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Regional NHS Integration Project:

Conservation Authority Natural Heritage System in the Town of Caledon and Region of Peel

Prepared by: Credit Valley Conservation
Prepared for: Region of Peel

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Technical Working Group
Aviva Patel, Credit Valley Conservation
Erika Nardone, Credit Valley Conservation
Janel Sauder, Credit Valley Conservation
Jacquelyn Kiers, Credit Valley Conservation
Katherine Robbins, Credit Valley Conservation
Liam Marray, Credit Valley Conservation
Scott Sampson, Credit Valley Conservation
Yvette Roy, Credit Valley Conservation
Jessica Chan, Lake Simcoe Region Conservation Authority
Shauna Fernandes, Lake Simcoe Region Conservation Authority
Ian Ockenden, Nottawasaga Valley Conservation Authority
Brennan Paul, Toronto and Region Conservation Authority
Jason Tam, Toronto and Region Conservation Authority
Mary-Ann Burns, Toronto and Region Conservation Authority
Namrata Shrestha, Toronto and Region Conservation Authority
Noah Gaetz, Toronto and Region Conservation Authority
Parth Sheth, Toronto and Region Conservation Authority
Quentin Hanchard, Toronto and Region Conservation Authority
Holly Anderson, Conservation Halton
Eniber Cabrera, City of Mississauga
Sarah Piett, City of Mississauga
Michael Hoy, City of Brampton

Steering Committee
Leilani Lee-Yates, Town of Caledon
Sylvia Kirkwood, Town of Caledon
Aviva Patel, Credit Valley Conservation
Josh Campbell, Credit Valley Conservation
Scott Sampson, Credit Valley Conservation
Shauna Fernandes, Lake Simcoe Region Conservation Authority
Ian Ockenden, Nottawasaga Valley Conservation Authority
Learie Miller, Region of Peel
Mark Head, Region of Peel
Mary-Ann Burns, Toronto and Region Conservation Authority
Namrata Shrestha, Toronto and Region Conservation Authority

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Executive Summary

The Region of Peel and its partner Conservation Authorities, agencies, and residents together protect, manage and restore the natural environment within its jurisdiction. The goal of the Region's Official Plan with respect to its natural environment is *to create and maintain a system of viable, well-functioning environmental features to ensure a healthy, resilient and self-sustaining natural environment within Peel Region* (Official Plan 2016).

The Greenlands System in Peel, which consists of Core Areas, Natural Areas and Corridors, and Potential Natural Areas and Corridors, is intended to support and strengthen the ecological integrity, human benefits, and long-term sustainability of the Region's natural environment. Protection of a robust, science-based natural heritage system (NHS) will help the Region manage future increases in population growth and development while addressing current pressures such as locally poor water quality, flooding or low water supply, invasive species affecting forest health, and climate change.

Drivers supporting the need for natural heritage system mapping include the following:

- Policy direction in the Regional Official Plan that indicates that the natural heritage systems policy framework of the plan be reviewed, including the identification of a natural heritage system and the consideration of natural heritage system studies and plans being completed by Conservation Authorities.
- Monitoring results by Conservation Authorities demonstrating that the Region is still below watershed targets for forest and wetland cover.
- The Region's Measuring and Monitoring report (2017), which notes that while progress has been made to incorporate Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC) natural heritage systems (natural and potential enhancement areas) into municipal Official Plans, this progress is *"insufficient to realize the intent of the Regional Official Plan policies".*
- Peel's Climate Change Strategy actions (Region of Peel et al. 2011), specifically *Goal 1: Proactive and responsive planning and leadership, Action 1.6: Address water, natural heritage and land management issues related to climate change through integrated watershed management;* and *Goal 3: Targeted and proactive adaptation actions, Action 3.1: Undertake specific initiatives…which are intended to maintain and restore natural habitats, trees and naturalized spaces within the urban system.*
- Priority actions identified in the 2017 climate change vulnerability assessment of natural systems in Peel (Tu et al. 2017). This assessment, commissioned by Peel Region in partnership with CVC, TRCA, and the Ontario Climate Consortium, identified a number of priority actions for building resilience of regional natural systems to climate change. Key actions included increasing ecosystem connectivity and protecting and restoring natural features.

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The Region has identified the need to review its Greenlands System policies using a watershed approach to promote sound land use planning as noted above and to achieve conformity with the *Provincial Policy Statement* and Provincial Plans, as amended in 2017 and 2019. The update process will include scoped consultation with key stakeholders and the Region's consultants to assist with the Region's five-year review of the Regional Official Plan.

In 2018, the Region requested that CVC and TRCA integrate their natural heritage systems for the Region, recognizing the scientific basis of the systems and the heavy investments made by the Region in their development. In addition, the Region requested that natural heritage systems be integrated across its remaining constituent Conservation Authorities, namely Lake Simcoe Region Conservation Authority (LSRCA), Nottawasaga Valley Conservation Authority (NVCA) and Conservation Halton (CH). This project, termed Regional NHS Integration Project, consisted of two phases: Phase 1 integrated Conservation Authority (CA) systems with local refinements for the Town of Caledon. Phase 2 included the integration of CA systems across the remaining portion of Peel, namely Mississauga and Brampton, to create a Conservation Authority Natural Heritage System (CA NHS) map product for all of Peel Region.

Prior to the initiation of this project, both CVC and TRCA provided input to the development of the City of Mississauga's Official Plan Natural Heritage System. Also, the natural heritage systems developed by CVC and TRCA were successfully scaled to the municipal level in the City of Brampton a few years ago. A similar systems approach was developed for this project to merge existing watershed-scale mapping within the Town of Caledon and for the Region of Peel as a whole.

CVC, as the project manager, worked collaboratively with member municipalities and CAs to produce CA NHS mapping within the Region of Peel and an accompanying methodology report that supports the requirements of the *Provincial Policy Statement* and Provincial Plans in the local context. The mapping was developed by integrating and working with the currently available Conservation Authority data and reflects detailed stakeholder consultation that has already occurred within the CVC, TRCA and LSRCA watersheds.

In the first phase of this project, a Caledon CA NHS was created by integrating Conservation Authority mapping within the Town of Caledon. The result is a cost-effective, defensible, and technically sound product which provides a consistent and watershed-based approach across the Town of Caledon with respect to natural heritage system identification and mapping. At the request of the municipalities, the Caledon CA NHS map was then further refined for the purposes of the Greenlands System Regional Official Plan Amendment (ROPA) discussion paper to incorporate areas where the NHS boundaries had been locally refined based on recent planning approvals (e.g. active aggregate sites, settlement areas). The Caledon CA NHS with these municipal refinements makes up 48% of Caledon's area, and is 71% natural cover and 29% potential enhancement area (non-natural or naturalizing lands that can be enhanced or restored to improve ecosystem

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function within the system). The mapping was overlaid with a variety of protected features and areas to ensure that the CA NHS captured natural features covered under existing legislation and policy. There is a high degree of overlap between the Caledon CA NHS and designated features (e.g. Provincially Significant Wetlands), areas regulated by Conservation Authorities, and existing provincial and municipal natural heritage systems within the Town. The Caledon CA NHS captures 89% of Caledon's Environmental Policy Area and Environmental Zone 1 and 2 identified in the Town's Official Plan and 96% of the Peel Greenlands System Core Areas.

In Phase 2 of this project, a Peel CA NHS was developed by integrating the Caledon CA NHS mapping with Conservation Authority mapping in the Cities of Brampton and Mississauga. The Peel CA NHS makes up 34% of the Region of Peel and is 68% natural cover and 32% potential enhancement area. Like the mapping in Caledon, there is a high degree of overlap between the Peel CA NHS and designated features, areas regulated by Conservation Authorities, and existing provincial and municipal natural heritage systems across the Region. The Peel CA NHS captures 96% of the Peel Greenlands System Core Areas and 88% of the local municipal natural heritage systems.

The Peel CA NHS is a landscape-level tool based on current science and is recommended for consideration and use by the Region and its partners for planning and programming purposes. The Region of Peel and Town of Caledon can use the mapping to inform their Official Plan updates as appropriate for their needs and context. In addition to this, the CA NHS is a tool that supports a number of other municipal initiatives, including determining settlement area boundary expansions, next generation watershed planning, and prioritizing restoration and stewardship activities. Because the CA NHS is a landscape-level tool, further refinement may be needed at local- and site-level scales.

This report documents the approach and methodology used to create and refine the Peel CA NHS mapping, as well as some recommendations for implementation. The mapping and report provide key information to support the review of Peel's Greenlands System and the ROPA discussion paper. The CA partners are committed to providing ongoing assistance and support to the municipality throughout the development of the NHS and its implementation as part of the Official Plan review process.

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1.0 Introduction

1.1 Purpose and Scope

1.1.1 Project context and drivers

The Region of Peel and its partner Conservation Authorities, agencies, and residents together protect, manage and restore the natural environment within its jurisdiction. The goal of the Region's Official Plan with respect to its natural environment is *to create and maintain a system of viable, well-functioning environmental features to ensure a healthy, resilient and self-sustaining natural environment within Peel Region* (Official Plan 2016).

The Greenlands System in Peel, which consists of Core Areas, Natural Areas and Corridors, and Potential Natural Areas and Corridors, is intended to support and strengthen the ecological integrity, human benefits, and long-term sustainability of the Region's natural environment.

Regular review and updating of its Greenlands System helps the Region conform to provincial plans as well as manage future increases in population growth and development. It also helps the Region address current pressures such as ongoing urbanization and climate change which can present threats of locally poor water quality, streambank erosion and slope instability, flooding or low water supply, diminished biodiversity and invasive species affecting forest and wetland health.

Drivers supporting the need for natural heritage system mapping include the following:

- Policy direction in the Regional Official Plan that indicates that the natural heritage systems policy framework of the plan be reviewed, including the identification of a natural heritage system and the consideration of natural heritage system studies and plans being completed by Conservation Authorities.
- Monitoring results by Conservation Authorities demonstrating that the Region is still below watershed targets for forest and wetland cover.
- The Region's Measuring and Monitoring report (2017), which notes that while progress has been made to incorporate Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC) natural heritage systems (natural and potential enhancement areas) into municipal Official Plans, this progress is *"insufficient to realize the intent of the Regional Official Plan policies".*
- Peel's Climate Change Strategy actions (Region of Peel et al. 2011), specifically *Goal 1: Proactive and responsive planning and leadership, Action 1.6: Address water, natural heritage and land management issues related to climate change through integrated watershed management;* and *Goal 3: Targeted and proactive adaptation actions, Action 3.1: Undertake specific*

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initiatives…which are intended to maintain and restore natural habitats, trees and naturalized spaces within the urban system.

- Priority actions identified in the 2017 climate change vulnerability assessment of natural systems in Peel (Tu et al. 2017). This assessment, commissioned by Peel Region in partnership with CVC, TRCA, and the Ontario Climate Consortium, identified a number of priority actions for building resilience of regional natural systems to climate change. Key actions included increasing ecosystem connectivity and protecting and restoring natural features.

Consequently, the Region identified the necessity for regional scale mapping of a natural heritage system that was based on science and recommended for consideration and use by the Region and its partners for programming purposes.

In 2018, the Region requested that natural heritage system mapping be integrated across its constituent Conservation Authorities, namely CVC, TRCA, Lake Simcoe Region Conservation Authority (LSRCA), Nottawasaga Valley Conservation Authority (NVCA) and Conservation Halton (CH). A map of the Conservation Authority jurisdictional boundaries in Caledon is shown in Figure 1-1 (and Figure A1, Appendix A).

This project, termed the Regional NHS Integration Project, consisted of two phases: Phase 1 integrated Conservation Authority (CA) systems with initial local refinements for the Town of Caledon. Phase 2 included the integration of CA systems across the remaining portion of Peel, namely Mississauga and Brampton, to create a Conservation Authority Natural Heritage System (CA NHS) map product for all of Peel Region. The resulting mapping product of this project is a science-based natural heritage system in the Region of Peel. The Region of Peel and Town of Caledon can use the mapping to inform their Official Plan updates as appropriate for their needs and context. In addition to this, the CA NHS is a tool that supports a number of other municipal initiatives, including determining settlement area boundary expansions, next generation watershed planning, and prioritizing restoration and stewardship activities. Additional data and tools that are being developed and used by agencies and municipalities will further strengthen and support these initiatives.

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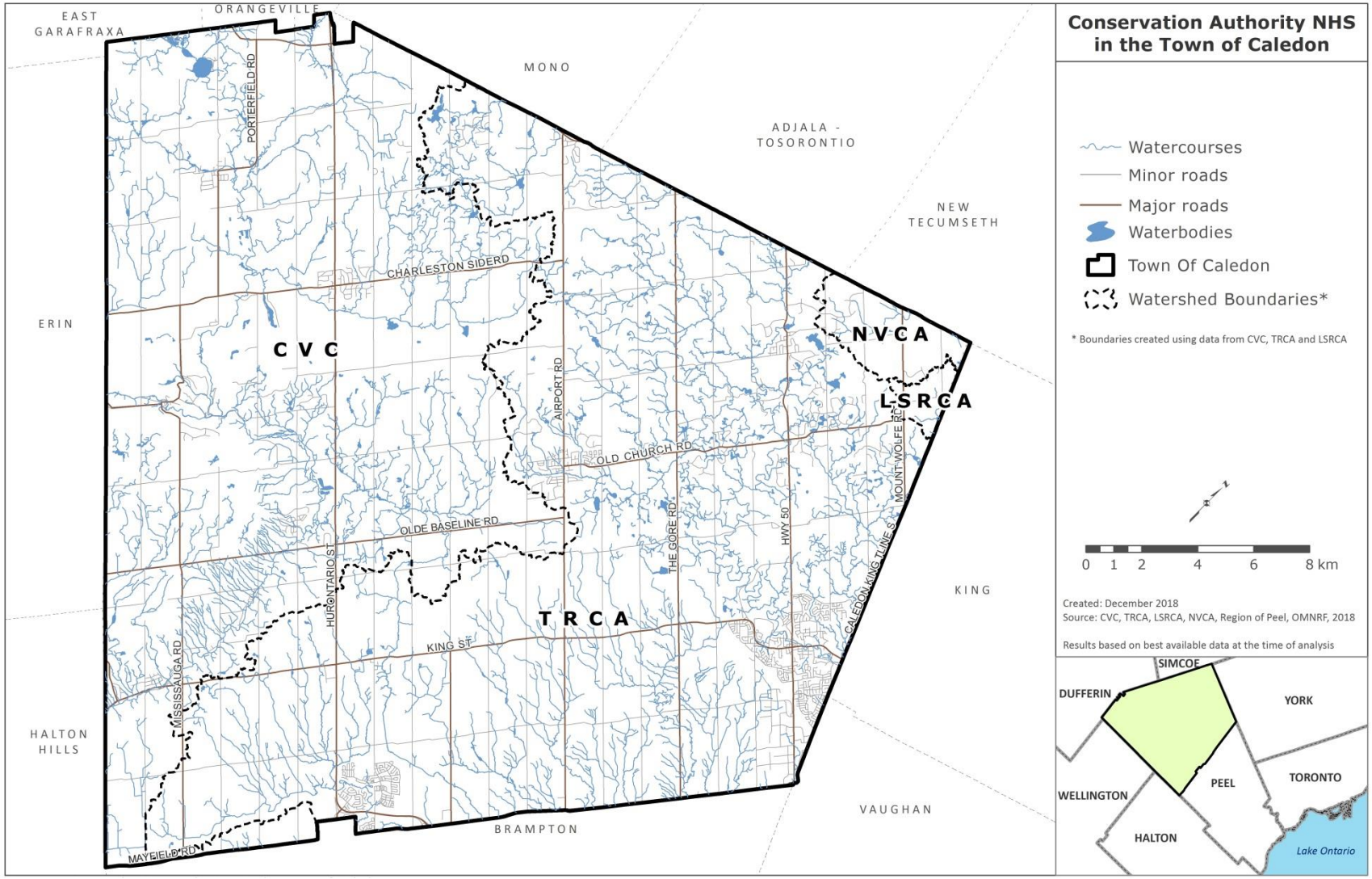

Figure 1-1. Conservation Authority jurisdictions in the Town of Caledon.

1.1.2 Regional NHS Integration Project leverages existing municipal investments

Conservation Authorities have undertaken detailed natural heritage work at the watershed scale for several years. Existing CA NHS mapping is the product of extensive datasets and multidisciplinary technical expertise. Natural heritage systems that meet science-based watershed targets for natural cover help Conservation Authorities and their partners manage stressors such as habitat loss, fragmentation, pollution, and climate change.

Natural heritage systems have multiple benefits; they:

- Provide opportunities for sound land use planning and enhancement of existing local natural heritage systems based on sound landscape science and conservation biology principles and a watershed approach;
- Provide opportunities for prioritizing protection, land securement, restoration and stewardship while supporting the *Provincial Policy Statement*;
- Build resilience to stressors on existing protected natural features and functions through NHS connections and linkages, to enable the continued existence and health of features and their functions;
- Provide opportunities to manage the built and natural environment to ensure sustained societal benefits, e.g. a livable environment, sustainable surface and ground water supplies, recreation, natural pest control, and pollination; and
- Provide identification of those lands that act as the green infrastructure of urbanized watersheds, which help to retain flood waters and stormwater and filter water and air pollutants.

Both CVC and TRCA provided input to the development of the City of Mississauga's Official Plan Natural Heritage System. In the City of Brampton, the natural heritage systems developed by CVC and TRCA have been successfully scaled to the municipal level through a collaborative approach with the municipality, allowing for integrated, cost-effective and focused partnerships in stewardship, monitoring, land securement, and protection (CVC and TRCA 2014). A similar systems approach was developed to merge existing watershed-scale mapping within the Town of Caledon and for the Region of Peel as a whole (CVC 2018).

1.1.3 Project deliverables

Specific CA deliverables for the project are as follows (CVC 2018):

Phase 1

- To provide the Region of Peel and the Town of Caledon with an integrated Caledon CA NHS as a shapefile with an accompanying technical report, based on landscape ecology and conservation biology principles and taking local context into account.

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- To identify an NHS that will support the *Provincial Policy Statement* (PPS) and Provincial Plans using a watershed-based approach and through identifying lands by which the biodiversity, ecological and hydrological functions of Peel and Caledon will be conserved and restored for the long term.
- Initial refinements to the CA NHS to meet the needs of the Greenlands Regional Official Plan Amendment (ROPA) discussion paper.

Phase 2

- To provide the Region of Peel and member municipalities with an integrated CA NHS that covers all of Peel Region, as a shapefile and accompanying brief technical report.
- To provide a methodology that documents how the CVC and TRCA watershed-based systems were combined for Peel across Caledon, Mississauga and Brampton.

Phase 3, which is beyond the scope of this current project, involves further refinement, consultation, and finalization of the CA NHS for inclusion in the Region of Peel's Official Plan. This work will be led by the municipality at a later stage.

An overview of the project phases and the steps involved is provided in Figure 1-2.

