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October 3, 2018

In October 2016, Wellington County Council initiated the process to develop a Wellington County Natural Heritage System. Since then, County and Grand River Conservation Authority staff have worked in collaboration with stakeholders to develop a natural heritage system using a made in Wellington approach.

On September 27, 2018, Wellington County Council received a staff report on the natural heritage system titled Wellington County Natural Heritage System - Final Report (PD2018-21), which contained the following recommendations:

> That the Wellington County Natural Heritage System Final Report be received for information; and
>
> That the report be distributed to member municipalities in Wellington County and the Wellington Federation of Agriculture; and
>
> That the Wellington County Natural Heritage System mapping be used as an information support tool.

Please find the Wellington County Natural Heritage System Final Report enclosed. For additional information, please visit the project website at the following link:

https://www.wellington.ca/en/resident-services/pl-naturalheritagesystem.aspx ← Letter and document from link to Oct. 18/18 Council.

If you have any questions please contact Danielle De Fields at danielled@wellington.ca.

Sincerely,

Danielle De Fields

Danielle De Fields, MCIP, RPP
Manager of Policy Planning
Wellington County

Mapping of a Natural Heritage System in the County of Wellington

Final Report

September 2018

Prepared for:
The County of Wellington

Prepared by:
Grand River Conservation Authority
400 Clyde Road
Cambridge, ON, N1R5W6

To be cited as:
Grand River Conservation Authority (GRCA). 2018. Mapping of a Natural Heritage System in the County of Wellington. Final Report, September 2018.

Acknowledgements

We would like to express appreciation to the Wellington County Council for recommending the development of a Wellington County Natural Heritage System (Wellington County NHS). The County of Wellington and the Grand River Conservation Authority (GRCA) would like to express gratitude to the members of the Steering Committee for their contributions in the development of the Wellington County NHS. We would also like to thank the many technical experts, stakeholders and members of the Wellington County Community for providing thoughtful, detailed and useful feedback at workshops and during the public commenting period. We are grateful to key Wellington County staff; Aldo Salis and Jameson Pickard, as well as former staff Mark Paoli, for facilitating this project. We are also grateful to GRCA staff Crystal Allan, Fred Natolochny, Katherine Robbins, Kevin Tupman and Tony Zammit for their management and development of the project.

Steering Committee Members

Crystal	Allan	Grand River Conservation Authority
Katherine	Robbins	Grand River Conservation Authority
Tony	Zammit	Grand River Conservation Authority
Fred	Natolochny	Grand River Conservation Authority
Mark	Paoli	Wellington County
Jameson	Pickard	Wellington County
Mathew	Shetler	Maitland Conservation
Kendra	Hopper	Maitland Conservation
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Josh	Campbell	Credit Valley Conservation Authority
Aviva	Patel	Credit Valley Conservation Authority
Kim	Barrett	Conservation Halton
Lesley	Matich	Conservation Halton
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1.0 Background and Context

1.1 A Systems Approach to Conservation

Approaches to the conservation of nature in Ontario have evolved significantly over the past few decades in response to advances in conservation biology and landscape ecology. Prior to the 1960's, conservation lands such as parks and reserves were identified primarily for the purposes of managing natural resource uses (e.g., forests for logging, reservoirs for flood control) and recreational activities (Environment Canada, 2005).

The conservation of lands were successful in achieving the protection of many important natural areas, however there became an increasing awareness through the 1980's that the health of species and communities within these protected areas were being impacted by surrounding human land uses (Harris, 1984). Population declines were occurring in some protected areas due to their spatial isolation.

Connectivity between natural features on the landscape was being lost. Increasingly land-use changes resulted in the conversion of large, unbroken swaths of natural land into smaller, often isolated natural areas. The separation or fragmentation of the natural landscape into smaller parcels is referred to as landscape fragmentation and it can disrupt seasonal movements of wildlife, decrease wildlife access to resources and mates, and increase the presence of nuisance wildlife in rural and urban lands, among other negative effects.

Biogeographers and conservation biologists called for a re-evaluation of the existing "Natural Areas" approach to conservation (Noss & Harris, 1986). It is now recognized that the ecological integrity of our natural heritage can best be maintained with a "Systems" approach to conservation, where natural areas are connected to one another via corridors and linkages, forming an interconnected web of natural habitat.

Today, natural areas are being managed by a variety of groups, both government and non-government, with a much broader set of objectives, including the conservation of ecological, hydrological and geological interconnected values (Gray et al. 2009; Margules & Pressey, 2000). Connected Natural Heritage Systems (NHSs) provide many ecosystem services such as pollination, clean water, and soil erosion control which support healthy communities. NHSs also provide many ecological functions (e.g. endangered species habitat, movement corridors for wildlife, biodiversity maintenance) which contribute to ecological sustainability and resiliency of the local, regional and global landscape.

What is a Natural Heritage System?

The Provincial Policy Statement (2014), under the Planning Act, defines a Natural Heritage System (NHS) as:

"..a system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions, and working landscapes that enable ecological functions to continue."

1.2 The Relationship of the Wellington County NHS to the Growth Plan NHS

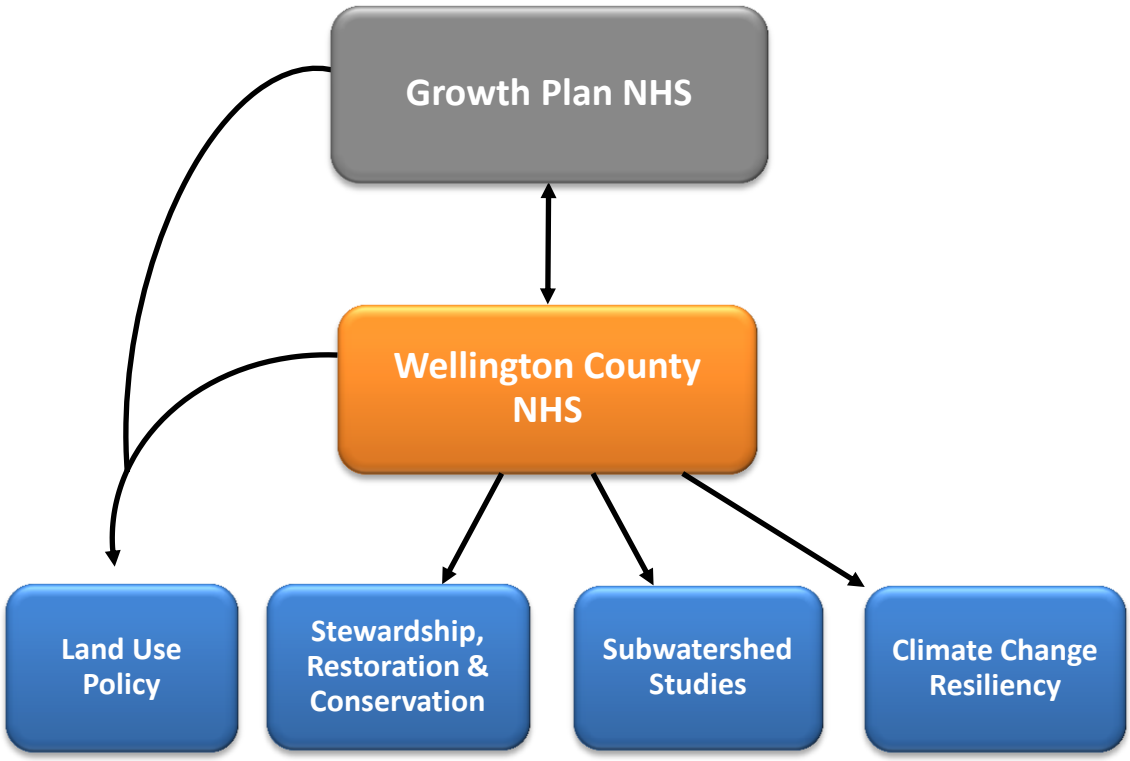
On February 9, 2018 the province released a regional-scale NHS in accordance with updated policies in the 2017 Growth Plan for the Greater Golden Horseshoe (the Growth Plan NHS). The Growth Plan for the Greater Golden Horseshoe requires that member municipalities, including Wellington County, incorporate the Growth Plan NHS mapping through an official plan review.

From a landscape perspective, NHSs should be identified at various scales because the ecological importance of certain features may not be easily discernable at a single spatial scale. For example, a habitat may be considered significant wildlife habitat (SWH) after field assessments that can only be done at a local scale. Conversely, the hydrological or terrestrial connectivity within valleylands or between woodlands can only be discerned at broader spatial scales.

The province identified the Growth Plan NHS at a mapping scale of roughly 1:50,000. The Wellington County NHS presented in this report identifies a connected NHS at a mapping scale of roughly 1:10:000.

The Wellington County NHS may help the County conform to provincial planning requirements by providing a scientific basis for refinements to the Growth Plan NHS before it is incorporated into the County's official plan (figure 1). It can also be a resource for existing stewardship programs and strategies to help prioritize conservation actions (figure 1). Furthermore, the Wellington County NHS can be a foundational tool that will support watershed and subwatershed planning, as well as climate change strategies (figure 1).

Figure 1 The hierarchical relationships between Growth Plan NHS, the Wellington County NHS, County land use policy, and stewardship initiatives within the County. A Wellington County NHS has a number of potential uses (in blue).



2.0 Overview of Wellington County Natural Heritage

The following describes the current physical and ecological characteristics of the landscape in Wellington County, all of which contribute to the development and ecological function of features in the Wellington County NHS.

2.1 Physical Characteristics

2.1.1 Climate

The Wellington County climate is characterized by a humid continental climate with large seasonal differences of warm and humid summers to cold or very cold winters. Climate averaged data was obtained from Environment Canada's weather station at Belwood Shand Dam for a 30 year period between 1981-2010.

Summer days typically reach highs in the mid to low-20s °C but may also include several days where temperatures exceed 30 °C. During the winter, daytime highs are normally a few degrees below 0 °C, but can also be much warmer or colder. Overall the average annual daily temperature is 6.7 °C (table 1).

The average annual precipitation in the area is 945.7 mm (table 1). The County typically receives more precipitation in the spring and summer months than in the fall and winter. Snowfall accounts for approximately 16% of the annual precipitation.

Table 1. Climate Average Data for the years 1981-2010. Environment Canada Shand Dam Weather Station

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Mean Temperature (°C)	-7.4	-6.3	-1.9	5.7	12.2	17.5	20.0	19.0	14.9	8.3	2.1	-3.9	6.7
Precipitation (mm)	67.9	55.9	59.6	74.1	86.9	83.9	89.2	96.6	93.1	77.2	93.0	68.6	945.7

2.1.2 Bedrock and Surficial Geology

Underlying Wellington County are strata (layers) of bedrock, characterized by the geological time scale of their formation (i.e. Period, Era, and Eon) and by the type of rock. The County is situated on bedrock formed during the Silurian Period (OGS, 2011). The Silurian bedrock of Wellington County has four major strata (figure 2). The Amabel

formation (the lowest strata) and the Guelph formation (the second lowest strata) consist of sandstone, shale, dolostone, siltstone rock types (Hoffman at el., 1963). The Salina formation (the third lowest strata) and the Bass Islands formation (the top strata) consist of limestone, dolostone, shale, sandstone, gypsum and salt. In the westernmost sides of Minto and Mapleton, Selurian bedrock is overlain with younger bedrock from the Devonian Period, consisting of sandstone, dolostone and limestone (Hoffman at el., 1963).

Repeated glaciation events in Southern Ontario deposited varying thicknesses and types of sediment on top of the underlying geology (Hoffman et al., 1963). In Wellington County, sediment was mostly deposited directly by glacier ice (i.e. glacial deposits, or till) or by streams flowing away from those glaciers (i.e. glaciofluvial deposits, or outwash; Chapman & Putnam, 2007). The mode in which sediments were deposited determined the type of materials present in surficial deposits, their thickness, and whether the materials were organized (stratified) or mixed (Stephenson et al., 1988).

The most prevalent material present in Wellington County is till, a poorly sorted and poorly stratified surficial deposit (figure 3; OGS, 2010). Glaciofluvial deposits account for the majority of other types of material present in the County, mainly in Minto, Erin, Centre Wellington, Guelph/Eramosa and Puslinch. In Erin, glaciofluvial deposits are composed of mainly sand and gravel, in Puslinch, gravel was deposited, and in Centre Wellington and Guelph/Eramosa, sand, gravel, and combinations of sand and gravel were deposited (figure 3; OGS, 2010). In Minto, glaciofluvial deposits of sand, sand and gravel, or sand, silt and gravel predominate in the northern half of the municipality (figure 3; OGS, 2010).

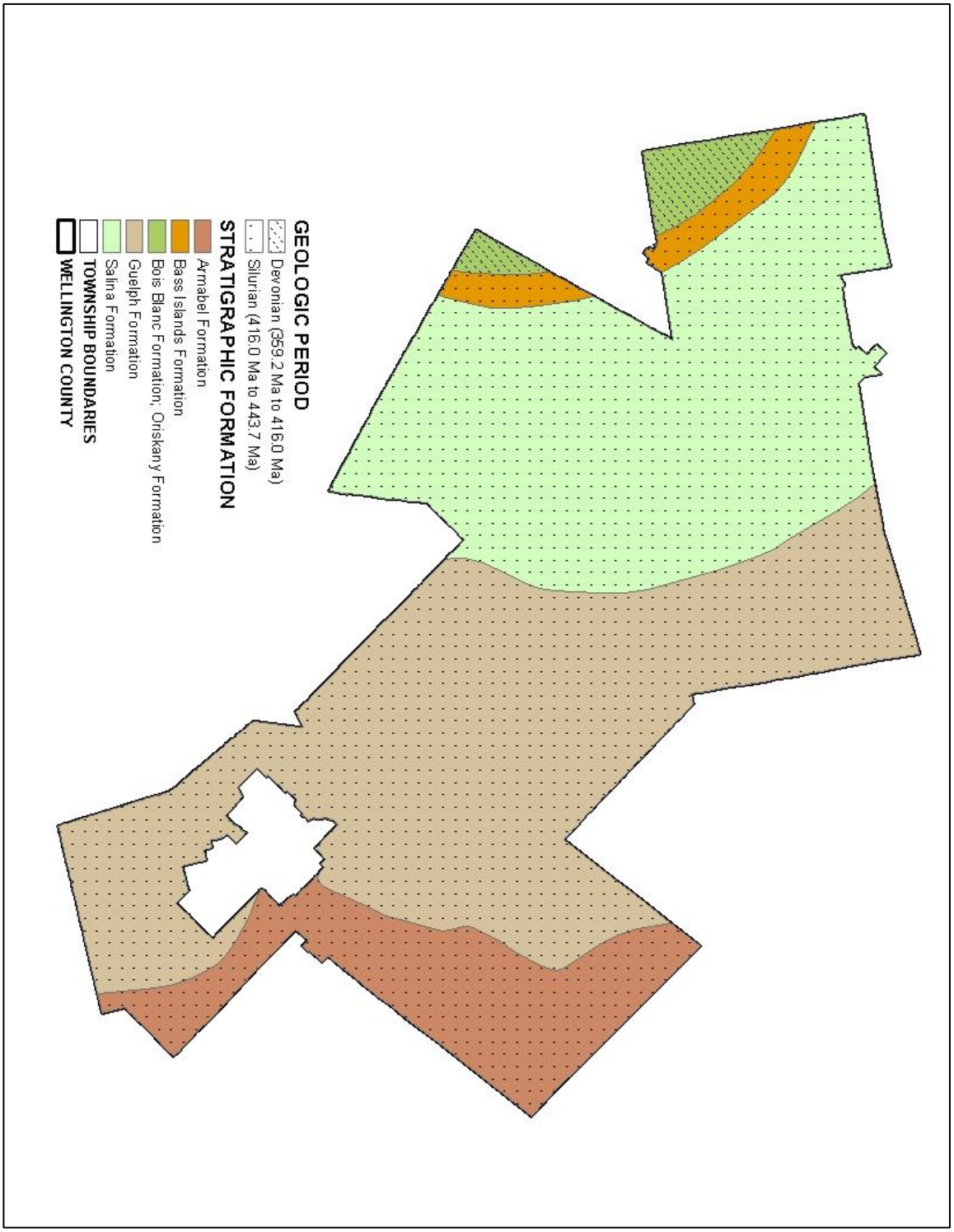


Figure 2. Bedrock Geology in Wellington County

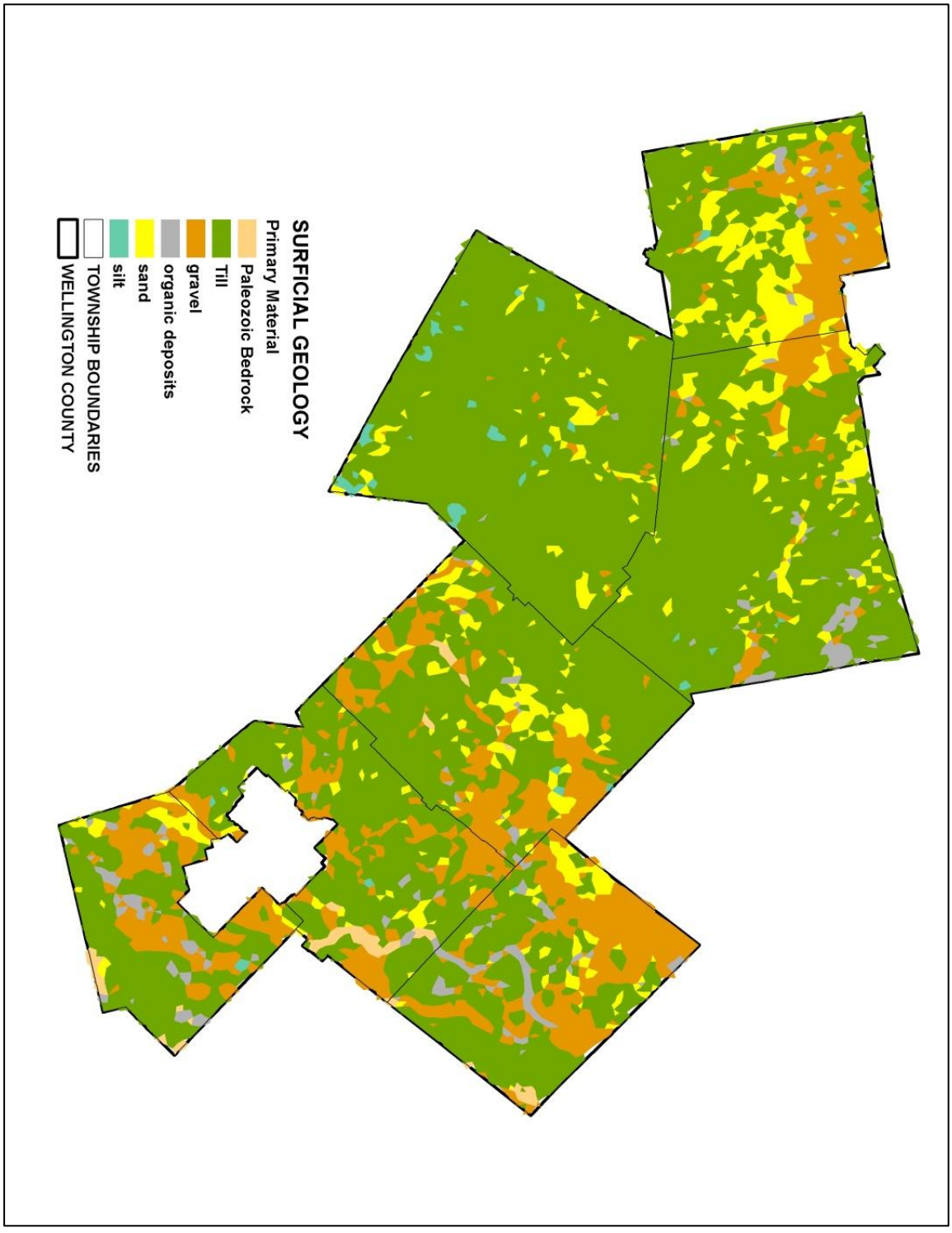


Figure 3. Surficial Geology in Wellington County

2.1.3 Physiography and Soils

Physiography and soils affect hydrological connectivity directly and other ecosystem functions indirectly by influencing the growth and species composition of vegetation communities.

Wellington County contains eight physiographic regions (figure 4), each one distinct based on topographic features, surficial geology, and soils (Chapman & Putnam, 2007). The dominant soil types in the county (figure 5) are loamy soils which are ideal for agriculture as they tend to contain more nutrients than other soil types and have ideal water permeability.

The Townships of Centre Wellington and Guelph Eramosa are mostly situated within the Guelph Drumlin Field, which is characterized by a high density of drumlins (low and broad oval hills), glacial spillways, and loam or fine sandy loam soils (figures 4 and 5; Chapman & Putnam, 2007).

The Townships of Mapleton and Wellington North comprise the relatively flat terrain of the Dundalk Till Plain and Stratford Till Plain regions (figure 4). Soil types in both of these regions are dominated by loam in the southern parts of the region and silty loam in the northern parts, with clay loam soils predominating in the Luther Marsh area of Wellington North Township (figure 5). Agricultural land use is greatest in Mapleton and Wellington North than all other lower-tier municipalities in Wellington County, probably in part due to the combination of flat topography and loam soils.

The Paris-Galt Moraine (i.e. the Horseshoe Moraine) is a large till moraine making up much of the physiography in Puslinch Township (figure 4). The Paris-Galt Moraine is a significant groundwater recharge area consisting of well drained sandy loam soils and glacial rock deposits.

Finally, the sandy kame moraines in the northern part of Minto and the silty loam kame moraines in eastern Centre Wellington and northern portions of Erin Township are also well drained and areas important for groundwater recharge (figures 4 and 5).

