental Impact Study Guidelines. Since Option 3A largely identifies features and areas outside of settlement areas, implementation could rely more heavily on Provincial guidance such as the Greenbelt Plan Technical Definitions and Criteria for Key Natural Heritage Features in the N.H.S. of the Protected Countryside Area (O.M.N.R. 2012) and the Natural Heritage Reference Manual (O.M.N.R. 2010). There would be few implementation tools required to map the N.H.S. or implement policies for Options 1 and 2. With Option 1 identifying the N.H.S. as an overlay and across a smaller area of the Region, mapping the system would require less time, and fewer tools or guidance documents would be required.
Anticipated costs to develop implementation tools (e.g., mapping, screening tools, E.I.S. guidelines, water resource study guidelines, etc.)	◐	●	●	◐	◑	It is expected that for Options 1, 2 and 3A, the Region could rely more heavily on Provincial guidance such as the Greenbelt Plan Technical Definitions and Criteria for Key Natural Heritage Features in the N.H.S. of the Protected Countryside Area (O.M.N.R. 2012) and the Natural Heritage Reference Manual (O.M.N.R. 2010). When identifying additional key natural features, enhancements, linkages and buffers outside of the Provincial plan areas and within settlement areas, there will be additional resources and tools required to support the interpretation and implementation of policies and mapping.

Table 5. Evaluation of options for the Water Resource System.

Evaluation Criteria	Ability of Option to Meet Criteria (full = ●, partial = ◐, minimal = ◑)			Comparison of Options
	1	2A	2B	
Consistent				
Achieves the Vision, Goals and Objectives of the new N.O.P. with consideration of Regional Council's strategic priorities	●	●	●	<p>The Region has not finalized a Vision, Goals and Objectives for the new N.O.P. However, through feedback received during the 1st Point of Engagement, the options have been reviewed against this statement:</p> <p>"The Region's natural environment system planning framework should be forward thinking, following a systems approach that accurately identifies and protects the natural environment, recognizes the uniqueness of Niagara's geography, and important agricultural system, and is implemented through a clear and consistent set of policies, with roles and responsibilities clearly identified".</p> <p>None of the options are intended to impose additional restrictions to normal farming practices as already identified in Provincial policy, as such, all options recognize the importance of the agricultural system.</p> <p>All three W.R.S. options meet the intent of the above noted statement. However, Option 2B best represents a forward thinking systems approach that would protect more of the components of the W.R.S. region-wide. In addition all wetlands would be designated in Options 2A and 2B.</p>
Balanced				
Considers stakeholder needs and interests	◐	◑	◐	<p>Agriculture - Generally speaking, Provincial policy recognizes and permits agricultural uses in and adjacent to key hydrologic features and hydrologic areas within the two Provincial N.H.S.s and recognizes existing agricultural uses. While additional lands may be identified in Option 2, the impacts of doing so would be negligible. As such, the agricultural communities' needs have been recognized in all options.</p> <p>Development and Growth - The impacts of identifying additional land in Option 2A and 2B on other land uses is a consideration, particularly where rural development is proposed in the form of residential lot creation for both options and for development in settlement areas in option 2B. Option 1 would provide the least amount of constraints to development, particularly in settlement areas where the W.R.S. would not identify additional components.</p> <p>Environmental Protection – Option 2B includes more features and areas, thus Option 2B provides a relatively high degree of confidence that the W.R.S. will provide long-term protection of key hydrologic features, key hydrologic areas, and their functions.</p> <p>Option 2A would best provide a balanced option that considers stakeholder needs as it identifies more components of the W.R.S. that would increase the resiliency of the system, but only outside of settlement areas as not to encumber growth and intensification within settlement areas.</p>

Evaluation Criteria	Ability of Option to Meet Criteria (full = ●, partial = ◐, minimal = ◑)			Comparison of Options
	1	2A	2B	
Provides flexibility to achieve balanced land use planning or provides clear direction with respect to how balanced land use planning will be achieved	◐	●	◐	<p>W.R.S. Option 1 provides some flexibility when considering the development of land uses since only the required features and areas and associated minimum prescribed V.P.Z.s are identified in an overlay designation outside of settlement areas.</p> <p>While Options 2A and 2B identify additional features, Option 2A provides the most balanced approach to land use planning as the additional features are identified outside of settlement areas, thus supporting directing development into settlement areas. Furthermore, the additional features identified in W.R.S. Option 2B are most often located in rural areas (e.g., headwater drainage features), contained within other key natural features, or confined by surrounding development in settlement areas. Therefore, it is anticipated that Option 2A would capture most of these features, and by not including them in settlement areas, growth and development can more appropriately be achieved in settlement areas.</p>
Defensible				
Policies and identification of systems are informed by best practices (i.e., supported by science)	◐	●	◐	<p>This criterion has more to do with the criteria relied upon to identify the components of the N.H.S. The ecological integrity of a system as a whole is more robust when linkages and contributing areas are identified to support the resiliency of the system, as well if the system applies region wide. While the policy and mapping options have all been based on best practices and follow a science-based approach to ensure defensible and rigorous policies and mapping, Option 2A applies the most balanced, defensible approach. The approach in Option 2A incorporates both an ecological approach to identifying a complete system, while limiting constraints on development in settlement areas. As such, W.R.S. Option 2A would be highly defensible at an L.P.A.T. hearing from an ecological and land use planning perspective.</p>
Policies follow a systems-based approach	◐	◐	●	<p>While W.R.S. Options 1 and 2A are representative of a systems approach, they do not apply across the entire Region.</p> <p>While there would be different policies applying to features based on geography, Options 2B would apply region-wide, and include lands within the N.E.P. Option 2B includes the largest areal extent and includes contributing areas, therefore, allowing the policies to be applied to a more inclusive system.</p>
Effective				
Ensure protection of the natural environment system	◑	◑	●	<p>Moving from W.R.S. Option 1 through 2B, the system includes more hydrologic features and areas, thus, providing an increasing degree of confidence that the W.R.S. will provide a resilient system that will provide long-term protection of key hydrologic features, key hydrologic areas, and their functions. Furthermore, a larger more robust W.R.S. is more resilient to impacts from climate change, and identification and protection of larger areas of natural cover and impervious surfaces can help to mitigate the impacts of climate change. Option 2B best ensures the protection of the W.R.S. by identifying the system region-wide, including in settlement areas.</p>
The policies can be effectively implemented	●	◐	◑	<p>Provincial policy outlines in considerable detail how components of the W.R.S. outside of settlement areas are to be protected and under what conditions development may be considered. This would apply across all of the options.</p> <p>For the other hydrologic features and areas included in Option 2B, the Region has the ability and discretion to establish policies that are based on local context. However, moving beyond Provincial policy requires more consideration for how policies could be interpreted and implemented. Implementation tools may need to be developed to support the interpretation and implementation of some policies (e.g., identification and treatment of floodplain zones in settlement areas; approach to protect and/or manage headwater drainage features).</p> <p>Option 1 provides relative ease of implementing Provincial policy requirements compared to the more complex policy framework that would result through Options 2A and 2B; therefore, Option 1 better fulfills this criterion.</p>

Evaluation Criteria	Ability of Option to Meet Criteria (full = ●, partial = ◐, minimal = ◑)			Comparison of Options
	1	2A	2B	
Directing development to desired locations that support the objectives of the Province with respect to the location of growth and development	●	●	◐	All of the options would aim to support development in desired locations (e.g. infill / intensification, etc.) where appropriate. Even Option 2B could include policies that encourage protection of the additional components identified, while permitting appropriate development to occur in settlement areas. However, with the identification of additional hydrologic features and areas in settlement areas, additional restrictions would be imposed. That said, Option 2A increases the potential for constraints outside of settlement areas, but not in settlement areas, as such would have the effect of directing development to settlement areas.
Time and Resourcing				
Anticipated timeline for approval	◐	●	◐	This criterion considers the timeline and resources required to implement both the policies of the natural environment system, as well as subsequent development applications that require implementation of the natural environment policies of the new N.O.P. Based on feedback received through the 1 st Point of Engagement, there is a desire to protect the W.R.S., while ensuring development is directed to appropriate locations. Option 2A best fulfills this criterion related to approval of the new N.O.P. and limiting constraints to development in settlement areas, as it identifies a region-wide system, while providing flexibility to develop policies that support appropriate development in settlement areas.
Anticipated timeline to develop implementation tools (e.g., mapping, screening tools, E.I.S. guidelines, water resource study guidelines, etc.)	●	◐	◐	Moving through Options 1, 2A and 2B, there would be a greater need for implementation tools to provide clear guidance and direction for identifying the components of the W.R.S. Since Option 1 mainly identifies hydrologic features and areas outside of settlement areas, implementation could rely more heavily on Provincial guidance. There would be fewer implementation tools required to map the W.R.S. or implement policies for Option 1.
Anticipated costs to develop implementation tools (e.g., mapping, screening tools, E.I.S. guidelines, water resource study guidelines, etc.)	●	◐	◐	It is expected that for Option 1 the Region can more readily obtain existing information and geospatial datasets from existing source (e.g., Contemporary Mapping of Watercourses dataset, watershed planning reports, etc.). When identifying additional hydrologic features and areas, there will be additional resources and tools required to support the interpretation and implementation of policies and mapping.

5.0 Preliminary Preferred Option for the Region's Natural Environment System

Following the evaluation of the options against the criteria, the following have been identified as the preliminary preferred options:

- N.H.S. Option 3B
- W.R.S. Option 2A

The following sections provide an overview of the evaluation and explanation regarding the selection of the preferred options for the N.H.S. and the W.R.S.