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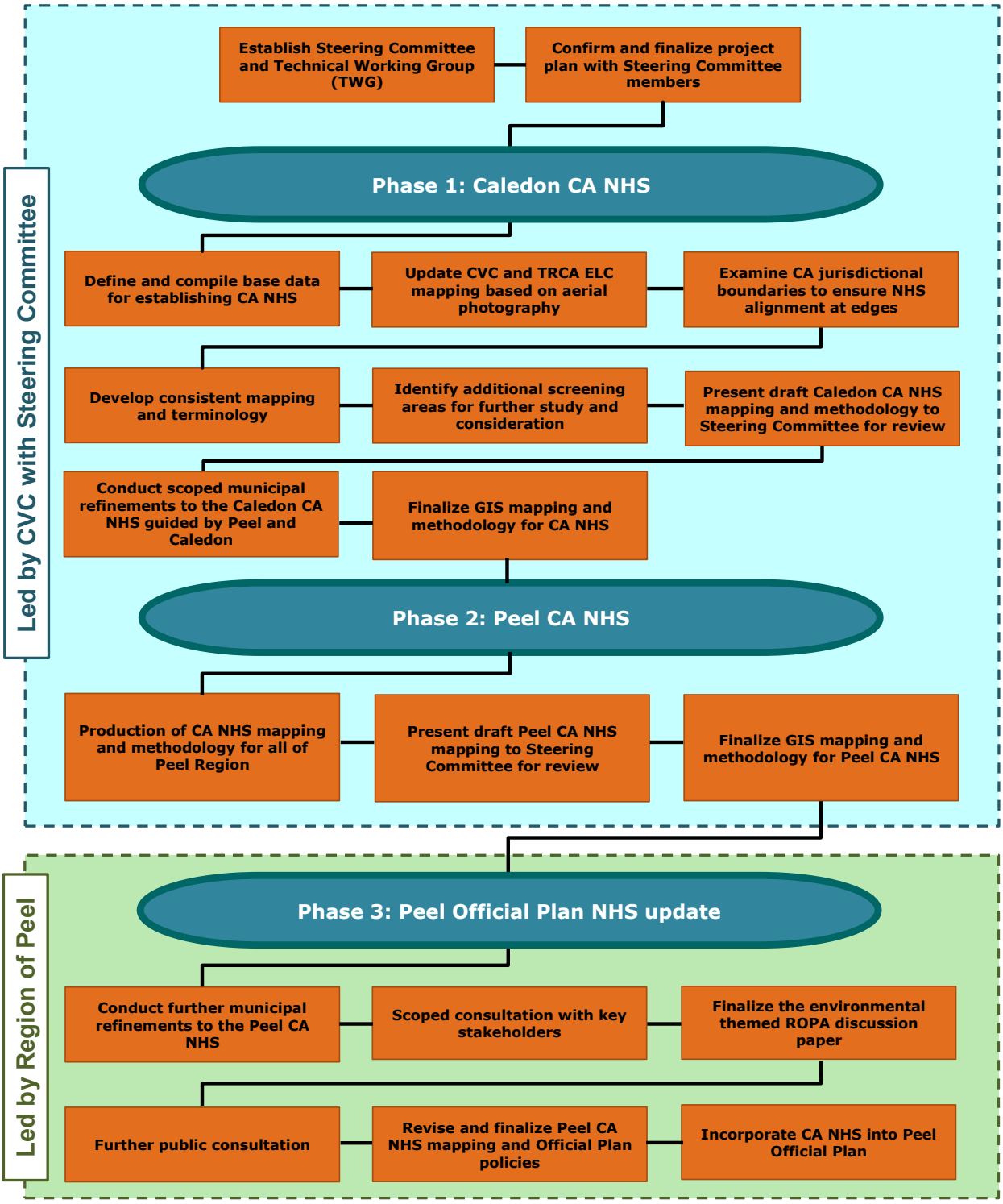

Figure 1-2. Overview of the Peel Regional NHS Integration phases, as established by the Technical Working Group and Steering Committee.

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1.2 Existing NHS Policy Framework in Ontario and Recent NHS Development

Environmental planning in Ontario began in the 1970s and 1980s with the identification and protection of natural heritage features in response to the request of municipalities for a more comprehensive approach to conservation and for predictability in review of development plans. In 1991, the province introduced the concept of protecting natural cores and corridors, moving beyond "*islands of green*" and into "*natural systems*" conservation (OMNR 1991). Provincial Policy direction followed, and in 1996, the PPS was released to provide direction on matters of provincial interest related to land use planning and development. The PPS (latest update OMMAH 2014) contains natural heritage policies that provide protection for key natural heritage features, while stressing that the diversity and functions of natural features be maintained and that connectivity of natural features in an area should be *"…maintained, restored, or, where possible, improved."*

Provincial direction has evolved to a stronger focus on a systems approach, recognizing that linkages between and among natural features are required to maintain, restore or, where possible improve connectivity, long-term ecological function and biodiversity of natural heritage systems. The 2014 PPS provides strong support for a systems approach by requiring the development of natural heritage systems. The provincial Greenbelt Plan takes a similar systems approach with the identification of natural heritage features that are connected by linkages (OMMAH 2005).

The rationale for developing watershed-based natural heritage systems is stated in a number of other provincial and federal policies, plans, and legislation including the *Conservation Authorities Act* (OMNR 1990, Sections 21 and 28) which grant Conservation Authorities powers to determine programs to conserve, restore, develop and manage the natural resources of the watershed and to prohibit or regulate development if the conservation of land may be affected by such development.

The direction provided by the provincial government to municipalities and Conservation Authorities has steered the development of several watershed and municipal natural heritage systems in Ontario (e.g. UTRCA 2003, OMNR 2005, UTRCA and County of Oxford 2006, TRCA 2007a, North-South Environmental Inc. 2009). In addition to the PPS, the importance of natural heritage planning is also identified in a number of other federal and provincial policies and plans and is covered in greater detail elsewhere (CVC 2010c, 2011).

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1.3 Ecological and Landscape Context for NHS Planning

1.3.1 Benefits of natural systems and the value of a watershed approach

Natural areas, or ecosystems, within the Region of Peel are critical for the provision of ecosystem services to local residents. Examples include (but are not limited to) flood control, groundwater recharge, climate moderation, pollination, waste management, and erosion and sediment control (Costanza et al. 1997, Daily 1997, de Groot et al. 2002, Green Analytics 2017). Further, natural ecosystems provide habitat for native plants and animals, and provide a variety of recreational, cultural and educational values. A study commissioned by CVC estimated that the Credit River watershed alone provides a minimum of $371 million in ecological services annually to area residents (Kennedy and Wilson 2009).

The continued provision of ecosystem services over the long term occurs when ecosystems are managed for resilience with a watershed-based approach. This is recognized by the province (OMMAH 2014) which requires planning authorities *to protect, improve or restore the quality and quantity of water by…using the watershed as the ecologically meaningful scale for integrated and long-term planning*.

When the valuable ecosystem services provided by the watershed's natural areas are compromised, the lost value must ultimately be borne by taxpayers. For example, a study of the Credit River watershed (Kennedy and Wilson 2009) showed that the watershed's natural capital saves watershed taxpayers $100 million in water supply costs every year. Maintaining and restoring a resilient, self-sustaining natural heritage system is a precautionary approach that reduces the risk of impaired ecological services and is more cost-effective than addressing problems after ecosystem services are lost.

1.3.2 Mitigation of stressors on natural systems requires increased natural cover

Primary stressors on natural systems in the Region of Peel include habitat loss, habitat fragmentation, habitat degradation, pollution, and alteration of soils or hydrology; pathogens, pests and invasive species; and climate change.

Cumulatively, the impact of these stresses is evident through long-term monitoring programs. For example, CVC's long-term Integrated Watershed Monitoring Program (IWMP) has detected some trends of concern, some of which reflect broader regional or continental issues:

- Declines in certain valued wildlife species with specialized habitat requirements (e.g. brook trout, ground nesting bird species, certain species at risk);
- Increasing proportions of non-native plant species;

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- Negative effects on tree health from invasive pests and diseases (e.g. Emerald Ash Borer, Beech Bark Disease); and
- Increasing chloride concentrations in streams and in some groundwater wells, with the potential for negative impacts to humans and wildlife (possible sources of these increased chloride concentrations include septic system effluent, road salt, and leachate from landfills).

CVC and TRCA monitoring data also show that the major constituent watersheds of the Region (those of the Credit and Humber rivers and Etobicoke-Mimico Creek) are deficient in the amount of woodland and wetland cover that is required to maintain biodiversity as well as ecosystem integrity and related ecosystem benefits to residents over the long term, based on Environment Canada's *How Much Habitat is Enough?* Guidelines (Environment Canada 2013).

Development of an NHS based on current science and landscape ecology principles can help lessen the impacts of these stressors on the watershed's ecosystems. Principles such as habitat size, connectivity, diversity and representation are incorporated into natural heritage system design to help mitigate stresses on sensitive or important ecological features and functions, as well as improve the resilience of ecosystems. In addition, protecting and connecting large natural areas with representative biodiversity are some of the key recommendations for adapting ecosystems to climate change (Heller and Zavaleta 2009). Hence, existing conditions and projected climate change adaptation measures require planning for increased watershed natural cover to achieve long-term ecosystem sustainability.

1.3.3 Integration of NHS planning across multiple scales

A systems approach to natural heritage planning includes the development or refinement of natural heritage systems at different scales. At the provincial scale, the province of Ontario has designed connected systems (e.g. Greenbelt Natural Heritage System for the Protected Countryside, Oak Ridges Moraine Conservation Plan). At the watershed scale, Conservation Authorities have designed natural heritage systems to protect or enhance water quality and quantity and watershed-scale ecosystem benefits. Subwatershed scale or local scale plans (e.g. municipal natural heritage systems, Secondary plans, site plans) may further refine larger scale natural heritage systems to achieve local objectives for biodiversity, ecological function, water management and benefits to local communities. An overview of the process for integrating and refining natural heritage system mapping at different scales is outlined in Figure 1-3.

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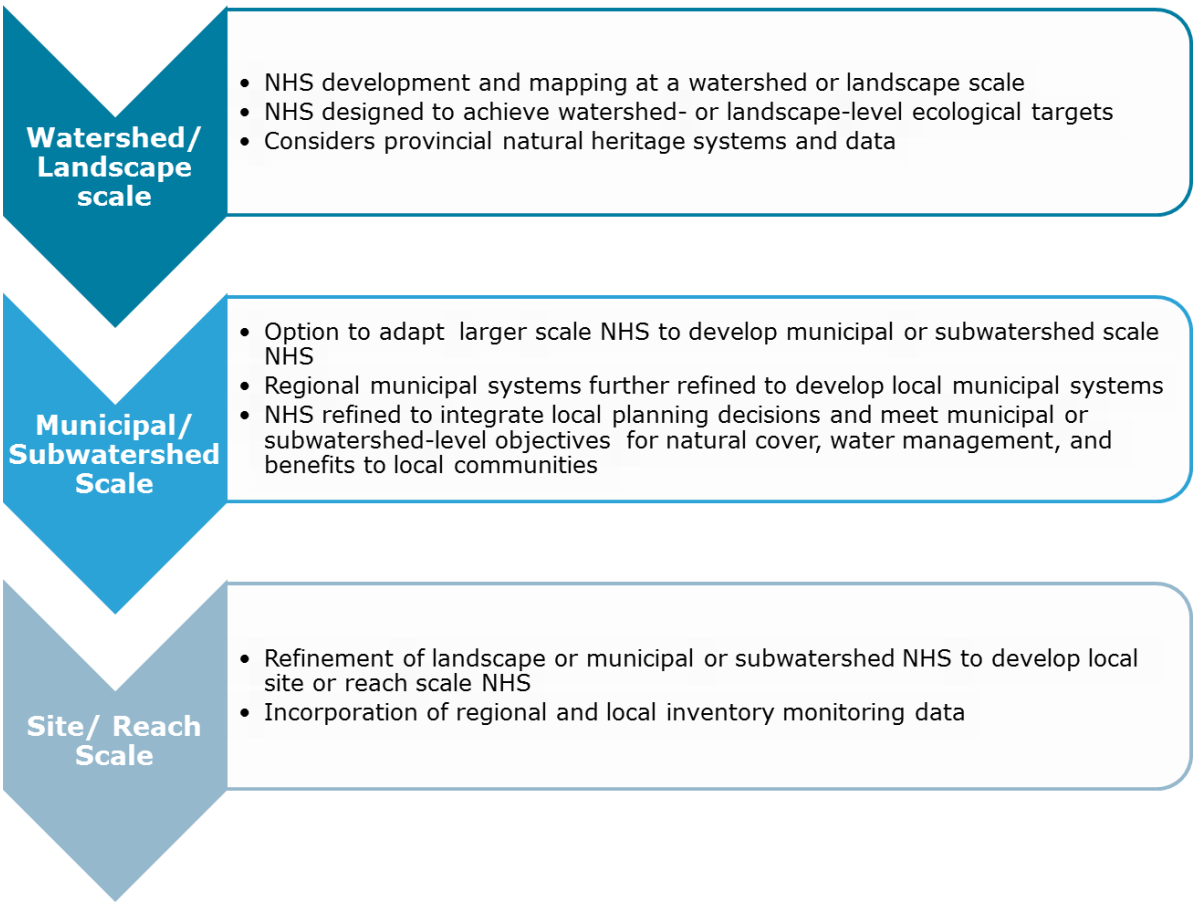

Figure 1-3. Overview of the process for integrating and refining natural heritage system mapping across multiple scales.

Integrating watershed-based systems with regional or provincial systems results in long-term resilience of natural features and functions because ecosystems and the flow of energy, material and water transcend political boundaries. Provincial Plan areas and plans such as the Greenbelt Plan, the Niagara Escarpment Plan and the Oak Ridges Moraine Conservation Plan cross watershed boundaries and consequently integrate different watershed-based natural heritage systems (see Figure A2, Appendix A for a map of Provincial Plan areas in Caledon). At local scales, the natural heritage system can integrate subwatershed or local scale systems to achieve watershed or municipal objectives for natural cover, water quality and water quantity.

The value of designing systems at different scales, and the shared objective of healthy, resilient ecosystem functioning across scales, allows for efficient and optimal land use planning at each scale.

2.0 Conservation Authority Natural Heritage Systems in Region of Peel

2.1 Overview of Conservation Authority Systems

Credit Valley Conservation, LSRCA and TRCA have each developed natural heritage systems, using watersheds as an ecologically meaningful scale for planning (OMNR 2010, OMMAH 2014). These watershed systems are designed to encompass the necessary land base to protect and restore biodiversity and ecosystem function over the long term in the rapidly developing Greater Golden Horseshoe.

Conservation Authority data and analyses indicate that protecting current levels of cover will not be sufficient to sustain ecosystem health over the long term (TRCA 2007a, CVC 2010a, CVC 2010b). As such, Conservation Authorities have taken on the challenge of developing models to identify "target systems" made up of existing natural cover, and areas with the potential to be restored or managed to increase ecosystem function. These systems have also incorporated stakeholder consultation that has occurred at a variety of stages in their development.

Within the Region of Peel, NVCA and CH have not developed a watershed-scale natural heritage system. Based on a review of available data for this project and discussions with CA staff in those agencies, it was recommended that the CVC NHS methodology be applied to the NVCA and CH jurisdictions and combined with the CVC, LSRCA and TRCA systems within the Region of Peel.

An overview of the Conservation Authority natural heritage systems within the Region of Peel, including the Credit River Watershed Natural Heritage System (CRWNHS), the Etobicoke-Mimico Target Refined NHS and the Humber River Watershed Target Refined NHS, and the LSRCA NHS is provided below. Table 2-1 also provides a high-level comparison of the criteria used to develop the Conservation Authority systems.

2.1.1 CVC natural heritage systems planning

An integrated terrestrial and aquatic watershed-wide NHS has been developed for the Credit River watershed (CVC 2015a) to achieve the organization's strategic goals of planning for an environmentally sustainable future and managing a healthy, resilient environment through protection, restoration and enhancement.

The watershed system includes both existing natural areas, as well as lands with the potential for restoration or enhancement. The CRWNHS was developed through the following steps:

1. The existing conditions of natural areas in the watershed were characterized and assessed.
2. Targets were identified for overall natural cover required for long-term aquatic and terrestrial health to guide system development.

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3. Criteria were developed for components of the NHS through review of literature, existing provincial guidance documents, and use of best available science within a watershed context.
4. Components of the NHS were mapped using Geographic Information System (GIS) data. The components were combined into a single GIS layer that represents the NHS.
5. The resulting NHS was reviewed and compared to recommended natural cover targets. The system was also compared to other landscape analyses and data to ensure high quality habitat was included, and to adjust criteria if necessary.

The Credit River Watershed Natural Heritage System consists of natural heritage features and their buffers, and natural heritage areas (i.e. Centres for Biodiversity; See Table B1, Appendix B and CVC 2015a for a complete description of CRWNHS criteria). It is the combination of the natural heritage features, their buffers and natural heritage areas in their entirety that define a resilient, robust system for the Credit River watershed. When implementing the CRWNHS it is essential that the structural and functional characteristics of the system (e.g. amount and distribution of natural cover, connectivity, and hydrology) be maintained and enhanced in order to sustain or improve the function of the Credit River watershed.

Areas within the system that are currently non-natural represent strategic locations where voluntary efforts or management practices would achieve the most ecosystem benefits for the long term.

2.1.2 CH and NVCA natural heritage systems planning

Both the Nottawasaga Valley Conservation Authority (NVCA) and Conservation Halton (CH) did not have a natural heritage system at the time this project was initiated. After discussion and a review of existing data, the project technical working group decided to use CVC's NHS criteria to develop a NVCA NHS for the portion of NVCA in Caledon and a CH NHS for the portion of CH in Mississauga. The NHS development was undertaken by CVC in consultation with NVCA and CH staff. Table 2-1 provides an overview of the methodology used.

2.1.3 TRCA natural heritage systems planning

The Toronto and Region Conservation Authority (TRCA) has collected natural heritage inventory and monitoring data on an ongoing basis since the mid-1990s. Data clearly show the declines in native biodiversity in the jurisdiction. In an effort to address this decline, TRCA developed the Terrestrial Natural Heritage System Strategy (TNHSS) in 2007. The TNHSS identifies the need to not only protect natural features and areas, but to expand on them through restoration and connect them within the landscape. The "target system" that is identified in the TNHSS was developed by evaluating the quantity, quality, and distribution of the terrestrial natural cover in the landscape as an integrated functional unit, rather than as

separate natural areas. Fundamental to the system are valley and stream corridors as well as other existing features outside the valleys such as wetlands, woodlands and meadows.

The "target system" includes much of the existing natural cover of forests, wetlands and meadows (about 25 per cent of the Toronto region) plus additional areas to be restored, or potential natural cover. Therefore, among the PPS "*areas with the potential to be restored to a natural state*" in TRCA's jurisdiction, is potential natural cover. Potential natural cover is land within the target TNHS that is not existing natural cover but would be needed to achieve TRCA's targets for regional biodiversity and the long-term health of the natural system. Conserving and restoring potential natural cover lands would be expected to enhance the resilience of the natural system to impacts from urbanization and climate change. Detailed criteria for the TRCA NHS can be found in Table B2, Appendix B. It is important to note that where potential natural cover falls on privately-owned land, opportunities for restoration would only be explored through development and/or infrastructure planning processes in cooperation with landowners.

2.1.4 LSRCA natural heritage systems planning

The Lake Simcoe Region Conservation Authority (LSRCA) developed a Natural Heritage System and Restoration Strategy (NHSRS; LSRCA 2018) for the Lake Simcoe watershed as identified in the LSRCA Strategic Plan (2016-2020). This natural heritage system was developed with a three-step approach (Section 3.0 of LSRCA 2018):

1. Minimum policy standards;
2. Enhanced ecological system; and
3. Systems-based approach

This Strategy recognizes the need to balance natural heritage features in urbanized, agricultural and natural cover environments. It intends to complement existing policies and where possible assist the natural heritage support needs of municipalities to guide their public and stakeholders to extend beyond the status quo and recognize their watershed-wide role and responsibility. Using a GIS system-based approach, it includes a science and policy framework to define and categorize the natural heritage system into core features, targeted areas that enhance the NHS, and buffers (Section 4.0 of LSRCA 2018). The management of the NHS will occur through implemented actions led by the LSRCA and its partners in order to achieve watershed targets that will achieve a sustainable and resilient NHS. Detailed criteria for the LSRCA NHS can be found in Table B3, Appendix B.