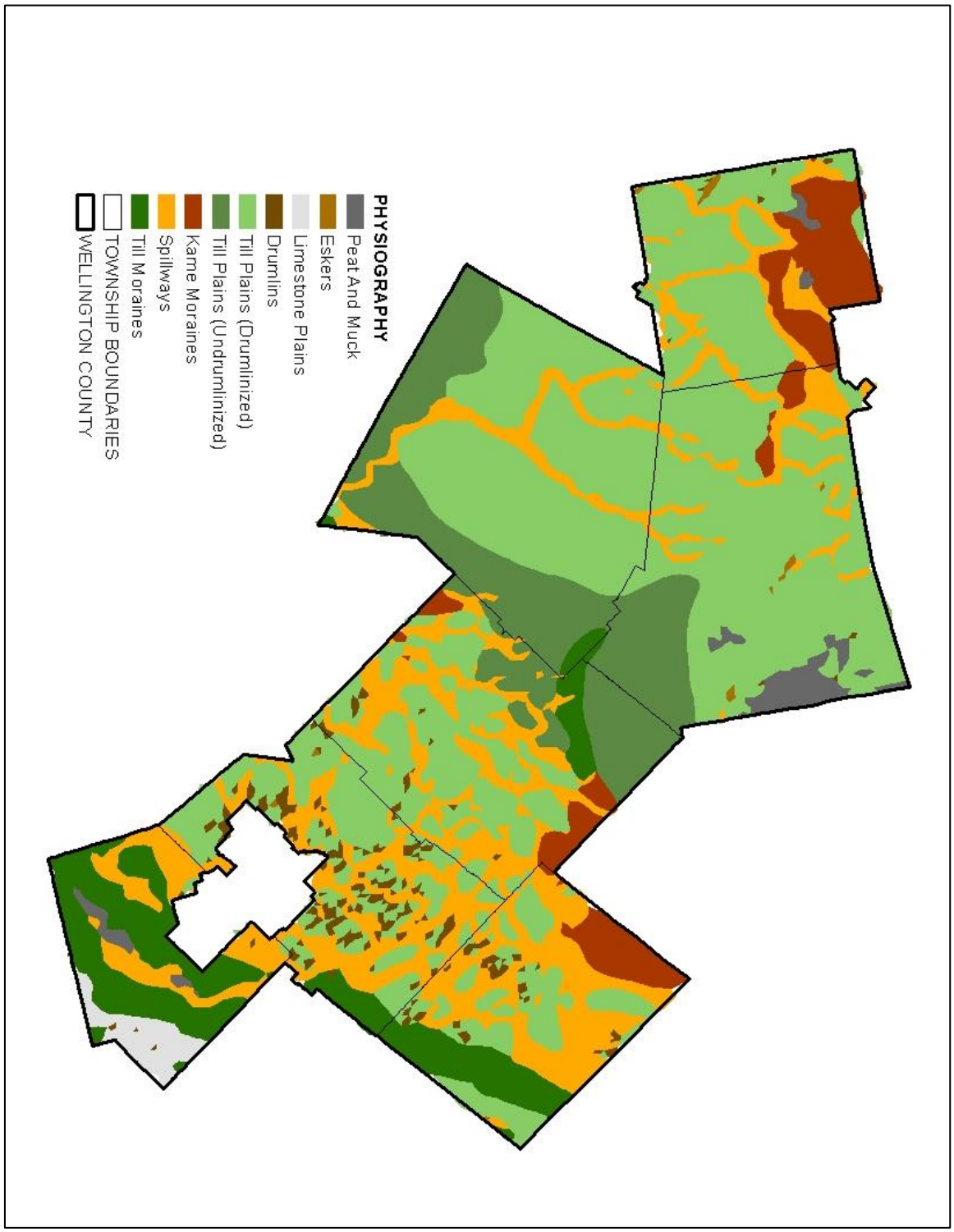


Figure 4. Physiography in Wellington County

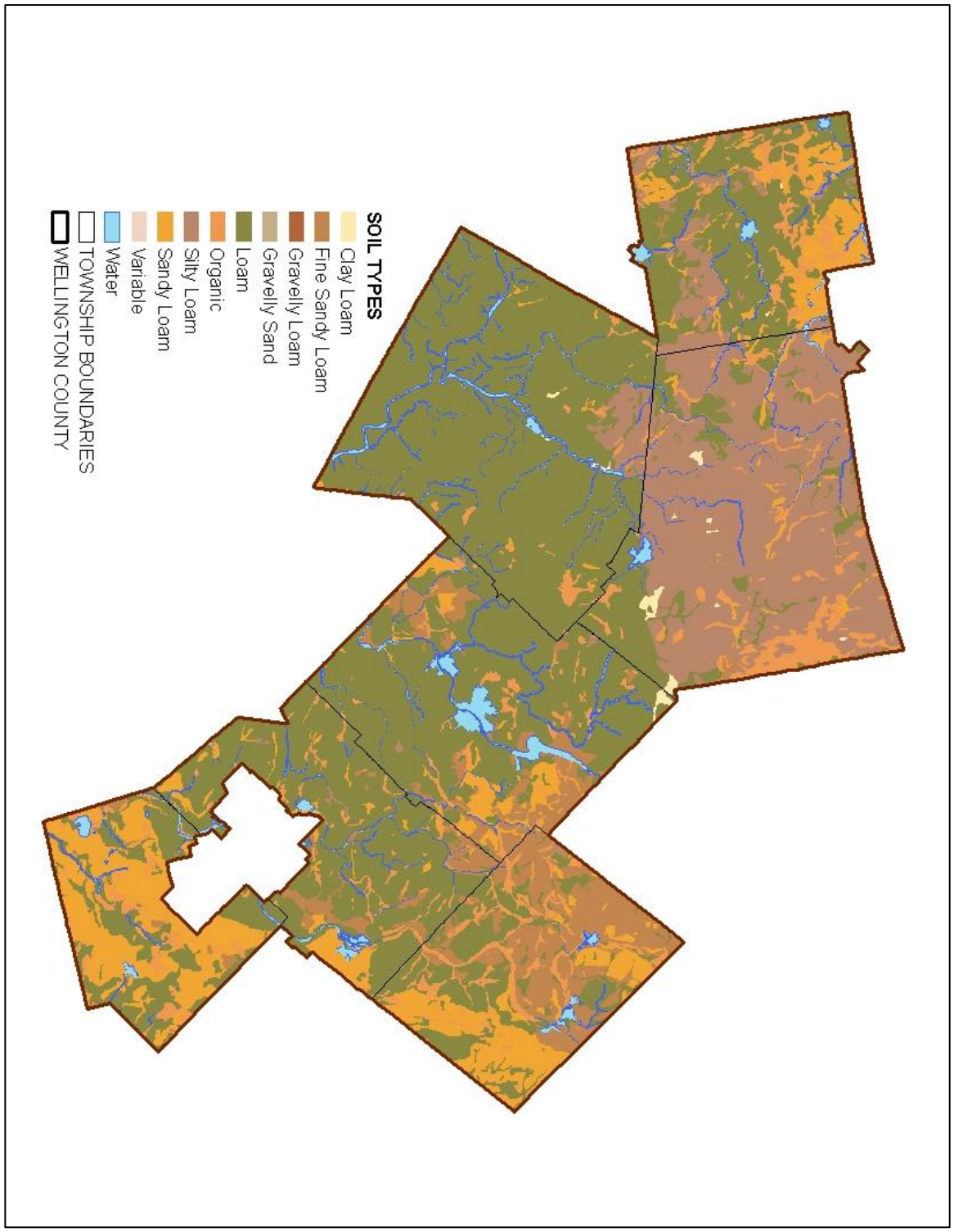


Figure 5. Soil Types in Wellington County

2.1.4 Groundwater Hydrology

Modelled estimates of groundwater recharge have been produced by conservation authorities as part of the Drinking Water Source Protection Program in accordance with Ontario's Clean Water Act (figure 6). While modelled estimates of groundwater recharge have been compiled across the County, not all data is similar for comparison purposes in figure 6 (e.g. areas mapped white).

In Wellington, areas of high recharge are concentrated on the Paris-Galt Moraines in Puslinch and the Moraines of the Hillsburgh Sandhills in Erin, ranging mostly between 295-579 mm/yr. Recharge to the groundwater system is lowest in the Dundalk Till Plain and Stratford Till Plain regions, generally recharging at 65 mm/yr or less.

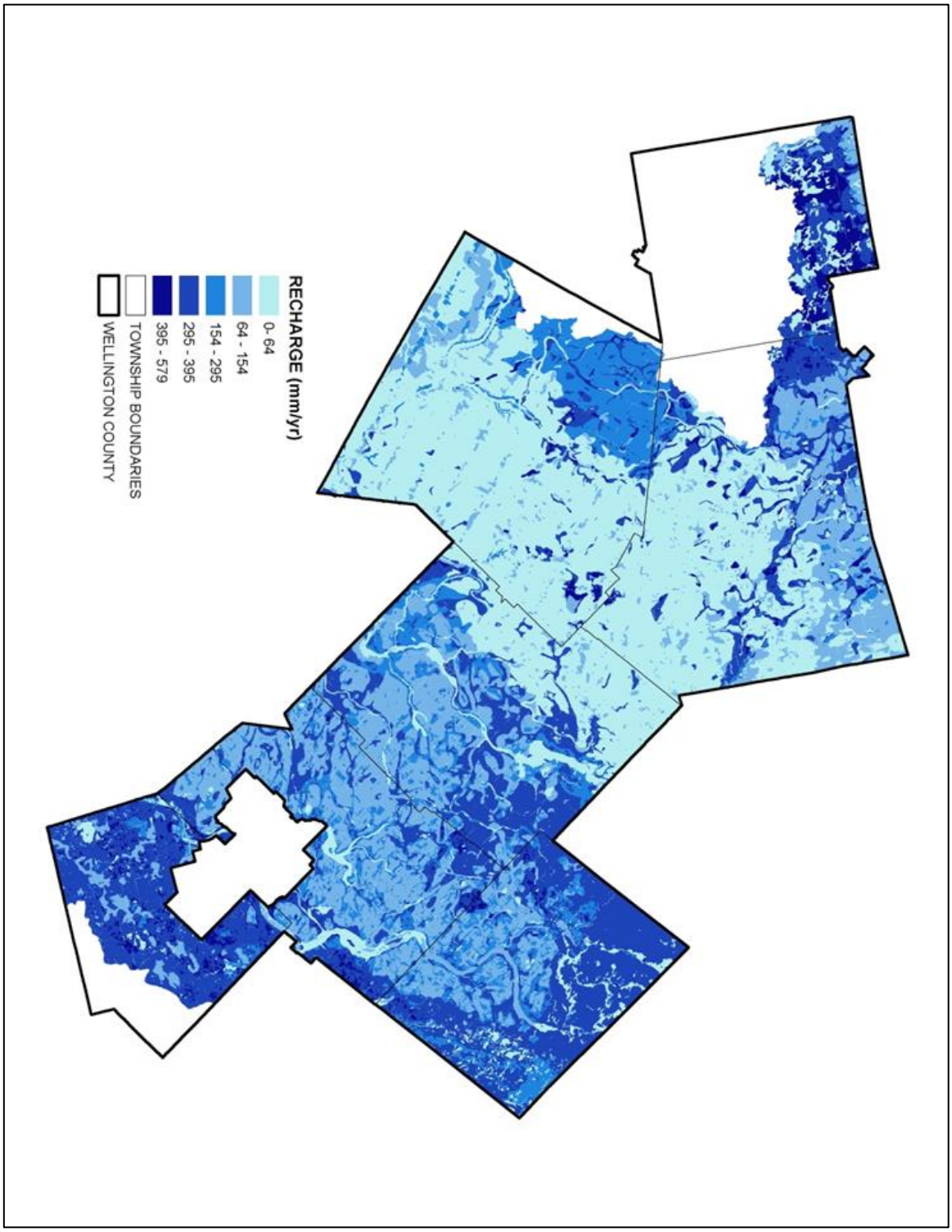


Figure 6. Modelled Groundwater Recharge Areas in Wellington County

2.2 Aquatic and Wetland Ecology

2.2.1 Watercourses

Fifty-six percent of the watercourses in the county have been classified by the Ontario Ministry of Natural Resources and Forestry (OMNRF) based on assessments of the temperature regime and the composition of the fish community within specific reaches. The remaining 44% have an unassigned classification or are not classified. Of the currently assessed watercourses, a majority are classified as warmwater fish habitat (figure 7, table 2).

Table 2. Lengths of Classified Watercourses in Wellington County

Lengths of Mapped Watercourses				
Total Length of Watercourses (km)			Classified Watercourses (km)	Not Classified Watercourses (km)
3,512			2,573	939
Lengths of Classified Watercourses				
Total (km)	**Cold (km)**	**Cool (km)**	**Warm (km)**	**Unknown (km)**
2,573	667	540	766	600

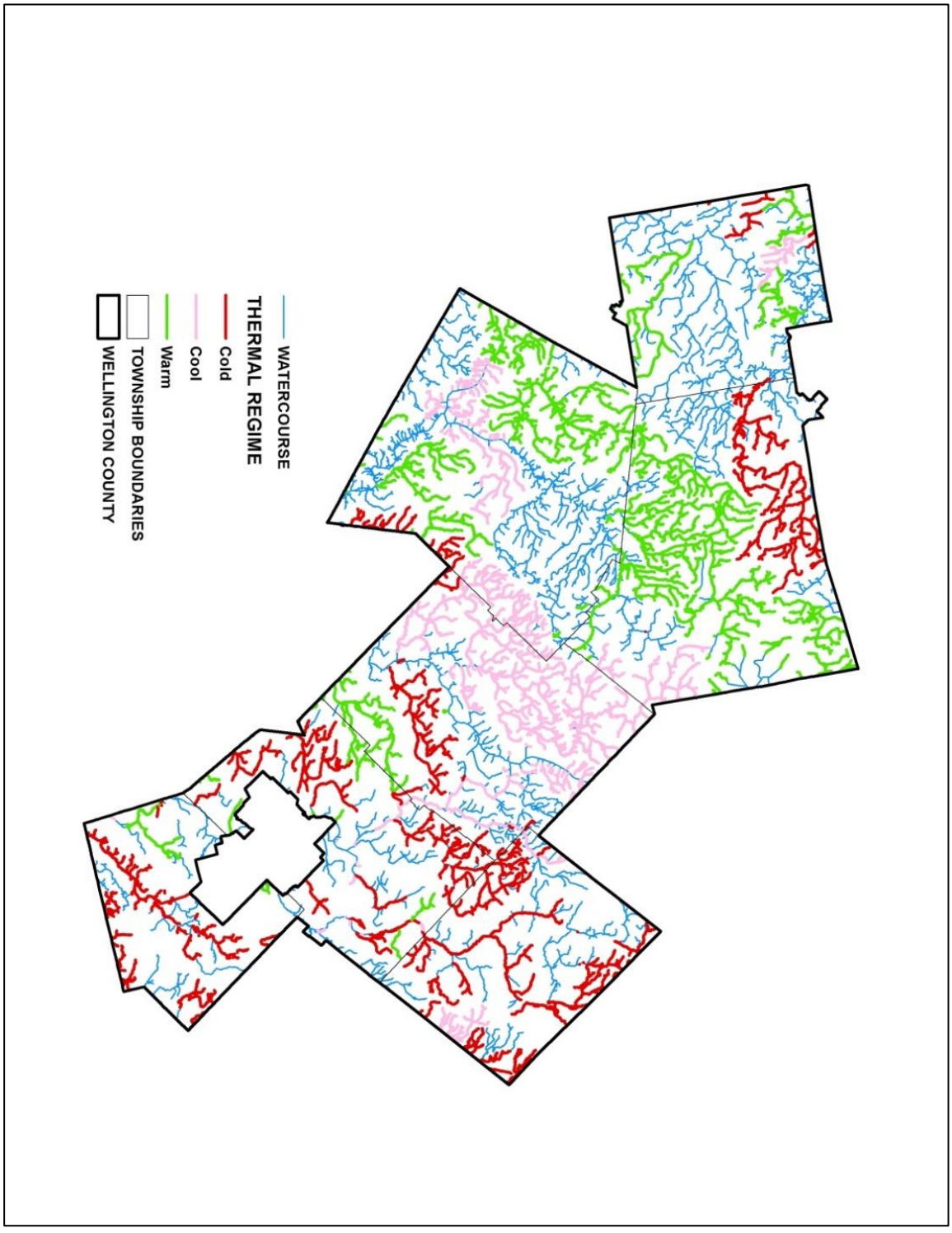


Figure 7. Thermal Regimes of Watercourses in Wellington County

2.2.2 Wetlands

Wetlands are lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the ground surface. In either case the presence of abundant water has caused the formation of hydric soils and has favored the dominance of either hydrophytic plants or water tolerant plants. Periodically soaked or wet lands being used for agricultural purposes, which no longer exhibit wetland characteristics, are not considered to be wetlands.

Many wetlands have been evaluated and mapped by the Ontario Ministry of Natural Resources and Forestry using Ontario's Wetland Evaluation System (OMNR, 2014). Wetland evaluations consider biological, hydrological, socio-economic factors as well as special features of a wetland or wetland complex. Wetlands that meet certain criteria through the Ontario Wetland Evaluation System (OWES) are designated as Provincially Significant and afforded protection under Ontario's Planning Act. This analysis considered both evaluated (PSWs and non-PSWs) and unevaluated wetlands.

Wetlands can also be mapped by local planning authorities such as conservation authorities and municipalities. These agencies may have local wetland protection policies that consider certain wetlands identified through OWES as non-provincially significant to be locally significant wetlands on the landscape. All wetlands are afforded protection in accordance with conservation authority policies.

Wetlands cover 30,267 hectares, or about 12% of the county. Wetland cover in the county is above the federal subwatershed and watershed targets (6% and 10% percent, respectively per Environment Canada, 2013). A vast majority of the mapped wetlands in the county have been evaluated in accordance with provincial standards, and most of these wetlands (91% of the total evaluated wetland area) are considered to be provincially significant (table 3). Of the 90 wetlands that have been evaluated, 46 are considered to be provincially significant whereas 44 are considered locally significant (table 3).

Table 3. Total Wetland Cover and Evaluated Wetland Cover in Wellington County

Wellington County Area	260,982 ha			
Total Wetland Cover	30,267 ha			
	No. Wetland Complexes	**Area (ha)**	**% of County**	**% of Total Wetland in County**
Total Evaluated Wetlands	90	27,424	10.5	90.6
Provincially Significant Wetland (PSW)	46	24,943	9.6	82.4
Non-Provincially (Locally) Significant Wetland	44	2,481	0.9	8.2
Percentage PSW (of total evaluated wetland area)	91%			

The geographic extent of evaluated and unevaluated wetlands within the county is illustrated in figure 8. Although a high percentage of the wetlands within the county have been evaluated, these field assessments have not occurred evenly across the landscape. For instance, whereas most wetlands in Minto, Guelph/Eramosa, and Puslinch Townships have been evaluated, several wetlands in Mapleton and Wellington North Townships have not been evaluated. Although many wetlands throughout this and other townships have not been evaluated in accordance with provincial standards or are considered to be locally significant only, all wetlands in the county are considered valuable to a natural heritage system and support a number of functions including:

- providing habitat for a variety of plants and animals, including species at risk and other species of conservation concern,
- controlling flooding and erosion,
- attenuating nutrients, and
- providing educational, recreational, and research opportunities.

Many of the wetlands found within Wellington County are part of much larger wetland complexes which in many cases extend beyond the municipal boundary. Some of the largest (>1000 total hectares) and diverse wetlands complexes partially or wholly represented in the county include the following:

Speed-Lutteral-Swan Creek Wetland, a 5,683 ha complex of deciduous and coniferous swamp (95% of the complex) and marsh (5%) communities located within glacial meltwater channels associated with the Guelph Drumlin Field. The wetland complex covers portions of Eramosa, Erin, Nichol, and West Garafraxa Townships in Wellington County. Considerable portions of the wetland (60% of complex area) is underlain by organic soils, where carbon storage is expected to be proportionately high, and is sustained by and/or contributes groundwater to local watercourses known to contain Brook Trout.

Luther Marsh Wetland Complex, a 4,029 ha complex of deciduous and coniferous swamp, marsh, fen and bog communities. Luther Marsh is a large and diverse headwater wetland that drains toward the upper Grand River. Wylde Lake Bog is one of the more significant biological features and one of the largest peatlands within the district. Luther Lake is known to harbor large concentrations of waterfowl during fall migration and is a known breeding area for species at risk, including Least Bittern, Black Tern, and Bald Eagle. The wetland continues to support a breeding colony of Great Blue Heron and several Osprey nests. During the fall, large numbers of Great Egret and Sandhill Crane roost in the marsh areas.

Eramosa-Blue Springs Wetland, a 3,089 ha complex of deciduous and coniferous swamp (95%) and a marsh (5%) communities. Much of the wetland complex occurs along the riparian zones or meltwater channels and as such have a permanent or intermittent surface water connection with other nearby wetlands and/or watercourses that feed Blue Springs Creek and the Eramosa River. Much of the wetland (95%) is underlain by organic soils, where carbon storage is expected to be proportionately high, and is sustained by and contributes groundwater to local watercourses known to contain Brook Trout.

Mill Creek Wetland, a 1,804 ha complex of deciduous and coniferous swamp (95%) and a marsh (5%) communities closely associated with Aberfoyle Creek and Mill Creek in Puslinch Township. Upper portions of the wetland complex located on the Galt-Paris Moraine are sustained by high rates of groundwater discharge, which also sustains a diverse cold water fish community dominated by Brook Trout and Brown Trout.

A complete list of evaluated wetlands can be found in Appendix II: Evaluated Wetlands in Wellington County.

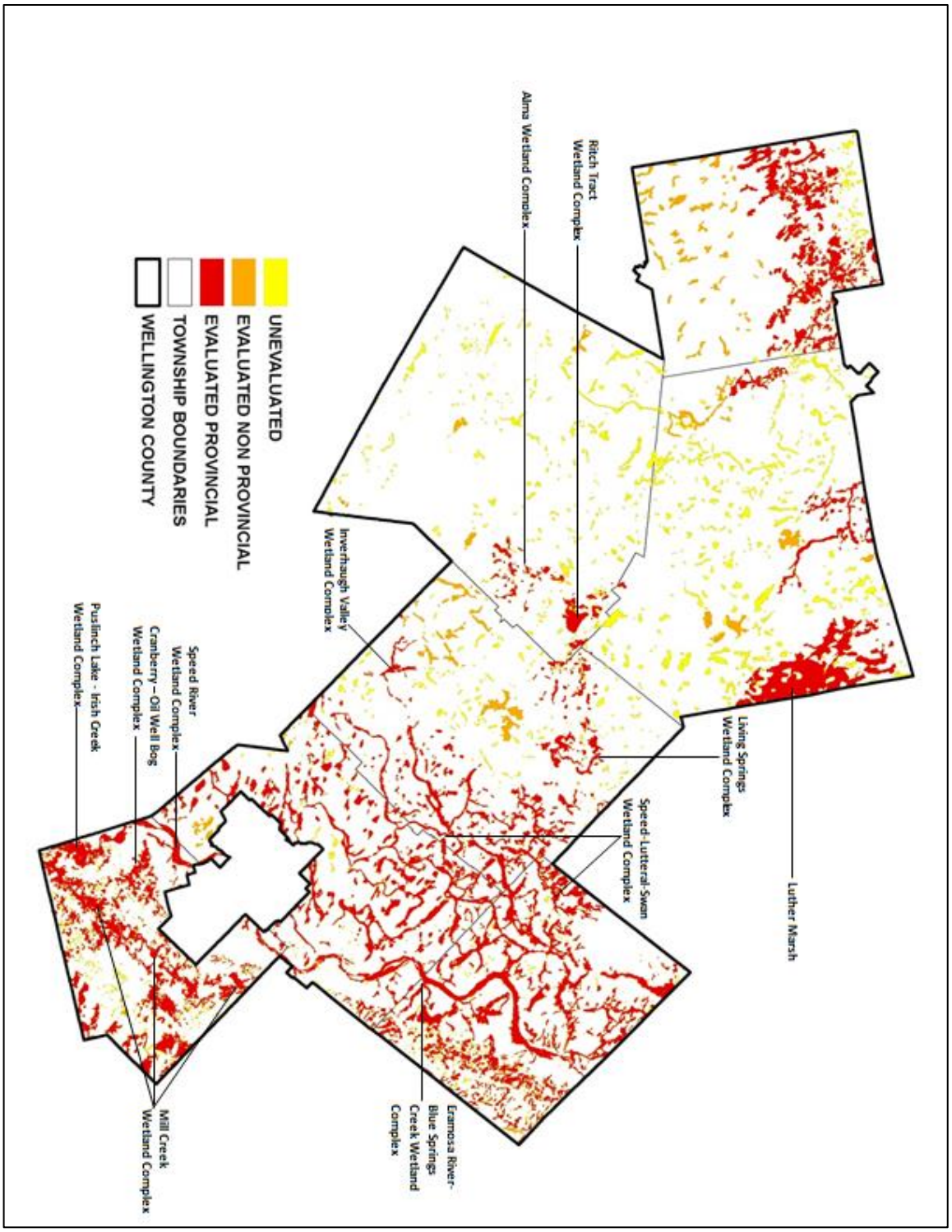


Figure 8. Evaluated and Unevaluated Wetlands in Wellington County

2.3 Terrestrial Ecology

2.3.1 Valleylands

Valleylands are natural areas that occur in a valley or other landform depression that has water flowing through or standing for some period of the year (OMMAH, 2014). Valleylands form across the landscape, from their origins in headwater areas to their outlets in aquatic features such as wetlands and lakes. Although the physical boundaries of valleylands can be determined, some valleylands are more well-defined than others. For example, vallelyands with flows occurring overland through streams and rivers are more well-defined than valleylands where flows originate from springs, seepage areas or surface run-off (OMNR, 2010). Well-defined valleylands can be delineated by the stable top-of-bank, and less well-defined valleylands can be delineated using a combination of proxy boundaries such as riparian zones, flood hazard limits, the meander belt of the watercourse or the highest general level of seasonal inundation (OMNR, 2010). For much of the county valleylands have not yet been identified by planning authorities – the exception being valleyland mapping, and an associated methodology, developed by Credit Valley Conservation as part of the Credit River Watershed NHS.