5.1 Natural Heritage System Preliminary Preferred Option

The following provides a summary of the framework for N.H.S. Option 3B:

- The N.H.S. for the Growth Plan and the N.H.S. for the Greenbelt Plan are both identified as an overlay;
- A N.H.S. would also be established as an overlay on lands outside of the Growth Plan and Greenbelt Plan N.H.S., but outside of settlement areas;
- Within the Greenbelt Plan N.H.S. and Growth Plan N.H.S., key natural heritage features and key hydrologic features would be designated. Vegetation protection zones and linkages within the Greenbelt Plan N.H.S. and Growth Plan N.H.S. would also be identified separately and included in an overlay designation;
- Beyond the Greenbelt N.H.S. and Growth Plan N.H.S. linkages would be identified as an overlay and policies would be included in the N.O.P. that provide guidance on the establishment of V.P.Z's in these areas;
- Significant natural heritage features and areas outside of the Greenbelt Plan N.H.S. and Growth Plan N.H.S. and the N.E.P. would be designated
- Key natural heritage features and key hydrologic features within the N.E.P. would also be designated;
- Other key natural features and areas and supporting features and areas outside of the Greenbelt N.H.S. and Growth Plan N.H.S. and the N.E.P. both outside and inside settlement areas would be identified through the use of an overlay;
- The restrictive policies as provided in the P.P.S., and the Provincial plans would be incorporated into the new N.O.P.;
- Prime agricultural areas and key features and areas would be designated in mutually exclusive land use designations, which equally recognizes the importance of the natural heritage and agricultural systems;

The following provides an overview as to why N.H.S. Option 3B was selected as the preliminary preferred option:

1. Option 3B most closely aligns with the feedback statement, summarizing the direction received from feedback through the 1st Point of Engagement.

2. Option 3B provides a more balanced approach to the identification and protection of the N.H.S., by increasing the number of components and connections outside of settlement areas, while also attempting to support development in settlement areas by limiting the number of components, linkages and requirements for buffers within settlement areas.
3. Option 3B applies the most balanced, defensible approach that incorporates best practices from an ecological approach to identifying a complete system, while limiting constraints on development in settlement areas. As such, N.H.S. Option 3B would be highly defensible at an L.P.A.T. hearing from an ecological and land use planning perspective.
4. Option 3B would be effective in ensuring protection of the N.H.S. The N.H.S. includes key features and areas both inside and outside of settlement areas. Additional linkages and enhancement areas are identified outside of settlement areas, thereby increasing the resiliency of those features and areas.
5. While Option 1 and 2 would be the most straight-forward, cost effective, requiring the least amount of time and resources, Option 3B can be mapped in the timeline set out for the new N.O.P. This would be achieved by updating select datasets (e.g., woodland dataset), acquiring other more recent datasets (e.g., wetlands from the NPCA), and by developing a clear set of definitions and criteria for the other components not being mapped. Furthermore, implementation could rely more heavily on Provincial guidance such as the Greenbelt Plan 'Technical Definitions and Criteria for Key Natural Heritage Features in the N.H.S. of the Protected Countryside Area' (O.M.N.R., 2012) and the Natural Heritage Reference Manual (O.M.N.R., 2010). Additional guidance documents and tools (e.g., updated Environmental Impact Study Guideline, Buffer Guidelines) can be prepared prior to final approval and adoption of the new N.O.P.

5.2 Water Resource System Preliminary Preferred Option

The following provides a summary of the framework for W.R.S. Option 2A:

- This option reiterates the policy direction for the W.R.S. established through policy in the P.P.S., Growth Plan, Greenbelt Plan, and N.E.P.;
- The W.R.S. would be shown as an overlay designation on an operative schedule of the Official Plan. This overlay would extend into settlement areas;
- Wetlands outside of settlement areas would be designated as per N.H.S. Option 3B;
- Prime agricultural areas and wetlands would be designated in mutually exclusive land use designations, which equally recognizes the importance of the natural heritage and agricultural systems (with the W.R.S. identified as an overlay); and
- The components of the W.R.S. would include:
 - Key Hydrologic Features;
 - Key Hydrologic Areas;
 - Ground water features;
 - Surface water features;

- Shoreline Areas;
- Hydrologic functions outside of settlement areas;
- Ecologically Significant Groundwater Recharge Areas outside of settlement areas; and
- Vegetation Protection Zones for Key Hydrologic Features outside of settlement areas.

The following provides an overview as to why W.R.S. Option 2A was selected as the preliminary preferred option:

1. Option 2A most closely aligns with the feedback statement summarizing the direction received from feedback through the 1st Point of Engagement.
2. Option 2A provides a more balanced approach to the identification and protection of the W.R.S. by increasing the number of components and connections outside of settlement areas and minimizing the hydrologic features and areas identified within settlement areas, which has the effect of directing development to settlement areas.
3. Option 2A applies the most balanced, defensible approach that incorporates best practices from an ecological perspective that identifies a complete system, while limiting constraints on development in settlement areas. As such, W.R.S. Option 2A would be highly defensible at an L.P.A.T. hearing from an ecological and land use planning perspective.
4. When considering the effectiveness of the options to ensure protection of the W.R.S., Option 2A includes additional hydrologic features and areas outside of settlement areas that will provide long-term protection of key hydrologic features, key hydrologic areas, and their functions. The resulting W.R.S. mapping and policy framework would have the effect of appropriately directing development to settlement areas while identifying a more robust system with stronger policies outside of settlement areas.
5. While Option 1 would be the most straight-forward and cost effective, requiring the least amount of time and resources. Option 2A can be mapped in the timeline set out for the new N.O.P. This can be achieved by using existing geospatial datasets (e.g., Contemporary Mapping of Watercourses) and compiling available information from existing sources (e.g. subwatershed studies, groundwater studies, etc.) that would form the equivalent to a region-wide watershed plan.

5.3 Implications for Natural Environment System Planning

The preliminary preferred options go beyond the minimum Provincial standards for the identification of the N.H.S. and W.R.S. The selection of these options was informed by the feedback and direction received during the 1st Point of Engagement as summarized in the key themes noted in **Section 2.3**. The feedback provided additional direction that should be considered when developing the natural environment system policies and framework.

As a result of the preliminary preferred options going beyond the Provincial minimum standards, the following is recommended to ensure the objectives for the natural environment system are met and policies are implemented as intended:

- Policies will need to include an appropriate level of flexibility given the inclusion of other features and supporting features and areas that go beyond the Provincial requirements, being mindful that a systems-based approach must be preserved;
- Definitions for component features not currently defined will need to be more fully developed and vetted through the process;
- Criteria will need to be well developed for the identification of component features, particularly those which are not currently well defined (e.g., 'lands that have been restored or have the potential to be restored');
- Environmental Impact Study Guidelines will need to be updated to support the identification and/or refinement of component features, including how to appropriately identify buffers/V.P.Z.s (currently there is no minimum provided); and
- W.R.S. Guidelines will need to be provided that support the appropriate identification and/or refinement of component features.

6.0 Mapping the Natural Environment System

The direction from the Province as outlined in the P.P.S. and Provincial plans identify what features/components that could comprise the proposed natural environment system. Although Provincial direction specifies that N.H.S. and W.R.S. (which together comprise the natural environment system) must be identified by municipalities, the direction for mapping features/components within these systems varies among the Provincial plans. However, it is recognized that features are to be mapped where information exists and is deemed appropriate by the municipality to support implementation of the relevant official plan policies.

6.1 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 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 that 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.

Through the development of natural environment system options provided in this report and in consideration of the data that will be obtained through studies currently being completed (i.e., Ecological Land Classification Mapping for the Region and the Watershed Equivalency Study) the following components are recommended for mapping the N.H.S. and W.R.S.:

Natural Heritage System:

- P.S.W.s;
- Significant woodlands;
- Linkages;
- Life Science A.N.S.I.s;
- Earth Science A.N.S.I.s;
- Other wetlands (required to be mapped in the Growth Plan and Greenbelt Plan N.H.S.);
- Permanent and intermittent streams (required to be mapped in Greenbelt Plan N.H.S.);
- Inland Lakes (required to be mapped in Greenbelt Plan N.H.S.)*;
- Other woodlands*;
- Grasslands/meadows not meeting the criteria as significant wildlife habitat that are continuous with key features*;
- Sand barrens, savannahs, tallgrass prairies and alvars*;
- Enhancement areas*.

Water Resource System:

- 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*;
- Floodplains, flooding hazards, floodways*.

All components recommended for mapping in Section 6.2.1 of the Mapping Discussion Paper have been carried forward in this report. Those components denoted by an asterisk are components that were previously not identified for inclusion in the natural environment system, or were not recommended for mapping due to a lack of available data. In the case of Inland Lakes, the initial review of a potential dataset was based on the category 'inland lakes and their littoral zones'. While mapping of littoral zones is currently not available nor is it anticipated to be produced through a current or anticipated study, there is a dataset available to map Inland Lakes. Therefore, Inland Lakes are recommended for mapping.

The Region has recently initiated a study to map vegetation communities, with a minimum mapping unit of 0.1 hectares, in the Region according to Ecological Land

Classification. This dataset will allow the mapping of other woodlands, grasslands/meadows that are continuous with key features, and sand barrens, savannahs, tallgrass prairies and alvars. Enhancement areas can also be mapped in part informed through the Ecological Land Classification dataset currently being produced, as well as applying GIS-based algorithms.

Shoreline areas do not currently have a GIS dataset available for mapping this component. However, the N.P.C.A. currently regulates shorelines and the dynamic beach hazard, which is typically considered 30 meters from the limits of the shoreline flood hazard. A dataset representing this 30 m shoreline area can be easily produced using a GIS buffering tool. Furthermore, the mapping dataset produced through the Ecological Land Classification mapping project can be used to map natural/naturalized shoreline areas that are located within or overlap the shoreline area.

Floodplain datasets were evaluated in the Mapping Discussion Paper as suitable for mapping, but would require an updated dataset from the N.P.C.A. prior to developing mapping for the new N.O.P.

It should be acknowledged that additional datasets may be developed at a later time or sufficient data be available through other studies (e.g., subwatershed studies, environmental assessments, etc.) that could be used to map other components included as part of the Region's natural environment system. If other datasets are determined suitable for mapping the Region may consider updating the mapping of the natural environment system through an Official Plan Amendment.