Table 2-1. Comparison of criteria for Conservation Authority natural heritage systems in CVC, TRCA and LSRCA. For this project, the NVCA and CH jurisdiction were mapped using the CVC NHS methodology.

	CVC, NVCA and CH	TRCA	LSRCA
Overview	The CVC NHS includes natural heritage features, their buffers and natural heritage areas (i.e. Centres for Biodiversity). Natural features in the watershed are classified as High Functioning, Supporting or Contributing, and both High Functioning and Supporting features are included in the NHS. The NHS includes natural cover and enhancement areas. The NVCA NHS in Caledon and the CH NHS in Mississauga were mapped using the CVC NHS methodology, and thus include the same features and classifications (with the exception of Centres for Biodiversity, which were not mapped for the NVCA or CH NHS).	TRCA's NHS is their Terrestrial Natural Heritage System (TNHS), which is comprised of existing natural cover (forest, wetland, successional, meadow, and beach/bluff) and potential natural cover (areas with the potential to be restored). This follows a systems approach where a raster-based landscape was used to delineate areas based on several ecological and policy criteria.	LSRCA's NHS includes core features and their buffers, as well as targeted areas to enhance the NHS and achieve watershed targets.
GIS Methods	NHS is mapped using vector-based GIS methodology, where the entirety of the feature or area is included or excluded.	The TNHS is mapped using vector-based analysis of features (entirety of features), with raster-based landscape analysis (i.e. grid squares) to define the target TNHS.	NHS is mapped using vector-based GIS methodology, where the entirety of the feature or area is included or excluded.
Provincial Plan Designations			
Greenbelt Plan, Oak Ridges Moraine, Niagara Escarpment, Lake Simcoe Protection Plan	Provincial plan designations were not used to define the NHS. There is strong overlap with natural features and systems identified by the Greenbelt Plan, Oak Ridges Moraine Conservation Plan and Niagara Escarpment Plan.	The Greenbelt Plan, Oak Ridges Moraine Conservation Plan and Niagara Escarpment Plan were each added as policy criteria for scoring in the raster-based landscape analysis that contributed to defining the target TNHS. There is strong overlap with existing provincial plan areas.	Provincial plan designations were not used to define the NHS, but there is strong overlap with natural features and systems identified by the Greenbelt Plan, Oak Ridges Moraine Conservation Plan and the Lake Simcoe Protection Plan including white belt areas.

	CVC, NVCA and CH	TRCA	LSRCA
Provincial Significant Features and Areas			
Environmentally Significant Areas (ESAs)	Not used to define NHS, but majority of ESAs are captured within other features.	ESAs are a criterion for scoring in the raster-based landscape analysis that contributed to defining the target TNHS.	Not used to define NHS, but majority of ESAs are captured within other features.
Areas of Natural and Scientific Interest (ANSIs)	Not used to define NHS, but majority of life science and earth science ANSIs are captured.	ANSIs are a criterion for scoring in the raster-based landscape analysis that contributed to defining the target TNHS.	All life science and earth science ANSIs were incorporated into the NHS as core features and overlap with other natural heritage features.
Provincially Significant Wetlands (PSWs)	Not used to define NHS, but majority of PSWs are captured (also see wetland criteria below).	PSWs are a criterion for scoring in the raster-based landscape analysis that contributed to defining the target TNHS.	Provincial wetland mapping used to define the NHS and includes all PSWs (see also description of wetland core features below).
Species at Risk	All habitat of endangered species and threatened species that has undergone an appropriate evaluation process and is determined to be retained (protected) on the landscape will be included in the NHS. This is a text criterion, however the majority of the system overlaps with known records of Species at Risk.	The TNHS is refined to ensure that it overlaps with all existing natural cover and expands beyond existing into potential areas that could be restored. Most species including federally and provincially endangered and threatened as well as regional species of concern (TRCA 2007a) inhabit these areas.	Species at risk and their habitat, as determined by MNRF and the government of Canada, is a core feature within the NHS. This is a text criterion, however the majority of the system overlaps with known data points for Species at Risk as appropriate.
Natural Heritage Features and Areas			
Woodlands/ Forests	Woodlands have been included in the NHS using ecological criteria, including: size, interior, proximity, and association with valleylands and/or surface water quality and quantity.	The TNHS includes all mapped natural cover including forests and woodlands. All habitat patches are scored according to size, shape and matrix influence, and ranked from L1 to L5 (L-ranks) that reflects the general quality gradient of the patches (L1 being the excellent patches).	Woodlands are included in the NHS based on their size following a review of ecological criteria and watershed policies, including Greenbelt Plan, Lake Simcoe Protection Plan and Oak Ridges Moraine Conservation Plan. Added consideration was given to land cover layers where scrubland was naturally succeeded to woodland.

	CVC, NVCA and CH	TRCA	LSRCA
Wetlands	Wetlands have been included in the NHS using ecological criteria including: size, proximity, and association with valleylands and/or surface water quality and quantity.	The TNHS includes all mapped natural cover including wetlands. All habitat patches are scored according to size, shape and matrix influence, and ranked from L1 to L5 (L-ranks) that reflects the general quality gradient of the patches (L1 being the excellent patches).	Wetlands are identified as core features in the NHS using provincial wetland mapping and includes all PSWs, as well as all evaluated non-PSW wetlands, and unevaluated wetlands >0.5 ha within 30 m of a core feature.
Valleylands	All valleylands are included in the NHS, and were defined based on crest of slope, meander belt, floodplains and stream corridor.	Valleylands were not included as a specific criterion in the TNHS, but the TNHS does include most (but not all) valleylands. Two modelling criteria ensured inclusion of much existing valleyland to capture valleyland functions: 1) distance to water and 2) regulation layers of crest of slope, meander belt, and floodplain.	Significant valleylands are core features in the NHS and are delineated based on policy, using floodplains, meander belt, valley slope, and also considering width and length of the valleyland.
Aquatic	Aquatic features including watercourses, lakes and ponds are included in the NHS.	The TNHS is based on the terrestrial system only; however, most of the valleylands are included, as distance to water was one criterion in the raster-based landscape analysis to ensure inclusion of valley functions. Specific criteria for aquatic ecosystem management are outlined in watershed-based Fish Management Plans and Watershed Plans.	Watercourses and fish habitat are a core feature in the NHS. Includes watercourses, fish habitat and their associated riparian zones.
Shoreline	The CVC NHS and CH NHS in Mississauga include all areas along the Lake Ontario shoreline defined by the Lake Ontario Flood Hazard, the Lake Ontario Erosion Hazard and the Lake Ontario Dynamic Beach Hazard. The NVCA NHS does not contain shoreline within the Town of Caledon.	The TNHS includes all areas (including shoreline areas) that meet the suite of ecological and policy criteria that were used for scoring in the raster-based landscape analysis that contributes to defining the target TNHS.	Natural Areas Abutting Lake Simcoe (NAALS) – areas of continuous natural vegetation communities that extend out from the Lake Simcoe shoreline – are included as a core feature in the NHS. In addition, all shoreline around Lake Simcoe was identified based on a minimum 30 m buffer and includes text criteria pertaining to erosion hazard and wave uprush setbacks.

	CVC, NVCA and CH	TRCA	LSRCA
Wildlife Habitat	Where Significant Wildlife Habitat (SWH) is identified, it is included in the NHS. This is a text criterion, however the majority of SWH is likely captured within the NHS. SWH will be further identified through the planning process.	The TNHS takes a systems approach to ensure the inclusion of all existing and potential natural cover areas that can contribute substantially to ensure a functioning habitat for all species in the region, including the about 693 species that are designated as Regional Species of Concern. SWH will be further identified through the planning process.	Where SWH is identified, it is recommended to be included in the NHS. This is a text criterion, however most SWH is likely captured within the NHS. The types of SWH that are likely outside the mapped NHS were reviewed. Alvars, tallgrass prairies and sand barrens were incorporated as core features. Open country breeding bird habitat and animal movement corridors were considered targeted areas to enhance the NHS. SWH will be further identified through the planning process.
Centres for Biodiversity	Within CVC's jurisdiction, eleven Centres for Biodiversity were identified as natural heritage areas within the NHS. These are large landscapes with a concentration of natural heritage features, representative of the watershed's biodiversity. They include representation from eight physiographic regions, an inland lake and an estuarine area. Majority of Centres for Biodiversity area overlaps with other NHS features. Given the very small proportions of NVCA in the Town of Caledon and CH in the City of Mississauga, the identification of Centres for Biodiversity was not considered applicable for the NVCA or CH NHS.	The TNHS takes a systems approach to ensure the inclusion of all existing and potential natural cover areas that can contribute substantially to ensure a functioning habitat for all species in the region, including the about 693 species that are designated as Regional Species of Concern.	Not a criterion for development of the NHS. Large core areas captured under other criteria.

	CVC, NVCA and CH	TRCA	LSRCA
Buffers			
Buffers	Minimum buffers were identified on woodlands, wetlands and valleylands. Buffers are considered enhancement areas in the NHS. Buffer evaluations also occur through the planning process, using available policies and guidelines.	The TNHS does not incorporate buffer criteria. However, the raster-based landscape analysis inherently identifies areas of potential natural cover adjacent to existing natural cover to improve patch size and shape. Requirements for buffers to the NHS are identified and implemented through the planning process.	A 30 m buffer was applied to all core features except watercourses, fish habitat and shoreline, where the riparian area was already considered a setback to the feature. Requirements for buffers to the NHS are identified and implemented through the planning process.
Potential Enhancement Areas			
Enhancement areas	Enhancement areas are defined as locations that can be managed, enhanced or restored. They are integral parts of NHS features (i.e. valleylands, Lake Ontario shoreline), their buffers, or NHS areas (i.e. Centres for Biodiversity).	The TNHS used a raster-based landscape analysis model that identified potential natural cover areas that strategically expand the existing natural system. These areas did not contain any natural cover at the time of TNHS development. It was expected that through development and infrastructure planning processes, opportunities to naturalize these areas of potential natural cover would be explored to achieve the target TNHS. This will enhance the overall habitat quality including patch size, shape and reduce the negative impacts of the surrounding land use (matrix) influence.	Grassland habitat, corridor restoration, restoration in the floodplain, local linkages and regional linkages are considered targeted areas that enhance the NHS in order to achieve watershed targets.
Conservation Authority Property			
Conservation Authority Property	Conservation Authority lands were not used to define the NHS, but the majority are captured within the mapped system.	Conservation Authority properties were a criterion for scoring in the raster-based landscape analysis that contributed to defining the target TNHS.	Conservation Authority lands were not used to define the NHS, but the majority are captured within the mapped system.

2.2 Rationale for Combining Conservation Authority Natural Heritage Systems

The Conservation Authority natural heritage systems within Peel are based on common goals and principles, including:

- To provide well-distributed natural cover across watersheds, recognizing that natural cover needs to be expanded for a robust NHS
- To develop a healthy natural system with existing natural cover as a foundation, and potential restoration/enhancement areas that can enhance ecological resilience
- To protect, enhance and restore features and their ecological functions for the long term
- To manage land and water resources for environmental and public health, well-being and safety
- To provide outdoor appreciation and recreational opportunities and to promote healthy communities

The CA NHS provides the Region with system-based comprehensive Conservation Authority data that has been identified with consistent principles. To ensure that the resulting recommended mapping was comparable across the Region, the Conservation Authorities reviewed the systems to ensure consistent land uses were included and refined where necessary. Outstanding differences between the jurisdictions are discussed below.

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3.0 Phase 1: Caledon CA NHS

3.1 Methodology

This section documents the methodology used to map the Caledon CA NHS. The data sources used to complete the CA NHS mapping are listed in Table C1, Appendix C.

3.1.1 Updates to land cover

Land cover mapping based on aerial photography is the base data used to map the Conservation Authority natural heritage systems. For this project as a first step, land cover mapping in CVC, TRCA and NVCA jurisdictions in Caledon was reviewed and updated based on Region of Peel 2017 aerial photographs. Major updates to land cover included areas that had been urbanized, natural cover that had been removed due to an approved permitting process (e.g. aggregate pits), and areas that had undergone succession to natural cover.

3.1.2 Development of a Caledon CA NHS

Once updates to land cover were complete, individual Conservation Authority natural heritage systems were refined or created in Caledon as follows using a manual, vector-based digitization approach:

- CVC refined its watershed-based NHS boundaries by applying its existing NHS criteria to the updated land cover mapping.
- TRCA refined its Etobicoke TNHS and Humber TNHS by removing areas of new development, urbanization or stormwater management infrastructure from the systems, and adding areas that have undergone succession to forest, wetland or successional cover based on updated natural cover mapping and land use information.
- No new potential natural cover (TRCA) or enhancement areas (CVC) were added to the systems. It should be noted that no additional modelling work and habitat patch L-ranking analysis was done to reflect the updated quantity and quality of habitat patches in TRCA's NHS for this exercise.
- LSRCA's system did not require refinement as it was recently created and consequently reflects updated land cover.
- NVCA did not have an existing NHS. Based on available data and resources, CVC adapted its NHS criteria to develop an NHS for the portion of NVCA within the Region of Peel; the criteria and mapping were reviewed and approved by NVCA staff.

After updates to the individual systems were complete, major roads were removed from the systems. In addition, "natural cover" and "potential enhancement areas" were attributed for the Caledon CA NHS as described in Box 3-1. A more detailed

GIS methodology that outlines the process for updating the mapping is available upon request (CVC 2020).

NATURAL COVER is land occupied by naturally or culturally occurring vegetation. These areas can be dominated by native and non-native species. Natural cover broadly includes woodlands, wetlands, aquatic habitat (watercourses and waterbodies), successional habitat including meadows, as well as other natural cover (e.g. sand dunes, rock barrens, cliffs).

POTENTIAL ENHANCEMENT AREAS are non-natural and naturalizing lands that can be restored or managed to improve ecosystem function within the system. For the CA NHS presented in this report, the term 'potential enhancement areas' is broadly used to describe TRCA's potential natural cover, as well as lands within the CVC, LSRCA, NVCA and CH NHSs that are urban, agriculture, open space, cultural meadow or cultural thicket (referred to as 'enhancement areas' in CVC's NHS). These areas aid Conservation Authorities in meeting science-based watershed scale targets for natural cover. Potential enhancement areas are strategic locations to restore to a natural state, where feasible, or to implement best management practices, where appropriate, to support the NHS and its functioning and to prevent further degradation (e.g. native species plantings, low impact development). Loss of potential enhancement areas to development is anticipated to negatively affect the form and function of the Natural Heritage System. Where potential enhancement areas fall on private land, opportunities for restoration and enhancement should only be explored in cooperation with landowners.

Box 3-1. Natural cover and potential enhancement areas within the Caledon CA NHS (see also Table 2-1 for detailed comparison of Conservation Authority systems).

3.1.3 Integration of the Caledon CA NHS at watershed boundaries

Next, Conservation Authority natural heritage systems were reviewed at their boundaries to resolve inconsistencies, such as system overlaps at watershed boundaries. CVC followed and expanded upon a process used to edge-match the NHSs of five CAs for the Region of Durham (Region of Durham 2012). Conservation Authority boundaries within Caledon were examined at a map scale of 1:2,000 to identify any edge-matching issues.

The following general rules were used during the edge-matching process (CVC 2020):

1. **NHS extent:** Mapping of each CA NHS was clipped to its respective watershed boundary.
2. **Areas of overlap:** The CA jurisdictional boundaries do not align perfectly. Natural heritage systems were merged in areas where CA jurisdictions overlapped to respect each methodology.

3. **Gaps:** In locations where gaps exist between CA jurisdictions and there was no existing NHS mapping, natural areas were mapped using natural cover identified in TRCA's 2017 natural cover data and potential enhancement areas were mapped using the potential natural cover from TRCA's 2007 TNHS. Gaps were only found along the TRCA jurisdictional boundary.
4. **Natural features:** For natural features that straddle CA jurisdictional boundaries, the entirety of the feature was included in the CA NHS if it met the criteria for either system along the boundary. This respects watershed-scale NHS methodologies and allows for cross jurisdictional connections.
5. **Potential enhancement areas:** Each Conservation Authority mapped potential NHS enhancement areas using a different methodology, resulting in discontinuous mapping at jurisdictional boundaries. However, no changes to these areas were made along jurisdictional boundaries, as potential enhancement areas have been identified strategically to meet watershed-scale targets for the respective CAs (See Section 3.1.7 below for further consideration of differences in potential enhancement area mapping by the CAs).

Conservation Authority ecology and planning staff reviewed each of the proposed edits and confirmed decisions made at the boundaries.

3.1.4 Aquatic system

To provide an integrated aquatic and terrestrial NHS to the Region of Peel and Town of Caledon, an aquatic system was mapped. Watercourses, lakes and other waterbodies are included as part of the CA NHS in the Town of Caledon presented herein (Figure A3, Appendix A).

Since the TRCA NHS was originally based on the terrestrial system only, aquatic features including all mapped watercourses and water bodies were incorporated through the refinement process using a vector-based methodology, similar to the process used for the Brampton CA NHS. Many watercourses and some other waterbodies were already included in TRCA's NHS given that much of the system's existing and potential natural cover falls within valley and stream corridors that contain these aquatic features.

Known stormwater management (SWM) ponds managed for water quality and/or water quantity, irrigation ponds, waste water treatment ponds, and active aggregate pits are not considered aquatic features within the NHS. Stormwater Management ponds are considered infrastructure that maintain water quality and provide flood control functions. Nevertheless, where these features fell entirely within another feature of the CA NHS (e.g. within valleylands) they were included in the system with the recognition that they would continue to be managed as necessary. GIS layers were reviewed to ensure no SWM ponds were erroneously included as waterbodies or other features outside the valleyland system (see Table C1, Appendix C for all GIS layers referenced in the development of the CA NHS).

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3.1.5 Incorporation of municipal refinements

At the request of the Region of Peel, CVC, in coordination with staff from the Town of Caledon and TRCA, undertook some refinements to the Caledon CA NHS to reflect key planning approvals that have been incorporated within Caledon's Environmental Policy Areas (EPA) zoning and/or Official Plan EPA land use designations. The purpose of these municipal refinements is to ensure that the best available information is presented in Peel's Greenlands ROPA Discussion Paper. These municipal refinements were conducted as follows:

1. The Region of Peel identified general areas in Caledon that should be reviewed to assess the need for municipal refinements;
2. The Town of Caledon and the Region of Peel reviewed these locations and identified sites that required refinement;
3. CVC, TRCA and the Town of Caledon developed a refinement methodology for each site based on the spatial data available from the Town at the time; and
4. CVC incorporated these refinements into the mapping for the Caledon CA NHS.

The data sources used to refine the CA NHS mapping are included in Table C1, Appendix C. The CA NHS is a landscape-level system, and the refinements completed at this stage did not include comprehensive review and integration of all approved development plans in the Town of Caledon. The CA NHS mapping is not intended to supersede existing planning decisions and development approvals. As a result, further refinements may be required at the site level; these refinements can be incorporated as needed at a later stage through the municipal planning process.