2.3.2 Woodlands

Woodlands are areas with trees greater than 2 m in height and 60% canopy coverage, with a minimum mapping unit of 0.25 ha where mapped from orthophotography and 0.5 ha where mapped from Infrared Satellite imagery, as identified and mapped by the province. Woodlands generally include forests, woodlots, plantations, and swamps. Woodlands are also defined in accordance with the Ecological Land Classification System for Southern Ontario (Lee et al., 1998). Accordingly, a forest is a terrestrial vegetation community with at least 60% tree cover whereas a woodland is a treed community with 35 to 60% cover of coniferous or deciduous trees. Interior forests are defined as those portions of the woodland in excess of 100 m from the edge of the feature.

Woodlands cover 45,556 ha or 17.4% of Wellington County (figure 9). Woodland cover is unevenly distributed across Wellington County, ranging from approximately 10% in the Township of Mapleton to 33% in the Township of Puslinch (figure 10).

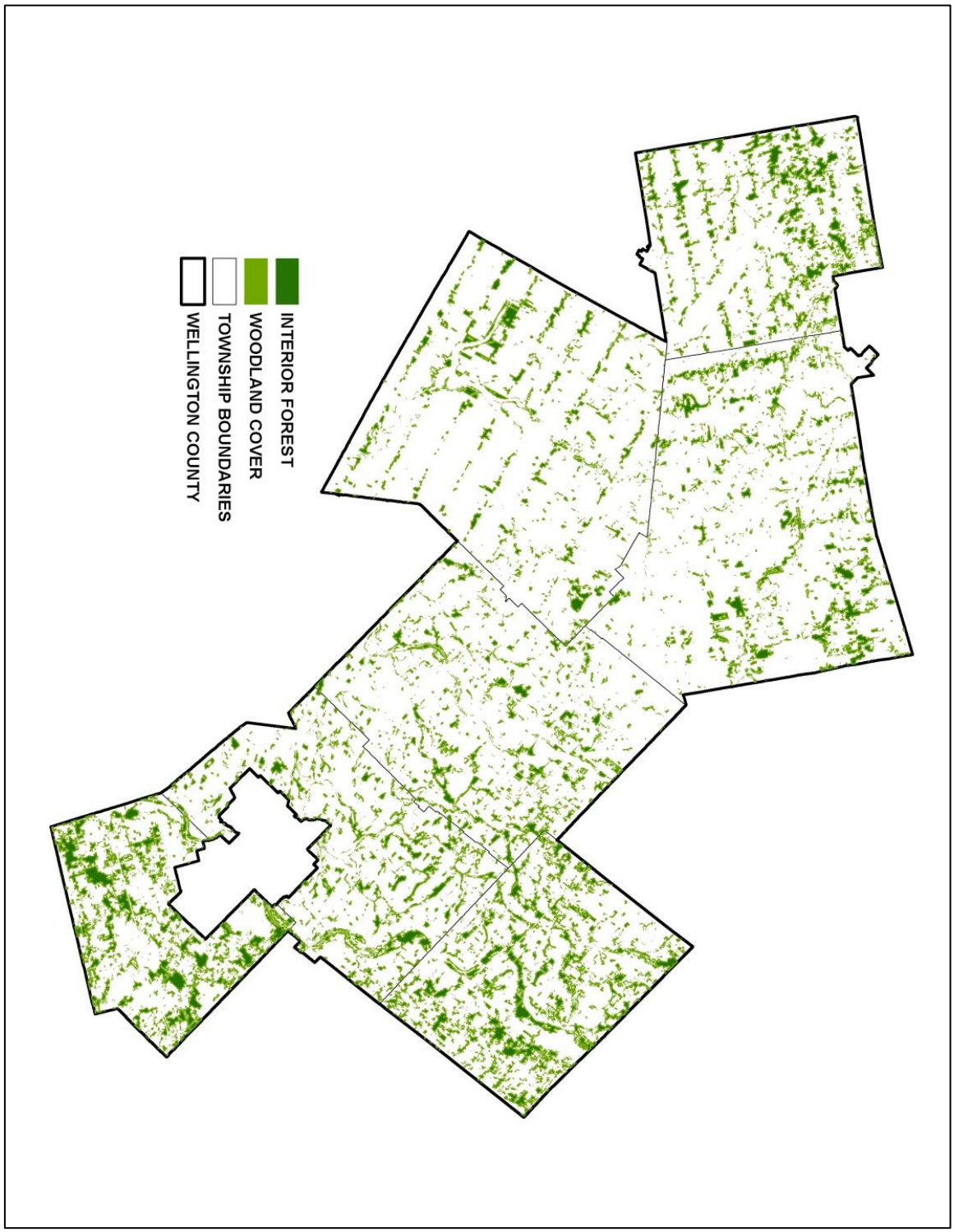
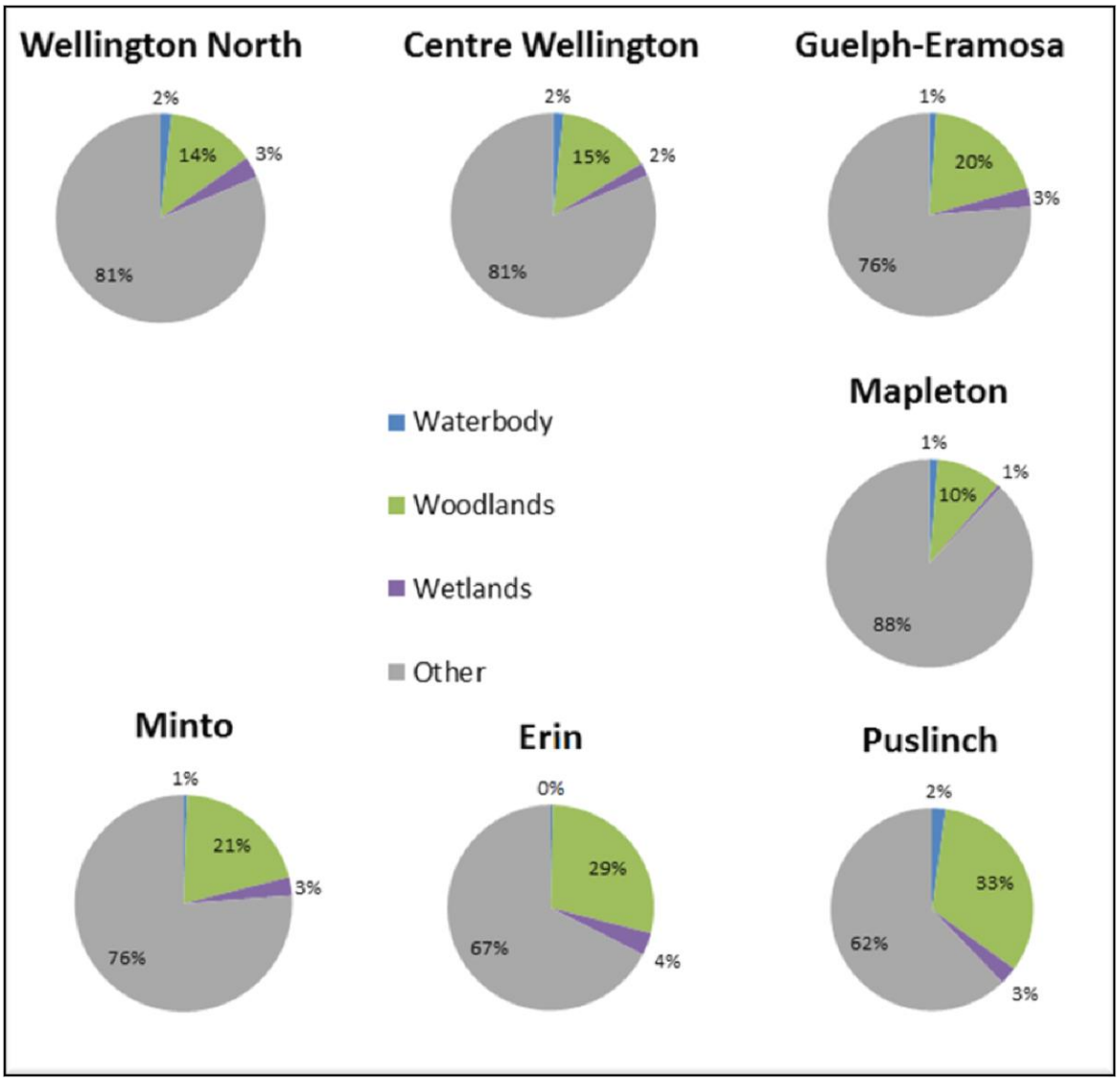


Figure 9. Woodland Cover and Interior Forest in Wellington County

Figure 10. Percent of Land Cover in Wellington County's Member Municipalities



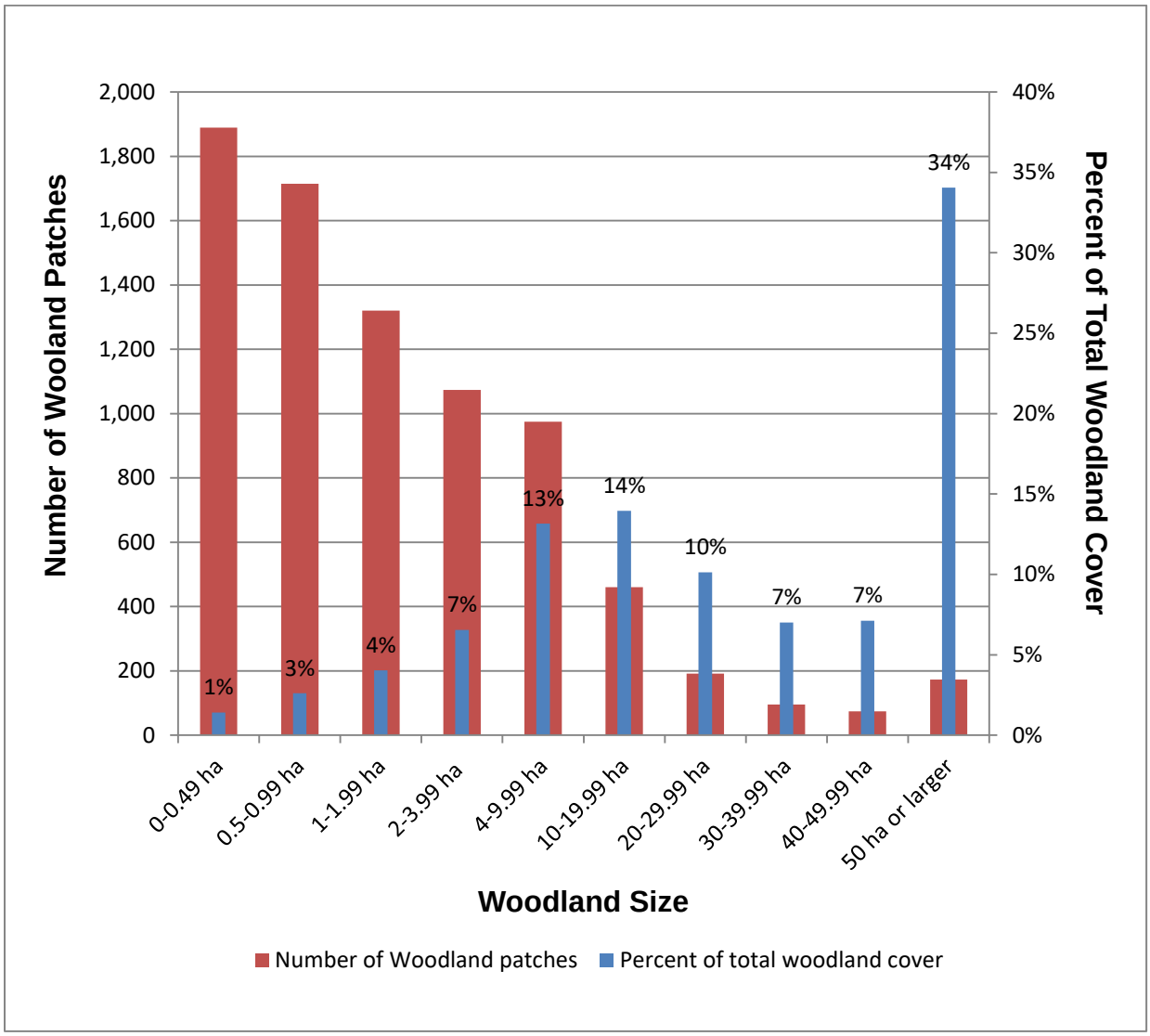
Approximately 6,460 ha, or 14% of the county's forested area, is considered interior forest (table 4).

Table 4. Total Woodland Cover and Interior Woodland Cover in Wellington County

Total Woodland Cover	45,556 ha (17.4% of Wellington County)
Interior Forest Cover (100 meters from edge)	6,460 ha (14% of total woodland cover and 2.4% of Wellington County)

Woodlands in the county are generally fragmented (figure 9) and woodland patch sizes vary considerably (figure 11). Forty-one percent of woodland patches in the county are over 40 ha in size, 31% between 10 and 40 ha in size, and 28% are less than 10 ha (figure 11).

Figure 11. Number and Percent Cover of Woodland Patches by Size in Wellington County



Woodlands tend to be larger and appear to be more connected in portions of Guelph/Eramosa, Puslinch, and Minto Townships whereas woodlands are smaller and more isolated within portions of Wellington North and Mapleton Townships. Some of the forested areas are located on areas characterized by a high groundwater table and moist soils, and are also mapped as wetlands. Many woodlands in the county are contiguous with or overlap with large wetland complexes such as Luther Marsh. Many

woodlands are confined to river and creek valleys and provide buffer and linkage functions. Some of the larger valleys, most notably the Speed River, Eramosa River, and Mill Creek valleys, are buffered by wooded swamps.

2.3.3 Areas of Natural and Scientific Interest

Areas of Natural and Scientific Interest (ANSIs) are defined by the province as “an area of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education” (MNR, 1983; Hilts et al., 1986; OMMAH, 2014). Life Science ANSIs target lands and water with representative terrestrial and aquatic natural heritage features whereas Earth Science ANSIs target lands and waters with representative geologic features. The best representative sites outside of national parks, provincial parks, or conservation reserves are considered to be provincially significant ANSIs. Other sites that are considered to be the next best examples of a representative ecological or geological unit, landform, or community are identified as regionally significant or locally significant (OMNR, 2010). These natural areas tend to comprise or are contiguous with locally significant woodlands and PSWs.

Fifty-three (53) ANSIs designated by the OMNRF are wholly or partially represented within Wellington County, including 31 Earth Science ANSIs and 22 Life Science ANSIs (figure 12). Twenty ANSIs are considered significant at a provincial scale whereas the remaining ANSIs are considered regionally significant.

In terms of area represented in the county, the top 5 Life Science ANSIs include Luther Marsh and the Eramosa River Valley, which are considered provincially significant and Galt Creek and Forests, Brisbane Woods, and Oil Well Bog-Little Tract, which are considered regionally significant.

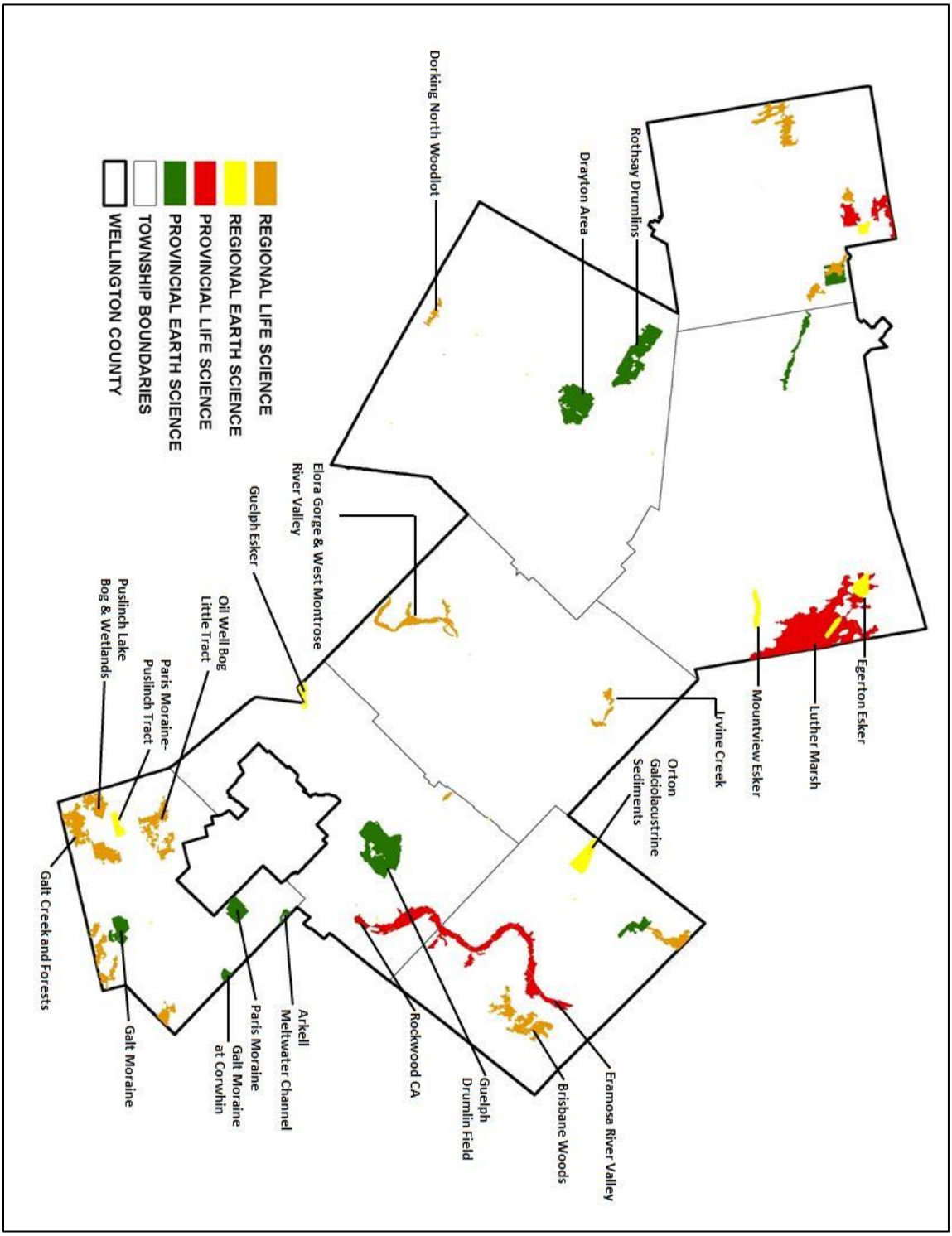


Figure 12. Areas of Natural and Scientific Interest (ANSIs) in Wellington County

2.3.4 Rare Species and Species at Risk

A total of 73 provincially significant species tracked by the Natural Heritage Information Center have been recorded in the county (see Appendix III: Provincially Significant Species Documented Within Wellington County), including 26 plants, 24 birds, 7 reptiles, 6 insects, 4 fishes, 4 mammals, 1 amphibian, and 1 mussel. The list of significant species includes 43 species at risk that have been assessed at the provincial and/or federal levels. Provincially-listed species at risk and their habitat are afforded protection in accordance with the provincial Endangered Species Act, which is administered by the Ontario Ministry of Natural Resources and Forestry. Federally-listed species at risk and their habitat are afforded protection in accordance with the Species at Risk Act, which is administered jointly by Environment and Climate Change Canada and Fisheries and Oceans Canada. Only threatened and endangered species are currently afforded legal protection. Species of special concern and their habitat generally receive protection in accordance with the Provincial Policy Statement (PPS) issued under the Planning Act.

2.3.5 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) has been identified by the province as a natural heritage area for the purposes of implementing Section 2.1 of the PPS (OMMAH, 2014). The Natural Heritage Reference Manual (OMNR, 2010) and the Significant Wildlife Habitat Technical Guide (OMNR, 2000) were prepared by the Ontario Ministry of Natural Resources and Forestry to assist planning authorities and others involved in land use planning in the protection of NHSs in the province. According to the Significant Wildlife Habitat Technical Guide (SWHTG), wildlife is described as “all wild mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, fungi, algae, bacteria and other wild organisms” (Ontario Wildlife Working Group, 1991).

What is Significant Wildlife Habitat?

The Provincial Policy Statement (2014), under the Planning Act, identifies wildlife habitat as:

"areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle, and areas which are important to migratory or non-migratory species."

Wildlife habitat is considered significant where it is:

"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. Criteria for determining significance may be recommended by the province but municipal approaches that achieve or exceed the same objective may also be used."