6.2 Components of the Natural Environment System Not Recommended for Mapping

As mention previously in **Section 6.1**, the Mapping Discussion Paper provided a review of the datasets and made recommendations for those that should be mapped using current datasets, available datasets requiring minor updates/modifications, or in anticipation of datasets developed through anticipated studies. The components recommended for inclusion in the Natural Environment System, but which should not be mapped, include the following:

Natural Heritage System

- Fish habitat
- Significant valleylands
- Significant wildlife habitat
- Habitat of threatened and endangered species
- Habitat of special concern species in Escarpment Natural Area and Escarpment Protection Area designations
- Seepage areas and springs
- Other valleylands
- Other wildlife habitat

Water Resource System

- Significant surface water contribution areas
- Ground water features;
 - recharge areas (not considered 'significant groundwater recharge areas')
 - discharge areas
 - water tables
 - aquifers (not considered 'highly vulnerable aquifers')
 - unsaturated zones
- Surface water features;
 - headwaters (i.e., headwater drainage features)
 - recharge areas (not considered 'significant groundwater recharge areas')
 - discharge areas
 - associated riparian lands that can be defined by their soil moisture, soil type, vegetation or topographic characteristics
- Hydrologic functions;
 - Karst features
- Ecologically Significant Groundwater Recharge Areas*

Through the Mapping Discussion Paper it was determined that the above listed datasets were either not available, could not be easily produced, were insufficient in areal extent, inaccurate, contained sensitive data, and/or were not anticipated to be developed, and therefore should not be considered for mapping. Of the above listed components that are not recommended for mapping, Ecologically Significant Groundwater Recharge Areas were not discussed in the Mapping Discussion Paper. Similar to other components of the W.R.S., Ecologically Significant Groundwater Recharge Areas are best identified through subwatershed studies, or other site specific studies; the coverage of such mapping if currently available or produced in the future, would not be sufficient at the region-wide scale for mapping in the new N.O.P., therefore should not be mapped.

Headwater drainage features have been mapped as part of the Contemporary Mapping of Watercourses dataset. While this information is available, it has been recommended in this report that only 'protection' and 'conservation' headwater drainage features be included as components of the Water Resource System (see description of headwater drainage features in **Appendix 2**) given their increased hydrological and ecological contribution to the downstream watercourse system. Classification of headwater drainage features has not been completed at the region-wide scale and it is not anticipated that such a study would be completed, therefore, mapping of 'protection' and 'conservation' headwater drainage features is not recommended.

6.3 Sources of Mapping Data and Recommendations for Mapping

The Mapping Discussion Paper provided a review of available mapping as well as recommendations for how datasets could be improved, acquired, or created. **Table 6**

provides a review of the above noted datasets and expands further on recommendations for datasets for use in mapping the natural environment system.

Table 6. Datasets and recommendations for improving or creating datasets for the components considered for mapping in the Region's Natural Environment Systems.

Component Features and Areas	Existing Source of Data	Recommendations
Natural Heritage System		
Provincially Significant Wetland	Ministry of Natural Resources and Forestry (M.N.R.F)	Updates are undertaken by the Province. Regularly scheduled data downloads from Land Information Ontario (L.I.O.) for updated dataset is recommended to ensure current data are in use.
Significant Woodland	Region woodland dataset is anticipated to be updated and criteria for significant woodlands can be applied to woodland dataset	<ol style="list-style-type: none"> 1. Use available woodland datasets as base data; and. 2. Apply criteria established for significant woodlands.
Linkages	Growth Plan N.H.S.	<ol style="list-style-type: none"> 1. The Growth Plan N.H.S. includes linkages, which would be sufficient for mapping N.H.S. Option 1 and 2; or 2. In addition to the Growth Plan N.H.S. which includes linkages, develop a GIS-based algorithm to identify key features that should be linked. This can be informed by reviewing the results of the Nature for Niagara's Future study which recommends connections.
Life Science A.N.S.I.	M.N.R.F., 2018	None
Earth Science A.N.S.I.	M.N.R.F., 2018	None
Other wetlands	N.P.C.A. Ecological Land Classification	<ol style="list-style-type: none"> 1. Mapping of 'Other' (i.e. non P.S.W.) wetlands is available through N.P.C.A. (in place of M.N.R.F. 'other evaluated wetland' and unevaluated wetland mapping). N.P.C.A.

Component Features and Areas	Existing Source of Data	Recommendations
	(E.L.C.) mapping where available	regularly updates their wetland mapping and provides mapping updates to M.N.R.F. 2. Where E.L.C. mapping is available, wetland datasets can be developed.
Permanent and intermittent streams	Contemporary Mapping of Watercourses (Region, 2016)	1. Use watercourse layers with attribute of 'permanent' or 'intermittent' flow regime.
Inland lakes	Contemporary Mapping of Watercourses (Region, 2016)	Inland lakes can be identified by applying the Greenbelt Plan definition: "any inland body of standing water, usually fresh water, larger than a pool or pond or a body of water filling a depression in the earth's surface." However, it is recommended additional parameters or size criteria be determined as part of the detailed design process for the N.H.S. to be completed as part of the next technical report.
Other woodlands	Region woodland dataset is anticipated to be updated	See recommendations #1-4 for Significant Woodlands noted in Appendix 1 .
Grasslands/meadows not meeting the criteria as significant wildlife habitat that are continuous with key features	E.L.C. mapping where available	It is anticipated that a region-wide E.L.C. dataset will be developed from which grasslands/meadows can be mapped.
Sand barrens, savannahs, tallgrass prairies and alvars	E.L.C. mapping where available	It is anticipated that a region-wide E.L.C. dataset will be developed from which sand barrens, savannahs, tallgrass prairies and alvars can be mapped.

Component Features and Areas	Existing Source of Data	Recommendations
Enhancement areas	None	Criteria and methods to identify enhancement areas will be established as part of the detailed design process for the N.H.S. to be completed as part of the next technical report.
Water Resource System		
Provincially Significant Wetlands	See above	See above
Other Wetlands	See above	See above
Inland Lakes	See above	See above
Permanent and Intermittent Streams	See above	See above
Significant Groundwater Recharge Areas	N.P.C.A. Groundwater Study Final Report (Waterloo Hydrogeologic Inc. 2005); Source protection planning documentation and mapping; and Review of subwatershed studies	Existing data can be obtained through the N.P.C.A. Groundwater Study Final Report, source protection planning documentation and mapping and data derived through subwatershed studies
Highly Vulnerable Aquifers	N.P.C.A. Groundwater Study Final Report (Waterloo Hydrogeologic Inc. 2005);	Existing data can be obtained through the N.P.C.A. Groundwater Study Final Report, source protection planning documentation and mapping and data derived through subwatershed studies

Component Features and Areas	Existing Source of Data	Recommendations
	Source protection planning documentation and mapping; and Review of subwatershed studies	
Shoreline Areas	N.P.C.A. shoreline flood/erosion inventory mapping	Combine hazard mapping (shoreline flood and erosion) from N.P.C.A. with natural heritage feature mapping (e.g., E.L.C.) to identify naturally vegetated shorelines.
Floodplain, flooding hazard, floodway	N.P.C.A	The regulatory floodplain as determined according to N.P.C.A. policies.

7.0 Next Steps

The preliminary preferred options identified in this technical report will be presented through the 2nd Point of Engagement. Initially, the preliminary preferred options will be presented to the Region's Planning and Economic Development Committee (P.E.D.C.) to seek direction to consult with stakeholders and the public. Following consultation on the preliminary preferred options, a preferred option would be presented to P.E.D.C. and Council for final endorsement.

Once a final option is selected, the detailed design of the N.H.S. and W.R.S. will be undertaken. This information will be provided in Technical Report #3 and include the following:

- Expanding on the preferred options to fully develop definitions, criteria, system components, sources of information, direction for preparing mapping, including R.O.P. schedules;
- Detailed recommendations for Official Plan policies to support implementation of the system, building on the recommendations that were provided in the Mapping Discussion Paper, Natural Environment System Background Study, and this technical report;
- A framework for implementation based on previous work completed for this work program, including how local area municipalities would incorporate the Region's natural environment system mapping and policies into their Official Plans and the roles and responsibilities of other public agencies and landowners;
- Recommendations for implementation tools that will need to be recognized in the new N.O.P. (e.g. E.I.S. guidelines); and
- A review of current Regional E.I.S. guidelines and preliminary recommendations for updating them.

8.0 References

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Appendix 1: Descriptions and Criteria for Select Components of the Natural Heritage System

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Description and Criteria for Select Components of the Natural Heritage System Components

The Mapping Discussion Paper and Natural Environment Background Study provided a review of the components recommended for inclusion in the N.H.S. The follow builds on that review with further discussion of the components, providing definitions where they have been developed and indicating if criteria have been established or need to be established to aid in identifying the component. While this Technical Report is not intended to develop criteria and definitions for all of the potential components, several components (e.g., significant woodlands, linkages and enhancement areas) require identification of preliminary criteria in order to identify what they include, and thus provide clarity on the range of options to be considered. The criteria provided herein are subject to change through future consultation and refinement through the next phases of the Natural Environment Work Program.

Provincially Significant Wetlands and Provincially Significant Coastal Wetlands

P.S.W.s (coastal and inland) are determined using the Ontario Wetland Evaluation System (O.W.E.S.). The Province is the administrator of these assessments, makes determinations in this regard and houses the analyses and dataset from wetland evaluations. As such, it is the Provincial dataset that will be used to identify and define this component.

Non-Provincially Significant Wetlands

Non-P.S.W.s (including evaluated wetlands determined to be non- Provincially significant, Locally Significant Wetlands, as well as unevaluated wetlands, etc.) can represent substantial natural heritage resources on the landscape and can provide valuable ecological function(s), especially in landscapes with few wetlands. It should be noted, that all wetlands are considered key hydrologic features according to the Growth Plan; as such, all wetlands outside of settlement areas are subject to policies of the Growth Plan that protect key hydrologic features (see Growth Plan Section 4.2.3). Notwithstanding the above, minimum size thresholds should be established to determine when a wetland becomes a key hydrologic feature.

Although the Growth Plan specifically indicates that key hydrologic features outside of settlement areas are to be protected, there is no requirement to protect them in settlement areas. However, they can be identified as key hydrological features within settlement areas, if deemed appropriate by the Region and could also be subject to different criteria than non-P.S.W.s outside of settlement areas. Since wetlands in settlement areas may provide important ecosystem services in addition to important ecological functions, consideration should be given to including 'other wetlands' in settlement areas as a component of the N.H.S., or at the least, as features to be protected. Targets for wetland cover could be considered when determining the size/threshold for those wetlands that should be included as 'other wetlands'. According

to guidance from How Much Habitat is Enough?, “at least 10% wetland habitat and 6% of each subwatershed, or 40% of the historic watershed wetland coverage should be protected and restored” (Environment Canada, 2013, p.13). Region-specific targets can be identified following a geospatial review of wetland cover in Niagara Region.