Refinements in active aggregate sites

The Region of Peel requested refinements to the Caledon CA NHS in areas with active aggregate extraction licences. Within the boundary of each active aggregate site, refinements were made only within areas zoned by Caledon as Extractive Industrial (MX*) in the Town's zoning mapping. No zoning mapping exists within the Niagara Escarpment Plan (NEP) area, because the area is under Niagara Escarpment Commission (NEC) Development Control as authorized under the provisions of the *Niagara Escarpment Planning and Development Act*. Refinements to active pits within the NEC Development Control Area were made within lands designated as Extractive Industrial in the Town's Official Plan land use mapping.

For almost all active aggregate sites, the Caledon CA NHS was completely removed from the Extractive Industrial zone (or Extractive Industrial land use designation within the NEP area), unless it occurred within:

1. Environmental Policy Area (EPA) land use designation in Caledon's Official Plan;
2. Caledon's Environmental zone (EPA1 and EPA2) designations; or
3. Caledon's Extractive Industrial zones that have overlapping environmental policy (MX-E and MX-ORM-E).

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As a result of these refinements, the Caledon CA NHS remains only within extractive industrial areas of active aggregate pits that also have associated environmental land use or zoning designations.

In addition, for aggregate sites where approved site plans were available, the CA NHS mapping was refined to exclude the mapped extraction limit from site plans.

Additional refinements
The Region of Peel requested that consideration of current land uses and planning approvals be included in the refinements to the CA NHS. Town of Caledon, CVC and TRCA staff examined current land uses within the settlement areas and areas where the NHS had been refined through planning approvals. CVC then refined and updated the CA NHS mapping based on this review. It is important to note that this initial refinement process was not exhaustive, and rather focused on recent known approvals where the EPA land use designation and/or zoning was approved or amended to reflect the refined NHS. Further refinements may be considered at the local level through subsequent planning processes (e.g. Official Plan Review, and Secondary Plans).

3.1.6 Small natural heritage feature screening areas

In some instances, features exist outside the mapped NHS that may be necessary to ensure ecosystem function over the long term. Small natural heritage feature screening areas outside the Caledon CA NHS were mapped to act as a screening tool when development applications occur, to evaluate if these features or their function need to be maintained on the landscape (Figure A4, Appendix A). These features include small woodlands, wetlands and meadows that did not meet the criteria for inclusion in the NHS or were not captured by the NHS modelling.

These smaller features can aid in meeting watershed-scale targets for natural cover and may also contain important habitat that requires protection when evaluated at the site level (e.g. significant wildlife habitat, species at risk habitat). The consideration of these features in designing and managing a local NHS is described below in ‘Section 5.0 Recommendations for Implementation’.

3.1.7 Key differences between NHSs

Valleylands
Currently valleylands are mapped differently by the Conservation Authority natural heritage systems in the Region of Peel (Table 2-1). In general, CVC, LSRCA and NVCA include the entirety of the valleyland feature within their natural heritage systems. The TRCA NHS strongly overlaps with the valleyland system, but excludes most open spaces (e.g. manicured parks) and urban areas within valleylands for the target modelled NHS.

The Conservation Authorities recognize that these lands generally fall within hazard lands and are protected on the landscape. As such, including these lands in a Regional natural heritage system could identify opportunities to avoid degrading the functions of the feature and the NHS. These areas may be enhanced through stewardship or restoration to improve their function and may offer future opportunities for naturalization or restoration to increase NHS function (where feasible).

Currently, differences in valleyland delineation and the land-uses therein have been left as is in the CA NHS mapping for the Region of Peel. Valleylands are important multifunctional features that support a number of ecological and hydrological functions, including but not limited to moderation of flooding and water temperature, maintenance of water quality, and provision of habitat and movement corridors for wildlife. Should the Region wish to explicitly include valleylands as a feature in the system across the Region of Peel, the Conservation Authorities are committed to working with municipal staff to update and refine the CA NHS mapping for consistency at the direction of the Region during the OP update process.

Potential Enhancement Areas

Potential enhancement areas in the Caledon CA NHS have been defined using differing, but related criteria and have different extents within the Region of Peel (Table 2-1). The extent of potential enhancement areas within each system helps meet science-based watershed-scale targets for natural cover quantity and quality, helps provide well-distributed natural cover across watersheds, and recognizes that current levels of natural cover are insufficient to protect biodiversity and ecological function of natural systems in our watersheds.

Important considerations regarding potential enhancement areas include:

- **Buffers** – the CVC, LSRCA and NVCA NHSs include buffers around certain features. Like all land in the Caledon CA NHS, these areas are mapped as either potential enhancement area or natural cover, depending on the land use within the buffer. TRCA does not explicitly map buffers within the NHS and instead maps a "target system" of existing natural cover and potential natural cover (areas with restoration potential). In cases where an existing feature represents the edge of the NHS, then the buffers are determined within the development review process using existing guidelines and policies established by the province, municipality and/or TRCA.
- **Valleylands** – Differences in how the CAs incorporate valleylands in their respective NHSs are described above (Table 2-1). Where the CA NHS includes areas without existing natural cover in valleylands, they are considered potential enhancement areas. LSRCA has also mapped additional restoration opportunities within the floodplain as a separate shapefile to their valleylands.
- **Tableland Potential Enhancement Areas** – Each CA NHS includes tableland potential enhancement areas, through differing methods but using similar systems approaches. CVC has mapped tableland potential

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enhancement areas in Centres for Biodiversity and buffers. TRCA has modelled potential natural cover to improve the ecological function of the system as a whole. LSRCA has included criteria for grassland restoration areas as well as corridor restoration areas that can extend into tablelands.

The implementation of potential enhancement areas is discussed further in Section 5.2.

3.2 Results

The integrated Caledon CA NHS is shown in Figure 3-1 (and also Figure A3 of Appendix A). The municipal refinements requested by Peel described in section 3.1.5 resulted in a removal of 242 ha from the CA NHS – 106 ha of natural cover and 136 ha of potential enhancement area. Overall, these changes did not have a major impact on the system's coverage and composition within the Town, and so the results presented in this section refer only to the Caledon CA NHS post-refinements.

The CA NHS covers 48% of the Town of Caledon, which comprises of both existing natural cover (34%) and potential enhancement areas (14%) that have the potential to be restored or managed to improve biodiversity and ecological function of the natural system (Table 3-1). Within the CA NHS, the majority (71%) of land is made up of natural cover (23,735 ha) and the remaining 29% of the system (9,701 ha) is identified as potential enhancement, providing opportunities for future stewardship and restoration efforts. Overall, the CA NHS captures 98% of existing woodland and wetland cover within the Town, which amounts to approximately 29% of Caledon's total area.

Table 3-1. Elements of the Caledon CA NHS (see also Figure 3-1).

Natural Heritage System element	Area (ha)	Percent of Town of Caledon Area (%)	Percent of Caledon CA NHS (%)
Natural Cover[1]	23,735 ha	34%	71%
Potential Enhancement Area[1]	9,701 ha	14%	29%
TOTAL NHS	**33,436 ha**	**48%**	**100%**

[1] Please see glossary for definitions

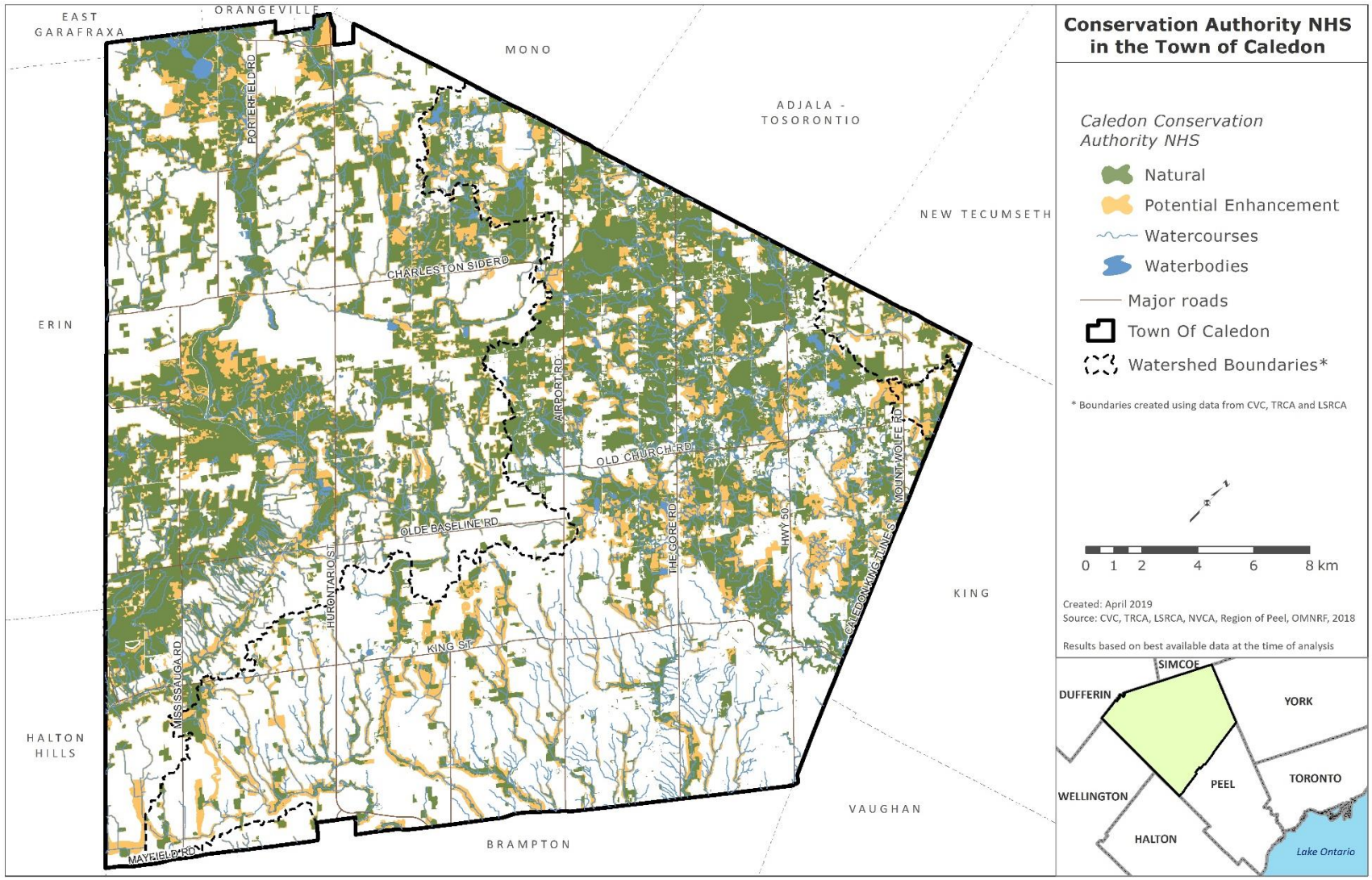

Figure 3-1. Caledon Conservation Authority Natural Heritage System (including municipal refinements requested by the Region of Peel).

For a more comprehensive understanding of the land use and land cover within the CA NHS, a more detailed breakdown of individual cover types is provided in Table 3-2. Land cover in the Town of Caledon is also mapped in Figure A5, Appendix A. As per the mapping methodology used in TRCA's TNHS, successional habitat (e.g. cultural meadow and cultural thickets) may be captured as existing natural cover or as potential enhancement within the TRCA jurisdiction. This is mainly to systematically reflect the gradient of ecological significance that these patches may have based on the surrounding landscape context. These differences may be refined at finer scales of study, such as subwatershed studies, secondary plans and/or block plans. The CA NHS includes some small pockets of urban land cover, which typically fall within valleylands and buffers of natural features. Because of their location, these areas can still contribute to maintaining ecological and hydrological processes and have been identified in the CA NHS as potential enhancement areas. Due to their current urban land use, opportunities for enhancement may be limited in these areas; examples of enhancement opportunities that could be explored for these lands to improve ecosystem function include naturalization, increasing canopy cover, and Low Impact Development (LID) initiatives. Potential enhancement opportunities on private lands would only be explored in cooperation with the landowner. The Region of Peel may wish to exclude some of these urban areas from the CA NHS mapping for Official Plan purposes.

Table 3-2. Land use and land cover within the Caledon CA NHS (based on the 2017 CVC Ecological Land Classification (ELC) and Land Use GIS layer, maintained across entire Region of Peel)[1].

Land Cover Type[2]	Area in the CA NHS (ha)	Percent of Town of Caledon Area (%)
Forest	9,587 ha	14%
Wetland	4,854 ha	7%
Cultural Woodland	1,865 ha	3%
Plantation	4,045 ha	6%
Successional	4,964 ha	7%
Aquatic	653 ha	1%
Other Natural (i.e. ELC communities not captured above)	51 ha	<1%
Agriculture	5,545 ha	8%
Open Space	601 ha	1%
Urban	1,271 ha	2%
Total NHS	**33,436 ha**	**48%**

[1] Estimates are based on current existing land use and land cover in the Town of Caledon and are not necessarily equivalent to municipal zoning.
[2] The ELC and land use components constituting each land cover type in Caledon are listed in Table D1, Appendix D.

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The Caledon CA NHS was compared to a variety of existing protected features in the Town of Caledon (Table 3-3). The areas mapped as part of the CA NHS are highly compatible with existing policy designations and features. For example, the CA NHS captures almost all Provincially Significant Life Science Areas of Natural and Scientific Interest (ANSIs) and Provincially Significant Wetlands (PSWs; Figure A6, Appendix A). The CA NHS also includes 93% of the Greenbelt Key Natural Heritage Features and Key Hydrologic Features in Caledon as mapped by EXP Services Inc. (2018) for the Town of Caledon (Figure A7, Appendix A). The areas where the CA NHS does not overlap with these features are quite minor and are typically the result of slight discrepancies in mapped feature boundaries. In addition, roads have been removed from the CA NHS but are sometimes included within the designated features. Not all of these features found within the CA NHS are captured completely within the natural cover. The reason that a small portion of the ANSIs and PSWs are captured within the potential enhancement areas is likely due to slight boundary discrepancies between the features and the CA NHS land cover classification. These minor mapping discrepancies are typically resolved during the municipal natural heritage system mapping process (Phase 3 in Figure 1-2). A larger portion of the Greenbelt Key Natural Heritage Features (KNHFs) and Key Hydrologic Features (KHFs) is captured within the CA NHS potential enhancement areas because these areas include feature types that are not strictly natural cover, such as significant valleylands and vegetation protection zones.

The CA NHS mapping captures 79% of areas regulated by Conservation Authorities (based on mapping available at the time the CA NHS was developed; Figure A8, Appendix A). Locations where regulated areas extend beyond the CA NHS generally include portions of flood hazard lands and large buffers on regulated features (e.g. wetlands). Also, some mapped regulated areas are not included in the CA NHS due to discrepancies in feature boundaries resulting from differences in data vintage. In addition, the CA NHS was also found to highly overlap with records of known Species at Risk in CVC's jurisdiction (84% overlap) and Species of Conservation Concern in TRCA's jurisdiction (96% overlap with L1-L3 ranked species).

Table 3-3. Proportion of areas regulated by Conservation Authorities and certain designated features and areas captured within the Caledon CA NHS.

Feature	Area in Caledon (ha)	Percent captured in CA NHS Natural Cover (%)	Percent captured in entire CA NHS[1] (%)
Conservation Authority Regulated Areas[2]	28,221 ha	56%	78%
Provincially Significant Life Science Areas of Natural and Scientific Interest (ANSIs)	1,305 ha	98%	99%
Provincially Significant Wetlands (PSWs)	3,278 ha	96%	99%
Greenbelt Key Natural Heritage Features (KNHFs) and Key Hydrologic Features (KHFs) mapped by EXP Services Inc.	10,444 ha	74%	93%

[1] Includes CA NHS natural cover and potential enhancement area.
[2] Areas regulated by Conservation Authorities include watercourses, valleylands, lake shorelines, hazard lands, and wetlands. Statistics are based on Conservation Authority regulated area mapping available at the time the CA NHS was developed.

There is also a high degree of overlap between the Caledon CA NHS and the existing provincial natural heritage systems and municipal natural heritage systems (Table 3-4). The CA NHS captures 76% of the provincial natural heritage systems, which includes the Greenbelt NHS, Niagara Escarpment Plan Natural Area and Protection Area, Oak Ridges Moraine Core and Linkage Areas, and the Growth Plan NHS for the Greater Golden Horseshoe (Figure A9, Appendix A). Areas that do not overlap are generally non-natural land uses included within the provincial systems, such as tablelands that are currently used as active agriculture.

The Region of Peel's Greenlands System Core Areas are considered significant at a regional scale and are identified in the Region's Official Plan; 96% of these areas fall within the mapped CA NHS (Figure A10, Appendix A). At a local scale, Caledon's Official Plan identifies Environmental Policy Area (EPA), and Environmental Zone 1 and 2 (EZ1 and EZ2) in the Palgrave Estate Residential Community; 89% of these areas are captured within the CA NHS (Figure A11, Appendix A).

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Table 3-4. Proportion of the existing provincial and municipal natural heritage systems that are captured within the Caledon CA NHS.

Feature	Area in Caledon (ha)	Percent captured in CA NHS Natural Cover (%)	Percent captured in entire CA NHS[1] (%)
Municipal natural heritage systems	**26,848 ha**	**75%**	**89%**
Region of Peel Greenlands System Core Areas	19,223 ha	89%	96%
Caledon EPA and EZ1/EZ2 within Palgrave	23,600 ha	74%	89%
Provincial natural heritage systems[2]	**34,140 ha**	**57%**	**76%**

[1] Includes CA NHS natural cover and potential enhancement area.
[2] Includes the Greenbelt NHS, Niagara Escarpment Plan Natural Area and Protection Area, Oak Ridges Moraine Plan Core and Linkage Areas, and the Growth Plan NHS for the Greater Golden Horseshoe.

In some areas, the CA NHS does not overlap with the regional and municipal natural heritage systems. These minor differences in the mapping occur for a variety of reasons, including:

- In some areas there are minor mapped boundary discrepancies between the CA NHS features and the same features mapped at the regional and local municipal scale. These differences are generally resolved at the site scale during the planning process.
- In some cases, the mapping discrepancies may be due to changes in land cover, as the CA NHS mapping in Caledon was updated to reflect 2017 land use and land cover and the municipal systems were developed based on older data.
- The municipal systems have been mapped using the boundary of the features while the Conservation Authority natural heritage systems were developed based on land use. Therefore, roads are not included in the Caledon CA NHS, but may be included in the municipal natural heritage systems mapping where they bisect a feature (e.g. valleylands).
- In TRCA's jurisdiction, urban areas and open space (e.g. golf courses and playing fields) were not included in the NHS, which results in some differences with the municipal systems, particularly in the valleylands and watercourse corridors.

However, the vast majority of the CA NHS (94% of the entire system and 96% of its natural cover) is currently either included within an existing provincial or municipal natural heritage system or regulated by a Conservation Authority (Table 3-5). As such, almost all of the CA NHS is captured by existing policy protections

and designations. The remaining 6% of the CA NHS that extends beyond these policy-protected systems and areas reflects the additional strategic areas identified by the Conservation Authorities at the watershed scale to ensure the long-term resilience of the natural system.

Table 3-5. Area and proportion of the Caledon CA NHS that is comprised of the provincial natural heritage systems, municipal natural heritage systems, and areas regulated by Conservation Authorities.