More recently, the OMNRF issued additional technical criteria to facilitate the identification of SWH in the province (OMNRF, 2015). Schedule 6E lists the recommended criteria for identifying SWH within Ecoregion 6E, which includes Wellington County. The 4 general categories of SWH are summarized in table 5 and are outlined and defined in greater detail in the SWHTG and Ecoregion Schedule 6E. The schedules include a description of wildlife habitat, wildlife species, and the criteria that must be met to identify SWH. Candidate SWH is described using the Ecological Land Classification (ELC) for Southern Ontario (Lee et al., 1998).

The identification of core natural heritage features such as significant wetlands, ANSIs, and other locally significant woodlands has facilitated the identification of SWH in the county. In addition, areas that are known to contain provincially significant species would also be considered SWH. A full and detailed assessment of SWH is beyond the scope of this report.

Table 5. Significant Wildlife Habitat Categories and their Definitions. Specific Criteria for Sub-categories are Outlined in the Significant Wildlife Habitat Technical Guide and Ecoregion Schedule 6E (OMNRF, 2000; 2015).

Category	Definition
Seasonal Concentration Areas Waterfowl Stopover and Staging Areas Shorebird Migratory Stopover Areas Raptor Wintering Areas Bat Hibernacula Bat Maternity Colonies Turtle Wintering Areas Reptile Hibernacula Colonial Nesting Bird Habitats Deer Winter Congregation Areas	These areas contain large numbers or concentrations of 1 or more wildlife species annually and usually at certain times of the year, sometimes within relatively small areas. Examples include deer wintering areas, breeding bird colonies, and hibernation sites for reptiles, amphibians, and bats.
Rare Vegetation Communities Cliff and Talus Slopes Alvars Old Growth Forests Savannah Tallgrass Prairie or Specialized Habitat for Wildlife Waterfowl Nesting Areas Bald Eagle and Osprey Nesting, Foraging and Perching Habitat Woodland Raptor Nesting Habitat Turtle Nesting Areas Seeps and Springs Amphibian Breeding Habitat Area-sensitive Bird Breeding Habitat	Rare vegetation communities often contain rare species, particularly plants and small invertebrates, which depend on such habitats for their survival and cannot readily move to or find alternative habitats. Rare vegetation species and communities are identified by the Natural Heritage Information Centre using a ranking procedure developed by The Nature Conservancy. Some wildlife species require large areas of suitable wintering and breeding habitat for their long-term survival. Wildlife populations also tend to decline when habitat becomes fragmented and reduced in size. The more wildlife species a habitat contains, the more significant the habitat becomes to the planning area. The largest and least fragmented habitats within a planning area will support the most significant populations of wildlife.

Category	Definition
Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species) Marsh Breeding Bird Habitat Open Country Bird Breeding Habitat Shrub/Early Successional Bird Breeding Habitat Terrestrial Crayfish	This habitat includes wildlife species that are listed as Special Concern, are ranked as being rare, that are declining, or are featured species. Such habitats do not include habitats of Endangered or Threatened species as identified by the Endangered Species Act 2007.
Animal Movement Corridors Amphibian Movement Corridors Deer Movement Corridors	These areas tend to be elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity within populations, to allow seasonal migration of animals (e.g. deer moving from summer to winter range), and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors function at different scales often related to the size and home range of the animal. For example, short, narrow areas of natural habitat may function as a corridor between amphibian breeding areas and their summer range, while wider, longer corridors are needed to allow deer to travel from their winter habitat to their summer habitat. Identifying the most important corridors that provide connectivity across the landscape is challenging because of a lack of specific information on animal movements. There is also some uncertainty about the optimum width and mortality risks of corridors. Furthermore, a corridor may be beneficial for some species but detrimental to others. For example, narrow linear corridors may allow increased access for raccoons, cats, and other predators. Also, narrow corridors dominated by edge habitat may encourage invasion by weedy generalist plants and opportunistic species of birds and mammals. Corridors often consist of naturally vegetated areas that run through more open or developed landscapes. However, sparsely vegetated areas can also function as corridors. For example, many species move freely through agricultural land to reach natural areas.

3.0 The Framework for Developing a Wellington County NHS

In October of 2017, the Grand River Conservation Authority (GRCA) was retained by Wellington County to map a Natural Heritage System (NHS) for the county. The project was to include a broad natural heritage characterization, and recommendations for a scientifically defensible methodology for identifying a NHS within Wellington County.

3.1 Project Governance

The GRCA managed and executed all aspects of NHS development and Wellington County managed and executed communications and consultations with the public.

A Project Steering Committee (SC) was formed to oversee the project. The SC was comprised of county staff and representatives from the six conservation authorities whose jurisdiction overlap county borders. Their role in this project was to provide expertise to help inform decision making and to facilitate access to relevant data and resources from their respective jurisdictions.

3.2 Project Scope

3.2.1 Guiding Principles

The following principles, as outlined in the Terms of Reference for this project, have guided the development of the Wellington County NHS:

- ✓ The process for identifying regionally significant natural features and areas in Wellington County should not be constrained by provincial guidance and policies (i.e. the PPS 2014 and Growth Plan NHS).
- ✓ A science-based approach (including either empirical evidence, conservation principles or expert opinion) should be used to guide the criteria measures and methodology, with consideration of economic, cultural and social values.
- ✓ The NHS is to focus on identifying local scale core areas and linkages within a landscape context.
- ✓ Data inputs will come from existing datasets (whether baseline or derived), will be of a reasonably recent vintage, and will be as consistent and complete as possible across the study area.
- ✓ The final methodology, criteria measures, analytical limitations, results and implications will be well-documented and clearly explained in the final report.
- ✓ Connection of the project NHS mapping to existing NHS mapping (of like-scale) in adjacent areas is to be made as much as reasonably possible.
- ✓ Defendable and repeatable methodology is to be used (i.e., the same map would result from someone else using the same criteria and methods).

3.2.2 Project Goals

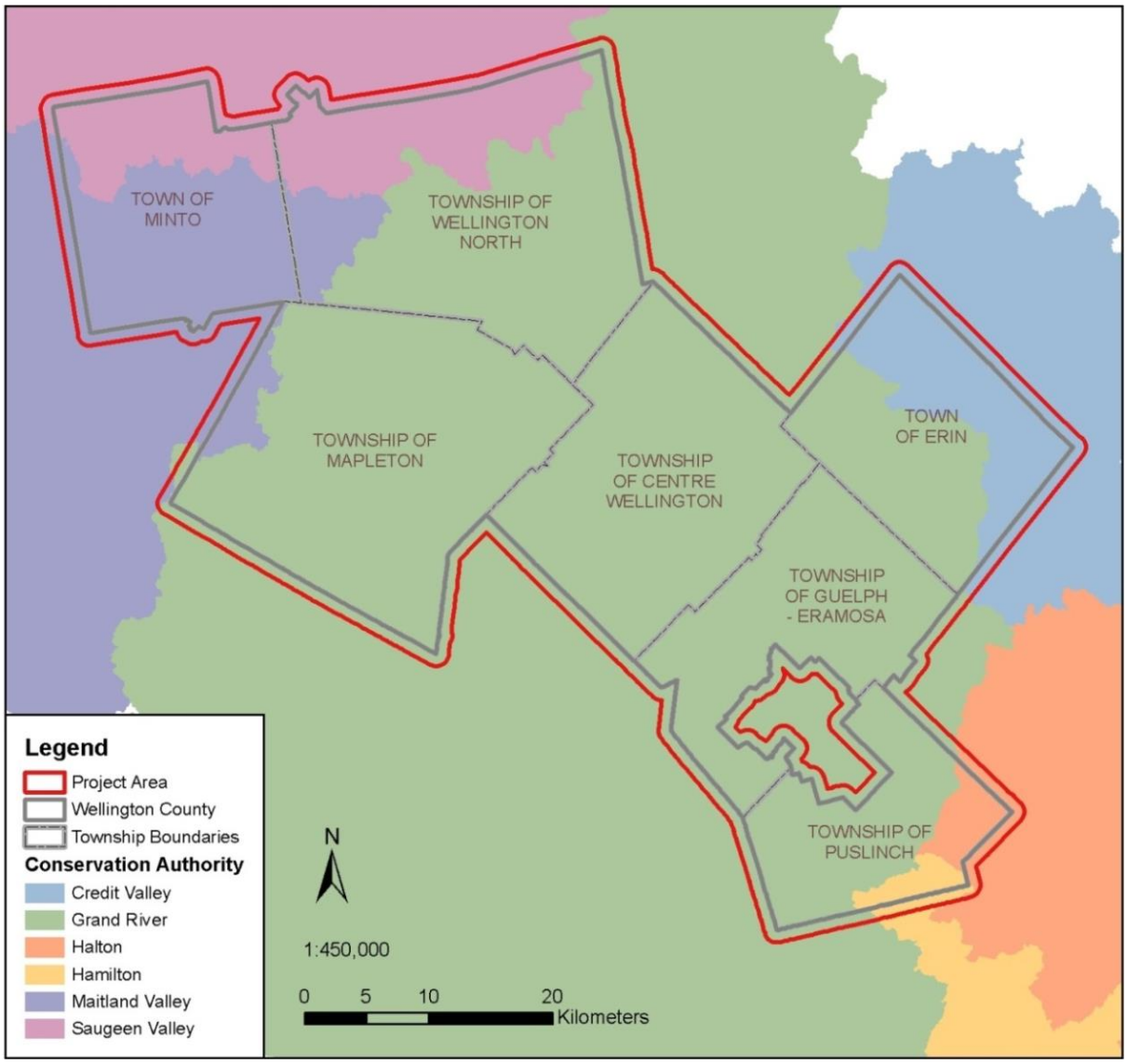
The project goals are to develop, through the engagement and agreement of stakeholders, a Wellington County NHS that will:

- ✓ Maintain and/or improve local and regional biodiversity
- ✓ Recognize local-scale linkage between and among natural heritage features and areas
- ✓ Provide a strategic direction for land and water restoration, stewardship activities, conservation land acquisition and securement, priorities for inventory programs, and amendments to the County Official Plan
- ✓ Inform resource-management decision-making
- ✓ Support sustainable economic opportunities
- ✓ Support sustainable recreational use

3.2.3 Study Area

The project area is defined as the County of Wellington, plus a 1 kilometer buffer to acknowledge connectivity beyond the municipal boundary (figure 13). This represents an area of 2,976 km^2 (297,568 ha).

Figure 13. Wellington County Natural Heritage System Project Area



3.3 Project Phases

Development of the Wellington County NHS occurred over six general phases:

Phase 1 – A Terms of Reference, detailing the project plan and scope, was formed between Wellington County and the GRCA. A Steering Committee (SC) was established and an initial meeting was held on November 20, 2017 with SC members to kick off the project.

Phase 2 – A review was conducted of scientific and grey literature related to NHSs, their supporting methodologies and models, as well as relevant landscape ecology

concepts and research. Existing spatial data resources were identified, obtained and reviewed.

Phase 3 – A full-day technical workshop was held on December 12, 2017 to review potential options for NHS methodologies and criteria. Workshop attendees included members of the SC as well as expertise in planning, Geographic Information Systems (GIS) analysis and landscape ecology from neighboring municipal offices and conservation authorities. Over several group discussions, methodology and criteria options were evaluated with consideration of the project's timeline and of Wellington's unique landscape. All methodology and criteria options were weighed in terms of their data requirements, whether they were appropriate for the degree of landscape fragmentation in the county, and how well they aligned with the goals and guiding principles of this project.

Phase 4 – The technical workshop informed the development of a methodology and criteria for identifying a Wellington County NHS. The spatial data layers acquired in phase 2 were prepared and processed in a GIS to create mapping that represents the Wellington County NHS. Mapping outputs were validated throughout the mapping process with quality assurance and quality control measures.

Phase 5 – Draft mapping was presented to the SC and workshop participants on March 20, 2018 for review and feedback. An open house was held on April 3, 2018 to present draft mapping to the general public (see section 6.0). Beginning April 3rd, comments from the public were welcomed and those received by May 7, 2018 were considered for incorporation in final mapping revisions.

Phase 6 – a final report (this document) was produced to summarize the development of the Wellington County NHS. It includes a description of the project, a general natural heritage characterization of the project area, a general description of the methodology and criteria used to identify the Wellington County NHS, an overview of the natural features captured by the Wellington County NHS mapping, a comparison of the Wellington County NHS to the Growth Plan NHS, recommendations for future work and several reference appendices. A technical report entitled "Mapping of a Natural Heritage System in the County of Wellington. Technical Report" was also produced to accompany the final report. The technical report outlines the step-by-step workflow followed to produce the NHS mapping. The information provided in the technical report is intended to provide sufficient enough detail to replicate or update the NHS mapping.

4.0 The Recommended Natural Heritage System for Wellington County

4.1 General Description of the Wellington County NHS

The Natural Heritage System (NHS) recommended for Wellington County was designed within the context of the County's landscape; a mosaic of diverse land uses and natural cover types, with rural land uses being dominant. It captures natural features, areas and linkages with an approach that considers both broad-scale and local-scale ecological functions. The aquatic components of the NHS form the main linkages in the NHS, and enhancement linkages have been identified in areas where voluntary stewardship activities can improve local linkages. The Wellington County NHS contains primarily natural land cover but also contains some non-natural cover in areas that provide ecological and/or hydrological function (e.g., valleylands).

4.2 Overview of the Wellington County NHS Components

The Wellington County NHS is comprised of two main component types (table 6):

1) ***Natural Heritage Components*** consist of natural features and areas such as woodlands, wetlands, valleylands, aquatic habitat, significant wildlife habitat, habitat of endangered and threatened species, and Life Science ANSIs. These are natural features and areas with important ecological and hydrological functions that are already on the landscape. They are the building blocks of the Wellington County NHS.

2) ***Stewardship Components*** consist of Enhancement Linkages and Enhancement Woodlands. These components have the potential to connect and enhance the overall ecological and hydrological functions of the Wellington County NHS.

Table 6. The Components of the Wellington County NHS with Definitions

Component Type	Definition
Natural Heritage Components	
Wetlands	Wetlands are lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the ground surface. Wetlands have hydric soils that support predominantly hydrophytic plants or water tolerant plants.
Woodlands	Woodlands are areas where trees provide 60 percent canopy coverage. Woodlands include forests, woodlots, plantations, and swamps.
Valleylands	Valleylands are depressional landforms whose formation was or is currently influenced by the flow regime of watercourses. Valleylands are dynamic features, changing both gradually through slow erosion and deposition processes, and also abruptly through rapid erosion processes such as floods.
Aquatic Habitat	Aquatic habitat refers to all watercourses and waterbodies, including those which are natural as well as those which have been altered or constructed.
Significant Wildlife Habitat	The PPS (2014) identifies wildlife habitat as: "areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle, and areas which are important to migratory or non-migratory species."

Component Type	Definition
Natural Heritage Components	
	Wildlife habitat is considered significant where it is: "ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or NHS. Criteria for determining significance may be recommended by the province but municipal approaches that achieve or exceed the same objective may also be used."
Habitat of Endangered and Threatened Species	The PPS (2014) identifies habitat of endangered and threatened species as: "a) with respect to…endangered or threatened species for which a regulation is made under …the Endangered Species Act, 2007, the area prescribed by that regulation as the habitat of the species; or b) with respect to any other endangered or threatened species, an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding, as approved by the Ontario Ministry of Natural Resources; and…that are used by members of the species as dens, nests, hibernacula or other residences."
Life Science ANSIs	Life Science ANSIs are areas of significant representative segments of Ontario's biodiversity and natural landscapes including specific types of forests, valleys, prairies and wetlands, their native plants and animals and their supportive environments. They contain

Component Type	Definition
Natural Heritage Components	
	relatively undisturbed vegetation and landforms and their associated species and communities.
Stewardship Components	**Definition**
Enhancement Linkages	Enhancement Linkages are potential connections between Natural Heritage Components. Enhancement Linkages should be thought of as approximate and flexible.
Enhancement Woodlands	Enhancement Woodlands are smaller woodlands in the Townships of Wellington County that have less than 29% overall woodland cover (Minto, Wellington North, Centre Wellington, Mapleton, and Guelph/Eramosa). Enhancement Woodlands are woodlands that, if enhanced, would improve the broad-scale ecological and hydrological functions of the NHS.

4.3 General Description of Mapping Methodology

The Wellington County NHS was mapped in two stages:

Stage 1: Mapping Natural Heritage Components

The best available existing spatial data of natural features and areas from Conservation Authorities and the province were used to map the Natural Heritage Components of the Wellington County NHS. Features mapped by these sources were included within the NHS if they fulfilled the ecological criteria listed in table 8. Ecological criteria classes and thresholds were used to select those natural heritage features and areas that are important for preserving ecological functions in the system (see section 4.4). These were based on a review of the current scientific and grey literature, of existing guidance documents, of effective and practical application of criteria in other Southern Ontario jurisdictions, and on the professional judgement of technical experts at the workshop. Natural Heritage Components were mapped using a Geographic Information System (GIS) called ArcGIS (See the companion to this final report “Mapping of a Natural

Heritage System in the County of Wellington. Technical Report" for a detailed workflow of technical steps in ArcGIS).

Stage 2: Mapping Stewardship Components

Stewardship Components were mapped using the Natural Heritage Components as building blocks.

Enhancement linkages were mapped as dotted lines between unconnected Natural Heritage Components to represent potential linkages (figure 14). Enhancement Linkages were identified with connectivity analysis using a toolbox for ArcGIS called Linkage Mapper (Version 1.1. Seattle, WA: The Nature Conservancy). This objective and automated process uses a combination of least-cost path analysis (LCP) and Euclidian distance calculations to identify the most ideal path, or "path of least resistance", between unconnected patches of Natural Heritage Components (figure 14). In the context of NHS design, the "cost" in a least-cost path analysis refers to factors that reduce the viability of linkages, such as land use types that limit the distribution and migration of flora and fauna. In the example shown in figure 14, feature A is isolated, so it will be connected via the "path of least resistance" to either feature B or feature C. The "path of least resistance" identified by Linkage Mapper occurs between feature A and feature B, rather than feature C, because this connection follows a natural watercourse and does not require a road crossing. We used data related to land cover characteristics to determine the relative "cost" of various land cover types. These relative "cost" values, a data input in Linkage Mapper, are shown in table 7.

Enhancement Woodlands were selected based on ecological criteria classes and thresholds. Enhancement Woodlands are smaller woodlands in parts of the county that, if grown in size through voluntary restoration actions, would increase the overall woodland cover in townships where there is currently less than 29% woodland cover.

Figure 14. An Example of how Enhancement Linkages were Mapped along the "Path of Least Resistance" using the Software Linkage Mapper

Feature A is isolated from the other natural features on the landscape. The "path of least resistance" occurs between feature A and feature B rather than feature C because this linkage follows a watercourse and does not require a road crossing.

Table 7. The Relative "Cost" Values Assigned to Land Cover Types to Map Enhancement Linkages

Land cover	Relative "cost" Value
Streams with adjacent natural cover	5
Natural cover not adjacent to a stream	10
Streams without adjacent natural cover	50
Pervious built-up areas, tilled farmland, undifferentiated lands, and slower-moving medium-impact roads	100
Impervious built-up areas, extraction sites, faster-moving medium-impact roads	1000
High-impact roads (All Freeways and any roads with speed limits ≥90km/hr and ≥4 lanes)	No data (no connections can made in this land cover type)

4.4 Criteria and Thresholds used to Identify Wellington County NHS Components

Broad concepts in the field of landscape ecology were established in the 1990's (Forman, 1995; Riley & Mohr, 1994) and continue to be refined by emerging hypotheses and research. Generally, these concepts recognize the heterogeneity of landscapes, and identify the various factors related to spatial-scale and spatial-pattern that influence the structure and function of ecosystems (Noss & Cooperrider, 1994; Riley & Mohr, 1994). They form the basis for Wellington County's selection criteria: size, representation, rarity, habitat quality, matrix influence, and hydrological importance (table 8).

These six criteria and their thresholds (table 8) are grounded in empirical evidence, guidelines produced by government or non-government science agencies, and the expertise of Conservation Authority and Municipal staff provided at a technical workshop held on November 20, 2017. In the following subsections we provide a brief elaboration of the scientific rationale behind each of these criteria.

Table 8. The Components of the Wellington County NHS with Criteria Thresholds

Natural Heritage Components		
Component	**Criteria class**	**Criteria Threshold**
Woodlands	Size	✓ Woodlands in Urban Centers: ≥ 1 ha and ≥30 m wide
		✓ Woodlands in Rural Areas: ≥4ha and ≥30m wide
	Matrix influence	✓ Woodlands of any size that is contained by or is within 30m of a natural heritage component meeting a criteria threshold
	Rarity	✓ Woodlands containing a vegetation community and/or species with a provincial ranking of S1, S2 or S3 (as ranked by the NHIC) or a global ranking of G1, G2 or G3 (as ranked by the NatureServe Network) (text criterion)
		✓ Woodlands containing 10 or more trees/ha greater than 100 years old (text criterion)
		✓ Woodlands containing 10 or more trees/ha that are ≥50 cm in diameter (text criterion)
Wetlands	Hydrological importance	✓ Evaluated non-Provincially Significant Wetlands and all Provincially Significant Wetlands
		✓ Unevaluated wetlands mapped by the MNRF or Conservation Authorities
Valleylands	Hydrological importance	✓ Valleylands associated with watercourses, waterbodies and wetlands
	Representation	✓ Valleylands representing distinctive landforms such as oxbows, bottomlands, terraces, deltas, etc. (text criterion)
Aquatic Habitat	Habitat Quality	✓ All watercourses
		✓ Waterbodies connected to a watercourse
		✓ All headwaters (text criterion)
	Matrix influence	✓ Waterbodies within 30 m of a natural heritage component meeting a criteria threshold

Natural Heritage Components		
Component	**Criteria class**	**Criteria Threshold**
Significant Wildlife Habitat (SWH)	Habitat Quality	✓ All identified SWH (text criterion)
Habitat of Endangered and Threated Species	Rarity	✓ All identified habitat of Endangered and Threatened Species (text criterion)
Areas of Natural and Scientific Interest (ANSI)	Representation	✓ Life Science ANSIs
Stewardship Components		
Components	**Criteria class**	**Criteria Threshold**
Enhancement Woodlands	Size	In lower-tier municipalities with <30% woodland cover: ✓ Woodlands in Rural Areas: 1-4 ha in size and ≥30m wide
Enhancement Linkages	Size	✓ Flexible connections between Natural Heritage Components. The exact location and the appropriate width of the linkage should be determined at the site-level and should accommodate the dispersal needs of the species at the site.

4.4.1 Size

Generally, larger habitat patches have more intact ecological functions than smaller habitat patches for a variety of reasons. Larger habitat patches tend to have greater structural diversity and are more likely to supports the habitat requirements of a greater number of species, particularly “area-sensitive” species which breed only in larger habitat patches (Environment Canada, 2013; Herkert et al., 2003).