Significant Woodlands

The Natural Environment Background Study provided a comprehensive review of the definition of woodlands and considerations for criteria to identify significant woodlands. Several recommendations for consideration were provided that have been carried forward for further discussion when developing the options to identify significant woodlands. Following from those recommendations, the following decisions will inform the criteria for significant woodlands in the Region.

Application of Guidelines and Technical Criteria

The Greenbelt technical paper provides criteria for identifying significant woodlands within the Greenbelt Plan area. The Province has also suggested that the Greenbelt Plan Technical Criteria and the Natural Heritage Reference Manual (O.M.N.R., 2010) be used as guidance to identify significant woodlands within the Growth Plan area, outside of the Greenbelt Plan N.H.S.

Targets to Inform Criteria

Based on existing woodland data, the woodland cover in Niagara Region is approximately 17.5%.

General guidance for woodland cover targets is provided in Environment Canada’s How Much Habitat is Enough? (Environment Canada, 2013):

“30% forest cover at the watershed scale is the minimum forest cover threshold. This equates to a high-risk approach that may only support less than one half of the potential species richness, and marginally healthy aquatic systems;

40% forest cover at the watershed scale equates to a medium-risk approach that is likely to support more than one half of the potential species richness, and moderately healthy aquatic systems;

50% forest cover or more at the watershed scale equates to a low-risk approach that is likely to support most of the potential species, and healthy aquatic systems.”

Setting targets for woodland cover will inform size-based components of woodland criteria. As Niagara Region’s woodland cover is approximately 17.5%, the Region could set a realistic target above 17% that is based on a geospatial review of potential areas for restoration or reforestation. Comparatively, York Region currently has 23% woodland cover and has set a target of 25% woodland cover by 2031. While this is below the 30% cover target that is considered a high-risk approach to support functions associated with woodlands, this would be a realistic cover target to achieve in the

timeframe established. The approach to achieve this increase in woodland cover can include protecting woodlands that meet a minimum size threshold and encouraging or requiring enhancement of woodlands through restoration of internal gaps, indents, or gaps between fragmented woodland patches. This would also have the effect of increasing the ecological function and resiliency of the existing woodlands.

The woodland cover by geographic area (e.g., settlement vs. outside of settlement areas, above vs. below the escarpment) should also be assessed to assist in setting targets for woodland cover in Niagara Region. These targets should inform the development of criteria to identify Significant Woodlands in Niagara.

Best Practices to Inform Criteria

Based on a review of best practice documents, (e.g., Natural Heritage Reference Manual (O.M.N.R., 2010) and How Much Habitat is Enough? (Environment Canada, 2013) developing criteria for significant woodlands may include consideration of the following factors:

- Land use (settlement area vs. outside settlement areas);
- Total and relative cover of woodlands;
- Ecological function and uncommon characteristics;
- Economic and social functional values;
- Proximity to other significant natural features (e.g., watercourses, wetlands, Great Lakes, etc.);
- Geography (e.g., above or below the escarpment); and
- Overlap with components of the W.R.S. (e.g., significant groundwater recharge area, vulnerable aquifer, etc.).

As recommended in the Natural Environment Background Study, criteria should be developed to include Significant Woodlands that have been affected by natural and anthropogenic changes in woodland composition and structure, where these changes would result in the feature no longer meeting the definition of woodland. These features provide an important ecological function and can contribute to meeting woodland cover targets in the long term, as the potential to restore them to woodlands remains. As such, criteria should be developed to recognize these features as Significant Woodlands (assuming they meet other criteria for significance). Alternatively, the woodland/natural feature could be captured in the criteria of another component of the N.H.S. (e.g., restoration or enhancement area) that remains a part of the natural environment system and is afforded appropriate protection in policy.

Criteria for Significant Woodlands

Greenbelt Plan Criteria to identify Significant Woodlands within the Greenbelt Plan N.H.S. have been provided in the Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside – Technical Paper 1 (O.M.N.R., 2012). These criteria include:

- Any woodland 4 ha or greater in size; or

- Any woodland 1 ha or greater in size containing:
 - Naturally occurring (i.e., not planted) trees (as defined in Appendix D of the Greenbelt Technical Paper); or
 - 10 or more trees per ha greater than 100 years old or 50 cm or more in diameter; or
 - Containing a basal area of at least 8 sqm per ha in native trees that are 40 cm or more in diameter; or
 - Any woodlands wholly or partially within 30 m of a significant wetland; habitat of an endangered or threatened species; significant woodland; or
- Any woodland 0.5 ha or greater in size containing:
 - A provincially rare treed vegetation community with an S1, S2 or S3 in its ranking by the M.N.R.'s Natural Heritage Information Centre (N.H.I.C.); or
 - 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.

In applying these criteria, a woodland must have an average minimum width of 40 m measured to crown edges to qualify as a 'significant' woodland. Also, the criteria noted above are specific to the Greenbelt Plan N.H.S. and may not be appropriate for use region-wide (e.g., applying criteria related to basal area or leaf coverage may be difficult to implement and are generally not used).

Criteria have not yet been developed for identifying significant woodlands in the N.H.S. for the Growth Plan. The Province has suggested following best practices as provided in the Natural Heritage Reference Manual (O.M.N.R., 2010) and the Greenbelt Plan Technical Paper (O.M.N.R., 2012). The Natural Heritage Reference Manual provides size criteria for Significant Woodlands based on woodland cover within a given jurisdiction (in this case Niagara Region). The Region's woodland cover is 17.5%, within the range of 15-30% woodland cover for the 20 ha size threshold (O.M.N.R., 2010, p. 68). The Natural Heritage Reference Manual also notes that "the size threshold should be reduced in the absence of information for the other three criteria" (O.M.N.R., 2010, p. 68). These criteria are related to ecological functions (e.g., woodland diversity), uncommon characteristics (e.g., presence of rare species), and economic and social functional values (e.g., other ecosystem services). In the absence of this information, the size threshold for significant woodlands in Niagara Region would be reduced to 4 ha, as recommended in the Natural Heritage Reference Manual (O.M.N.R., 2010, Table 7-2, p. 68). This is consistent with the Greenbelt Technical Paper criteria related to size for identifying Significant Woodlands. As such, it would be appropriate to apply the Greenbelt Plan Technical Criteria for size to identify Significant Woodlands within the N.H.S. for the Growth Plan.

The definition for 'significant' in regard to woodlands in the P.P.S. also suggests the identification of Significant Woodlands be determined "using criteria established by the Ontario Ministry of Natural Resources" (M.M.A.H., 2020, p. 51). As such, it would be appropriate to apply the same size criteria established for Significant Woodlands in the

Greenbelt Plan as a minimum for the remainder of Niagara Region (including within the N.E.P. area).

The current Regional Official Plan includes size criteria for identifying Significant Woodlands. With the preparation of a new N.O.P., criteria for significant woodlands will be proposed to ensure current best practices and science puts forward ecologically appropriate and defensible criteria. However, the current criteria for significant woodlands in Niagara provides a solid foundation on which to develop new criteria. Firstly, size requirements for identifying Significant Woodlands should consider the Greenbelt Plan Technical Paper criteria, as well as consideration of woodland cover in settlement areas compared with outside of settlement areas. For example, the current criteria indicate that woodlands 2 ha or larger in size “within or overlapping Urban Area Boundaries” (Niagara Region Official Plan, 2014, p. 7-18) would qualify as Significant Woodland. Following a review of current woodland cover in settlement areas (to be undertaken as part of the next Technical Paper), this may be determined to be an appropriate size threshold. To be consistent with the criterion in the Greenbelt Technical Paper, the size threshold for significant woodlands outside of settlement areas should be 4 hectares or larger. In addition to size criteria, proximity criteria could include any woodland of any size as significant where it overlaps with any key feature or significant feature. Therefore, based on the guidance from the Natural Heritage Resource Manual (N.H.R.M) and the Greenbelt Technical Paper, criteria to identify significant woodlands in Niagara Region should be as follows:

- Any woodland 4 ha or greater in size; or
- Any woodland 2 ha or greater in settlement areas; or
- Any woodland 1 ha or greater in size meeting at least one of the following criteria:
 - Naturally occurring (i.e., not planted) trees (as defined in the species list of Appendix D in the Greenbelt Technical Paper)
 - 10 or more trees per ha greater than 100 years old or 50 cm or more in diameter;
 - Any woodlands wholly or partially within 30 m of a significant wetland; habitat of an endangered or threatened species; significant woodland; or
- 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; or
- Any woodland of any size overlapping with one or more of the following features:
 - P.S.W.s;
 - Life Science A.N.S.I.;
 - Earth Science A.N.S.I.;
 - Fish habitat;

- Significant valleylands;
- Significant wildlife habitat; and
- Habitat of threatened species and endangered species.

To be consistent with the Greenbelt Technical Paper, a woodland must have an average minimum width of 40 m measured to crown edges to qualify as a 'significant' woodland according to these criteria.

Figure 1 provides a conceptual illustration of significant woodlands when applying the above using existing and available information (e.g. significant wildlife habitat, age of trees and composition of species was not used to map significant woodlands on Figure 2). This illustration of woodlands is based on existing woodland datasets. It is understood that the Region intends on updating the datasets available to identify woodlands in an effort to improve the accuracy of the significant woodland dataset.