Feature	CA NHS Natural Cover		Entire CA NHS[1]	
	Area (ha) of Natural Cover	Percent (%) of Natural Cover	Area (ha) of Entire CA NHS	Percent (%) of Entire CA NHS
Provincial natural heritage systems[2]	19,544 ha	82%	25,954 ha	77%
Municipal natural heritage systems[3]	20,181 ha	85%	24,026 ha	72%
CA Regulated Areas[4]	15,931 ha	67%	22,226 ha	66%
TOTAL COMBINED AREA	**22,726 ha**	**96%**	**31,713 ha**	**94%**

1 Includes CA NHS natural cover and potential enhancement area.
2 Includes the Greenbelt NHS, Niagara Escarpment Plan Natural Area and Protection Area, Oak Ridges Moraine Plan Core and Linkage Areas, and the Growth Plan NHS for the Greater Golden Horseshoe.
3 Includes the Peel Greenlands System Core Areas and the Caledon EPA / EZ1 and EZ2 in Palgrave.
4 Includes watercourses, valleylands, lake shorelines, hazard lands, and wetlands.

It is important to note that the CA NHS will likely also overlap with other planning areas (e.g. Secondary Plans). In areas that undergo active planning for local systems, this landscape scale NHS may be refined through site-level evaluations and the local planning process.

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4.0 Phase 2: Peel CA NHS

4.1 Methodology

This section documents the methodology used to map the Peel CA NHS. The data sources used to complete the CA NHS mapping are listed in Table C2, Appendix C.

4.1.1 Development of a Peel CA NHS

The Peel CA NHS was developed by combining existing Conservation Authority natural heritage system data in the Town of Caledon, City of Brampton, and City of Mississauga. The following is a description of the data used in each local municipality:

- **Town of Caledon:** Caledon CA NHS with municipal refinements (2019) as described in chapter 3 of this report.
- **City of Brampton:** Brampton CA NHS with additional refinements to support the update of the City's Official Plan (2016). CVC and TRCA originally completed the Brampton CA NHS in 2014, which incorporated mapping of some approved Secondary Plan and Block Plan areas where the natural heritage system had been locally refined through the planning process (CVC and TRCA 2014). In 2016, the City requested further refinements to the system to support the update of Schedule D in the Official Plan, and the mapping of several additional approved Secondary Plans were incorporated into the CA NHS.
- **City of Mississauga:** CVC NHS (2015) and TRCA NHS (2007). Both CVC and TRCA provided input to the development of Mississauga's current Official Plan NHS using their watershed-based mapping and data. To map the Peel CA NHS, CVC integrated the original watershed-based natural heritage system mapping of both CAs. In addition to CVC and TRCA, Mississauga also contains a small portion of CH jurisdiction. CH does not have an existing NHS, so CVC adapted its NHS criteria to develop an NHS for the portion of CH in the Region of Peel, using available data. The criteria and mapping were reviewed and approved by CH staff. Like the Caledon and Brampton CA NHSs, major roads were removed from the system. No mapping of approved planning areas where the natural heritage system had been locally refined was available in Mississauga, and thus municipal refinements have not been incorporated into the system.

All lands within the Peel CA NHS were classified as "natural cover" or "potential enhancement areas" as described in Box 3-1 in section 3.1.2. A more detailed GIS methodology that outlines the mapping process is available upon request (CVC 2020).

4.1.2 Integration of the Peel CA NHS at watershed and municipal boundaries

Conservation Authority natural heritage systems were reviewed at watershed and municipal boundaries to resolve inconsistencies. The boundaries examined within Peel as part of this process include the CA jurisdictional boundaries in Mississauga, the Mississauga-Brampton municipal boundary, and the Brampton-Caledon municipal boundary. These boundaries were examined at a map scale of 1:2,000 to identify any edge-matching issues.

Where edge-matching issues were identified, edits were made to the Peel CA NHS mapping following the same general rules used for the Caledon CA NHS (see section 3.1.3). A more detailed documentation of this process is provided in CVC 2020. Conservation Authority ecology and planning staff reviewed each of the proposed edits and confirmed decisions made at the boundaries.

4.1.3 Aquatic system

To provide an integrated aquatic and terrestrial system to the Region of Peel, an aquatic system was mapped for the CA NHS. Watercourses, lakes and other waterbodies are included as part of the CA NHS. The aquatic system was previously mapped for Caledon in Phase 1 of this project (section 3.1.4) and for Brampton as part of the Brampton CA NHS mapped by CVC and TRCA (CVC and TRCA 2014). To complete the aquatic system mapping across Peel, watercourses and waterbodies in Mississauga were mapped using the same methodology used in Caledon (see section 3.1.4 for full details).

4.1.4 Key differences between the NHSs

There are some key differences between the Conservation Authority natural heritage systems with respect to valleylands and potential enhancement areas. For a description of these differences, see section 3.1.7.

There are also differences in the vintage of the data used to map the Peel CA NHS in each local municipality, as well as differences in the municipal refinements made to the mapping:

- **Town of Caledon:** CA NHS mapping was completed in 2019 for this project and is based on CA natural heritage system mapping that was updated using 2017 aerial photographs. At the request of Peel, refinements were made to the CA NHS mapping in active aggregate pits, some settlement areas, and a few additional areas based on recent planning approvals.
- **City of Brampton:** CA NHS mapping was initially completed in 2014 and is based on draft 2014 CVC NHS mapping and the TRCA NHS (2007). The draft CVC NHS was based on 2012 land cover data and the TRCA NHS was based on 2002 land cover data. At the request of the City, the CA NHS mapping

was updated in 2016 in areas with approved Secondary Plans and Block Plans where the NHS had been locally refined.

- **City of Mississauga:** CA NHS mapping was completed in 2019 for this project and is based on the CVC NHS (2015) and TRCA NHS (2007). The CVC NHS was based on 2012 land cover data and the TRCA NHS was based on 2002 land cover data. No refinements have been incorporated into the CA NHS mapping to date (mapping of approved planning areas where the NHS had been locally refined was not available).

4.2 Results

The Peel CA NHS is shown in Figure 4-1 (and also in Figure A12 in Appendix A). The CA NHS covers 34% of the Region of Peel, which comprises both existing natural cover (23%) and potential enhancement areas (11%) that have the potential to be restored or managed to improve biodiversity and ecological function of the natural system (Table 4-1).

Within the Peel CA NHS, the majority (68%) of land is made up of natural cover (29,416 ha) and the remaining 32% of the system (13,955 ha) is identified as potential enhancement, providing opportunities for future stewardship and restoration efforts.

Table 4-1. Elements of the Peel CA NHS (see also Figure 4-1).

Natural Heritage System element	Area (ha)	Percent of Region of Peel Area (%)	Percent of Peel CA NHS (%)
Natural Cover[1]	29,416 ha	23%	68%
Potential Enhancement Area[1]	13,955 ha	11%	32%
TOTAL CA NHS	**43,371 ha**	**34%**	**100%**

[1] Please see glossary for definitions

The coverage of the Peel CA NHS as well as the breakdown of natural cover and potential enhancement area in each local municipality is provided in Table 4-2. This breakdown highlights the importance of the CA NHS being an integrated system that includes both natural cover and potential enhancement areas, particularly in Brampton and Mississauga where existing natural cover is currently quite low. The CA NHS covers 48% of the Town of Caledon, 21% of the City of Brampton, and 15% of the City of Mississauga.

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Table 4-2. Elements of the Peel CA NHS in each local municipality.

Natural Heritage System element	Area (ha)	Percent of Municipal Area (%)
CA NHS in Town of Caledon	**33,436 ha**	**48%**
Natural Cover	23,735 ha	34%
Potential Enhancement Area	9,701 ha	14%
CA NHS in City of Brampton	**5,582 ha**	**21%**
Natural Cover	3,231 ha	12%
Potential Enhancement Area	2,351 ha	9%
CA NHS in City of Mississauga	**4,353 ha**	**15%**
Natural Cover	2,449 ha	8%
Potential Enhancement Area	1,904 ha	7%
TOTAL CA NHS	**43,371 ha**	**34%**

The areas mapped as part of the Peel CA NHS are compatible with areas regulated by Conservation Authorities and existing policy designations and features (Table 4-3). The CA NHS captures almost all Provincially Significant Life Science ANSIs and PSWs. The areas where the CA NHS does not overlap with these features are quite minor, and are typically the result of slight discrepancies in mapped feature boundaries, as well as the fact that roads have been removed from the CA NHS but are sometimes included within the designated features. In addition, the Peel CA NHS captures 76% of areas currently regulated by Conservation Authorities.

Table 4-3. Proportion of areas regulated by Conservation Authorities and certain designated features captured within the Peel CA NHS.

Feature	Area in Peel (ha)	Percent captured in CA NHS Natural Cover (%)	Percent captured in entire CA NHS[1] (%)
Conservation Authority regulated areas[2]	38,958 ha	52%	76%
Provincially Significant Life Science ANSIs	1,377 ha	98%	99%
PSWs	3,593 ha	95%	99%

[1] Includes CA NHS natural cover and potential enhancement area.

[2] Areas regulated by Conservation Authorities include watercourses, valleylands, lake shorelines, hazard lands, and wetlands. Statistics are based on Conservation Authority regulated area mapping available at the time the CA NHS was developed.

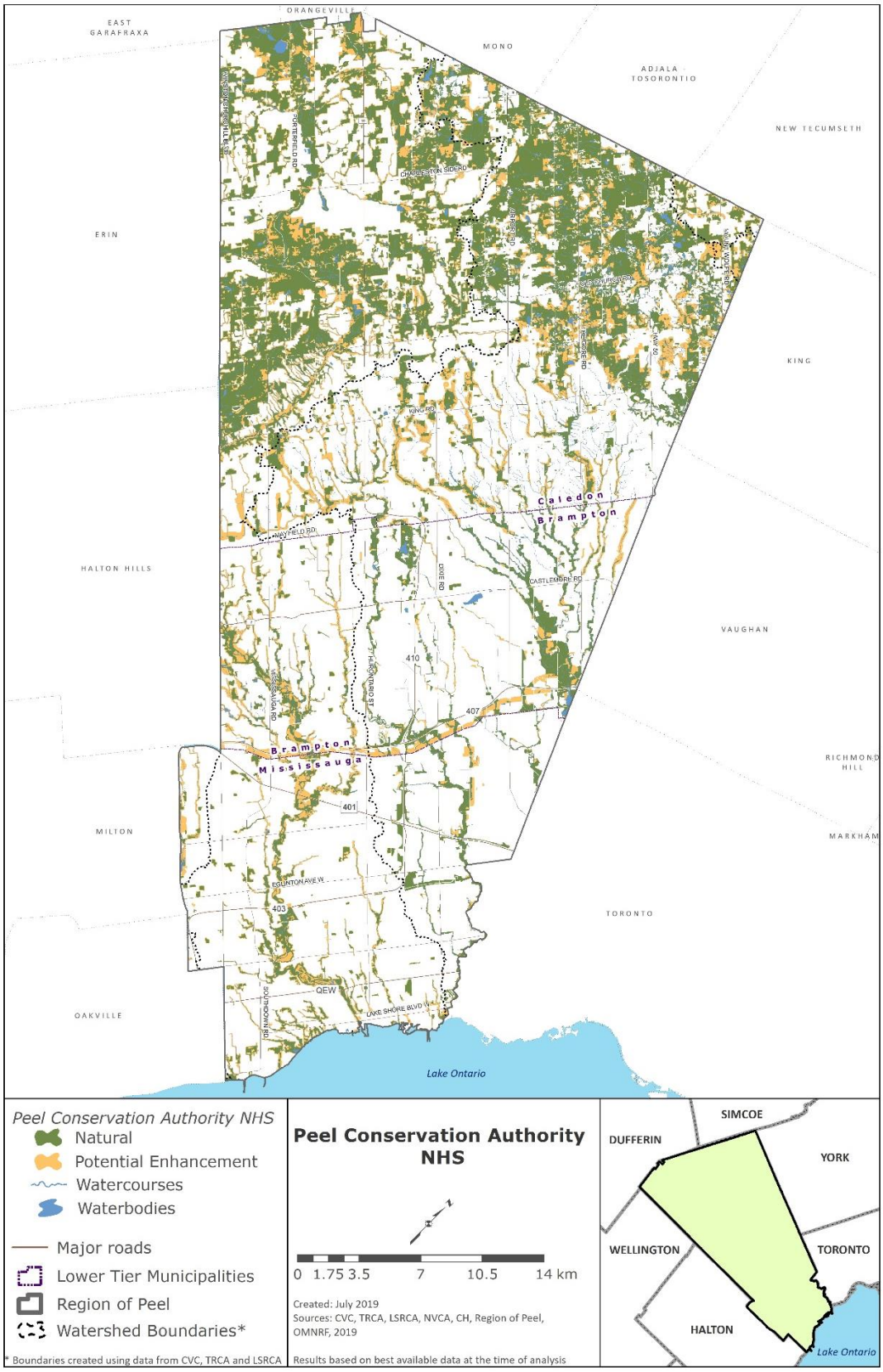

Figure 4-1. Peel Conservation Authority Natural Heritage System.

There is also a high degree of overlap between the Peel CA NHS and the existing provincial and municipal natural heritage systems (Table 4-4). The CA NHS captures 76% of the provincial natural heritage systems, which includes the Greenbelt NHS, Niagara Escarpment Plan Natural Area and Protection Area, Oak Ridges Moraine Core and Linkage Areas, and the Growth Plan NHS for the Greater Golden Horseshoe. Areas that do not overlap are generally non-natural land uses included within the provincial systems, such as tablelands that are currently used as active agriculture.

At a regional municipal scale, the Peel CA NHS captures 96% of the Region of Peel's Greenlands System Core Areas identified in the Region's Official Plan (Figure A13, Appendix A). One component of the Peel Greenlands System is the Core Valleys. The overlap of these Core Valleys with the CA NHS demonstrates the importance of including potential enhancement areas within the system, as 91% of the Core Valleys are captured within the entire CA NHS, compared with the 69% captured within the CA NHS natural cover (Figure A14, Appendix A).

At a local municipal scale, the CA NHS also captures the majority of existing natural systems in the Town of Caledon, City of Brampton and City of Mississauga. As previously mentioned in section 3.2, 89% of the Caledon EPA and EZ1/EZ2 is captured within the CA NHS. In Brampton, the CA NHS captures 87% of the NHS Core Areas in Brampton's Schedule D1 (proposed update to the Brampton Official Plan Schedule D; not yet approved) as of July 2019. Schedule D1 also includes an overlay of linkages and potential enhancement areas, which includes the Parkway Belt West lands; 72% of these lands are captured within the CA NHS (and 56% are within CA NHS potential enhancement areas). In Mississauga, the CA NHS captures 83% of the existing NHS in the City's Official Plan. Similar to the Peel Greenlands Core Valleys, the overlap of the CA NHS within the local municipal systems shows the importance of including potential enhancement areas within the system, as the proportion of the local municipal systems captured in CA NHS natural cover is much lower than the proportion captured in the entire CA NHS.

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Table 4-4. Proportion of the existing provincial and municipal natural heritage systems that are captured within the Peel CA NHS.

Feature	Area in Peel (ha)	Percent captured in CA NHS Natural Cover (%)	Percent captured in entire CA NHS[1] (%)
Region of Peel Greenlands System Core Areas	**24,612 ha**	**85%**	**96%**
Region of Peel Greenlands System Core Valleys	13,407 ha	69%	91%
Local municipal natural heritage systems	**31,320 ha**	**70%**	**88%**
Caledon EPA and EZ1/EZ2 within Palgrave	23,600 ha	74%	89%
Brampton NHS Core Areas in Schedule D1 (proposed)[2]	4,801 ha	59%	87%
Mississauga NHS	2,919 ha	62%	83%
Provincial natural heritage systems[3]	**34,372 ha**	**57%**	**76%**
TOTAL COMBINED AREA	**47,333 ha**	**57%**	**77%**

[1] Includes CA NHS natural cover and potential enhancement area.
[2] Proposed update of Schedule D – not yet approved.
[3] Includes the Greenbelt NHS, Niagara Escarpment Plan Natural Area and Protection Area, Oak Ridges Moraine Plan Core and Linkage Areas, and the Growth Plan NHS for the Greater Golden Horseshoe.

In some areas, the Peel CA NHS does not overlap with the regional and municipal natural heritage systems. Like the Caledon CA NHS, these differences in the mapping occur for several reasons, including:

- In some areas there are minor mapped boundary discrepancies between the CA NHS features and the same features mapped at the regional and local municipal scale. These differences are generally resolved at the site scale during the planning process.
- In some cases, the mapping discrepancies may be due to differences in the vintage of the data used to map the systems (depending on the vintage of the data, recent land cover changes may not be reflected in all systems).
- The municipal systems have been mapped using the boundary of the features while the Conservation Authority natural heritage systems were developed based on land use. Therefore, roads are not included in the Peel CA NHS, but may be included in the municipal natural heritage systems mapping where they bisect a feature (e.g. valleylands, woodlands, wetlands).

- In TRCA's jurisdiction, urban areas and open space (e.g. golf courses and playing fields) were not included in the NHS, which results in some differences with the municipal systems, particularly in the valleylands and watercourse corridors.

However, the vast majority of the Peel CA NHS is currently protected by existing policy. Ninety-two percent (92%) of the CA NHS, including 95% of its natural cover, is captured within existing provincial and municipal natural heritage systems and areas regulated by Conservation Authorities (Table 4-5).

The areas of the CA NHS that extend beyond these policy-protected systems and areas reflect the additional needs identified by the Conservation Authorities at the watershed scale to ensure the long-term resilience of the natural system. Inclusion of areas in the CA NHS (both natural and potential enhancement) that extend beyond existing municipal natural heritage systems also responds to the assessment made in Peel's Measuring and Monitoring Report (Region of Peel 2017) that *"there are opportunities to further protect and enhance the natural heritage system beyond the designated Greenlands System"*. The report acknowledges that work done by Conservation Authorities has helped to identify strategic lands outside of the current municipal systems that can enhance the natural heritage system.

Table 4-5. Area and proportion of the Peel CA NHS that is comprised of the provincial natural heritage systems, municipal natural heritage systems, and areas regulated by Conservation Authorities.

Feature	CA NHS Natural Cover		Entire CA NHS[1]	
	Area (ha) of Natural Cover	Percent (%) of Natural Cover	Area (ha) of Entire CA NHS	Percent (%) of Entire CA NHS
Provincial natural heritage systems[2]	19,630 ha	67%	26,003 ha	60%
Municipal natural heritage systems[3]	24,969 ha	85%	30,917 ha	71%
CA Regulated Areas[4]	20,265 ha	69%	29,469 ha	68%
TOTAL COMBINED AREA	**27,810 ha**	**95%**	**39,902 ha**	**92%**

1 Includes CA NHS natural cover and potential enhancement area.
2 Includes the Greenbelt NHS, Niagara Escarpment Plan Natural Area and Protection Area, Oak Ridges Moraine Plan Core and Linkage Areas, and the Growth Plan NHS for the Greater Golden Horseshoe.
3 Includes Peel Greenlands System Core Areas, Caledon EPA / EZ1 and EZ2 in Palgrave, proposed Brampton NHS Core Areas in Schedule D1 (not yet approved), and Mississauga NHS.
4 Includes watercourses, valleylands, lake shorelines, hazard lands, and wetlands.