With respect to woodlands specifically, there is strong evidence indicating that species diversity, abundance and breeding success in woodland patches can be at least partially attributed to patch size (Lee et al., 2002; Villard et al., 1999; Austen et al., 2001; Nol et al., 2005; Burke & Nol, 2000; Bayne & Hobson, 2002). Larger woodland patches are more likely to contain different successional stages, which translates to more structural diversity, providing different habitat types for a greater variety of

species. Some forest species can only be found in large patches because they are sensitive to “edge effects”, meaning they can only survive in the interior of a forest patch, far away from the patch’s edge (Forman, 1995; Burke & Nol, 2000). Larger patches also support more stable species populations as they have more space and more resources which enable larger population capacities (Connor et al., 2000; Andrén, 1994; Freemark & Merriam, 1986; MacArthur & Wilson, 1967). Larger patches are also more resilient to stressors tied to climate change. For example, large forests can better sustain the effects of blowdown and erosion caused by extreme weather, and their ecological equilibriums are more stable making them less susceptible to disease, insect infestations and exotic species invasions (Pearce, 1992).

Patch size has long been emphasized as a vitally influential, but current research has shown that landscape-level characteristics also have an important effect on the ecosystem functions at the scale of woodland patches (Driscoll et al., 2013; Ewers & Didham, 2006). In particular, research and guidance documents have stressed that patch size be considered in conjunction with the overall amount of woodland cover in an area (Fahrig, 2013; Federation of Ontario Naturalists, 2004; Environment Canada, 2013). As woodland patches become more fragmented and overall woodland cover decreases, preserving smaller woodlands becomes increasingly important (Andrén, 1994). Although the most cited value of small woodland patches is their social value to urban communities, they also provide ecosystem functions such as airborne pollution uptake, stepping stone habitat in lieu of connected movement corridors for migratory species (Forman, 1995; Leidner & Haddad, 2011; Lloyd & Marsden, 2011), and redirecting pressure for recreational opportunities away from the now fewer and more sensitive remaining large woodland patches.

The province and Ontario Nature have provided guidelines putting minimum woodland patch sizes in the context of overall woodland cover. They both suggest size thresholds for a variety of woodland cover scenarios (table 9). In a landscape with 30% woodland cover Ontario Nature suggests a more conservative size threshold of 15 ha, and the province suggests a size threshold of 20 ha. In a landscape with 10% woodland cover Ontario Nature suggests a size threshold of 2 ha, and the province suggests a size threshold of 4 ha.

Table 9. Minimum Woodland Patch Size Thresholds Recommended by the Province and Ontario Nature

Percent Woodland Cover	Minimum woodland patch size (OMNR 2010)	Percent Woodland Cover	Minimum woodland patch size (ON 2004)
<5 %	2 ha	<5 %	All woodlands
5-15%	4 ha	5-10%	2 ha
15-30%	20 ha	11-15%	4 ha
30-60%	50 ha	16-20%	10 ha
-	-	21-30%	15 ha
-	-	31-50%	25 ha

As discussed in subsection 2.3.2, woodland cover is unevenly distributed across Wellington County, ranging from approximately 10% in the Township of Mapleton to 33% in the Township of Puslinch (figure 10). Given this, a conservative approach for Wellington County would be to apply the 2 ha or 4 ha threshold to the entire county. At this threshold, the vast majority of interior woodland habitat in Wellington would be included by default. The county's overall woodland cover and interior woodland could also be increased by targeting small woodland patches for voluntary stewardship action in the Townships of Wellington North, Centre Wellington, Mapleton, Minto, and Guelph/Eramosa.

4.4.2 Matrix influence

Matrix influence refers to the effect of surrounding lands (known as the 'matrix') on the ecosystem services and ecological function of a patch. Some human land uses adjacent to a patch can have direct negative impacts (e.g., mortality) or indirect negative impacts (e.g., increased predation) on the populations of species (Ries et al., 2004; Ewers & Didham, 2006). Conversely, the ecological function of a habitat patch can be increased if it is adjacent to another natural habitat patch (e.g., riparian vegetation along a watercourse improves fish habitat), or, to a lesser degree, fallow fields and low-intensity agricultural lands (Perfecto & Vandermeer, 2002; Cook et al., 2002).

The fragmentation of woodland cover in a landscape results in patches of woodlands that are disconnected and sometimes isolated from other woodland patches by large gaps. A matrix of primarily urban land uses between woodland patches can impede the

distribution and migration of flora and fauna. Disruptions in the dispersal of species can threaten the health of populations (Ewers & Didham, 2006; Noss & Harris, 1986). Where patches of other natural cover exist in the matrix, functional connections are likely to persist if those patches are in relative close proximity; however there is limited science indicating specific distances at which certain functions are maintained. A study in Southern Ontario found that the movements of forest birds in fragmented landscapes are generally constrained by forest margins, but that most birds were more likely to cross a gap of up to 25 m if an existing detour under forest cover was considerably longer (Belisle & Desrochers, 2002). In a review of the functions provided by woodlands, Gartner-Lee (2002) reports that woodlands influence thermoregulation, sediment filtration, nutrient flow and habitat quality of riparian and aquatic habitat from distances of 4 – 300 m away. Given the limited guidance available, we recommend the inclusion of woodlands (of any size) in the landscape matrix within 30 m of any other NHS component.

Similarly, the matrix surrounding off-line waterbodies has a strong influence over their functional connectivity to the NHS. Off-line waterbodies (those which are not well connected to a watercourse) are generally formed naturally though geomorphic processes or artificially for aggregate extraction, stormwater management, irrigation or aesthetic purposes. Their lack of hydrological connectivity increases the potential to accumulate sediment, contaminants and nutrients to toxic levels (Tixier et al., 2011; Nurnberg et al., 2003). However, off-line ponds in urban areas can and do provide habitat for terrestrial and aquatic wildlife, (Helfield & Diamond, 1997; Scher & Thiery, 2005; Adams et al., 1985) presumably more so when in close proximity to other natural habitat patches.

4.4.3 Rarity

Rarity refers to uncommon characteristics. As with all concepts in landscape ecology, rarity must be considered in the context of spatial and temporal scale. For example, a species occurring over a broad geographic range is rare if its overall population densities are low relative to historical densities. Conversely, a locally common species may still be considered rare if its global range is very small, or if an individual is observed outside of its global range. Rarity applies not only to species, but also to vegetation communities and ecosystems, and all can be considered rare at one or multiple spatial scales.

Globally rare species and vegetation communities are identified and tracked by the NatureServe Network using a standardized conservation status ranking system (Master et al., 2012). In this system, globally rare species are ranked as G1 (critically imperilled species or communities), G2 (imperilled species or communities) or G3 (vulnerable species or communities; Rainer et al. 2017). NatureServe has also established methodology for assessments at the national and subnational level. In Ontario, the Natural Heritage Information Centre (NHIC) identifies and tracks species using the

subnational (Srank) system. Rare species are ranked as S1 (extremely rare species or communities – usually less than 5 occurrences), S2 (very rare species or communities – usually between 5-20 occurrences), or S3 (rare to uncommon species or communities – usually between 20-100 occurrences). It is necessary to protect the habitat of rare species in order to protect the species themselves from further rarity. NatureServe rankings, and the assessments that support them, are one of many resources used by the federal and provincial government in their designation of species at risk under the federal Species at Risk Act or the provincial Endangered Species Act. However, not all rare species end up listed, and only the habitats of species listed as endangered or threatened are protected by these pieces of legislation.

Although there is a reasonable amount of woodland cover in parts of southern Ontario, old-growth forests are rare. Mature and old-growth forests are sometimes considered "legacy features" because they take a significant amount of time to establish, and will only do so with minimal human and natural disturbance. Evidence suggests that forest composition (i.e. measures such as tree density, structural diversity, tree species diversity and tree age diversity) has a positive influence on the overall diversity and abundance of both flora and fauna (Austen & Bradstreet, 1996; Jacquemyn et al., 2003; Weber et al., 2008).

4.4.4 Habitat Quality

Habitat quality refers to the degree to which the habitat requirements (i.e. resources, mates, space etc.) of a species are met. High quality habitats are critical to the long-term sustainability of local and/or regional species populations (OMNR, 2000), and thus also critical for maintaining Wellington's biodiversity. Habitat quality is a species-specific concept as all species have different ideal habitat conditions (Hall et al., 1997), yet, the habitats of different species can and do overlap within the same natural feature.

Habitat quality is generally evaluated based on existing knowledge of the ideal physical, chemical and biologic conditions for each life history stage of a species' life cycle. The Significant Wildlife Habitat Technical Guide (OMNR, 2000), and its accompanying Criteria Schedule for Ecoregion 6E (OMNRF, 2015) is the most comprehensive system in Wellington County for identifying high quality habitats of birds, reptiles, amphibians, mammals, vascular plants, and butterflies. Although some significant wildlife habitats (SWH) have been identified by Conservation Authorities in Wellington County, exhaustive watershed-wide searches have not been performed. Nevertheless, natural features containing SWH, whether or not their existence is known, should be considered high quality habitat.

Identifying the locations of high quality fish habitat is a more complex task. The GRCA and Credit Valley Conservation (CVC) have both estimated the fish communities present in their respective watersheds in fisheries management plans (OMNR & GRCA, 2005; OMNR & CVC, 2002). Fish community estimates were produced using a

combination of predictive modeling of potential fish habitat based on geomorphology, and site-level fish and habitat analysis. Although the habitat needs and life cycles of the fish in these communities are known, the specific locations of high quality fish habitat is subject to rapid change due to highly dynamic hydrologic processes (Junk et al., 1989). Therefore, river systems and their on-line waterbodies should be thought of as mosaics of ever-changing habitat patches (Allan, 2004; Fausch et al., 2002; Ward et al., 2002). Evidence suggests that variability and variety in aquatic habitats supports greater biodiversity (Townsend, 1989; Hildrew & Giller, 1994; Robinson et al., 2002).

4.4.5 Representation

Representation refers to the full range of variation in species, communities and ecosystems within a landscape, whether common or rare (Smith & Theberge, 1986). Ecologists have a very limited understanding of the relative significance of species, communities and ecosystems. Therefore, the most effective way to preserve biodiversity is to ensure that the full range of ecological variation is represented in natural heritage systems (Margules & Pressey, 2000).

Representation is a concept that is relevant and significant at all spatial scales (Kukkala & Moilanen, 2013). The full range of species, communities and ecosystems in Wellington County is narrower than the full range in the province, and the provincial range is narrower the National and Global range of ecological variation, but all are significant at their respective scales.

Many of Ontario's designated parks and protected natural areas are identified on the basis of representation (Gray et al., 2009). Areas of Natural and Scientific Interest (ANSIs) are publicly or privately owned areas that are recognized for their representative earth science or life science diversity. There are over 1,000 ANSIs in Ontario (Gray et al., 2009). The ANSI designation was implemented in the 1980's to complement Provincial Parks system, as resource limitations do not allow for the acquisition of all representative areas into the Parks system. Life Science ANSIs target lands and water with terrestrial and aquatic natural heritage features that are provincially, regionally or locally representative.

Representation is an important concept with respect to Valleylands. The action of flowing water causes frequent disturbance and change to the landforms within Valleylands (Swanson et al., 1988; Tockner & Stanford, 2002). These landform changes over space and time provide a high diversity of riparian habitat types that support biodiversity, as well as ecological functions such as stream flow regulation (Décamps & Naiman, 1990; Tockner & Stanford, 2002).

4.4.6 Hydrological Importance

Hydrological importance refers to a feature's physical, biological and chemical connection to the aquatic system and/or its influence on the hydrological cycle.

Hydrological importance is a measure that pertains to waterbodies, wetlands, watercourses, headwaters, groundwater recharge areas and groundwater discharge areas.

Features with a connection to the aquatic system maintain the hydrological balance of a landscape. They help sustain water quantity by attenuating surface water runoff and controlling groundwater recharge and discharge. These features can be disproportionately more valuable in urbanizing areas where landscape changes interfere with the hydrological balance by replacing pervious land cover types (e.g. agricultural land) with impervious surfaces (Schueler et al., 2009; Bolund & Hunhammer, 1999; Diamond et al., 2002). Features with a connection to the aquatic system also maintain the quality of water. Contaminants, sediment and excess nutrients are degraded or stored, improving water quality downstream (USEPA, 2015; Meyer et al., 2003; Cappiella & Fraley-McNeal, 2007).

All wetlands are an integral part of the hydrologic cycle, including small and/or isolated wetlands such as headwater wetlands (Mitsch & Gosselink, 2007; OMNR, 2010). As of 2002, Wellington County has lost 49.3% of its historical wetland cover (DUC, 2010). Currently, wetlands represent 12% of Wellington's total area. Watersheds with less than 10% wetland cover are susceptible to declines in wetland functions, particularly hydrological functions such as flood abatement and water quality functions such as sediment trapping (Johnston et al., 1990). These key functions, as well as biodiversity, have also been shown to decline in watersheds that have lost approximately 60% of historical wetland area (Zedler, 2003). Based on these studies, Environment Canada (2013) has suggested a 'no net loss' approach, combined with maintenance of at least 40% of historical wetland cover.

Valleylands are the backbone of the aquatic system as they contain the drainage network of a watershed from their headwaters down to their ultimate drainage into lakes. Vegetated riparian zones in valleylands reduce the intensity and volume of surface water runoff, which helps to reduce shoreline erosion, while also buffering the aquatic system from contaminants originating in agricultural and urban lands (Strayer et al., 2003; Allan, 2004; Opperman et al., 2010). The floodplains in valleylands moderate inflows and outflows during a flood by providing storage areas where floodwaters can be temporarily retained until water levels decrease in streams (Tockner & Stanford, 2002).

5.0 Outcome of the Wellington County NHS

5.1 Wellington County NHS Summary

As discussed in detail in chapter 4, The Wellington County NHS is comprised of two main component types: 1) Natural heritage components, which consist of natural features and areas, and 2) Stewardship components, which consist of enhancement linkages and enhancement woodlands (table 6). Maps of the Wellington County NHS are shown in Appendix I: Maps. Some of the components of the Wellington County NHS are provided as text only (table 8) because mapped information is either sensitive, incomplete or unavailable.

The Wellington County NHS (excluding enhancement linkages) is 59,343 ha, or 23%, of Wellington's total area. A breakdown by feature is provided in table 10.

Table 10. Quantities of Natural Features in the County that are Captured in the Wellington County NHS as Natural Heritage Components

Feature	Area in County (ha or km)	Area expressed as a percent of Wellington's total area (%)	Amount of area captured in Wellington County NHS (ha or km)	Amount of feature captured in Wellington County NHS expressed as a percent
Wetlands	*30,267 ha	11.5%	30,267 ha	100%
Woodlands	*45,556 ha	17.4%	44,864 ha	98.5%
Valleylands	*29,859 ha	11.4%	29,859 ha	100%
Waterbodies	*5,056 ha	1.9%	4,736 ha	93.7%
Watercourses	*3,512 km	N/A	3,512 km	100%
Life Science ANSIs	*8,482 ha	3.2%	8,482 ha	100%

*These feature types are not mutually exclusive. For example, Life Science ANSIs and valleylands are comprised of a combination of features, and some woodland types (e.g., swamps) are both woodland and wetland. Summing these area values will not provide an accurate total area of features.

A total of 1,171 enhancement woodlands were identified in Mapleton, Wellington North, Minto, Centre Wellington and Guelph/Eramosa (table 11). Not surprising due to their size difference, Wellington North identifies the most enhancement woodlands and Minto the least. A total of 13,931 enhancement linkages were identified across the county, with a total length of 2,646 km. The longest enhancement linkage was identified in Centre Wellington at 5.6 km.

Table 11. Quantities of Natural Features in the County that are Captured in the Wellington County NHS as Stewardship Components

Stewardship Component	Lower Tier Municipality							Entire County
	Mapleton	Wellington North	Minto	Centre Wellington	Guelph-Eramosa	Erin	Puslinch	
Enhancement Woodlands								
Number (#)	242	358	157	241	173	0	0	1,171
Area (ha)	554.29	744.10	304.61	516.09	364.41	0	0	2,483.5
Enhancement Linkages								
Number (#)	5,703	1,333	950	1,616	1,070	1,460	1,799	13,931
Total Length (km)	985.42	334.96	249.60	390.40	247.08	200.96	237.64	2,646
Minimum Length (m)	14.99	14.99	14.99	14.99	14.99	14.99	14.99	14.99
Maximum Length (m)	3,118	2,333	3,975	5,632	3,411	1,538	3,813	5,632

5.2 Comparison of the Wellington County NHS to the Growth Plan NHS

The provincial and county NHSs were developed at different scales and with different by complimentary objectives. The province identified the Growth Plan NHS at a mapping scale of roughly 1:50,000. The Wellington County NHS presented in this report identifies a connected NHS at a mapping scale of roughly 1:10,000.

The province's Growth Plan for the Greater Golden Horseshoe maps 78,519 ha, or 30%, of Wellington's total area as part of the Growth Plan NHS. When overlaid with the Wellington County NHS, there are 40,442 ha captured similarly by both the Growth Plan NHS and the Wellington County NHS (see Appendix I: Maps – *Comparison of the Wellington County NHS to the Growth Plan NHS*).

The Growth Plan NHS includes more area than the Wellington County NHS because the methodology applied resulted in the inclusion of more non-natural land cover (i.e.

lands classified by the Southern Ontario Land Resource Information System (SOLRIS) Version 2.1 and Version 3 as Built-up areas, Extraction, Tilled, Transportation, or Undifferentiated). The Growth Plan NHS is 46% non-natural cover whereas the Wellington County NHS is 8% non-natural cover. Furthermore, The Growth Plan NHS includes less of the county's wetlands (76%), woodlands (68%), valleylands (64%), waterbodies (31%) and watercourses (44%) compared to the Wellington County NHS (table 12).

Table 12. Quantities of Natural Features in the County Captured by the Wellington County NHS and the Growth Plan NHS

Feature	Amount in County (ha or km)	Amount captured in Wellington County NHS (ha or km)	Amount captured in Wellington County NHS expressed as a percent	Amount captured in Growth Plan NHS (ha or km)	Amount captured in Growth Plan NHS expressed as a percent
Wetlands	30,267 ha	30,267 ha	100%	22,852 ha	76%
Woodlands	45,556 ha	44,864 ha	99%	31,160 ha	68%
Valleylands	29,859 ha	29,859 ha	100%	19,169 ha	64%
Waterbodies	5,056 ha	4,736 ha	94%	1,547 ha	31%
Watercourses	3,512 km	3,512 km	100%	1,549 km	44%
Life Science ANSIs	8,482 ha	8,482 ha	100%	8,372 ha	99%

6.0 Public Consultation

6.1 Public Open House and Stakeholder Engagement

As a component of the Wellington County NHS mapping project, the County of Wellington undertook several public consultation activities to communicate project information and gather input including the following:

- A Public Drop-In Open House on April 3, 2018 held in the Aboyne Hall at Wellington Place (figure 15)
- A dedicated page on the county's website with key project information and Frequently Asked Questions & Answers
- An interactive online mapping tool for the public to view the proposed NHS
- Social media posts on Facebook and Twitter

The proposed Wellington County NHS was posted on the county's website for a 35-day review period from April 3 to May 7, 2018.

Copies of stakeholder engagement material can be found in Appendix IV: Stakeholder Engagement.

Open House Attendees

6.2 Presentation to the Wellington Federation of Agriculture

A significant portion of Wellington County's landscape is characterized by agricultural lands therefore it is important that any NHS developed for Wellington County respects the role agriculture offers to the conservation and stewardship of the environment.

On April 3, 2018 the County of Wellington and the Grand River Conservation Authority (GRCA) presented the proposed Wellington County NHS to the Wellington Federation of Agriculture(WFA) Board of Directors. The presentation provided an overview of the project, an overview of the proposed Wellington County NHS methodology and mapping, answered questions about the mapping and sought feedback.

Through an email on April 5, 2018 the County of Wellington provided links to key project information, FAQs and the Public Comment Form that could be forwarded to WFA members.

A copy of the presentation given to the WFA can be found in Appendix V: Presentation to Wellington Federation of Agriculture.

6.3 Stakeholder Input on the Wellington County NHS

Notice of the Public Open House was advertised in the Wellington Advertiser for 2 weeks prior to the event. Additional notice was emailed to stakeholder contacts that were considered to have a potential interest in the Wellington County NHS project. A total of 21 members of the public signed into the Public Open House held April 3, 2018. No written comments were submitted at the Public Open House.

Some members of the WFA Board of Directors raised concerns with the project during the presentation given by County of Wellington and GRCA staff. There were also concerns about the potential impact on farm properties of the province's Growth Plan NHS. Members of the agricultural community were encouraged to review the draft mapping and provide feedback.

Public consultation on the proposed Wellington County NHS was provided for 35 days, from April 3 to May 7, 2018. As a result of the public consultation, the County of Wellington received a total of 3 written comment submissions: 2 submissions were received online and 1 comment submission was received through email.

A copy of all written submissions can be found in Appendix VI: Comments Received on the Wellington County Natural Heritage System

6.4 Outcome of Stakeholder Input to the Wellington County NHS

The intent of the public consultation was to present information on the proposed Wellington County NHS mapping and provide an opportunity for stakeholders to offer feedback. Overall public comments were generally supportive of the county's initiative to

identify a NHS that balances the conservation and stewardship of natural areas with the importance of agriculture on the landscape.

As a result of consultation and feedback received, the County removed Environmentally Sensitive Areas (ESAs) as a mapped component of the Wellington County NHS.

As a result of consultation and feedback received, the inclusion of floodplains was reviewed and determined to be an appropriate surrogate for significant valleylands until such time valleylands in Wellington County can be identified or an alternate surrogate considered.

Comments from the public received after May 7th, 2018 will be kept on file with the County of Wellington for consideration in future initiatives. The county remains open to input on planning matters of interest to the public. At the time of submission of this final report no additional comments have been received.

7.0 Concluding Remarks

7.1 Statement of Limitations

We use ecological principles and science-based criteria (see section 4.4) to include all important ecological features into the Wellington County NHS. This project was not scoped to derive custom spatial data layers through interpretation of aerial photographs or satellite imagery, nor was natural heritage information collected though field reconnaissance activities such as Ecological Land Classification (ELC) and wildlife surveys. We used best available existing mapped natural heritage data from Conservation Authorities and from the province to perform the analysis and map the components of the NHS. We relied on the vetting done by the source of the data and have not modified the delineations of any features. NHS Components that could not be mapped due to insufficient data were included in the Wellington County NHS as text. This mapping is intended for use at a mapping scale of 1:10,000. For use at finer scales, we recommend site-level refinement.