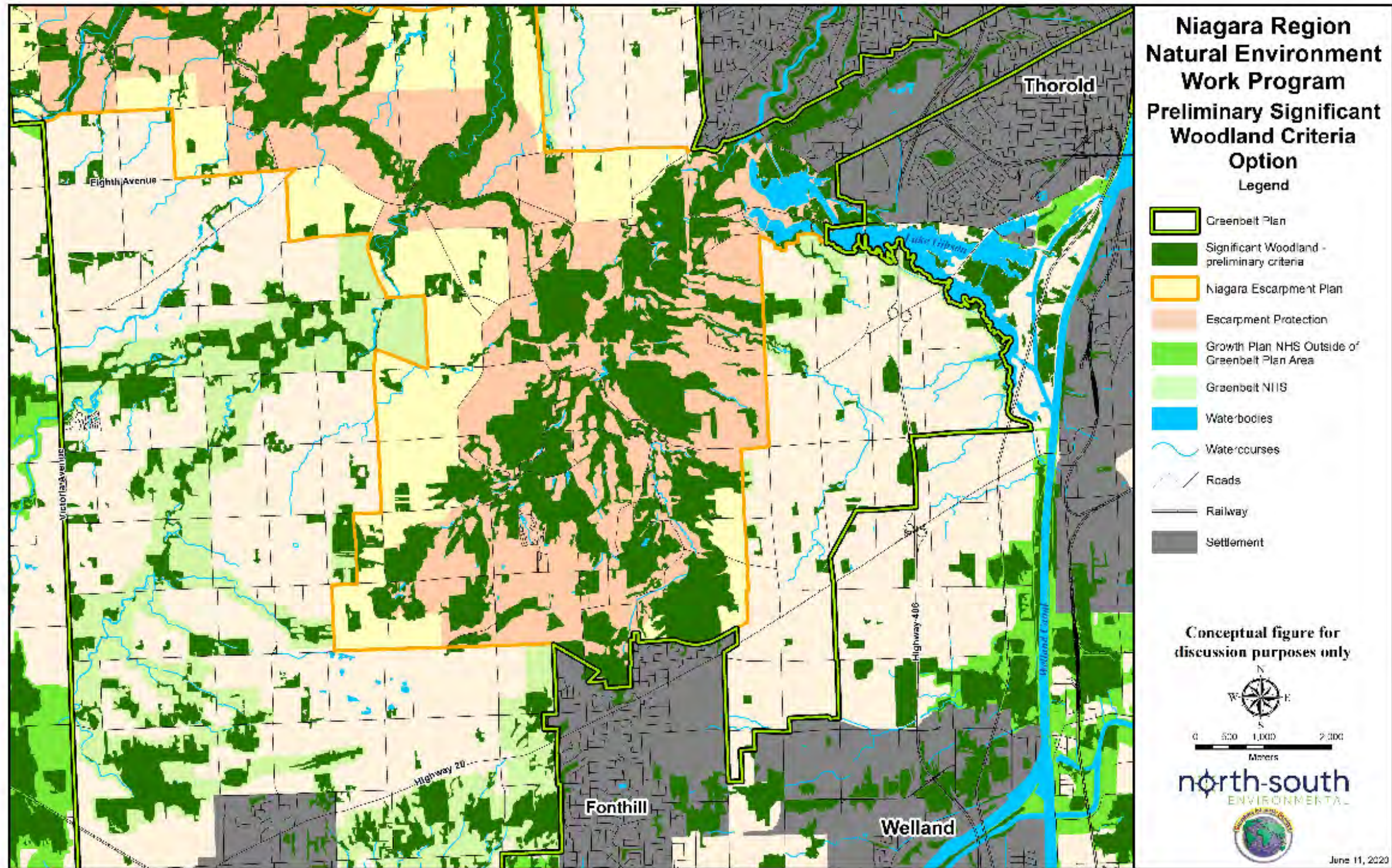


Figure 1. Significant Woodland mapping using recommended criteria.

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Significant Valleylands

Valleylands are landform features formed by watercourses and contain a watercourse for some part of the year. Often, as a result of their topography (e.g., deep valleys, steep slopes, often wooded, sometimes containing seepage areas, etc.) they are some of the most prominent and enduring natural features on the landscape in southern Ontario. Other features, such as forests and wetlands, have more frequently been removed or filled over for settlement areas, agriculture and development.

In the P.P.S. (2020), valleylands are defined as:

“... a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year.”

Under the P.P.S. the definition of significance with respect to valleylands means:

“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.”

The definition of a significant valleyland under the Growth Plan mirrors that of the P.P.S. with the additional statement that “[significant valleylands] are to be identified using criteria established by the Province.”

With respect to Provincial criteria, several may be useful in identifying criteria to identify significant valleylands in Niagara Region:

- **Greenbelt Plan 2005. Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside** (O.M.N.R., 2012): criteria applicable within the Greenbelt Plan area. Direction from the Province (M.N.R.F.) is to use the criteria for significant valleylands from the Greenbelt Technical Paper within the Growth Plan N.H.S.
- **The Natural Heritage Resource Manual** (N.H.R.M., 2010): criteria generally applicable throughout Ontario. Prepared in support of the 2005 P.P.S. The principles contained in this document remain relevant for the identification of natural heritage features in Ontario. The criteria can be used to identify significant valleylands outside of the Growth Plan N.H.S.

Significant Wildlife Habitat (S.W.H.)

Significant Wildlife Habitat (S.W.H.) is generally identified as those areas of ecological importance for supporting and providing specialized wildlife habitat form and/or function. S.W.H. represent the best quality examples of habitat types available on the landscape. The province prepared the ‘Significant Wildlife Habitat Criteria Ecoregion Schedules’ (M.N.R.F., 2015) to provide geographically-based guidance for the identification of significant habitat. Municipalities have the opportunity to identify equally or more restrictive criteria for the identification of S.W.H.; however, the S.W.H. Criteria

Schedules are generally used as the basis for identification of S.W.H. at the municipal level. The Ecoregion 7E Criteria Schedule applies to Niagara Region.

Areas of Natural and Scientific Interest (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).

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 landforms, the overlying land use may include a composite of natural and anthropogenic uses (e.g., woodland, agricultural, rural residential, etc.).

The M.N.R.F. identifies A.N.S.I.s and provides available mapping to municipalities.

Fish Habitat

A comprehensive discussion on the relationship between Fish Habitat and the new N.O.P. is included as Section 13 of the Natural Environment Background Study. A brief summary is provided below.

The Federal Fisheries Act provides a definition for Fish Habitat, which has been adopted across the P.P.S. and Provincial plans. It should be noted that the definition does not stipulate that the watercourse or waterbody have fish residing in it (i.e., be direct fish habitat) to be considered fish habitat under the Fisheries Act or in accordance with those plans that have adopted the definition. Within Niagara Region, fish habitat may therefore include:

- Watercourses and waterbodies that seasonally or permanently provide direct or indirect fish habitat;
 - Waterbodies containing fish habitat may exclude constructed off-line ponds (e.g., active irrigation ponds, stormwater ponds)
- Intermittent watercourses or headwater drainage features that provide contributions in terms of baseflow, material (e.g., substrates) or allochthonous inputs important to the maintenance of downstream fish habitat;
- Shoreline features that provide direct contributions in terms of materials (e.g., substrates) or allochthonous inputs important to the maintenance of fish habitat in Lake Ontario.

For the purpose of defining and identifying Fish Habitat to which natural environment policies will apply, the Federal Fisheries Act definition should be included in the new N.O.P. Where detailed fish habitat mapping is not available, all waterbodies, permanent

or intermittent streams, headwaters, seasonally flooded areas, municipal or agricultural surface drains, lakes and ponds (excluding human-made off-line ponds such as stormwater management ponds), should initially be considered fish habitat unless and until it is demonstrated to the satisfaction of the regulatory authority that the feature(s) do not meet the definition of Fish Habitat (per the Fisheries Act).

Based on the review provided in the Natural Environment Background Study, it is recommended that Fish Habitat not be mapped (although appropriate policies for protection would still apply). However, screening and identification of Fish Habitat can be supported by using available detailed Fish Habitat mapping provided by the M.N.R.F., Department of Fisheries and Oceans Canada, the conservation authority, or other mapping and data sources as suitable. Types or categories of Fish Habitat (e.g., warm water or cold water) can be used to inform management objectives, mitigation and potential enhancement activities, which could be appropriately informed by watershed planning.

Habitat for Endangered and Threatened Species

Habitat for Endangered Species and Threatened species is defined through the Endangered Species Act (2007) and may be identified through a variety of project processes (e.g., a subwatershed study); however, it is confirmed and managed by the Province through their administration of the Endangered Species Act (2007). Habitat mapping for many species may not be maintained as a comprehensive dataset. Habitat mapping access is generally highly restricted by the Province, in part owing to the sensitive nature of the data.

It should be recognized that habitat mapping for Endangered and Threatened species is incomplete and will change over time as surveys are completed and/or as species designations change (e.g., new species are listed or de-listed as Endangered or Threatened). It is not recommended this category be mapped as a component of the Region's N.H.S.

Linkages

In the context of N.H.S. planning, linkage means an area that provides ecological connectivity between natural heritage features. Linkages support a range of community and ecosystem processes enabling plants and animals to move among natural heritage features, in some cases over multiple generations. Linkages are preferably associated with the presence of existing natural areas and functions and should be established where they will provide an important contribution to the long-term sustainability of the overall N.H.S.

The Growth Plan identified a N.H.S. as one complete system. This system was developed by identifying core areas that include concentrations of natural features and connecting them with linkages, although core areas and linkages are not separately mapped. In Niagara Region, core areas for the Growth Plan N.H.S. were defined by the Province as being natural features that are 100 ha in size or greater. The Growth Plan

'Technical report on criteria, rationale and methods' (M.N.R.F., 2018) provides a thorough review of approaches to identifying core areas, including how core areas were identified in the N.H.S. for the Growth Plan. In addition, the Growth Plan technical report considers the following when identifying linkages:

- Natural features (e.g. water courses, valleylands, woodland/wetland patches) and rural/agricultural lands without barriers that connect core features;
- Connectivity/permeability (i.e., linkages were not identified where bisected by major roads);
- Length (no minimum); and
- Width \geq 500 m (e.g., added 250 m on each side of watercourses that qualify).

It should be recognized that the Growth Plan N.H.S. was undertaken at a Greater Golden Horseshoe scale that captures the larger/more significant features/areas (referred to as 'core areas') and links the larger core areas. The Growth Plan Regional N.H.S. Mapping – Technical Report (O.M.N.R.F., 2015, p. 4) recognizes this in the following statement:

"Given that N.H.S. mapping for the Growth Plan for the Greater Golden Horseshoe is on a broad, regional scale, it is focussed on identifying larger core areas and broad linkages. The mapping was not intended to identify all areas and connect features that may be important to consider at a local or smaller scale..."

The N.H.S. at the Niagara Region scale, including the identification of linkages, should therefore identify additional features and linkages that are important at the scale of the Region to meet the objectives and targets for the Niagara Region N.H.S. Based on the review of best practices and guidance documents provided in the Natural Environment Background Study, the following criteria should be considered for identifying Niagara Region Linkages:

- Large Linkages = Between large Core Areas (>50ha): 200-400 m wide;
- Medium Linkages = Between medium Core Areas (>20 ha): 100-200 m wide; and
- Small Linkages = Between small Core Areas (>10 ha): 50-100 m wide.