5.0 Recommendations for Implementation

5.1 Application of the CA NHS

The Peel CA NHS is a science-based natural heritage system in the Region of Peel. In addition to helping inform the update of municipal natural heritage systems during the OP review process, the CA NHS is a tool that also supports a number of other municipal initiatives, including determining settlement area boundary expansions, next generation watershed planning, and prioritizing restoration and stewardship activities. Additional data and tools that are being developed and used by agencies and municipalities will further strengthen and support these initiatives.

The Peel CA NHS may not include all lands required for protection in the future. Additional refinement of natural systems is anticipated at local scales. Site-level analyses such as Environmental Implementation Reports (EIR) for Block Plans, Master Environmental Servicing Plans (MESPs), and Environmental Impact Studies (EIS) consider additional information to refine natural system boundaries, including but not limited to:

- Significant Wildlife Habitat
- Species at Risk habitat
- Local connectivity for aquatic, terrestrial and groundwater systems
- Identification of additional locally and provincially significant features that have not been explicitly included in the CA NHS (e.g. PSWs, ANSIs)
- Buffer requirements for protection of natural features
- Requirements for protection/management of hydrologic functions of natural features
- Adjacent lands necessary to prevent degradation of ecological function of the system
- Adaptation to specific climate change vulnerabilities of the existing features and system
- Adjacent land use and intensity
- Delineation of and overlap with natural hazards
- Ecological linkages

The CA NHS mapping reflects the best available data at the time of analysis. Every effort has been made to ensure data quality and currency, however some minor mapping errors may exist and will be corrected as appropriate (e.g. via MESP, EIR, EIS, subwatershed plans or at other points in the planning process). In addition, it is understood that local scale plans are currently underway to refine the NHS in ongoing development processes.

Features may also change over time or mapping may be updated based on new information (e.g. field verification; Light Detection and Ranging, or LiDAR, data). For example, TRCA is currently updating regulation mapping and Significant Groundwater Recharge Area (SGRA) mapping. These updates were not available to be incorporated into this project given its scoped timeframe. Recommended policies

associated with the natural system should allow for the incorporation of the most up-to-date data at the time of implementation to ensure that planning decisions are based on the best available information.

However, if features are or have been removed from the NHS without the proper planning approvals, they should still be considered part of the system. A Greenbelt natural heritage feature mapping exercise conducted for the Town of Caledon has noted that some features may have been removed from the landscape that may not have been authorized (EXP Services Inc. 2018). The consultant for the Town notes that *"according to the MNRF, Greenbelt NHS features that have been removed from the landscape without authorization are still subject to applicable provincial, regional and local policies and these features should at some point continue to be identified in municipal mapping."*

Finally, designing an NHS does not replace other regional, provincial and federal natural heritage policy requirements. For example, provincial policies including natural heritage policies in the PPS continue to apply. The CA NHS mapping presented in this report is a landscape-level tool. Site-level refinements are expected during the EIS or development process.

5.2 Potential Enhancement Areas

Potential enhancement areas include strategically located agriculture, open space and successional land cover and land use that would be most effective and efficient in maintaining and enhancing the functionality and connectedness of the CA NHS. They also include areas of urban land use that currently provide some limited ecological function due to their placement in the system (e.g. infiltration, habitat, linkage functions on the lake shorelines or in valleylands). Appropriate management, stewardship, restoration or retrofit (if already developed) of these potential enhancement areas as desired and appropriate would help mitigate negative impacts and improve ecological or hydrological function of the system.

Identification of potential enhancement areas is consistent with the natural heritage systems planning direction provided by the province of Ontario in the *Provincial Policy Statement* (OMMAH 2014) in which *"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"* can be included in a natural heritage system. Furthermore, potential enhancement areas may support or be part of existing provincial or municipal systems, features or areas, including but not limited to:

- Greenbelt Plan Natural Heritage System or natural heritage feature vegetation protection zones
- Oak Ridges Moraine Conservation Plan Linkage or Countryside Areas or Core Area vegetation protection zones
- Water resource systems

- Significant Wildlife Habitat (e.g. meadows with species of conservation concern)
- Wellhead Protection Areas
- Buffers on Conservation Authority regulated features or hazards

NHS planning should deal with potential enhancement areas appropriately in mapping and policy to enable holistic management of the landscape and to ensure integration across multiple planning objectives.

Future potential enhancement areas should also consider strategic areas in the urban matrix where implementation of innovative living green infrastructure solutions may complement the NHS features and system directly and/or indirectly, such as through improved urban matrix influence, providing stepping-stones and refugia, and enhanced aquatic-terrestrial linkages for more robust ecosystem function across the landscape.

5.3 Headwater Drainage Features

Headwater Drainage Features (HDFs) are non-permanently flowing drainage features that may not have defined bed or banks; they are first-order and zero-order intermittent and ephemeral channels, swales and connected headwater wetlands, but do not include rills or furrows (CVC and TRCA 2013). HDFs are not explicitly included in the mapped CA NHS aquatic system (i.e. watercourses and waterbodies), but some of the features in the aquatic system may end up being evaluated as HDFs through site-level assessment. Collectively, HDF features are of vital ecological importance at catchment level, as they are sources of water, sediment, nutrients and organic matter to downstream watercourses (TRCA 2007b). HDFs need to be evaluated and their functions potentially protected during the planning process. CVC and TRCA have developed guidelines for evaluating the function of HDFs during the planning process (CVC and TRCA 2013).

During the planning process at the site level, the Conservation Authorities have GIS data that can be used to screen for potential HDFs. These data sources are available upon request, and include:

- TRCA drainage line layer (based on digital elevation model)
- CVC watercourse layer (based on orthophoto interpretation)

Where mapped drainage lines fall above the regulated drainage network, the CVC/TRCA HDF guideline should be used to evaluate the feature. Mapping provides a preliminary resource; however, it may not capture all HDFs in a given area.

5.4 Small Natural Heritage Feature Screening Area Mapping in Caledon

The CA NHS has incorporated systems which have been designed at the watershed scale by Conservation Authorities. Several small natural features fall outside of the

CA NHS boundaries. For example, some small wetland patches that are part of wetland complexes fall outside the CA NHS due to their size. These features nevertheless provide additional ecological or social benefits above and beyond the existing NHS. These small features have been mapped as screening areas in the Town of Caledon, and the Region or Town would need to review and consider these areas for inclusion within their system (Figure A4, Appendix A).

Potential criteria for including small features in NHS refinements at smaller scales could include:

- Social values, including access to natural areas for local residents;
- History and age of feature;
- Rarity or representation of vegetation community;
- Contribution of natural area to meeting local natural cover targets, and;
- Provision of ecological goods and services, including mitigating the urban heat island effect, and filtering air pollution.

5.5 Important Groundwater Recharge Areas in Caledon

Important Groundwater Recharge Areas have been mapped by the CAs in the Town of Caledon to consider in association with the CA NHS (Figure A15, Appendix A). For the purposes of this study, 'Important Recharge Areas for Caledon' include Significant Groundwater Recharge Areas (SGRAs), High Volume Groundwater Recharge Areas (HGRAs) and Ecologically Significant Groundwater Recharge Areas (ESGRAs) where these areas have been delineated (AquaResources Inc. 2009, TRCA 2010, and LSRCA 2014). Significant Groundwater Recharge Areas and HGRAs are locations where modelling has identified groundwater recharge greater than an established threshold. ESGRAs have been identified through a separate modelling exercise that identifies recharge areas linked to groundwater discharge areas supporting natural features (i.e., coldwater fish habitat and wetlands).

Hydrology is a key factor that influences the structure, composition and function of ecological communities (Brinson et al. 1981, Snodgrass et al. 2000, Wright et al. 2006). It is important to maintain hydrologic regimes, including the volume, duration, frequency, timing and spatial distribution of water, to ensure that the functions and integrity of the NHS are not impacted. Conversely, maintaining or enhancing the NHS can preserve groundwater recharge and discharge functions, thereby maintaining the hydrologic system. Groundwater and the NHS should be managed together using existing Conservation Authority guidelines, including but not limited to:

- Water balance criteria (CVC 2012, TRCA 2012)
- Application of Low Impact Development practices (TRCA and CVC 2012)

The important recharge areas for Caledon are particularly important to consider for their functional linkages to the NHS and represent potential targets for restoration and acquisition.

5.6 Climate Change and NHS Planning

Watershed-scale natural heritage systems based on scientific criteria help plan for ecosystem resilience in the face of climate change. "*Increasing connectivity*" is the top management recommendation for climate change adaptation for the natural environment in the literature (Heller and Zavaleta 2009). This includes designing corridors for habitat connectivity and wildlife movement, removing barriers for dispersal, managing the urban matrix influence, locating large and functioning habitats close to each other, and reforestation. Implementing a well-designed NHS is essential to achieving these objectives, and will contribute significantly to meeting municipal, regional and provincial climate change adaptation and mitigation goals.

Recently, a Natural System Vulnerability Assessment was undertaken for the Region of Peel (Tu et al. 2017), evaluating the vulnerability of groundwater, aquatic and terrestrial systems within Peel to climate change. Implementing a CA NHS within Peel helps to fulfill several key recommendations of the study, including:

- Increase enhancement and protection of existing wetlands and tablelands and create new wetland features where possible to build resilience and deliver numerous ecosystem services, including increased flood regulation.
- Protect, enhance and restore regional species diversity by increasing connectivity of natural areas through existing restoration programs, particularly in high priority areas.
- Incorporate climate change into watershed planning more directly, including identifying and protecting important local connections between shallow groundwater and surface features.
- Enhance urban tree canopy, especially in areas with little or no ability to effectively regulate summer land and water temperatures, including areas of acute thermal stress to fish.

In addition, Conservation Authorities are currently working on climate change adaptation plans and strategies; municipalities can consider the information in these plans and incorporate them as appropriate into natural heritage systems or watershed planning as they become available.

5.7 Stewardship and Enhancement of the Natural Heritage System

The CA NHS helps prioritize conservation activities within Peel. The NHS can guide a wide range of conservation actions undertaken by Conservation Authorities, municipalities, local landowners and non-profit organizations, including but not limited to:

- Restoring aquatic, wetland, woodland and meadow ecosystems;
- Managing invasive species;
- Removing barriers for aquatic and terrestrial species movement (e.g. road best management practices, culvert upgrades);

- Applying best management practices in partnership with agricultural producers;
- Redevelopment and/or retrofit of strategic urban lands in tandem with natural heritage restoration and/or natural hazard remediation;
- Sustainable development practices to reduce impacts to the NHS, such as integration of green infrastructure, low impact development or erosion control; and
- Managing the adjacent urban land use matrix, including the urban forest.

Conservation Authorities and their partners are able to increase the effectiveness of limited conservation funding by using the NHS as a guiding tool. For example, CVC and TRCA have developed restoration mapping tools that target priority areas of the system. In addition, the NHS can guide funding criteria (i.e. incentives) that private landowners receive (e.g. Peel Rural Water Quality Program funding, tree planting subsidies, implementing living green infrastructure solutions).

The CA NHS does not prescribe the most appropriate type of restoration or application of other green infrastructure for a given site. Additional site-level information is required to plan these projects that can enhance the NHS function, above and beyond what can be determined through GIS modelling. For example, the decision to create a meadow, wetland or forest habitat is based on on-the-ground factors. In addition, the CA NHS mapping is not prescriptive regarding the protection or management of waterbodies on the landscape. In some cases, site level study may determine that the most appropriate form of restoration is to remove an online pond. A site-level plan for restoration projects should consider the site conditions, including soils, ELC communities, floral and faunal species, and site constraints. On private lands, landowners that voluntarily undertake conservation actions would play an integral role in the development of conservation actions on their lands.

5.7.1 Role of agriculture and voluntary landowner activities

The PPS policy 2.19 is explicit in clarifying that nothing in policy 2.1 (which pertains to natural heritage) is intended to limit the ability of agricultural uses to continue. Natural heritage systems and agricultural systems within the province are intended to be mutually supportive (OMAFRA 2018). Within Peel, agricultural producers have adopted many ways of becoming environmental stewards that benefit both nature and farming. Organizations such as the Ontario Federation of Agriculture, Peel Federation of Agriculture, Ontario Soil and Crop Improvement Association and their local chapters, the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), as well as non-profits support the implementation of strategies to limit negative impacts on the soil, air and water of the Town.

Incentive programs such as the Peel Rural Water Quality Program (TRCA and CVC) and CVC's Landowner Action Fund assist landowners willing to implement the NHS. Through the implementation of the Peel Rural Water Quality Program for example, CAs have partnered with agricultural producers to complete numerous best

management practice projects within the Region of Peel including clean water diversions, cover cropping, managing manure, and restricting livestock from watercourses. Through the implementation of these practices, farmers can improve the protection of the environment while growing the food, fuel and fiber required by society. By employing practices such as the adjustment of mowing to prevent the disruption of nesting grassland birds (e.g. CVC's Bird Friendly Certified Hay Program) and through the maintenance of naturalized spaces to be used as wildlife corridors, the agricultural community is partnering to enhance our existing environment.

5.8 NHS Policy

Effective policies are essential for ensuring long-term protection and management of the NHS. The following resources are available to inform natural heritage system policy development within Peel Region:

- TRCA's Living City Policies (TRCA 2014)
- CVC Example Natural Heritage System Implementation Policies (CVC 2015b)
- Towards a Natural Heritage System for the Credit River Watershed: Natural Heritage Policy Review (Usher 2012)
- Best Practice Guide to Natural Heritage Systems Planning (Ontario Nature 2014)
- Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study (North-South Environmental Inc., Dougan & Associates and Sorensen Gravely Lowes 2009)
- Natural Heritage & Environmental Management Strategy (North-South Environmental Inc. and Lura Consulting 2015)
- City of Mississauga Natural Heritage and Urban Forest Study (North-South Environmental Inc. and Beacon Environmental Ltd. 2014)

Policies should be worded to allow for the natural heritage system to be refined and updated through appropriate processes and based on the best available data.

In addition, it is recommended that policy recognizes that ecological processes are dynamic. For example, disturbance that reduces woodland cover is anticipated within a natural system and may include blowdown and pests (e.g. Emerald Ash Borer). In these situations, the woodland should maintain its woodland designation as it has the capacity to recover full woodland function over time. These periodic changes to vegetation within the system should not impact the delineation of a natural feature or area boundary. The system should be managed as a whole to maintain its integrity over the long term.

5.9 Review and Monitoring of the NHS

It is recommended that targets and indicators are developed to evaluate the effectiveness of the NHS in meeting its goals and objectives. In addition, review

and update of the NHS should occur on a regular basis (at least every 10 years) to ensure that new science and data are incorporated. Ongoing monitoring, reporting and updates to the NHS should be scheduled accordingly to support Official Plan updates, with the support of Conservation Authorities.

5.10 Conclusion

The mapping and methodology presented in this report provides a science-based CA NHS to support the Region of Peel's Official Plan review. The Conservation Authorities remain committed to supporting Regional and Town staff throughout the Official Plan review process. The activities of the Conservation Authority partners continue to support implementation and management of the natural heritage system for the benefit of current and future generations.

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7.0 Glossary

Note: *Definitions that pertain only to a specific natural heritage system or Conservation Authority are indicated in brackets*

Aquatic System: The aquatic system includes shallow or deep standing or flowing waters with little or no emergent vegetation (Lee et al. 1998).
Note: The aquatic system broadly includes watercourses and Headwater Drainage Features, lakes, ponds, and surface water and groundwater features. For the purposes of natural heritage system planning presented in this report, watercourses, lakes and ponds have been mapped, stormwater management ponds are excluded, and some features are treated as screening areas to be managed through site level study.

Biodiversity: Biodiversity (biological diversity) is the variability among living organisms from all sources including…terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems (Secretariat of the Convention on Biological Diversity 2003).

Buffer [CVC]: A buffer is a vegetated area adjoining natural heritage features and areas in which only those land uses permitted within the feature or area itself are permitted. Buffers should be of sufficient size to protect the features and areas, including their functions, from potential impacts of development and site alteration that may occur before, during, and after, construction, and where possible, restore or enhance the features and areas, including their ecological functions and hydrological functions (from CVC 2010a).

Buffer [LSRCA]: An area or band of permanent vegetation, preferably consisting of native species, located adjacent to a natural heritage feature and usually bordering lands that are subject to development or site alteration. The purpose of the buffer is to protect the feature and its function by mitigating impacts of the proposed land use and allowing an area for edge phenomena to continue. (Also refer to Vegetation Protection Zone).

Buffer [TRCA]: A strip of permanent vegetation that helps alleviate the negative impacts of development on natural features and functions and can also include a non-vegetated erosion access allowance (also see definition of erosion access allowance as per TRCA 2014) required to manage a natural hazard (based on definition from MNR website).

Centres for Biodiversity [CVC]*:* Landscapes with a concentration of natural heritage features representative of physiographic regions in the watershed that collectively represent important ecological features and functions capable of supporting native biodiversity over the long term (CVC 2015a).

Connectivity: Connectivity means the degree to which natural heritage features are connected across the landscape (in this case the Region of Peel), by links such

as plant and animal movement corridors, hydrological and nutrient cycling, genetic transfer, and energy flows through food webs (adapted from OMMAH 2002).

Conservation Authority Regulated Areas: The extent of land that is regulated by a Conservation Authority for a number of natural features and natural hazards, including wetlands, flooding, erosion and prescribed allowances, as described in the text of individual Conservation Authority section 28 regulations under the *Conservation Authorities Act*.

Core Features [LSRCA]: Those considered critical to the natural heritage system whose protection and longevity are imperative to ecosystem functions and services of the Lake Simcoe watershed. They include features like wetlands, watercourses, and woodlands.

Corridor [LSRCA]: An area in the natural heritage system intended to provide connectivity (at the regional or site level), supporting a range of community and ecosystem processes, enabling plants and smaller animals to move between core areas and other larger areas of habitat over a period of generations. (Also called *Linkage*).

Ecological Functions: The natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions (PPS 2014).

Ecological Integrity: Including hydrological integrity, means the condition of ecosystems in which:

a. The structure, composition and function of the ecosystems are unimpaired by stresses from human activity,
b. Natural ecological processes are intact and self-sustaining, and
c. The ecosystems evolve naturally (OMMAH 2002).

Ecological Land Classification (ELC): The Canadian classification of lands from an ecological perspective; an approach that attempts to identify ecologically similar areas. The original system proposed by the Subcommittee on Biophysical Land Classification in 1969 included four hierarchical levels that are currently called ecoregion, ecodistrict, ecosection and ecosite. Ecoprovince and ecoelement were later added to the upper and lower levels of the hierarchy (Lee et al. 1998).

Enhancement Area [CVC]: Enhancement areas in the context of the Credit River Watershed Natural Heritage System are areas that are currently non-natural but can be restored or managed to improve ecosystem function within the system.

Ecosystem Management: Ecosystem management is management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function (Christensen et al. 1996). Ecosystem management can include habitat

restoration and enhancement activities (described below), education, land use planning and policy initiatives.

> **Enhancement:** Enhancement refers to activities, including restoration, to improve the ecological functioning of a feature or nearby features. Examples of enhancement activities may include improvement of a non-natural area to benefit nearby natural communities (e.g. light mitigation, native plant gardens), or addition of habitat attributes within a natural area (e.g. bat box).
>
> > **Restoration:** Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (Society for Ecological Restoration 2004).

Green Infrastructure: Natural and human-made elements that provide ecological and hydrological functions and processes. Green infrastructure can include components such as natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs (PPS, OMMAH 2014).

Headwater Drainage Feature: Non-permanently flowing drainage features that may not have defined bed or banks; they are first-order and zero-order intermittent and ephemeral channels, swales and connected headwater wetlands, but do not include rills or furrows (CVC and TRCA 2013).