7.2 Recommendations for Future Work

7.2.1 Identification of Enhancement Areas

Federal guidelines suggest that an adequately healthy NHS should contain at least 30 percent forest cover and 10 percent wetland cover at the watershed scale, which will only support approximately half of its potential species-richness. If targeted for voluntary stewardship action, enhancement woodlands can help to increase Wellington County's overall natural cover, thereby increasing the resiliency of the system. However to reach

these federal targets, it is recommended that enhancement areas are also identified. Enhancement areas should be:

a) areas that would connect functionally to the Wellington County NHS if restored
b) areas that are currently pervious (i.e. lands that are currently unpaved and allow water to reach the soil).

7.2.2 Assessment of Connectivity to Neighbouring Municipal Natural Heritage Systems

Within the Wellington County NHS, natural heritage components such as aquatic habitat and valleylands provide the majority of existing hydrological and terrestrial connectivity in the system, and enhancement linkages identify opportunities to improve overall connectivity. Ecological processes such as species dispersion and stream flow fluctuations do not halt at geographic boundaries, so an assessment of hydrological and terrestrial connectivity at Wellington County's jurisdictional boundary should be done to ensure system connectivity with neighbouring municipalities.

8.0 Acronyms

ANSI	Areas of Natural and Scientific Interest
CVC	Credit Valley Conservation
ELC	Ecological Land Classification System
ESA	Environmentally Sensitive Areas
GRCA	Grand River Conservation Authority
GIS	Geographic Information System
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
OGS	Ontario Geological Survey
OMMAH	Ontario Ministry of Municipal Affairs and Housing
OMNRF	Ontario Ministry of Natural Resources and Forestry
PPS	Provincial Policy Statement
PSW	Provincially Significant Wetland
SC	Steering Committee
SWH	Significant Wildlife Habitat
SWHTG	Significant Wildlife Habitat Technical Guide
WFA	Wellington Federation of Agriculture

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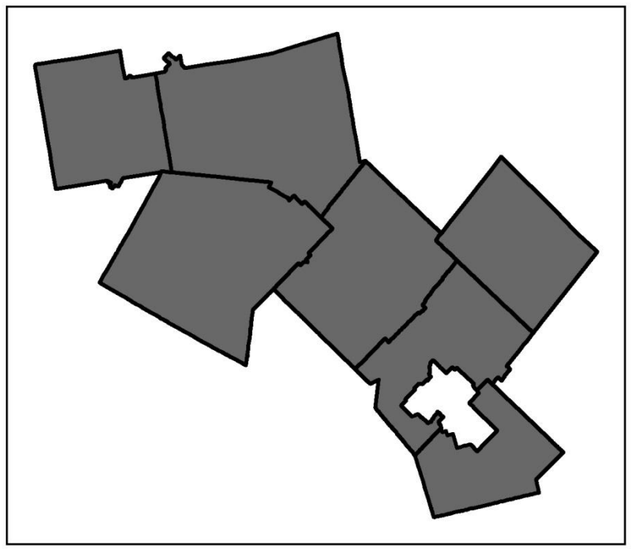
Appendix I: Maps

Wellington County
Natural Heritage System

Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



NAD 1983 UTM Zone 17N

Wellington County
Natural Heritage System

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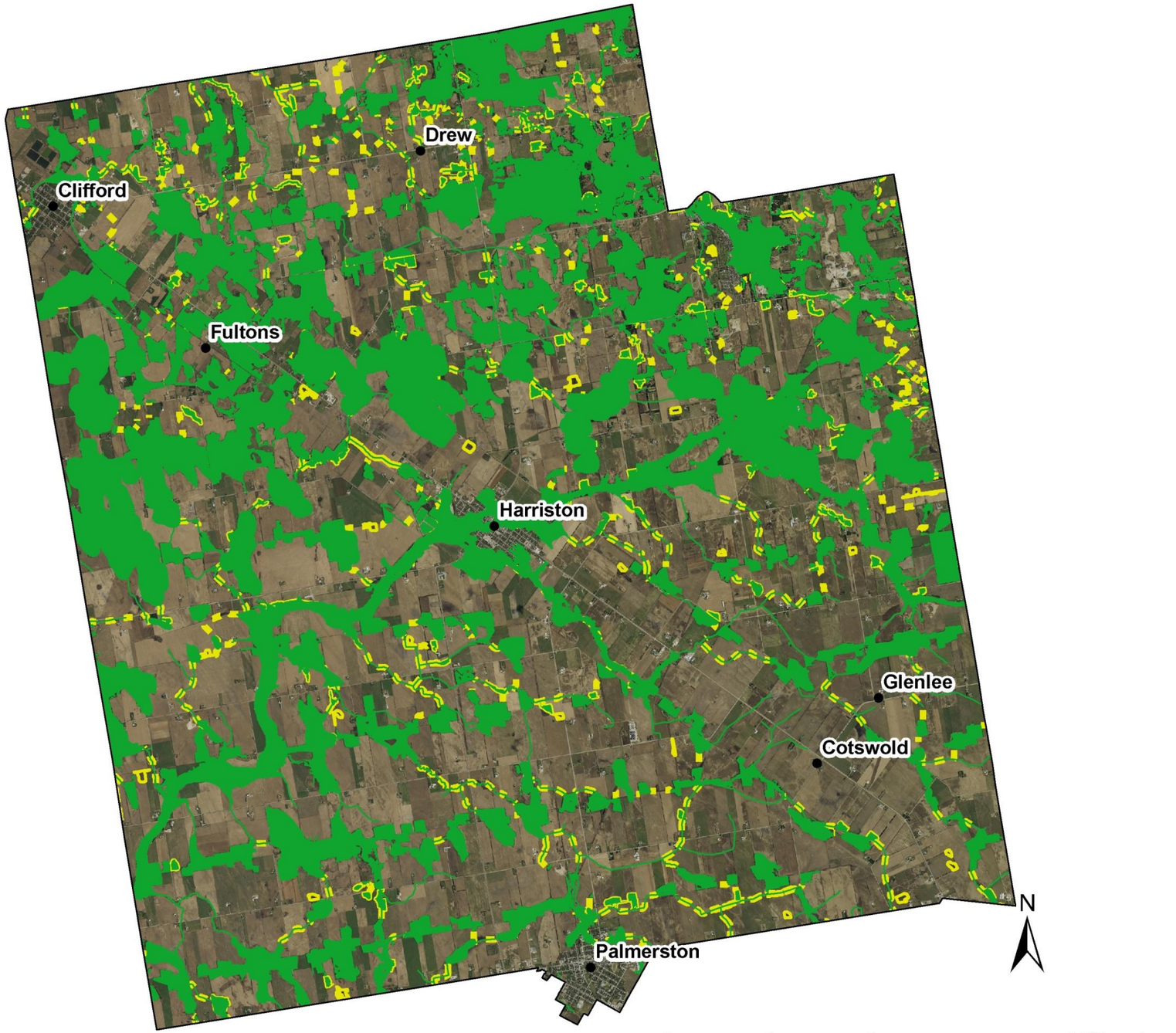
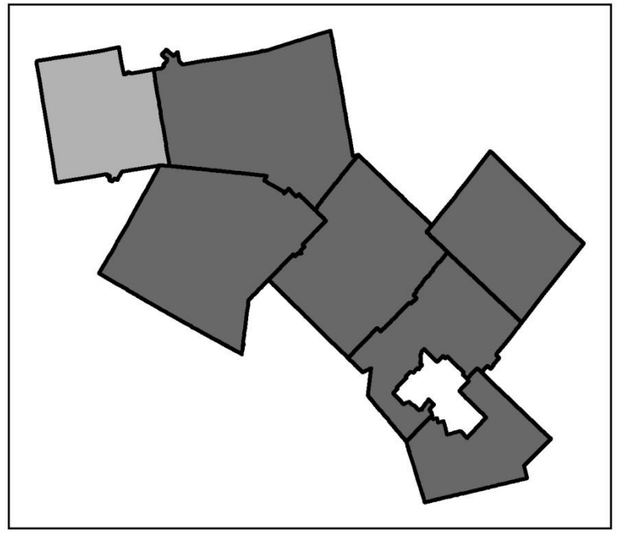


Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



NAD 1983 UTM Zone 17N

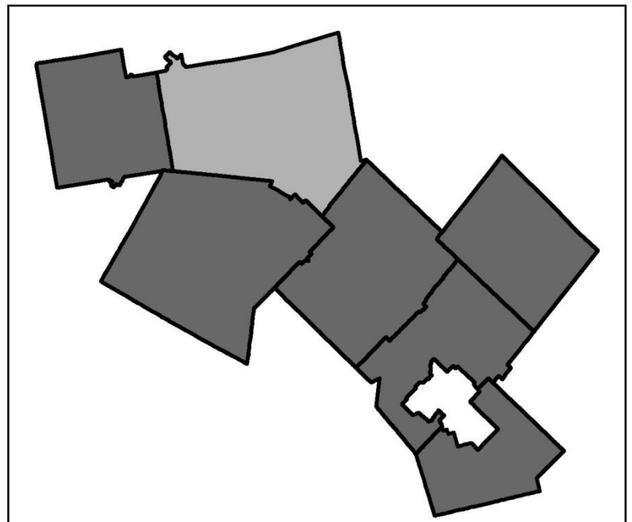
Wellington County
Natural Heritage System

Township of Wellington North

Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



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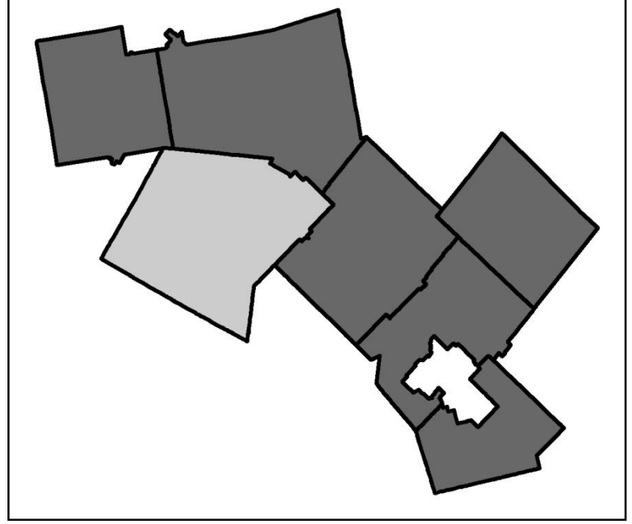
Wellington County Natural Heritage System

Township of Mapleton

Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



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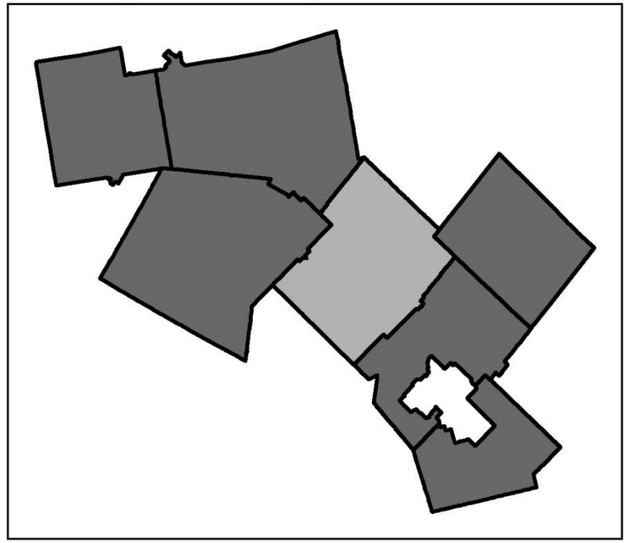
Wellington County
Natural Heritage System

Township of Centre Wellington

Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



NAD 1983 UTM Zone 17N

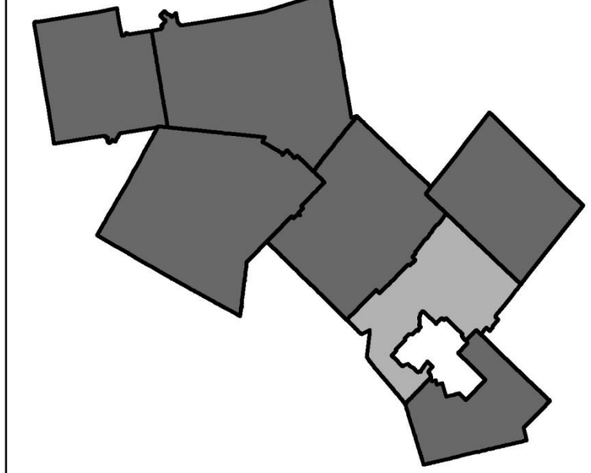
Wellington County
Natural Heritage System

Township of Guelph Eramosa

Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

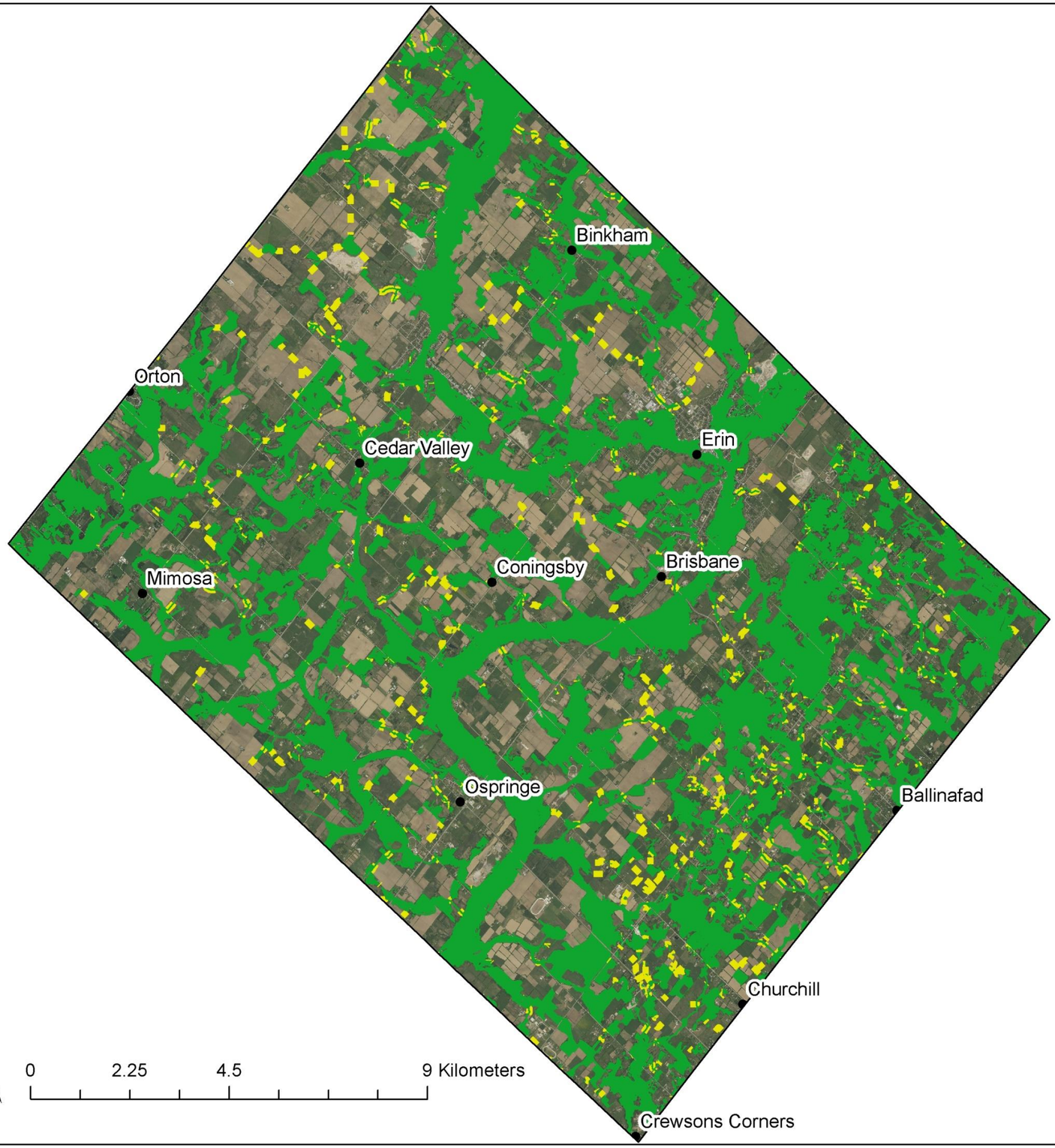
Wellington County



NAD 1983 UTM Zone 17N

Wellington County Natural Heritage System

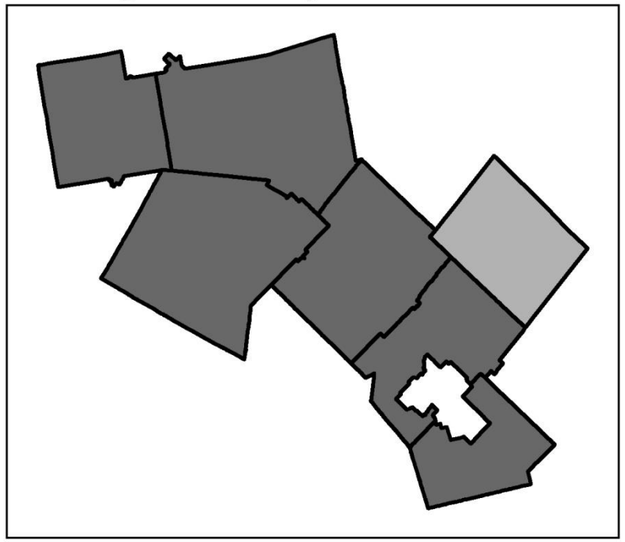
Town of Erin



Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



NAD 1983 UTM Zone 17N

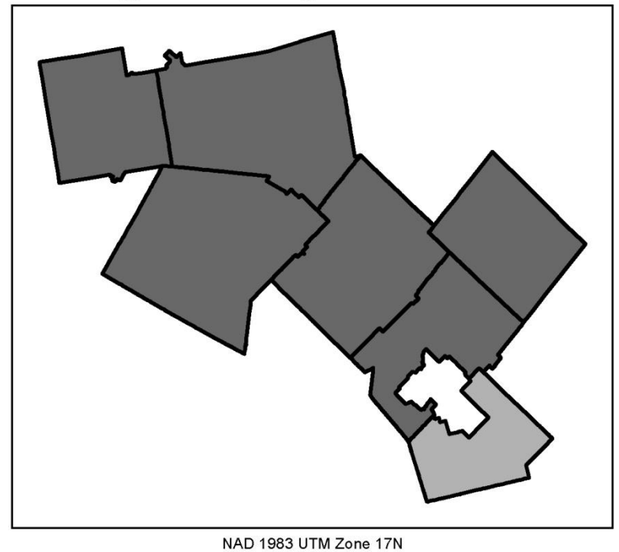
Wellington County Natural Heritage System

Township of Puslinch

Legend

- Existing Natural Heritage Components
- Enhancement Woodlands
- Enhancement Linkages

Wellington County



NAD 1983 UTM Zone 17N

Growth Plan Natural Heritage System and Wellington County Natural Heritage System

Legend

- Wellington County Townships
- Both Growth Plan NHS and County NHS
- Growth Plan Natural Heritage System
- Wellington County Natural Heritage System

NAD 1983 UTM Zone 17N

Appendix II: Evaluated Wetlands in Wellington County

Wetland Complex Name	Total Complex Area (Ha)	Overall Wetland Score
Acton Silver Creek Wetland Complex	170.79	720
Alma Wetland Complex	230.41	708
Alton Hillsburgh Wetland Complex	290.11	700
Arkell Bog Wetland Complex	44.42	630
Arkell Corwhin Wetland Complex	188.80	723
Badenoch Moffat Wetland Complex	479.74	792
Beverly Swamp Wetland Complex	2759.76	776
Brotherston Wetland Complex	136.46	436
Caledon Mountain Wetland Complex	266.93	845
Central Carroll Creek Wetland Complex	47.57	464
Clare Creek Wetland Complex	490.23	706
Clifford-Harriston Complex	54.75	Null
Clifford Harriston Wetland Complex	2805.59	789
Clythe Creek Wetland Complex	124.58	604
Conn Swamp	153.99	Null
Cotswold East Wetland Complex	25.61	391
Cotswold Wetland Complex	21.35	367
Cranberry Oil Well Bog Wetland Complex	372.57	854
Creek Bank Valley Wetland	238.07	551

Wetland Complex Name	Total Complex Area (Ha)	Overall Wetland Score
Damascus Southeast Wetland Complex	211.54	483
Derrynane Swamp	151.17	440
East Morriston Swamp	12.48	337
Ellis Creek Wetland Complex	524.84	772
Elmira Wetland	55.88	433
Eramosa River - Blue Springs Creek Wetland Complex	3444.71	776*
Erin Town Line Woods Swamp	19.71	268
Fairchild Creek Headwaters Wetland Complex	294.84	772
Farewell Swamp	199.00	746
Fletcher Creek Swamp	563.13	781
Glenchristie Wetland Complex	53.65	643
Glenlee Wetland Complex	26.82	409
Goldstone South Swamp	44.97	334
Guelph Junction Wetland Complex	485.43	782
Guelph Northeast Wetland Complex	285.23	620
Guelph Southwest Wetland Complex	90.76	467
Hanlon Creek Swamp	233.18	632
Harriston South Wetland Complex	74.21	441
Harriston West Wetland Complex	17.57	285
Harriston Wetland Complex	12.79	359

Wetland Complex Name	Total Complex Area (Ha)	Overall Wetland Score
Hopewell Creek Riparian Wetland	147.83	484
Howick Minto Wetland Complex	217.27	556
Inverhaugh Valley Wetland Complex	137.90	712
Irvine Creek Wetland Complex	286.13	523
Keldon Swamp	920.68	Null
Living Springs Wetland Complex	363.32	693*
Lower Cox Creek Wetland Complex	333.95	619
Lower Mountsberg Creek Wetland Complex	365.79	667
Luther Marsh	4033.07	874
Marden South Wetland Complex	757.81	669
Melgund Wetland Complex	24.30	341
Mill Creek Puslinch Wetland Complex	1804.10	788
Minto 1 Wetland	13.39	336
Minto 10 Wetland	9.97	254
Minto 11 Wetland	8.66	289
Minto 12 Wetland	12.72	258
Minto 13 Wetland	27.95	333
Minto 14 Wetland	2.04	326
Minto 2 Wetland	66.50	361
Minto 3 Wetland	54.41	421
Minto 4 Wetland	15.08	282

Wetland Complex Name	Total Complex Area (Ha)	Overall Wetland Score
Minto 5 Wetland	18.54	287
Minto 6 Wetland	17.35	385
Minto 7 Wetland	8.28	232
Minto 8 Wetland	14.25	360
Minto 9 Wetland	10.29	241
Minto Wallace 1 Wetland Complex	65.99	425
Minto Wallace 2 Wetland Complex	61.90	404
Moffat Creek Swamp	238.69	707
Morriston Marsh	4.63	253
Mountsberg Reservoir Marsh	230.81	701
North Cumnock Wetland Complex	254.20	619
North Woolwich Swamp	249.58	603
Palmerston Northwest Wetland Complex	36.04	312
Portuguese Swamp	60.68	654
Puslinch Lake Irish Creek Wetland Complex	485.11	763
Ritch Tract Swamp	328.50	563
Salem South Wetland Complex	151.14	565
South Saugeen River Wetland Complex	113.82	Null
Speed-Lutteral-Swan Creek Wetland Complex	5853.16	798*
Speed River Wetland Complex	661.58	808
Stirton South Swamp	43.27	276

Wetland Complex Name	Total Complex Area (Ha)	Overall Wetland Score
Torrence Creek Swamp	141.55	692
Trecastle Swamp	72.65	350
Valens Wetland Complex	290.46	774
Wagram Wetland Complex	216.89	585
Waterloo Guelph Townline Wetland	81.08	591
Wellington Huron Wetland	25.75	391
West Credit River Wetland Complex	907.76	785

*Where more than one overall score is listed for the complex, the most recent overall score is shown (data source - Ontario Ministry of Natural Resources and Forestry. Dataset Name: Wetland. Ontario: Queen's Printer of Ontario, 2017.)