In applying these recommended criteria, the approach of identifying core areas is solely intended to inform the location for ecologically appropriate linkages; as such, core areas would not be mapped in a schedule in the new N.O.P., nor have policies associated with them. In the case of identifying linkages for Niagara's N.H.S., core areas can be defined as an individual feature or group of features in close proximity to each other (e.g., within 120 m) that have functional ecological connectivity (i.e., their proximity to each other supports ecological functions, such as wildlife habitat, exchange of genetic material, etc.). **Figure 2** provides a conceptual illustration of how linkages can be identified following this approach. The recommended approach for identifying core areas for the purpose of identifying linkages will be further discussed in the Regional Natural System(s) Technical Report, to be completed during Phase 6 of the Natural Environment Work Program.

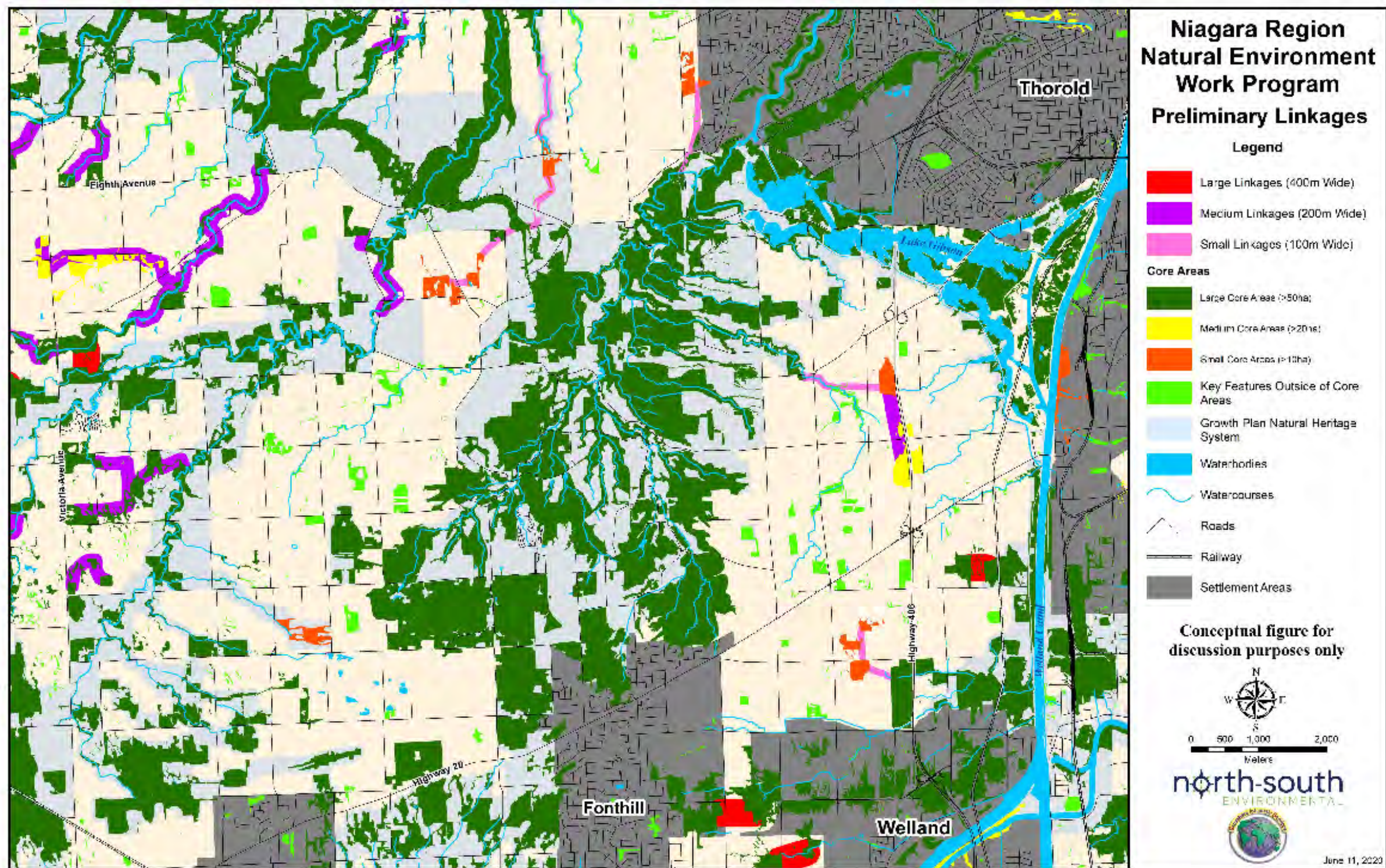


Figure 2. Preliminary conceptual linkage options.

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Key Hydrologic Features

Key Hydrologic Features are discussed in Section 2.1.

Other Natural Heritage Features and Areas

There is currently no definition for this optional component of the N.H.S. However, this component could include any number of natural features that do not currently meet the criteria to be considered on of the listed components in the definition for 'Natural Heritage Features and Areas'. For example, this component may include:

- Other woodlands (i.e., not meeting the criteria as Significant Woodland);
- Non-P.S.W.s (defined in section 1.1.1) in settlement areas;
- Other valleylands; and
- Other wildlife habitat.

Other than non-P.S.W.s, these features are not currently defined, nor are criteria proposed at this time.

Lands That Have Been Restored or Have the Potential to Be Restored to a Natural State [Enhancement Areas]

There is currently no definition for this optional component of the N.H.S. However, this component would function as and can be referred to as enhancement areas. Enhancement areas can include those areas recommended for restoration or enhancement as identified in watershed plans and other environmental studies or reports. These can be identified through consultation with the N.P.C.A. and can be identified through mapping sources, such as E.L.C. mapping.

The Natural Environment Background Study (Section 14) provided a review of best practices related to identifying potential enhancement areas. Based on applying accepted landscape ecology principles, the following objectives should be considered when identifying enhancement areas to key features:

- Achieve minimum size threshold of core area (woodland/swamp = 20 ha, wetland/open habitat = 10 ha);
- Group key natural features to create larger contiguous natural areas;
- Reduce edge habitat and increase proportion of interior conditions (> 100 m from edge); and
- Include critical function zones and important catchment areas critical to sustaining ecological functions.

Types of enhancements to mapped key features (i.e., Significant Woodlands, P.S.W.s, Life Science A.N.S.I.s) and potential criteria can be developed by applying these accepted landscape ecology and biogeography principles related to size and proximity. For example, options for criteria could include the following:

- Enhancement Option 1:
 - Fill 'bays and inlets' along the edge of features - < 30 m wide
 - Fill interior gaps in features - < 0.25 ha
 - Fill gaps between features - < 30 m
- Enhancement Option 2:
 - Fill 'bays and inlets' along the edge of features - < 60 m wide
 - Fill interior gaps in features - < 0.5 ha
 - Fill gaps between features - < 60 m
- Enhancement Option 3:
 - Fill 'bays and inlets' along the edge of features - < 100 m wide
 - Fill interior gaps in features - < 1.0 ha
 - Fill gaps between features - < 120 m

Figure 3a, 3b and 3c provide a conceptual illustration of how each enhancement option may appear as enhancements to key features. To understand the relative difference in area these enhancement areas cover for each of the options, the areal coverage for each enhancement option within the visual extent of the figure is provided as follows:

- Enhancement Areas Option 1 = 856 ha
- Enhancement Areas Option 2 = 1,195 ha
- Enhancement Areas Option 3 = 3,157 ha

Visually, and spatially, moving from Enhancement Area Option 1 through 3, more enhancement areas are captured resulting in a larger N.H.S. Enhancement Area Option 1 would in effect overlap with buffers, should they be required. Therefore, Enhancement Area Option 1 would result in very little increase in overall area of the N.H.S. should minimum buffers be required. For the example illustrated in **Figure 3b**, Enhancement Area Option 2 would identify approximately 50% more area than Enhancement Option 1, by filling in larger gaps, indents, and bays/inlets.

Enhancement Area Option 3 would identify an even larger area of enhancement, achieving a similar visual and functional result for the N.H.S. as was developed by the Province for the N.H.S. for the Growth Plan, where the N.H.S. for the Growth Plan includes the areas in between key natural heritage features. The policies in the Growth Plan restrict the percentage of land that can be developed in areas of the Growth Plan N.H.S. not occupied by a key natural heritage feature, as described in Section 4.2.2.3 of the Growth Plan. Through implementation of the Growth Plan policies where new development or site alteration is proposed, there is a requirement that a portion of the area must "remain or be returned to natural self-sustaining vegetation", thereby having the effect of 'enhancing' the key natural heritage features of the N.H.S.