Lake [CVC]: An extensive body of water lying in a depression that is 2 ha in size or greater. A lake can be completely enclosed by land or can have either or both an in-flowing or out-flowing stream. A lake can also be created by interrupting the normal flow of a watercourse with a dam (CVC 1998).

Linkage [LSRCA]: See *Corridor.*

Local Rank (L-rank) [TRCA]: A rank assigned to a species, vegetation community, or habitat patch which describes its status in the TRCA region (TRCA 2007a).

> **Species of (Conservation) Concern [TRCA]:** According to the TRCA methodology, any species with a local rank of L1 to L3, and those L4 species found within the Built-up Area. Generally, species that are disappearing in the regional landscape, primarily because of land use changes. Species of Concern can also be used as indicators – a surrogate measure of ecosystem function. Improvements in their distribution may indicate an improving trend in ecosystem or regional health (TRCA 2007a).

Natural Areas Abutting Lake Simcoe (NAALS) [LSRCA]: Land in the natural heritage system that extends from the Lake Simcoe shoreline with natural self-sustaining vegetation of any plant form or potential natural community, but does not include vegetation communities maintained by anthropogenic-based

disturbances (e.g. land for agricultural uses, manicured lawns or ornamental plantings).

Natural Cover [Caledon CA NHS and Peel CA NHS]: Land occupied by naturally or culturally occurring vegetation. These areas can be dominated by native and non-native species. Natural cover broadly includes woodlands, wetlands, aquatic habitat (watercourses and waterbodies), successional habitat including meadows, as well as other natural cover (e.g. sand dunes, rock barrens, cliffs).

Natural Cover [TRCA]: Land occupied by naturally or culturally occurring vegetation that is not characterized as agricultural or urban land uses. These areas can be dominated by native and non-native vegetation. Natural cover does not include manicured areas such as parkland or lawns. Natural cover includes the following ELC community class codes – BB (beach/bar), SD (sand dune), BL (bluff), CL (cliff), TA (talus), AL (alvar), RB (rock barren), CC (crevice/cave), SB (sand barren), TP (tallgrass prairie, savannah and woodland), FO (forest), CU (cultural), SW (swamp), FE (fen), BO (bog), MA (marsh), SA (shallow aquatic).

> **Existing Natural Cover [TRCA]:** Lands in the natural heritage system that are current existing natural cover and fall within one of the ELC community class codes listed under natural cover (above).
>
> **Potential Natural Cover [TRCA]:** Lands within the natural heritage system that are not existing natural cover, but are necessary to achieve the complete natural heritage system. Through implementation these lands will become a vegetation community falling into one of the ELC community class codes listed above (Adapted from TRCA 2007a).

Natural Heritage System: 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. The Province has a recommended approach for identifying natural heritage systems, but municipal approaches that achieve or exceed the same objective may also be used (PPS, OMMAH 2014).

Open Space [CVC]: For the purposes of the Credit River Watershed Natural Heritage System, Open Space includes commercial, industrial, institutional or educational open space; recreational or private open space; or manicured open space (CVC 1998).

> **Manicured Open Space [CVC]:** Open space dominated by gardens, parkland, and lawn areas. For example, cemeteries, golf courses, urban parks, ski hills, and residential/industrial open space (CVC 1998).

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Pond [CVC]: An area of still water between 0.5 and 2 ha in size lying in a natural or man-made depression. Can be completely enclosed by land or can have either or both an in-flowing or out-flowing stream. A pond can also be created by interrupting the normal flow of a watercourse with a dam (CVC 1998).

Potential Enhancement Area [Caledon CA NHS and Peel CA NHS]: Non-natural and naturalizing lands that can be restored or managed to improve ecosystem function within the system. For the CA NHS presented in this report, the term 'potential enhancement areas' is broadly used to describe TRCA's potential natural cover, as well as lands within the CVC, LSRCA, NVCA and CH NHSs that are urban, agriculture, open space, cultural meadow or cultural thicket. These areas aid Conservation Authorities in meeting science-based watershed-scale targets for natural cover. Potential enhancement areas are strategic locations to restore to a natural state, where feasible, or to implement best management practices to support the NHS and its functioning and to prevent further degradation (e.g. native species plantings, low impact development). Intensification in these areas is anticipated to negatively affect the form and function of the natural heritage system. Where potential enhancement areas fall on private land, opportunities for restoration and enhancement should only be explored in cooperation with landowners.

Raster: [data models] A spatial data model that defines space as an array of equally sized cells arranged in rows and columns and composed of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature (ESRI GIS Dictionary. Available online: http://support.esri.com/en/knowledgebase/Gisdictionary/browse).

Significant Wildlife Habitat: Wildlife habitat that is ecologically important in terms of features, functions, representation or amount, and contributes to the quality and diversity of an identifiable geographic area or natural heritage system. Wildlife habitat is defined 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 (PPS 2014).

Stewardship: An ethic that embodies cooperative planning and management of environmental resources in which individuals, organizations, communities and other groups actively engage in the prevention of habitat loss, as well as the facilitation of resource recovery and/or replenishment, usually with a focus on long-term sustainability (Ontario Biodiversity Council 2011).

Systems Approach: A systems approach recognizes that the health and integrity of natural heritage features relies on their interdependence on other features and areas as well as their placement within a functioning system. The systems-based

approach to natural heritage system planning not only identifies significant areas for protection, but also recognizes the importance of linkages between and among natural features (GGH Natural Heritage Subcommittee 2011).

Targeted Areas to Enhance the Natural Heritage System [LSRCA]: Areas that are important to achieving a resilient natural heritage system, either through the protection or restoration of these areas. These areas may include grasslands, restoration areas and linkages.

Valleylands: Land that has depressional features associated with a river or stream, whether or not it contains a watercourse (Conservation Authorities Act 1990).

Vector: [data models] A coordinate-based data model that represents geographic features as points, lines, and polygons. Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices. Attributes are associated with each vector feature, as opposed to a raster data model, which associates attributes with grid cells (ESRI GIS Dictionary. Available online: http://support.esri.com/en/knowledgebase/Gisdictionary/browse).

Watercourse: means an identifiable depression in the ground in which a flow of water regularly or continuously occurs (Conservation Authorities Act 1990).

Watershed: An area of land that drains into a river, lake or other water body (Ontario Biodiversity Council 2011).

Wetlands: means lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens (PPS, OMMAH 2014). Wetlands also directly contribute to the hydrological function of a watershed though connection with a surface watercourse, but they do not include periodically soaked or wet land that is used for agricultural purposes and no longer has hydric soils or vegetation dominated by hydrophitic or water tolerant plants (Conservation Authorities Act 1990).

Woodlands: Treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional and provincial levels. Woodlands may be delineated according to the *Forestry Act* definition or the Province's Ecological Land Classification system definition for "forest" (PPS, OMMAH 2014).

Woodlands [CVC]:
For the purpose of defining woodlands for the Credit River Watershed Natural Heritage System, the following definition was applied:
a) A tree crown cover of over 35% of the ground, determinable from aerial photography; or
b) A tree crown cover of over 25% of the ground, determinable from aerial photography, together with on-ground stem estimates of:

- 1,000 trees of any size per hectare, or
- 750 trees measuring over five centimetres in diameter, per hectare, or
- 500 trees measuring over 12 centimetres in diameter, per hectare, or
- 250 trees measuring over 20 centimetres in diameter, per hectare but does not include a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees (CVC 2015a; based on the *Forestry Act* of Ontario, R.S.O. 1990 http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90f26_e.htm)

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Appendix A: Map Figures

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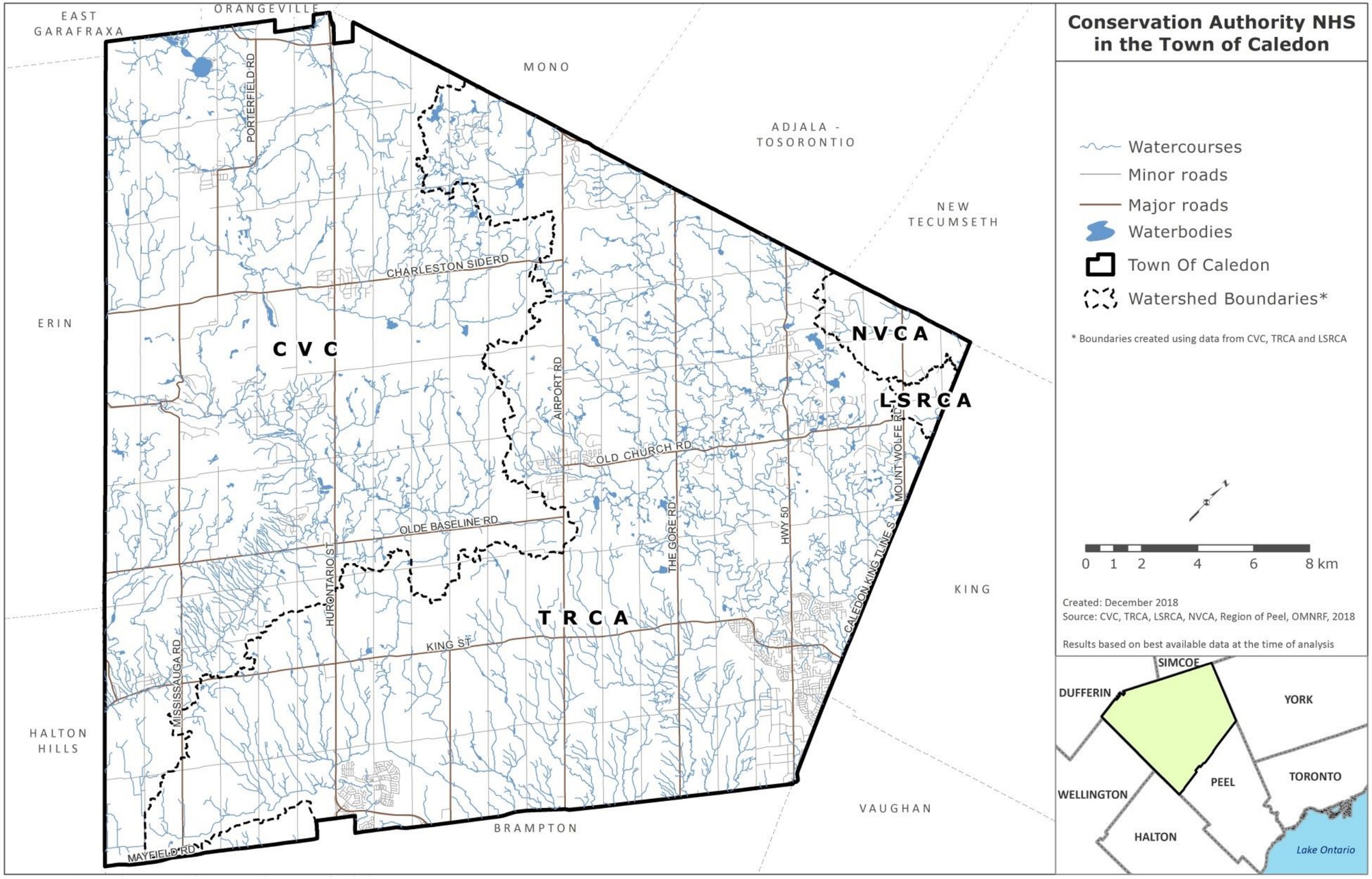

Figure A1. Conservation Authority jurisdictions in the Town of Caledon.

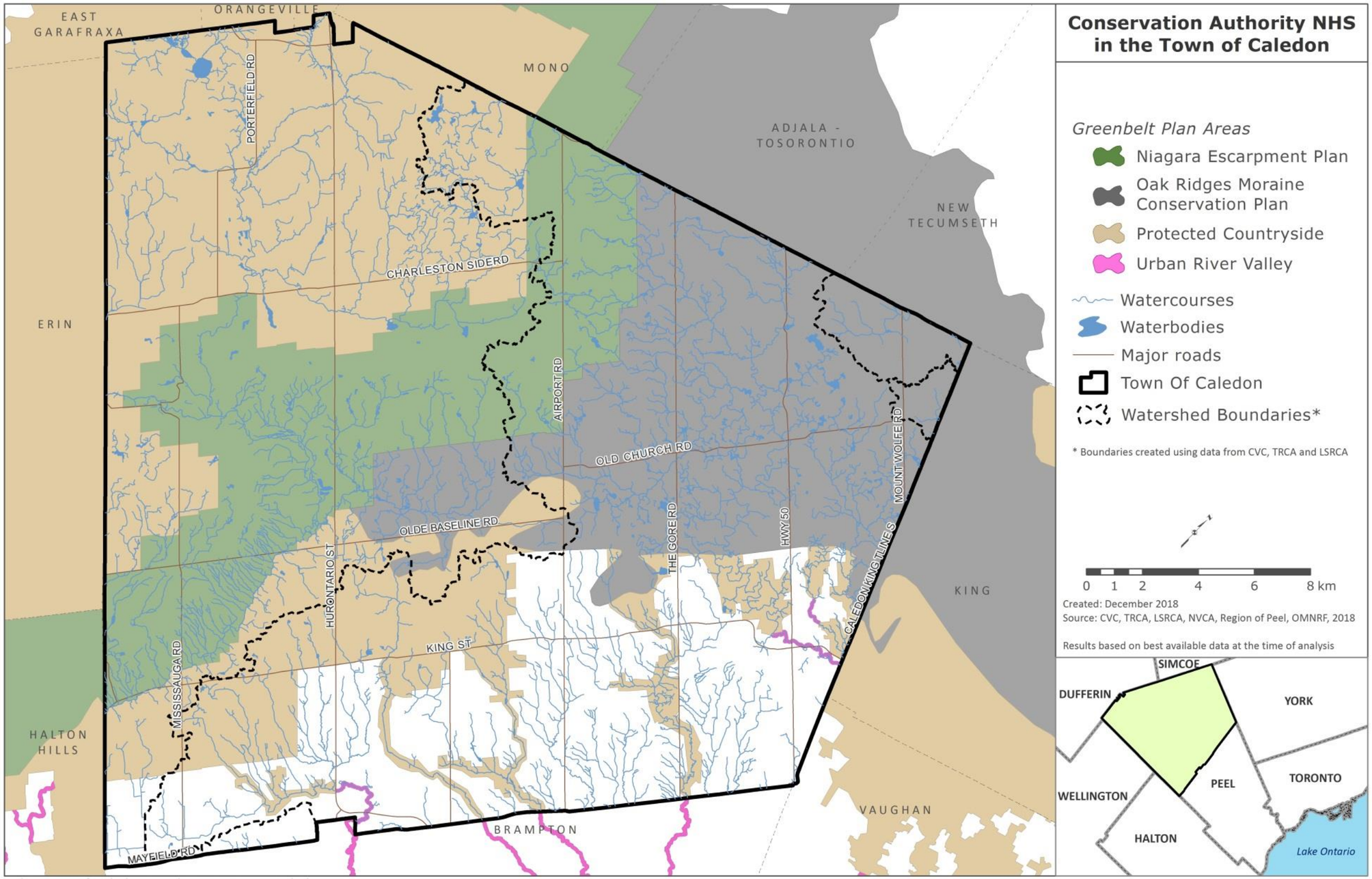

Figure A2. Town of Caledon in relation to Provincial Plan areas.

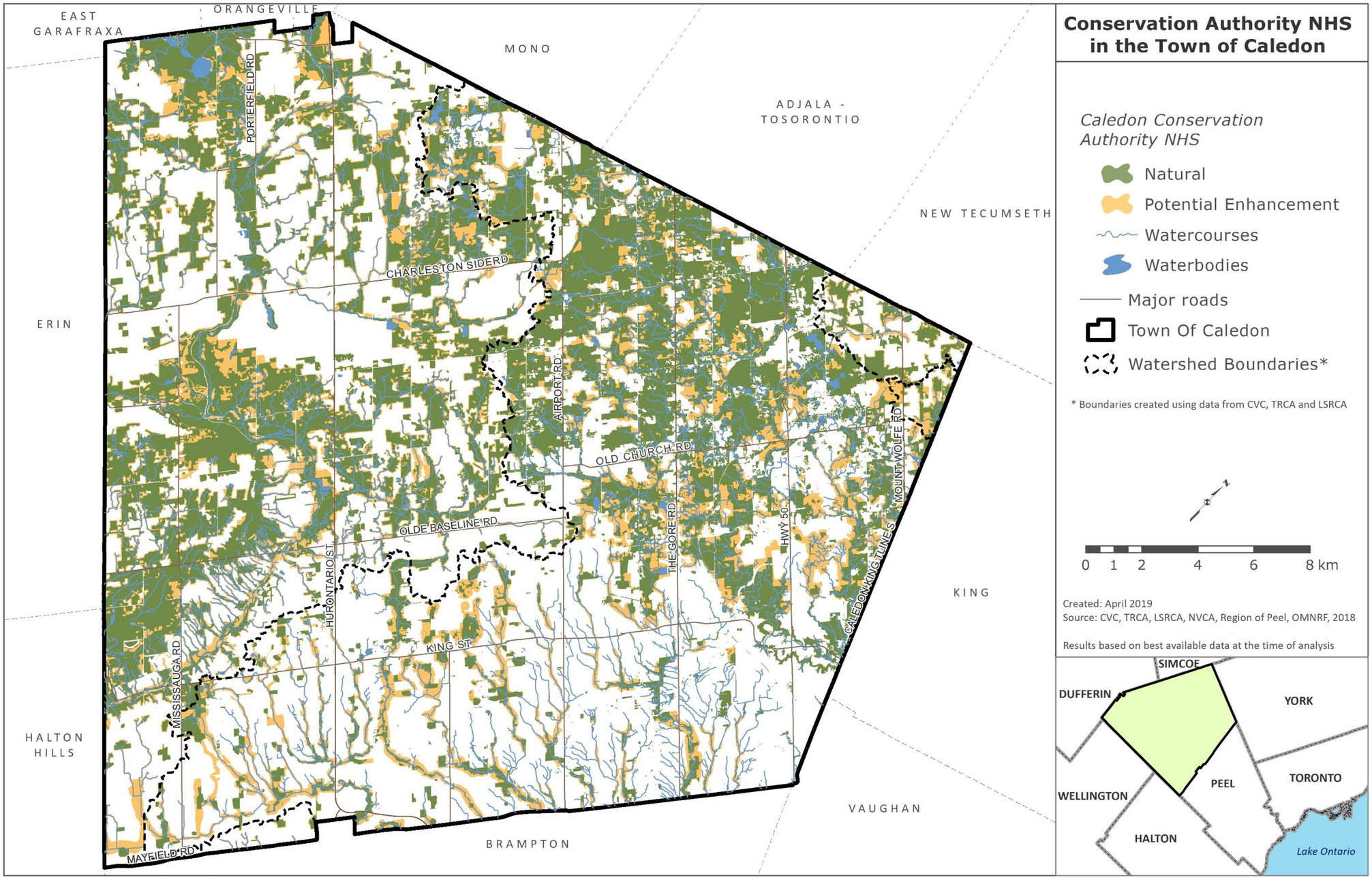

Figure A3. Caledon Conservation Authority Natural Heritage System (including municipal refinements requested by the Region of Peel).