Appendix III: Provincially Significant Species Documented Within Wellington County

Common Name	Scientific Name	Provincial Rank[1]	Provincial Status[2]	Federal Status[3]	Source	Last Known Observation	Habitat present
Plants							
American Chestnut	*Castanea dentata*	S1S2	ENDANGERED	ENDANGERED	NHIC 2015	1983	Yes
American Gromwell	*Lithospermum latifolium*	S3	No Status	No Status	NHIC 2015	1941	Yes
Beaked Spiked Rush	*Eleocharis rostellata*	S3	No Status	No Status	NHIC 2015	1909	Yes
Burning Bush	*Eonymus atropureus*	S3	No Status	No Status	NHIC 2015	1902	Yes
Butternut	*Juglans cinerea*	S2?	ENDANGERED	ENDANGERED	NHIC 2015	2009	Yes
Canadian Black-snakeroot	*Sanicula canadensis var. grandis*	S2	No Status	No Status	NHIC 2015	1904	?
Carey's Sedge	*Carex careyana*	S2	No Status	No Status	NHIC 2015	1997	Yes
Carolina Vetch	*Vicia caroliniana*	S2	No Status	No Status	NHIC 2015	1948	Yes
Downy False Foxglove	*Aureolaria virginica*	S1	No Status	No Status	NHIC 2015	1990	Yes
False Hop Sedge	*Carex lupuliformis*	S1	ENDANGERED	ENDANGERED	NHIC 2015	1902	?
Harbinger-of-Spring	*Eriginea bulbosa*	S3	No Status	No Status	NHIC 2015	1942	Yes
Hill's Pond Weed	*Potamogeton hillii*	S2	SPECIAL CONCERN	SPECIAL CONCERN	NHIC 2015	?	?
Large Roundleaf Orchid	*Platanthera macrophylla*	S2	No Status	No Status	NHIC 2015	?	?
Moss Flox	*Phlox subulata*	S1?	No Status	No Status	NHIC 2015	1974	?
Northern Hawthorn	*Craetagus dissona*	S3	No Status	No Status	NHIC 2015	1942	Yes
Pignut Hickory	*Carya glabra*	S3	No Status	No Status	NHIC 2015	1980	Yes
Ram's Head Lady's Slipper	*Cypripedium arietinum*	S3	No Status	No Status	NHIC 2015	1986	?
Rugulose Grapefern	*Botrychium rugulosum*	S2	No Status	No Status	NHIC 2015	1979	?
Scarlet Beebalm	*Monarda didyma*	S3	No Status	No Status	NHIC 2015	1892	?
Sharp-fruited Rush	*Juncus acuminatus*	S3	No Status	No Status	NHIC 2015	1902	Yes
Shrubby St. John's Wart	*Hypericum prolificum*	S2	No Status	No Status	NHIC 2015	?	Yes
Slender Stubble Moss	*Gyroweisia tenuis*	S1	No Status	No Status	NHIC 2015	?	?
Slim-flowered Muhly	*Muhlenbergia tenuiflora*	S2	No Status	No Status	NHIC 2015	1989	?
Smith's Bulrush	*Schoenoplectus smithii*	S3	No Status	No Status	NHIC 2015	1902	Yes
Soft-Hairy False Gromwell	*Onosmodium molle ssp. hispidissimum*	S2	No Status	No Status	NHIC 2015	?	?

Woodland Flax	*Linum virginianum*	S2	No Status	No Status	NHIC 2015	?	Yes
Birds							
Acadian Flycatcher	*Empidonax virescens*	S2S3B	ENDANGERED	ENDANGERED	eBird 2018	1988	?
Bank Swallow	*Riparia riparia*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Bald Eagle	*Haliaeetus leucocephalus*	S4B S2N	SPECIAL CONCERN	Not At Risk	eBird 2018	2017	Yes
Barn Swallow	*Hirundo rustica*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Black Tern	*Chlidonia niger*	S3B	SPECIAL CONCERN	Not At Risk	eBird 2018	2007	Yes
Bobolink	*Dolichonyx oryzivorus*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Canada Warbler	*Wilsonia canadensis*	S4B	SPECIAL CONCERN	THREATENED	eBird 2018	2017	Yes
Cerulean Warbler	*Dendroica cerulea*	S3B	THREATENED	ENDANGERED	eBird 2018	2005	?
Chimney Swift	*Chaetura pelagica*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Common Nighthawk	*Chordeiles minor*	S4B	SPECIAL CONCERN	THREATENED	eBird 2018	2017	Yes
Eastern Meadowlark	*Sturnella magna*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Eastern Whip-poor-will	*Caprimulgus vociferus*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Golden Eagle	*Aquila chrysaetos*	S2B	ENDANGERED	NOT AT RISK	eBird 2018	2017	No
Golden-winged Warbler	*Vermivora chrysoptera*	S4B	SPECIAL CONCERN	THREATENED	eBird 2018	2000	Yes
Horned Grebe	*Podiceps auritus*	S1B	SPECIAL CONCERN	SPECIAL CONCERN	eBird 2018	2018	Yes
Henslow's Sparrow	*Ammodramus henslowii*	SHB	ENDANGERED	ENDANGERED	NHIC 2015	1988	?
Least Bittern	*Ixobrychus exilis*	S4B	THREATENED	THREATENED	eBird 2018	2017	Yes
Loggerhead Shrike	*Lanius ludovicianus*	S2B	ENDANGERED	ENDANGERED	NHIC 2015	1982	?
Olive-sided Flycatcher	*Contopus cooperi*	S4B	SPECIAL CONCERN	THREATENED	eBird 2018	2016	Yes
Peregrine Falcon	*Falco peregrinus*	S3B	SPECIAL CONCERN	SPECIAL CONCERN	eBird 2018	2017	Yes
Prairie Warbler	*Dendroica discolor*	S3B	Not At Risk	Not At Risk	eBird 2016	2016	Yes
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4B	SPECIAL CONCERN	THREATENED	eBird 2018	2016	Yes
Short-eared Owl	*Asio flammeus*	S4B S2N	SPECIAL CONCERN	SPECIAL CONCERN	eBird 2018	2017	Yes
Yellow-breasted Chat	*Icteria virens*	S2B	SPECIAL CONCERN	SPECIAL CONCERN	eBird 2018	June 14, 2017	Yes
Mammals							
Eastern Small-footed Myotis	*Myotis lebii*	S2	ENDANGERED				Yes

Little Brown Myotis	*Myotis lucifugus*	S4	ENDANGERED	ENDANGERED			Yes
Northern Myotis	*Myotis septentrionalis*	S3	ENDANGERED	ENDANGERED			Yes
Tricolored Bat	*Pipistrellus subflavus*	S3?	No Status	No Status			Yes
Herpetofauna							
Blanding's Turtle	*Emydoidea blandingii*	S3	THREATENED	THREATENED	NHIC 2015	1988	Yes
Butler's Gartersnake	*Thamnophis butleri*	S2	ENDANGERED	ENDANGERED	NHIC	2009	Yes
Eastern Massassauga	*Sistrurus catenatus*	S3	THREATENED	THREATENED	NHIC 2015	1962	Yes
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	SPECIAL CONCERN	SPECIAL CONCERN	NHIC 2015	1990	Yes
Jefferson Salamander	*Ambystoma jeffersonianum*	S2	ENDANGERED	THREATENED	NHIC 2015	1985	?
Jefferson X Blue-spotted Salamander	*Ambystoma hybrid pop. 1*	S2	No Status	No Status	NHIC 2015	1990	Yes
Milksnake	*Lampropeltis triangulum*	S3	SPECIAL CONCERN	SPECIAL CONCERN	NHIC 2015	1990	Yes
Northern Map Turtle	*Graptemys geographica*	S3	SPECIAL CONCERN	SPECIAL CONCERN	NHIC 2015	1924	?
Snapping Turtle	*Chelydra serpentine*	S3	SPECIAL CONCERN	SPECIAL CONCERN	GRCA 2017	2017	Yes
Fishes							
Black Redhorse	*Moxostoma duquesnei*	S2	THREATENED	THREATENED	NHIC 2015	1982	Yes
Greater Redhorse	*Moxostoma valenciennesi*	S3	No Status	No Status	NHIC 2015	1997	Yes
Redside Dace	*Clinostomus elongatus*	S2	ENDANGERED	ENDANGERED	NHIC 2015	2001	Yes
Silver Shiner	*Notropis photogenis*	S2S3	THREATENED	SPECIAL CONCERN	NHIC 2015	1981	Yes
Mussels							
Rainbow Mussel	*Villosa iris*	S2S3	ENDANGERED	THREATENED	NHIC 2015		
Insects							
A Mayfly	*Ameletus walleyi*	SH	No Status	No Status	NHIC 2015	1969	?
Giant Lacewing	*Polystoechotes punctatus*	SH	No Status	No Status	NHIC 2015	?	?
Clam-tipped Emerald	*Somatochlora tenebrosa*	S2S3	No Status	No Status	NHIC 2015		
Mottled Darner	*Aeshna clepsydra*	S3	No Status	No Status	NHIC 2015	1995	?
Rusy-patched Bumblebee	*Bombus affinis*	S1	ENDANGERED	ENDANGERED	NHIC 2018	1980	
Tawny Emperor	*Asterocampa clyton*	S2S3	No Status	No Status	NHIC 2015	1997	?

Appendix IV: Stakeholder Engagement

Open House Notice

COUNTY OF WELLINGTON

NOTICE OF OPEN HOUSE

Wellington County Natural Heritage System

Tuesday April 3, 2018
4:00 pm - 8:00 pm

at the Aboyne Hall
Wellington County Museum and Archives
0536 Wellington Road 18, Fergus

Wellington County retained the Grand River Conservation Authority (GRCA) to develop a Natural Heritage System across the County. The project was designed to identify a natural heritage system with a 'made in Wellington' approach that reflects the diversity of natural heritage resources on the County landscape and respects the balance between natural systems and the importance of farming and other land uses.

You are invited to this drop-in format Open House to view the draft mapping, ask project team members questions about the project, and learn about stewardship opportunities for landowners.

This Open House marks the beginning of public consultation so if you are unable to attend, please feel free to phone or email the address below to provide your input or ask questions.

For more information, please feel free to contact the County Planning Department at:

519.837.2600 x2040 | countynhs@wellington.ca

or visit our website at:

https://www.wellington.ca/en/resident-services/pl-majorprojects.aspx

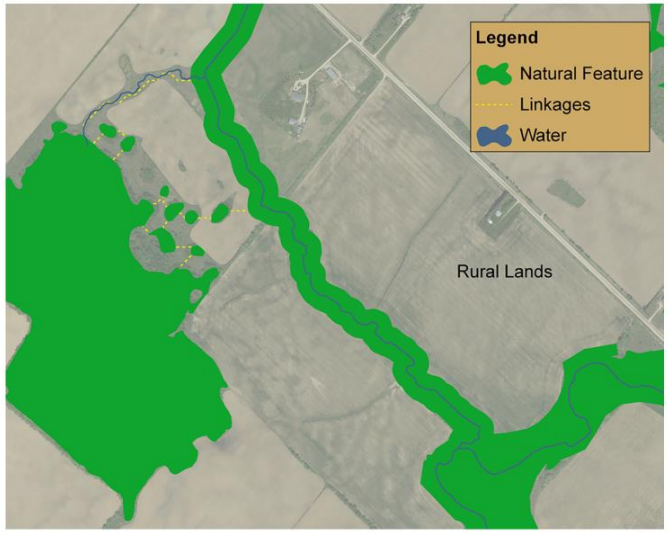
ALTERNATE FORMATS OF THIS NOTICE ARE AVAILABLE UPON REQUEST

Open House Story Boards

Wellington County Natural Heritage System

What is a Natural Heritage System?

A natural heritage system is a network of interconnected natural features and areas such as wetlands, woodlands, valleylands, lakes and rivers.



Natural Heritage Systems are identified to help conserve biological diversity, maintain ecological functions (e.g. movement corridors for wildlife, endangered species habitat) and sustain ecosystem services that we all depend on (e.g. pollination, clean water, flood damage reduction).

Biological Diversity

The Henslow's Sparrow and the Spotted Turtle are two species at risk found in Wellington County

Ecological Functions

An aerial photograph showing the importance of corridors within a rural landscape

Ecosystem Services

Bees and other pollinators are crucial for the pollination of fruit, vegetable, oil, seed, and nut crops

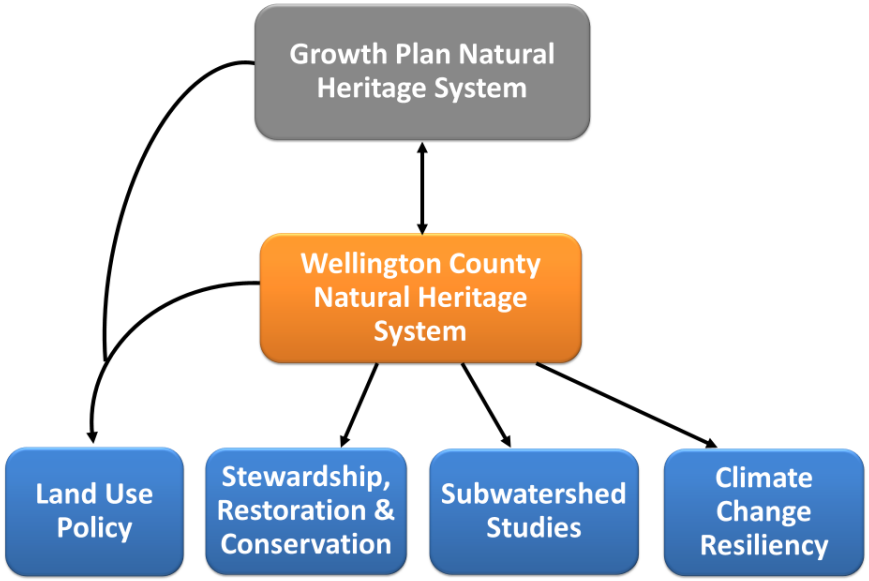
Wellington County Natural Heritage System

The relationship to the Growth Plan Natural Heritage System

The County recognizes that the regional scale Natural Heritage System in the Growth Plan for the Greater Golden Horseshoe (Growth Plan NHS) was recently issued and that decisions on planning matters must conform with the policies related to that system.

At the same time, the County feels that it needs a more detailed and locally developed Natural Heritage System as a scientific basis for:

- ✓ Refinements to the Growth Plan NHS when we amend the County Official Plan to conform with the Growth Plan and consider possible future policy amendments
- ✓ Stewardship programs and strategies
- ✓ Watershed and subwatershed planning
- ✓ Developing climate change strategies



Wellington County Natural Heritage System

What is the goal of this project?

The goals of this project are to identify, through the engagement of stakeholders, a Natural Heritage System that will:

- ✓ Maintain and/or improve local and regional biodiversity
- ✓ Recognize local-scale linkage between and among natural heritage features and areas
- ✓ Provide a scientific basis for land and water stewardship activities, conservation land acquisition, priorities for Inventory Programs, and possible future amendments to the County Official Plan
- ✓ Inform resource-management decision-making
- ✓ Support sustainable economic opportunities
- ✓ Support sustainable recreational use

Wellington County Natural Heritage System

What is included in Wellington's Natural Heritage System Mapping?

Existing Natural Heritage Components	
Components	**Criteria**
Wetlands	✓ Any evaluated non-Provincially Significant wetlands and Provincially Significant wetlands
	✓ Any unevaluated wetlands mapped by the MNRF or Conservation Authorities
Woodlands	✓ Woodlands in Urban Centers: ≥ 1 ha and ≥ 30 m wide
	✓ Woodlands in Rural Areas: ≥ 4ha and ≥ 30m wide
	✓ Woodlands of any size that is contained by or is within 30m of an existing natural heritage component meeting a criteria threshold
	✓ Woodlands containing a vegetation community with a provincial ranking of S1, S2 or S3 (as ranked by the NHIC) or a global ranking of G1, G2 or G3 (as ranked by the NatureServe Network) (text criterion)
	✓ Woodlands containing 10 or more trees/ha greater than 100 years old (text criterion)
	✓ Woodlands containing 10 or more trees/ha that are ≥ 50 cm in diameter (text criterion)
Valleylands	✓ Valleylands associated with watercourses, waterbodies and wetlands
	✓ Valleylands representing distinctive landforms such as oxbows, bottomlands, terraces, deltas, etc. (text criterion)
Aquatic Habitat	✓ All watercourses
	✓ Waterbodies connected to a watercourse
	✓ All headwaters (text criterion)
	✓ Waterbodies within 30 m of an existing natural heritage component meeting a criteria threshold
Significant Wildlife Habitat (SWH)	✓ All identified SWH (text criterion)
Habitat of Endangered and Threated Species	✓ All identified habitat of Endangered and Threatened Species (text criterion)
Areas of Natural and Scientific Importance(ANSI)	✓ All Life Science ANSIs
Environmentally Sensitive Areas (ESA)	✓ All ESAs

Stewardship Components	
Components	**Criteria**
Enhancement Woodlands	In lower-tier municipalities with ≤30% woodland cover: ✓ Woodlands in Rural Areas: 1-4 ha in size and ≥ 30m wide
Enhancement Linkages	✓ Flexible connections between Existing Natural Heritage Components

Wellington County Natural Heritage System

Methods used to map Wellington County's draft Natural Heritage System

Step 1: Identification of Existing Natural Heritage Components

- The best available data from Conservation Authorities and the Province were used to map natural features.
- Existing Natural Heritage Components of the draft Natural Heritage System were selected using science-based criteria.
- Ecologically important components that could not be mapped due to insufficient data were included in the draft Natural Heritage System as text.

Step 2: Identification of Stewardship Components

- Enhancement Linkages were mapped using an objective, automated software tool (Linkage Mapper*) in a Geographic Information Systems (GIS).
- Enhancement Woodlands were selected using science-based criteria. If enhanced through voluntary stewardship action these woodlands could increase the overall woodland cover in Wellington County.

We want to hear from YOU!
Please leave your comments and suggestions on a comment form!

* McRae, B.H., and D.M. Kavanagh. 2014. Linkage Mapper connectivity analysis software. The Nature Conservancy, Seattle, WA. [Available at: http://www.circuitscape.org/linkagemapper].

Wellington County Natural Heritage System

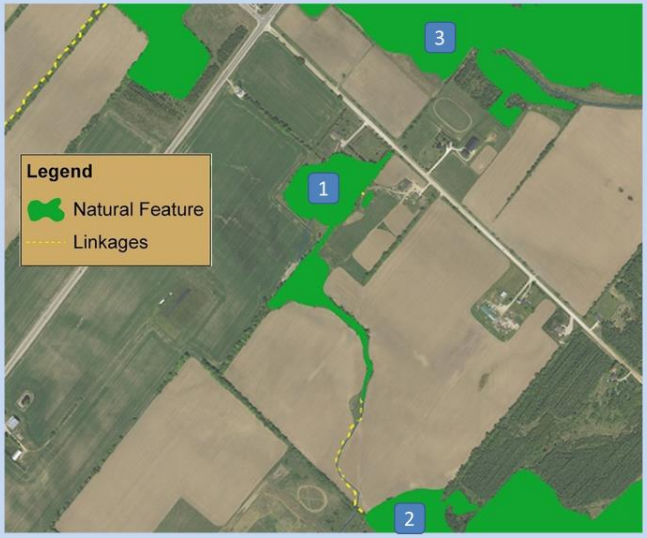
What are Enhancement Linkages?

Enhancement Linkages aim to improve or create connections between Existing Natural Enhancement Components in the Natural Heritage System.

Enhancement linkages were mapped by identifying the "path of least resistance" between Existing Natural Heritage Components.

Enhancement Linkages should be thought of as ***approximate*** and ***flexible*** locations.

An example of the "Path of Least Resistance"



Feature 1 is isolated from the other natural features on the landscape. The "path of least resistance" occurs between feature 1 and feature 2 , rather than feature 3 , because this linkage follows a watercourse and does not require a road crossing.

Wellington County Natural Heritage System

What programs and funding are available to landowners?

Wellington County and its Stewardship Partners have a long history of working with residents to protect and improve natural heritage in the County through voluntary stewardship programs such as:

- The Green Legacy Programme
- Trees for Mapleton
- Trees for Minto
- Wellington Rural Water Quality Program
- CVC Landowner Action Fund
- Halton Watershed Stewardship program
- Reforestation and Tree Planting Programs offered by your local Conservation Authority
- …and more!

Wellington County Natural Heritage System Q and A

County Natural Heritage System Questions and Answers

This project is striving to identify a natural heritage system that best reflects the County of Wellington's natural heritage with a 'made in Wellington' approach that respects the balance between natural systems and the importance of agriculture and other land uses on the County landscape.

What will the Grand River Conservation Authority (GRCA) produce for the County at the end of this project?

The GRCA will provide:

- Digital mapping of the County Natural Heritage System;
- An analysis of the Natural Heritage System for the Growth Plan for the Greater Golden Horseshoe (Growth Plan NHS);
- A final report that includes a general description of how the mapping was done as well as appendices with technical information; and
- The GRCA will present the final report to the County Planning Committee.

The County will post copies of the above products on its web site.

What support is available for landowners who want to do stewardship?

Stewardship projects are voluntary.

Landowners who are planning or considering stewardship projects on their lands can begin using the County Natural Heritage System to see where there may be opportunities. For advice to identify the best locations, landowners can contact their Conservation Authority stewardship or landowner outreach service.
Green Legacy staff can also connect you with planting advice and services that may be available in your area.

There are a number of funding programs available to assist landowners undertaking stewardship projects on their property. This includes the Wellington Rural Water Quality Program and the Green Legacy Program, in addition to a number of provincial initiatives. Each program has its own goals, grant rates and eligibility criteria. Your local Conservation Authority stewardship staff can help to connect you with potential funding opportunities for your project.

What is the difference between this County Natural Heritage System and the Greenlands System that is in the County Official Plan?