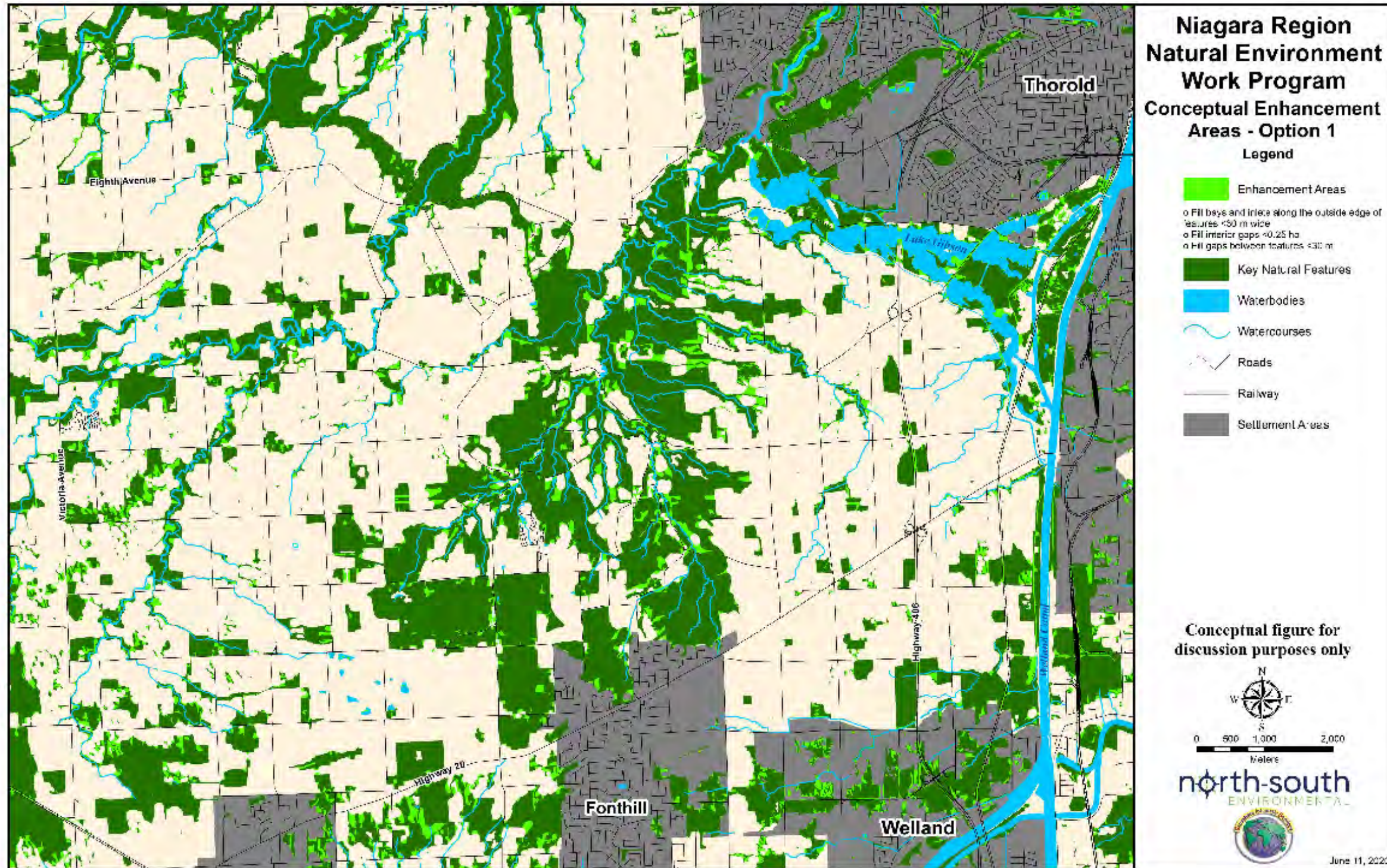


Figure 3a. Conceptual enhancement areas for Option 1.

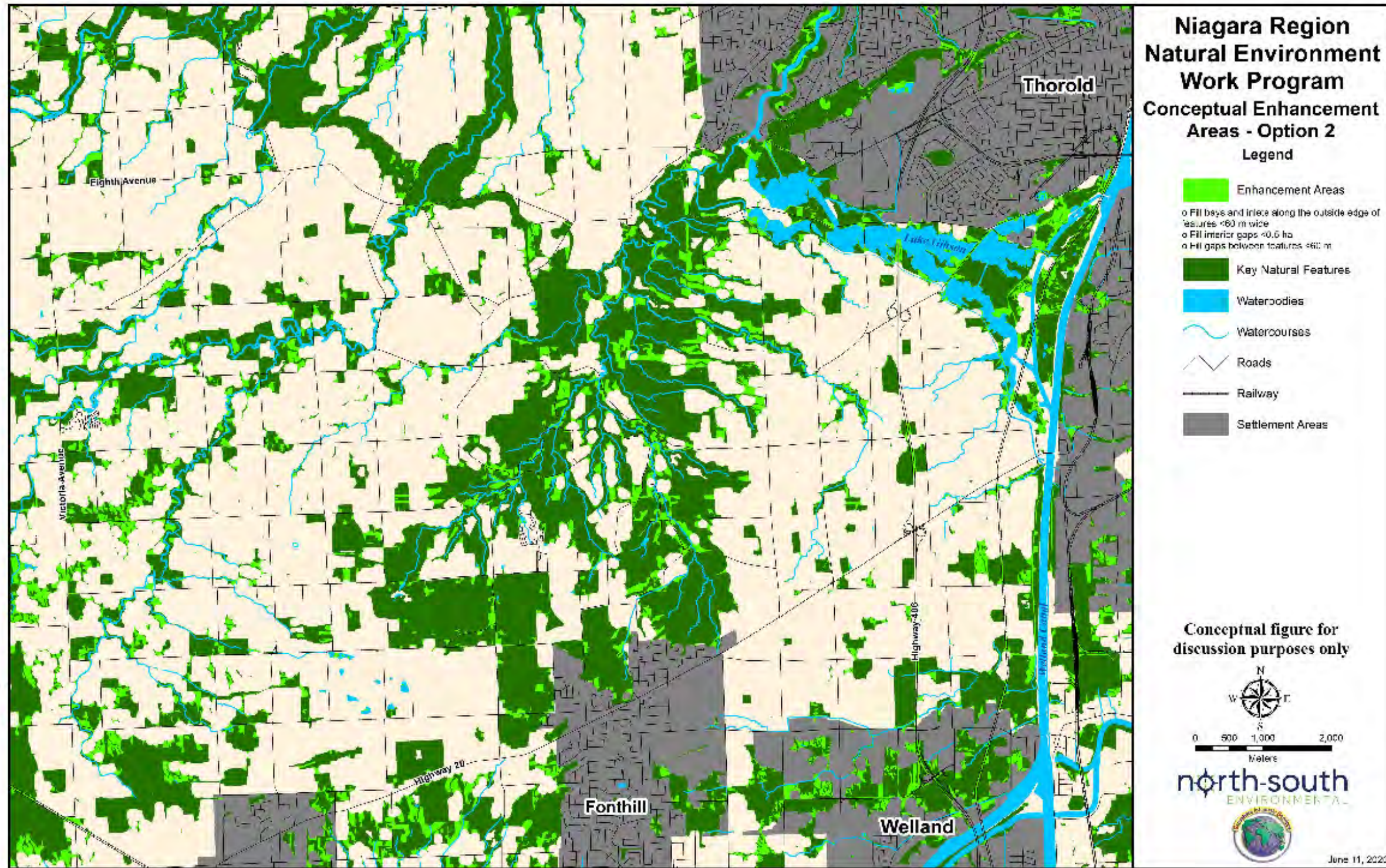


Figure 3b. Conceptual enhancement areas for Option 2.

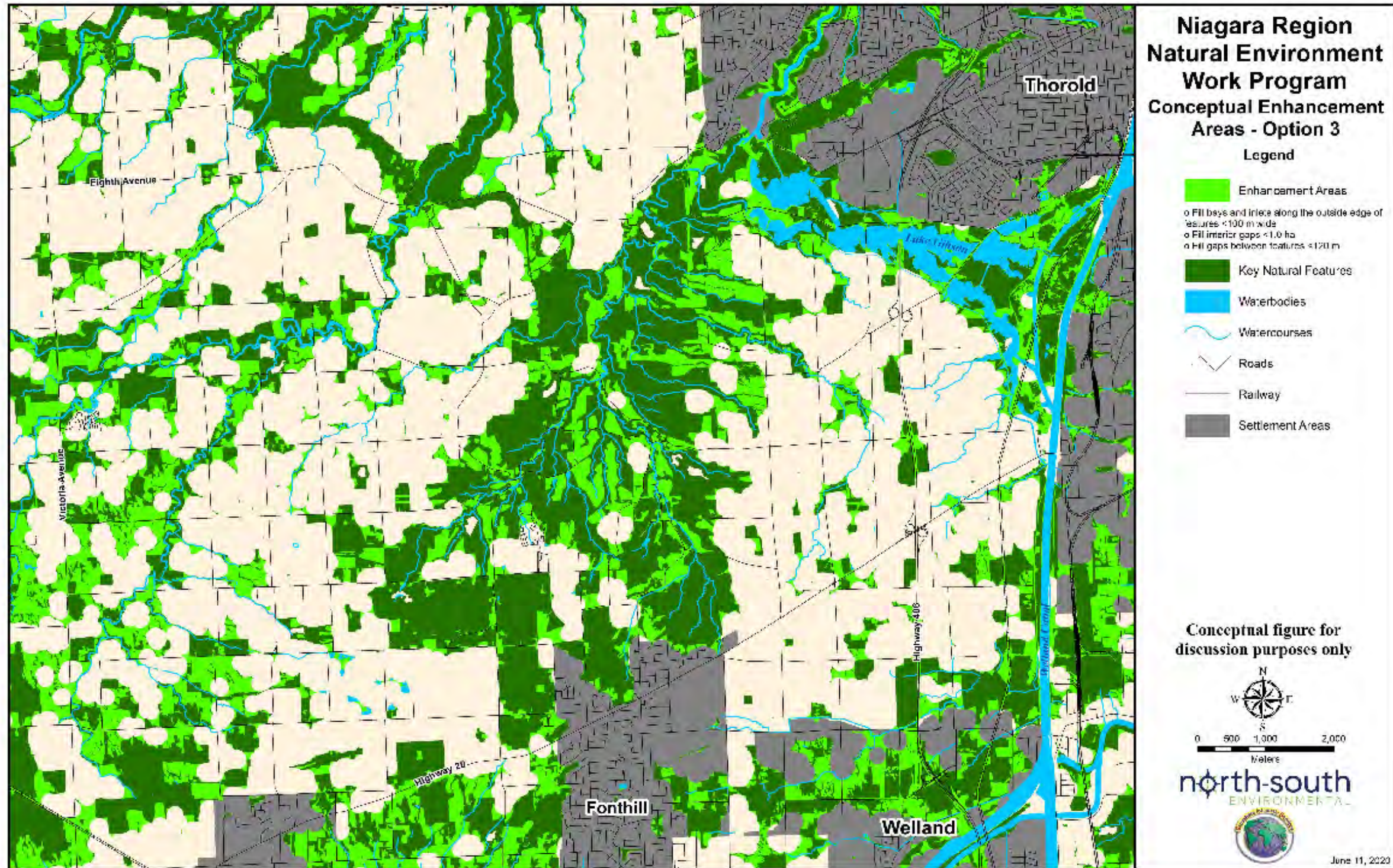


Figure 3c. Conceptual enhancement areas for Option 3.

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Areas That Support Hydrologic Functions

Hydrologic Functions are defined in the P.P.S. (2020) and the Growth Plan as:

“the functions of the hydrological cycle that include the occurrence, circulation, distribution and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water’s interaction with the environment including its relation to living things.”

The definition includes every potential component of water as it relates to the N.H.S. and W.R.S. Whereas the other components of the natural environment system provide more clear direction relating to definitions and potential criteria, there are no specific criteria to identify areas that support hydrologic functions. To capture other features/functions/areas that support hydrologic functions, which have not been specifically included in other components of the natural environment system, the following features/areas could be considered as part of this optional component:

- Floodplain, flooding hazard, floodway;
- Dynamic beach hazard; and
- Karst.

Buffers and Vegetation Protection Zones

Section 15.1 of the Natural Environment System Background Study provided a comprehensive review of policy requirements and exemptions for V.P.Z.s in the Provincial plan areas and Provincial N.H.S.s, a review of comparator municipal approaches to identifying and implementing buffers, and best practices to identifying buffers. The Background Study provided the following recommendations related to V.P.Z.s and buffers:

- The new N.O.P. will need to provide a definition of V.P.Z., and policies for the protection and implementation of exemptions (e.g., agriculture) and minimum required V.P.Z.s that is consistent with the Greenbelt and Growth Plan. The Region may consider including requirements for buffers and even prescribe minimum buffers as part of the natural environment system.
- The new N.O.P. must ensure that policies related to buffers to V.P.Z.s refer to and are consistent with the Greenbelt Plan policies 3.2.5.7 and 3.2.5.8, which notes that the agricultural community is exempt from Policy 3.2.5.4 and 3.2.5.5 within the Niagara Peninsula Tender Fruit and Grape Area.
- The Region may consider developing a guidance document for determination of buffers as part of site-specific studies (e.g., subwatershed plan, secondary plan, E.I.S.). There are several examples from comparator municipalities, which the Region may be able to draw from.

Following from these recommendations, review of best practices and comparator municipal approaches to identifying buffers, the following approaches to determine

buffer widths for key natural features areas (as listed in Table 2 within the main body of this Technical Report) is suggested for areas outside of the Provincial plan areas:

1. Minimum buffers (can be determined to be larger based on site-specific studies and following guidance documents developed by the Region)
 - a. Outside of settlement areas
 - i. All features = 30 m
 - b. Inside of settlement areas
 - i. P.S.W.s = 30 m
 - ii. All other key natural features = 15 m
2. Mandatory buffers that can be refined (increased or decreased) following a refinement framework or guidance developed by the Region)
 - a. Inside and outside of settlement areas
 - i. All features = 30 m

Appendix 2: Descriptions and Criteria for Select Components of the Water Resource System

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Description and Criteria for Select Components of the Water Resource System

The Mapping Discussion Paper and Natural Environment Background Study provided a review of the components recommended for inclusion in the W.R.S. The following builds on that review with further discussion of the components, providing definitions where they have been developed, and indicating if criteria have been established or need to be established to aid in identifying the component.

Key Hydrologic Features

Permanent and Intermittent Streams

Permanent and intermittent streams are those that contain water for a sufficient period in an average year to develop defined channel form and morphology. Intermittent streams may be dry during parts of the year. They may include features where the water table is above the stream bottom during parts of the year. The Growth Plan and Greenbelt Plan define intermittent stream as follows:

"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)

Inland Lakes and their Littoral Zones

The Greenbelt Plan defines inland lakes as "any inland body of standing water, usually fresh water, larger than a pool or pond or a body of water filling a depression in the earth's surface". However, it is recommended additional parameters or size criteria be determined as informed through watershed planning or equivalent.

The littoral zone of a lake refers to the area near shore where the light penetrates to the lakebed making this zone the most ecologically productive area in a lake and which supports rooting aquatic vegetation.

Seepage Areas and Springs

The Greenbelt Plan and Growth Plan define Seepage Areas and Springs as "sites of emergence of groundwater where the water table is present at the ground surface." (Greenbelt Plan)

Wetlands

The Greenbelt Plan and Growth Plan define wetlands 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.”
(Greenbelt Plan)

Wetlands components are previously discussed in **Section 1.1**.

Key Hydrologic Areas

Significant Groundwater Recharge Area

The Greenbelt Plan and Growth Plan defines a Significant Groundwater Recharge Area (S.G.R.A.) as follows:

“An area that has been identified:

- a) as a significant groundwater recharge area by any public body for the purposes of implementing the P.P.S., 2014;
- b) as a significant groundwater recharge area in the assessment report required under the Water Act, 2006; or
- c) as 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)

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). 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). 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).

Highly Vulnerable Aquifers

The Greenbelt Plan and Growth Plan define a Highly Vulnerable Aquifer (H.V.A.) as follows: “Aquifers, including lands above the aquifers, on which external sources have or are likely to have a significant adverse effect.” (Greenbelt Plan)

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).

Significant Surface Water Contribution Areas

The Greenbelt Plan and Growth Plan define Significant Surface Water Contribution Areas as follows: "Areas, generally associated with headwater catchments, that contribute to baseflow volumes which are significant to the overall surface water flow volumes within a watershed."

Ground Water Features

Recharge/Discharge Areas

An area where rain or snow seeps into the ground and flows to an aquifer is called a recharge area. Recharge areas tend to be areas that are characterized by permeable soils, such as sand or gravel, which allow the water to seep easily into the ground. Discharge areas are locations where groundwater transitions to the surface through springs or seeps, often into wetland features or watercourses.

Another important recharge area that may be considered as part of a W.R.S. includes Ecologically Significant Groundwater Recharge Areas (E.S.G.R.A.s). "E.S.G.R.A.s are identified as areas of land that are responsible for supporting groundwater systems that sustain sensitive features like coldwater streams and wetlands" (Lake Simcoe Region Conservation Authority, 2014). Ecological significance of the recharge area is identified where there is a "linkage" between the recharge area and an ecologically significant feature (e.g., a reach of a coldwater stream, a wetland, or an A.N.S.I.). The identification of an E.S.G.R.A. represents the pathway in which recharge would reach that feature. In this way, E.S.G.R.A.s would be important areas to include, in order to provide a connection or linkage between Key Hydrologic Features and Key Natural Heritage Features.

Water Tables

The water table refers to the upper surface or elevation of the saturated zone in an aquifer (i.e., the soil that is saturated with groundwater). This elevation or location of the water table can vary substantially over time and spatial location.

Aquifers and Unsaturated Zones

An aquifer is the underground storage of groundwater within permeable rock or unconsolidated sediment. By definition, water can be extracted from, or enter, an aquifer with relative ease. Unconfined aquifers are those in which surface water can enter directly. Confined aquifers are those that are situated between impermeable

layers of stone or sediment. Aquifers may exist at shallow depths close to watercourses, or may be found at much greater depths. The unsaturated zone of an aquifer refers to the porous underground area that is above the water table. Saturated zones refer to the underground area in which water occupies all pores and fractures.

Surface Water Features

Headwaters

Headwaters are not defined in the Provincial plans. The Evaluation, Classification and Management of Headwater Drainage Features Guideline, prepared by the Toronto and Region Conservation Authority and Credit Valley Conservation (2014) defines Headwaters as:

“Non-permanently flowing drainage features that may not have defined bed or banks; they are first-order and zero-order intermittent and ephemeral channels, swales and connected headwater wetlands, but do not include rills or furrows”.

This guideline document provides criteria for identifying and classifying headwater drainage features (H.D.F.s) for the purpose of recommending an approach to management. Management recommendations are provided based on the classification of the feature, such as:

- Protection (important functions);
- Conservation (valued functions);
- Mitigation (contributing functions);
- Recharge Protection (recharge functions);
- Maintain or Replicate Terrestrial Linkage (terrestrial functions); and
- No Management Required (limited functions).

According to the H.D.F. guidelines (Toronto and Region Conservation Authority and Credit Valley Conservation 2014), protection H.D.F.s are recommended to be protected in situ and conservation H.D.F.s should either be protected or ensure that their form and function are replicated in a natural channel design if relocated. Other management recommendations are generally related to maintaining hydrologic functions that can be achieved through storm water management designs and low impact development options. Terrestrial linkage functions would be considered as part of the N.H.S., and are therefore not recommended for inclusion as part of the H.D.F. component of the W.R.S. As such, it is recommended that if H.D.F.s are to be included as a component of the W.R.S., ‘protection’ and ‘conservation’ H.D.F.s be included and protected as part of the system.

Recharge/Discharge Areas

This has been previously defined under Ground Water Features.

Associated Riparian Lands

As the Growth Plan definition for 'Surface Water Features' states, Associated Riparian Lands "... can be defined by their soil moisture, soil type, vegetation or topographic characteristics" (as defined in part of the definition for Surface Water Features in the Growth Plan 2019). Riparian zones are the ecotone or interface between a watercourse and the terrestrial vegetation community and are characterized by hydrophilic plants.

Hydrologic Functions

The intent of the W.R.S. is to provide long-term protection for the functions associated with Key Hydrologic Features and Key Hydrologic Areas. As defined in the P.P.S., hydrologic function is defined as:

"The functions of the hydrological cycle that include the occurrence, circulation, distribution and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water's interaction with the environment including its relation to living things."

Consideration of elements that could be mapped to protect hydrological function include the following:

- **Floodplain** – the regulatory floodplain is defined by N.P.C.A. as the floodlines corresponding to the 100 - year flow event and represents the flood hazard area.
- **Karst Features** –Karst landscapes form due to the dissolution of soluble rocks such as limestone and dolomite. The resultant geology includes underground drainage systems such as sinkholes, caves, and rivers. The surface of karstic terrain is marked by dissolution features referred to as karren and is bare/rocky or supports a shallow overburden of soil that could support unique ecological communities. Generalized mapping of karstic terrain is available from the Ontario Geological Survey and is refined based on site-specific observations. Linkage between karst features and both the W.R.S. and N.H.S. is undertaken as part of watershed planning.

Shoreline Areas

Shorelines 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, etc. Naturalized shorelines also allow for natural shoreline processes, provide filtering / buffering and assist in protecting and maintaining water quality. The form and function of natural shorelines and shoreline features are important components of a connected and dynamic natural environment system.

It should be noted that hazards, including shorelines and the dynamic beach hazard, are also regulated according to the Conservation Authorities Act and through policies of

the various Conservation Authorities (N.P.C.A. in Niagara Region). The regulated area is typically identified as 30 m (98 ft) from the limits of the shoreline flood hazard. This regulated area should be considered when developing criteria for Shoreline Areas in addition to direction provided in watershed planning reports.