The County Official Plan Greenlands System relates to policies in the Provincial Policy Statement about protecting natural heritage features from development and protecting people and property from lands that are subject to flooding, erosion or unstable slopes. The Greenlands and Core Greenlands designations show the boundaries of the features that were included. As a result, many of the features in the Official Plan Greenlands System are also in the County Natural Heritage System. The main difference is that the County Natural Heritage System identifies linkages between the features and potential areas for enhancement.

Will the County Natural Heritage System add to the Conservation Authority Regulated Area?

Conservation Authority Regulations are focused on natural hazards such as floodplains, watercourses, slopes, wetlands, etc. Changes to Conservation Authority regulated area mapping will focus on these features and the lands adjacent to them. The Conservation Authority regulation for natural hazards does not include linkages so linkages will not be added to the Regulated Area mapping.

Since the Province has issued a Natural Heritage System for the Growth Plan that includes Wellington, why is the County developing a Natural Heritage System?

The County recognizes that planning decisions made under the Planning Act must conform with the policies for the Growth Plan Natural Heritage System (Growth Plan NHS). The County will be required to add the Growth Plan NHS as an overlay to the County Official Plan. This change will be part of a larger Official Plan Amendment to conform with the Growth Plan that we need to complete by 2022 (conformity OPA). When we draft the conformity OPA, we will have an opportunity to refine the Growth Plan Natural Heritage System to make it more precise. In order to have a scientific basis for the Growth Plan NHS refinement process, possible future policy amendments, and mapping to support stewardship efforts, the County needs a more detailed and locally developed natural heritage system.

How do I provide feedback and when is the deadline for input?

The mapping presented at this time is Draft. You can provide comments in a number of ways:

- Fill in the comment form on our web site at: **www.wellington.ca/naturalheritagesystem**
- Send an email to us at **countynhc@wellington.ca**
- Write to:

  Aldo Salis, Director of Planning
  County of Wellington, 74 Woolwich Street, Guelph, ON N1H 3T9

We would appreciate getting your comments by May 7th. Comments received after May 7th will be kept on file for consideration in future initiatives and the County is always open to input on planning matters of interest to the public. You are also welcome to provide feedback on the comment form on the next page.

ALTERNATE FORMATS AVAILABLE UPON REQUEST.

Comment Form

The mapping presented at this time is Draft. You can provide comments in a number of ways:

- Fill in the comment form on our web site at: **www.wellington.ca/naturalheritagesystem**
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1. **Do you think we selected the right features to include in the system?**

2. **Do we show the features correctly on the draft mapping? If not, what changes would you recommend?**

3. **Do you agree with showing the enhancement linkages with arrow symbols?If not, how would you recommend showing the linkages?**

4. **What other feedback would you like the County to consider?**

First Name: _____ Last Name: _____
Telephone: _____ Email: _____
Address: _____

I hereby request the County of Wellington Planning Department to keep me informed of all further public meetings in relation to this matter. Disclosure of this information is governed by the Municipal Freedom of Information and Protection of Privacy Act, R.S.S 1990. Questions about this collection and disclosure should be directed to Mark Paoli, Senior Planner, County of Wellington.

ALTERNATE FORMATS AVAILABLE UPON REQUEST.

Appendix V: Presentation to Wellington Federation of Agriculture

Draft Mapping of a Natural Heritage System in the County of Wellington

Presentation to the Wellington Federation of Agriculture

April 3rd, 2018

Grand River Conservation Authority

Natural Heritage Systems & Agriculture

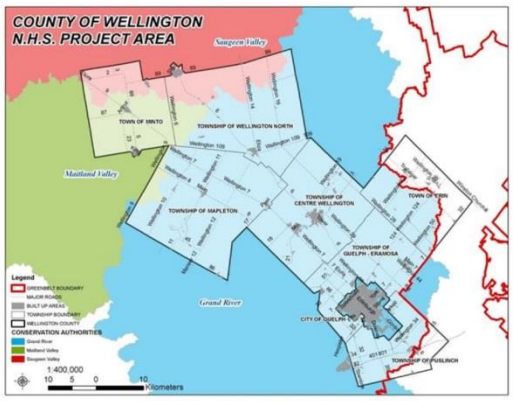
- Agricultural lands are not only economically beneficial to Wellington County but can also produce ecosystem services
- Agricultural lands can support ecological function of nearby natural cover
- Agricultural lands can support hydrological connectivity
- The benefits of agricultural lands to human health and the environment are a source of pride for many farmers and the County

What happens next for this project

- Today kicks off a one month commenting period
- In May, the County and GRCA will review and consider the input received
- In June, the GRCA will present a report to the County Planning Committee

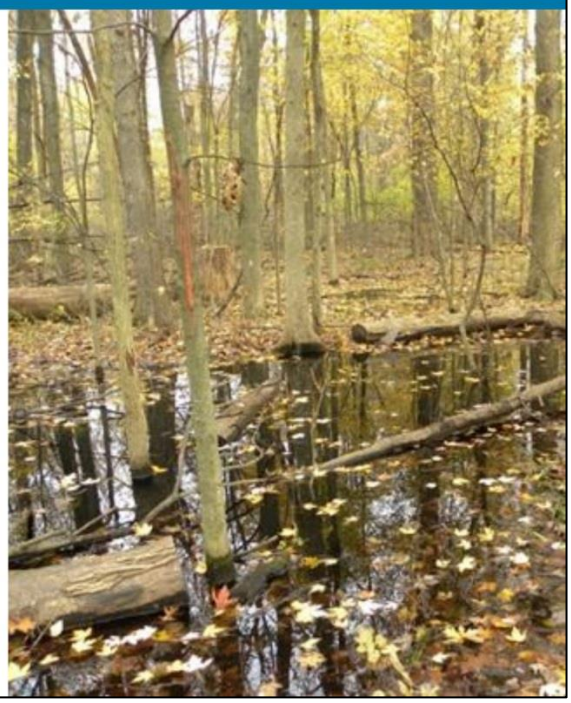
Initiating a Wellington NHS

In the fall of 2016, County Council passed a recommendation requesting GRCA provide a proposal to develop a natural heritage system for the County.



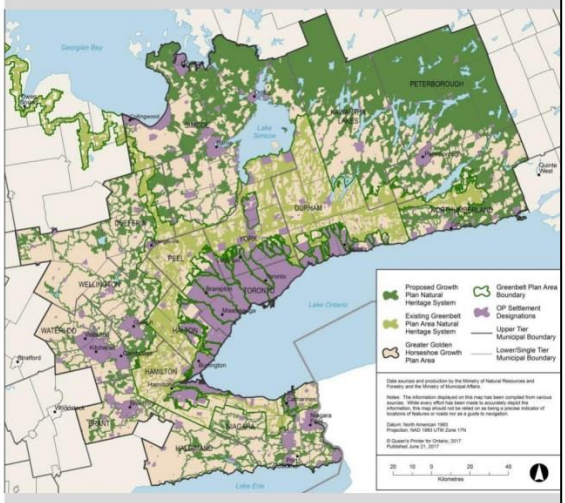
Grand River NHS Framework

GRCA's Strategic Plan identifies the development of a Natural Heritage Systems Framework for the Grand River watershed as a priority.

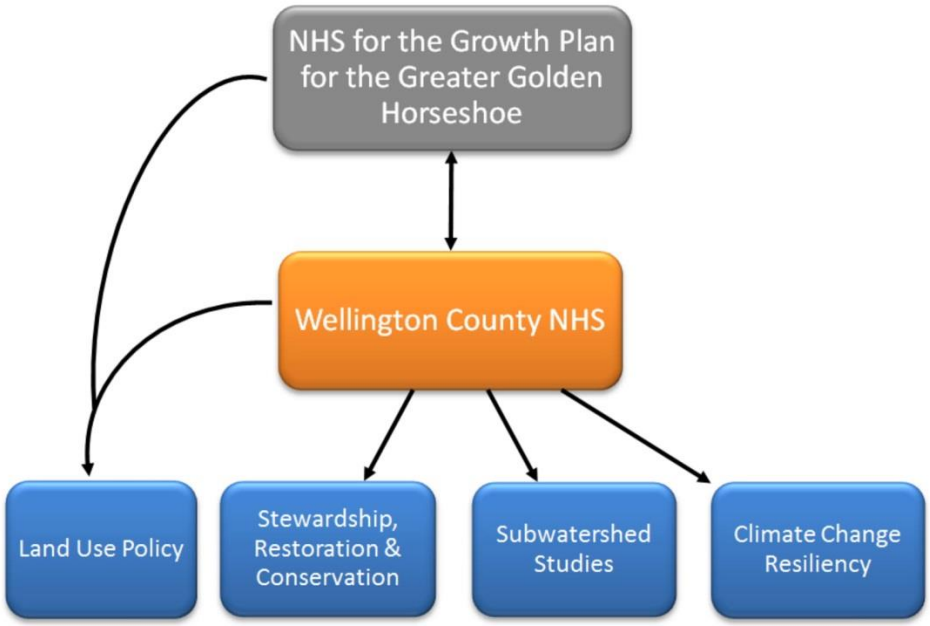


Proposed NHS for the GPGGH

In the Summer of 2017, the Province released the proposed regional NHS for the Growth Plan for the Greater Golden Horseshoe region.



A multi-purpose NHS



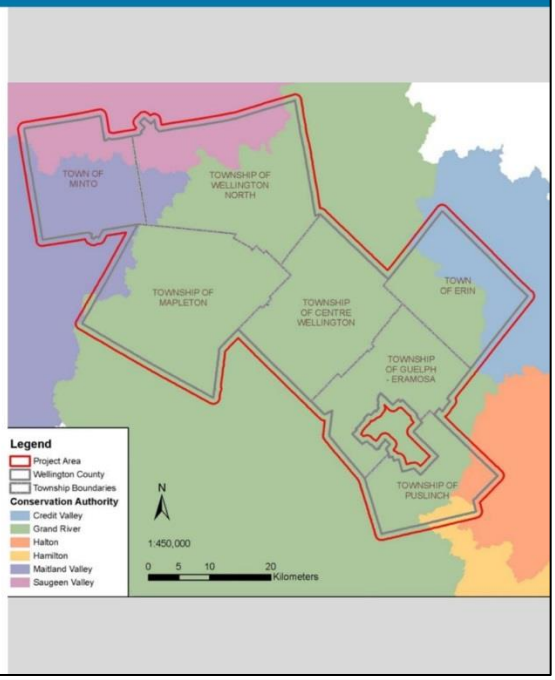
Overall Goal

This project is striving to identify a natural heritage system that best reflects the County of Wellington's natural heritage with a 'made in Wellington' approach that respects the balance between natural systems and the importance of agriculture and other land uses on the County landscape.

Project Area & Committee

County of Wellington including Greenbelt areas + 1km buffer.

Coordination of project by GRCA with County staff & other CA reps to provide strategic direction.



The system was built in two steps

Step 1: Identification of Existing Natural Heritage Components

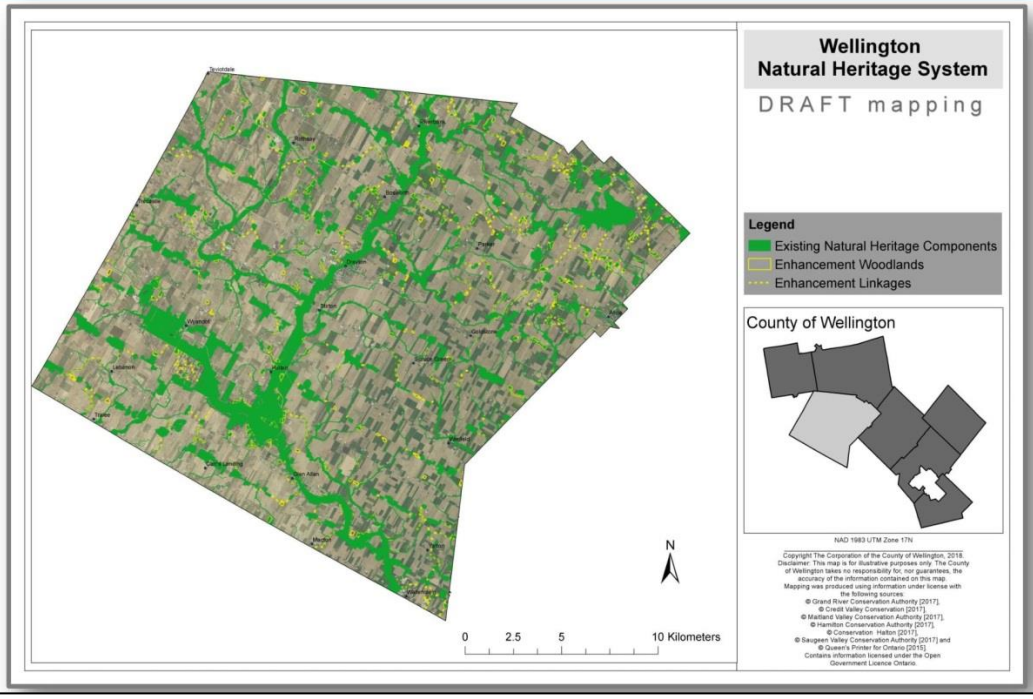
- Existing Natural Heritage Components for the draft Natural Heritage System were selected using science-based criteria.
- The best available data from Conservation Authorities and the Province were used to map natural features.
- Ecologically important components that could not be mapped due to insufficient data were included in the draft Natural Heritage System as text.

The system was built in two steps

Step 2: Identification of Stewardship Components

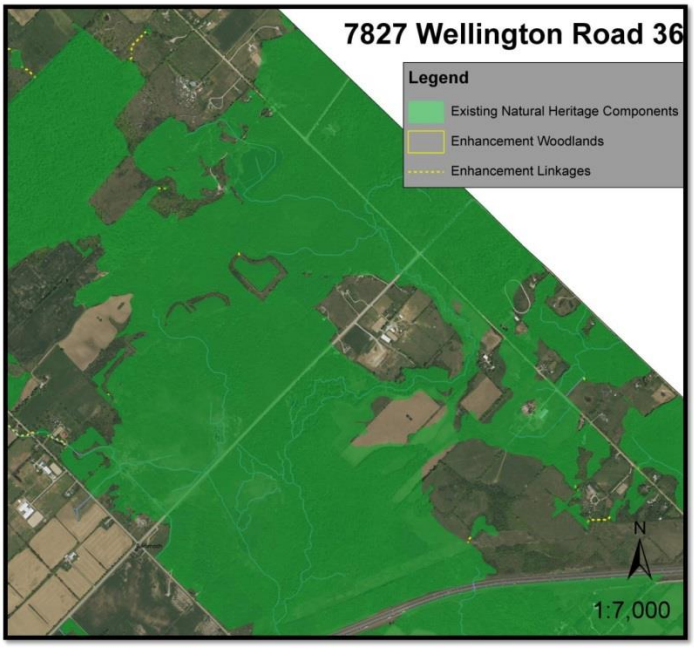
- **Enhancement Linkages** were mapped using an objective, automated software tool (Linkage Mapper*) in a Geographic Information System (GIS).
- **Enhancement Woodlands** were selected using science-based criteria. If enhanced through voluntary stewardship action these woodlands could increase the overall woodland cover in Wellington County.

Natural Heritage System

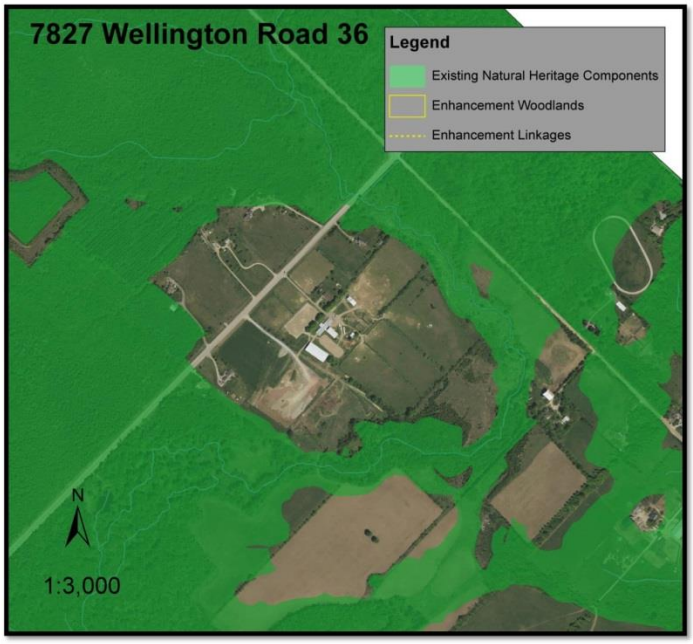


Natural Heritage System

Agricultural Property (Puslinch)



Agricultural Property (Puslinch)



Agricultural Property (Puslinch)

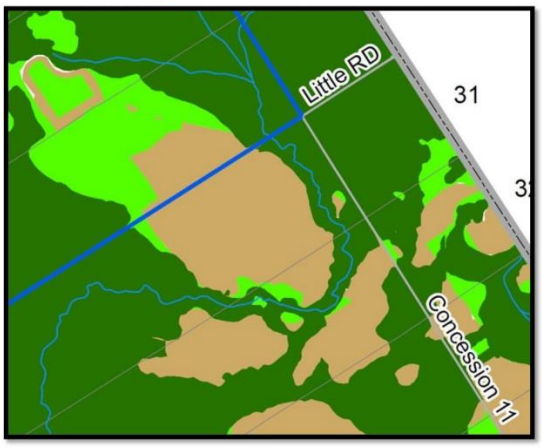
Valleylands Floodplain Component

Wetlands Component

Agricultural Property (Puslinch)

Wellington NHS

Wellington Greenlands



A Tool for Stewardship

Wellington County and its Stewardship Partners have a long history of working with residents to protect and improve natural heritage in the County through voluntary stewardship programs such as:

- ✓ The Green Legacy Programme
- ✓ Trees for Mapleton
- ✓ Trees for Minto
- ✓ Wellington Rural Water Quality Program
- ✓ CVC Landowner Action Fund
- ✓ Halton Watershed Stewardship Program
- ✓ Reforestation and Tree Planting Programs offered by your local Conservation Authority

…and more!

Photo: Grand River Conservation Authority/Shari Lovell

Paris and Galt Moraine Policy Area Policies

- Agriculture is a major activity on the moraines and is an accepted and supported use of land. The County will encourage best practices for agriculture by developing and supporting stewardship programs.
- Large scale development proposals will be required to demonstrate that ground and surface water functions will be maintained, and where possible, enhanced.
- Small scale developments that do not rely on significant site alterations will not normally be required to demonstrate protection of the moraines. Where planning approvals for small scale developments are needed, best practices for site alteration will be required to reduce or eliminate cut and fill activities that would fill in land surface depressions.

Appendix VI: Comments Received on the Wellington County Natural Heritage System

Summary of Public Comments on the County of Wellington Natural Heritage System		
Submission	Comment	Response
#1	A) Mapping is at such a large scale it is hard to make sense of the mapping. There are areas where there should be dark green and there are not. There are enhanced linkage areas shown in yellow, which is unnecessary as the stream corridor is completely vegetated on both sides. B) There are areas marked Natural Heritage Components in green on the County Map that are absolutely devoid of any natural features whatever, other than a ditch, drain or stream. C) The Software used by the GRCA, the same used by the province, I understand, apparently does not include decommissioned railway right of way as a medium for enhanced linkage purposes. If so, this is something that you will need to attend to manually. In my view, these abandoned rail corridors can potentially be as effective as a stream corridor. In the case of the Elora Cataract Trail way, owned by the GRCA, and CVC, it links two watersheds, the Grand and Credit, three major parks spaces, Forks of the Credit Provincial Park, Belwood Conservation Area, and the Elora Gorge Conservation Area, a variety of landscapes, rural and urban communities. Further, there are many initiatives along the way to create further linkages to local park space. Among others elsewhere in the County, we have in the Township of Centre Wellington alone, the CNR. ROW from Fergus to Alma, the CNR ROW from Elora to Guelph, the CNR ROW, now owned by the County and converted to the Trestle Bridge Trail and associated linkages to Grand River, the museum and nursing home complexes, and soon to be hospital lands. Even those ROW that been conveyed to adjacent landowners remain as effective, vegetated linkages.	• The scale of the online mapping is adjustable allowing the user to zoom out for a broader landscape perspective or to zoom in and view neighbourhood/community connectivity. • The scope of the study used existing data sets that could be applied across Wellington County. The accuracy and representation of the NHS is a result of the best data available. Updated datasets will inform future updates to the NHS mapping. • Decommissioned railway corridors were not selected as a dataset, nor available, as a component of the Wellington County Natural System. • Enhancement linkages were identified through the use of an automated program – the application of manual adjustments was beyond the scope of the study. The intent of displaying enhancement linkages is to demonstrate potential connections or corridors between existing natural heritage components however the linkage may be flexible in its route to connect features.
#2	It is important to preserve and protect our waterways as vital community assets and now appreciating the aesthetics of our County. Connecting on foot as well.	• Comment noted.
#3	I like the overall concept of what the county is trying to do. I like the idea of showing the dashed where a connection could be made but most of them were not practical as they cut across a farm at an angle. It would be good if the County could look at other models like the ALUS Canada and identify and target areas where more environmental restoration needed to be done. The county has a good model of promoting environmental initiatives like green legacy but maybe a component could be added on to rural water quality program to help encourage better stewardship practices and provide the corridors for animals to co exist with us in the farming community. I see increases in windbreaks but also see other fence lines coming down. With increased flooding, climate change and a lack of awareness of how our practices on farm can affect the climate, wildlife , soil erosion , etc much work will be needed to be done to get us in the farming community on side. There is no ag extension really any more and younger farmers get information in different ways. We need to be re engaged. (somehow). At the recent farm show in Drayton I was encouraged by the number of younger farmers that were interested in doing more, There is a good article in the most recent Ontario Grain Farmer on page 6 on Alternative Land use. I believe some monetary compensation will be needed, some case studies that show a benefit to society and to the farmer, some taxation changes on properties that are currently bush but not under a land conservation program to keep them bush and in wetlands, some restrictions maybe on when we can take out another fence row, etc.	• Linkages shown in the Natural Heritage System represent a connection between core areas exists, not necessarily the connection between the Core areas. It is our thought that linkages in most cases will form in areas outside of cultivated fields. • The County and GRCA researched other models for the Natural Heritage system and reviewed available options with the working group at the technical workshop. It was determined that a hybrid approach was appropriate for the County using the Feature Composite method and the Core Areas and Linkages method. • The Wellington County Natural Heritage System will be utilized as a resource to guide restoration and enhancement projects that are undertaken. These may include projects through the Green Legacy program, Rural Water Quality Program or initiatives by local Conservation Authorities. • The Wellington Federation of Agriculture (WFA) was consulted throughout this project.

	I commend the county on the work done so far but please engage, dialogue with the farm community and get us on side. I think in general all of us need to think longer term and I believe this project is attempting to do that.	