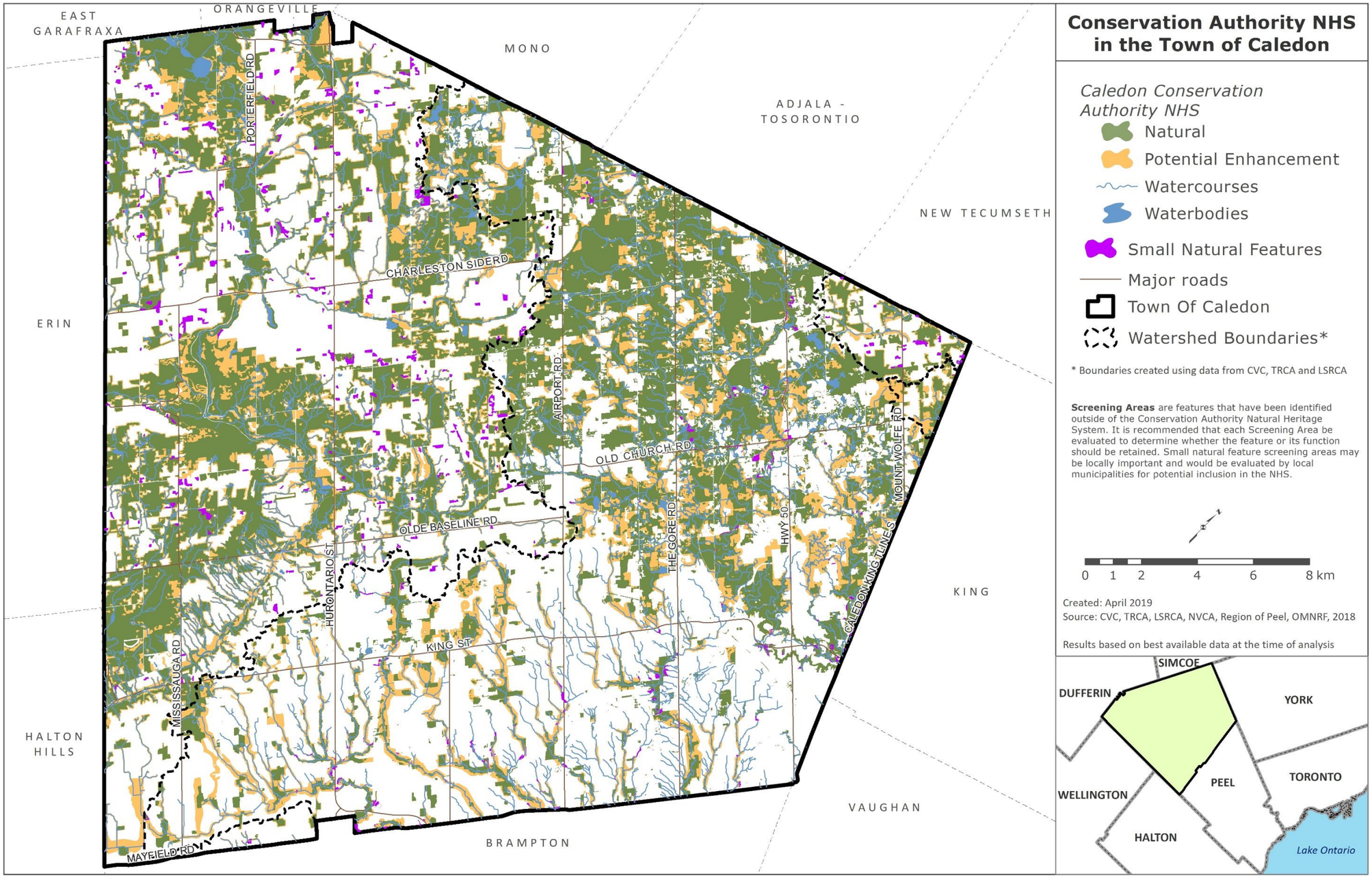

Figure A4. Caledon Conservation Authority Natural Heritage System with small natural feature screening areas.

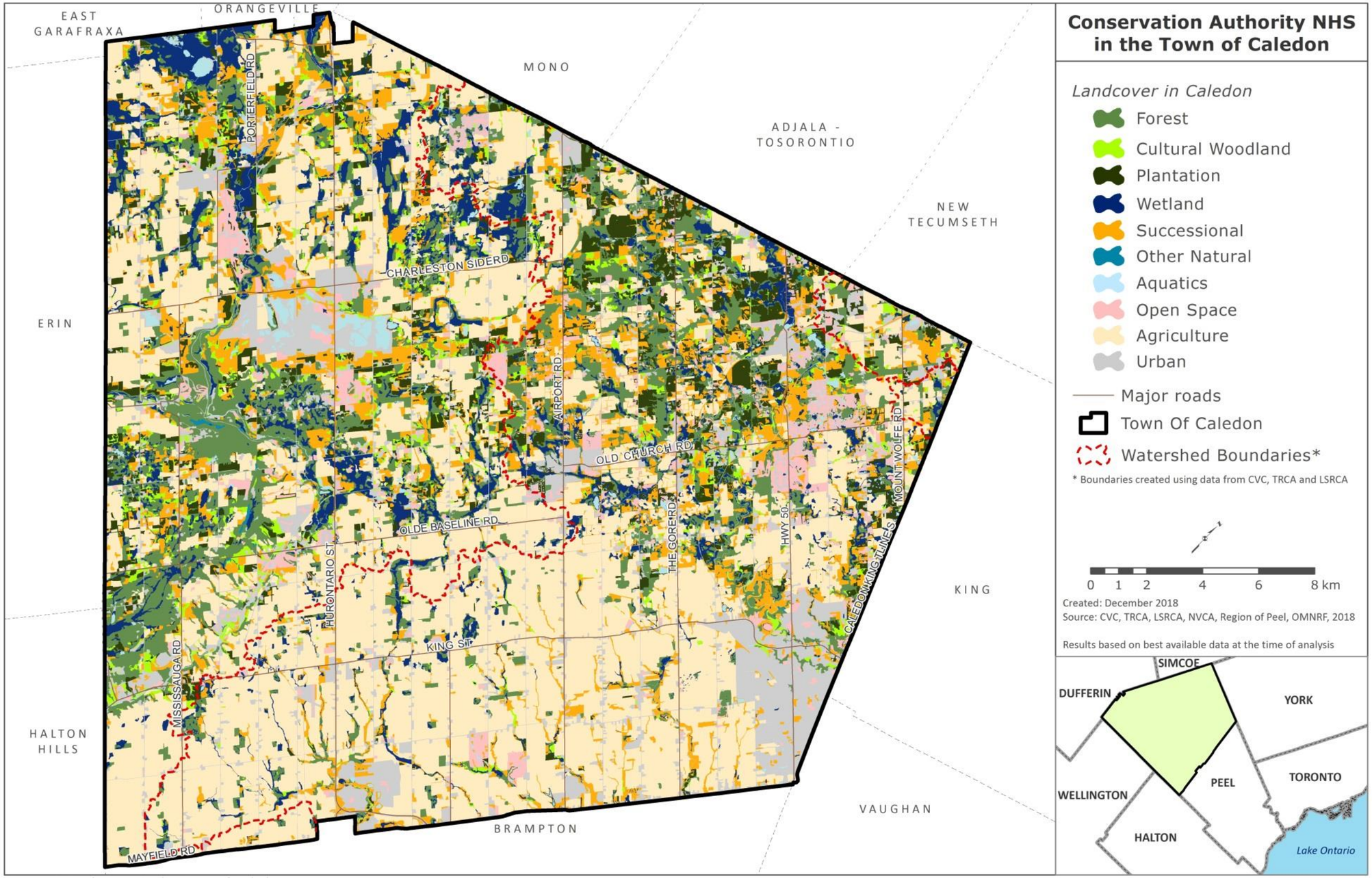

Figure A5. Current land cover in the Town of Caledon based on 2017 CVC Ecological Land Classification (ELC) and land use data.

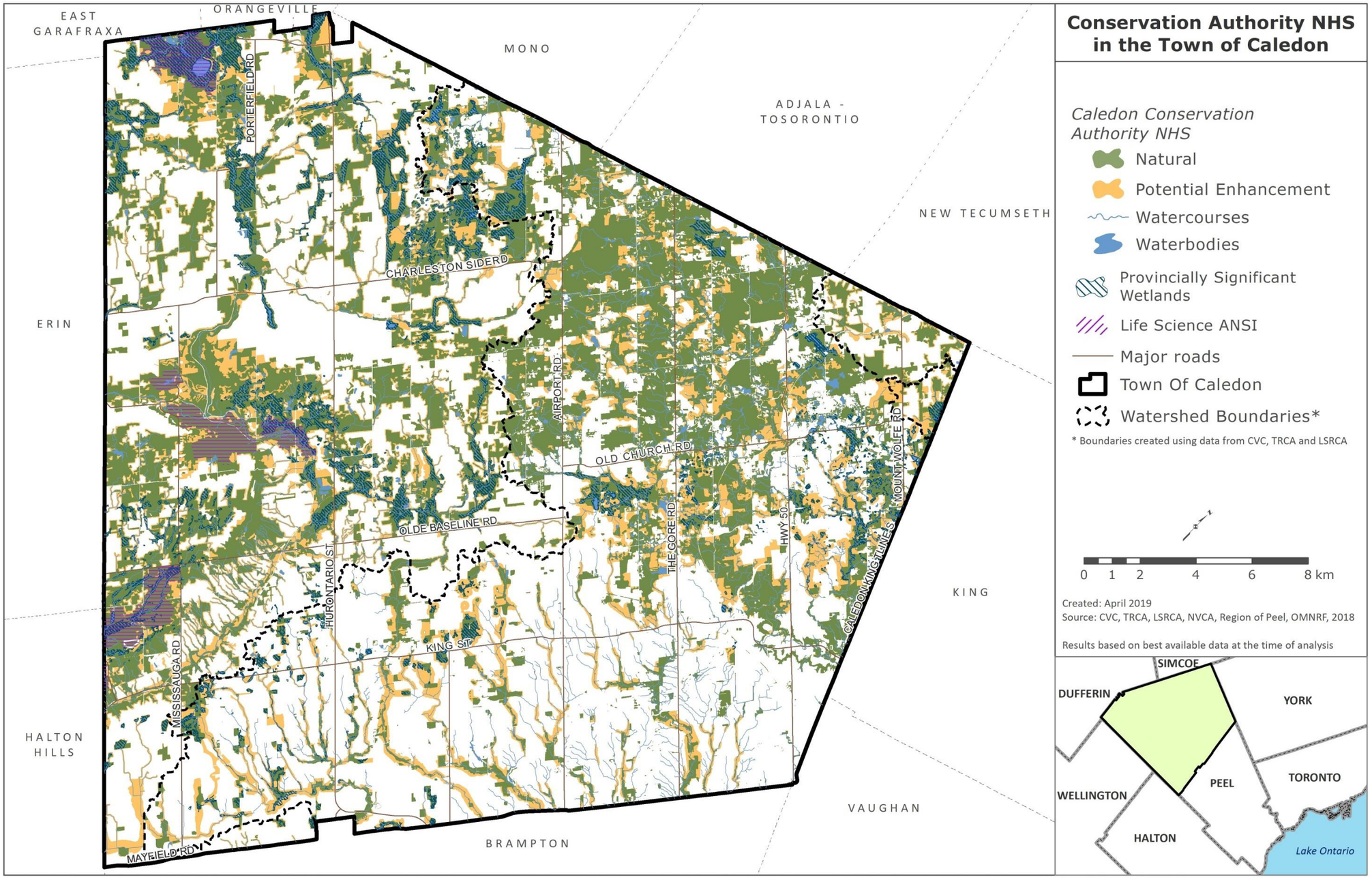

Figure A6. Caledon Conservation Authority Natural Heritage System with Provincially Significant Life Science Areas of Natural and Scientific Interest (ANSIs) and Provincially Significant Wetlands (PSWs).

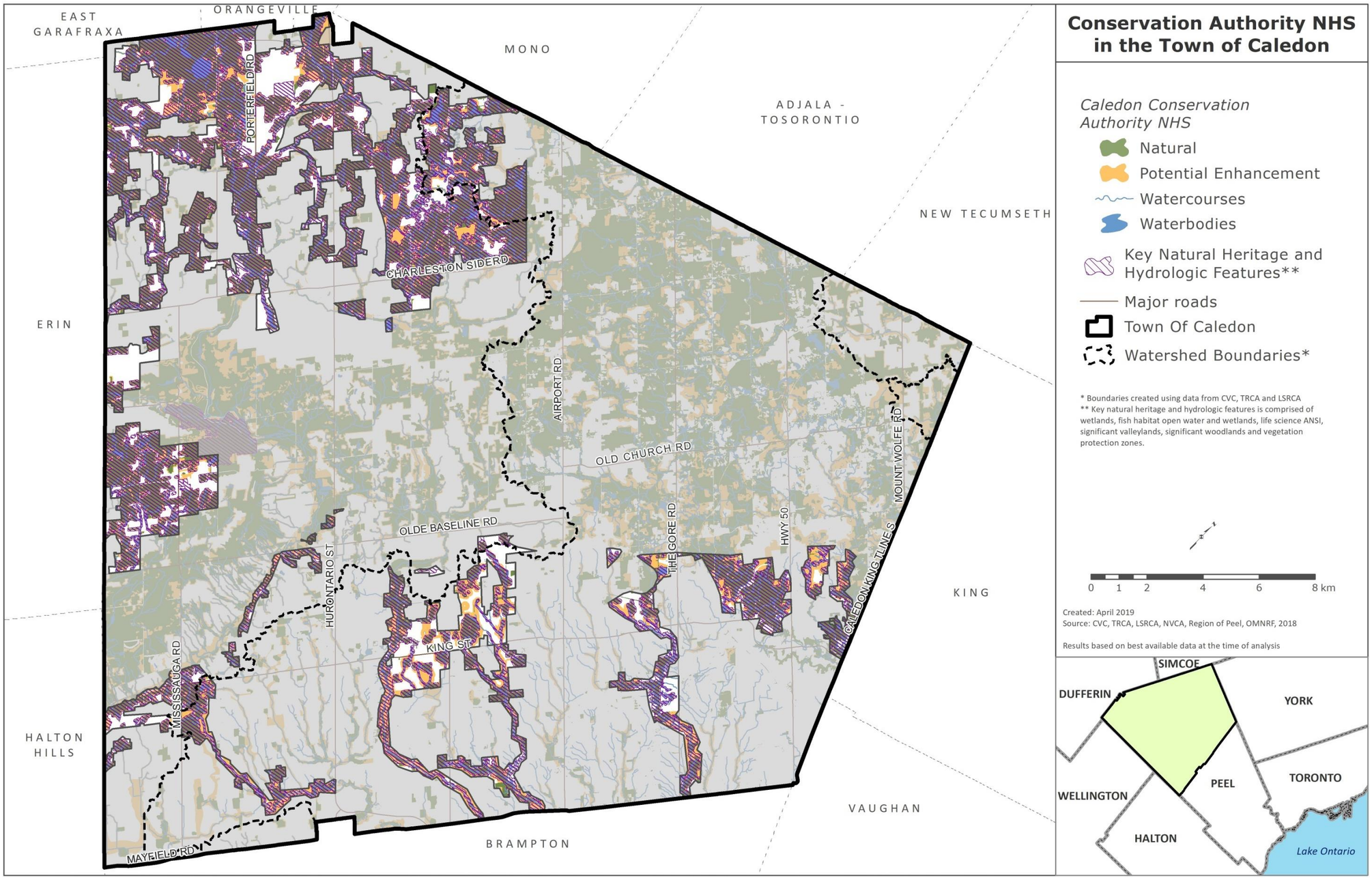

Figure A7. Caledon Conservation Authority Natural Heritage System with Greenbelt Key Natural Heritage Features and Key Hydrological Features mapped by EXP Services Inc. for Caledon.

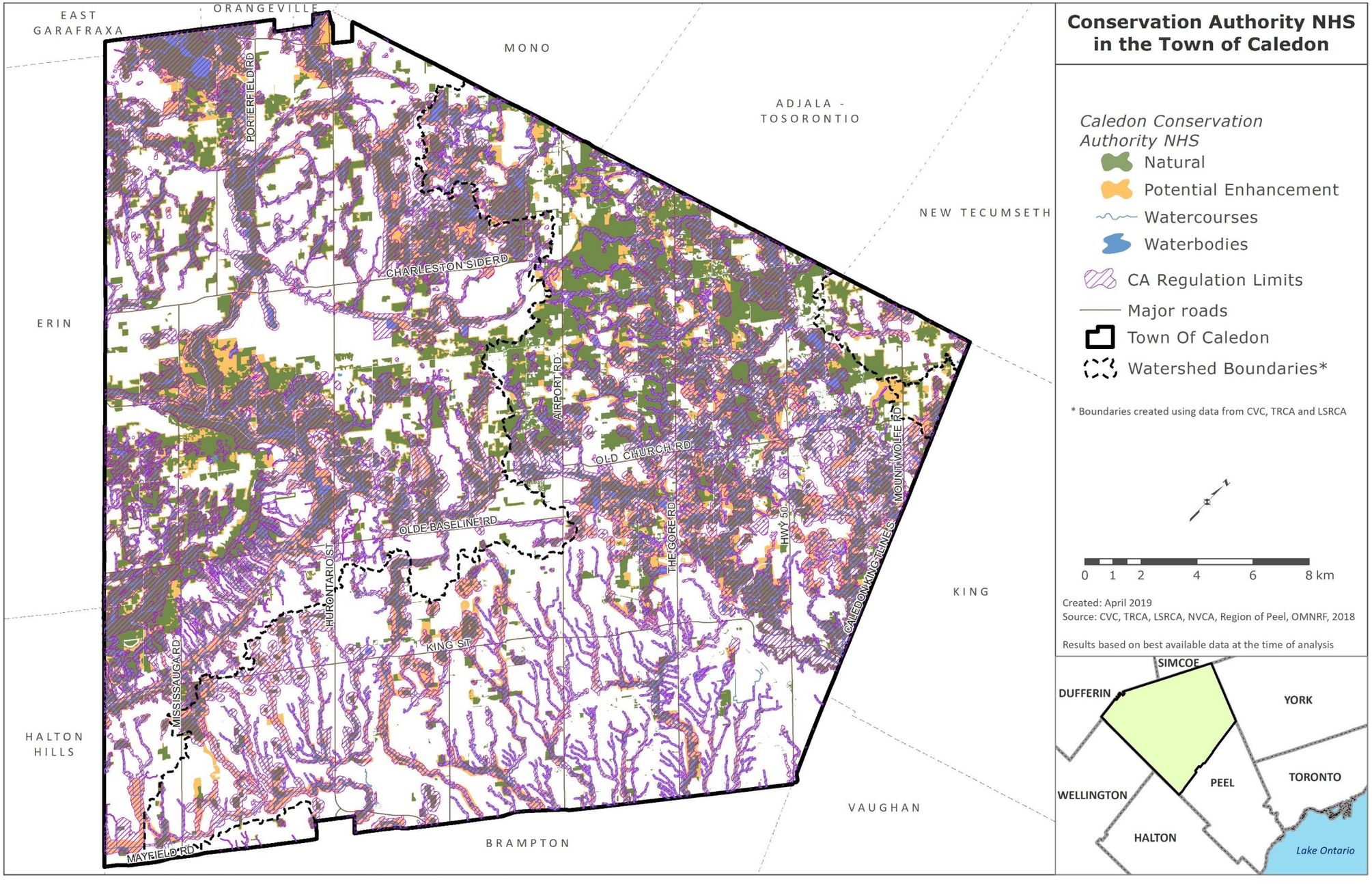

Figure A8. Caledon Conservation Authority Natural Heritage System with Conservation Authority regulation limits.

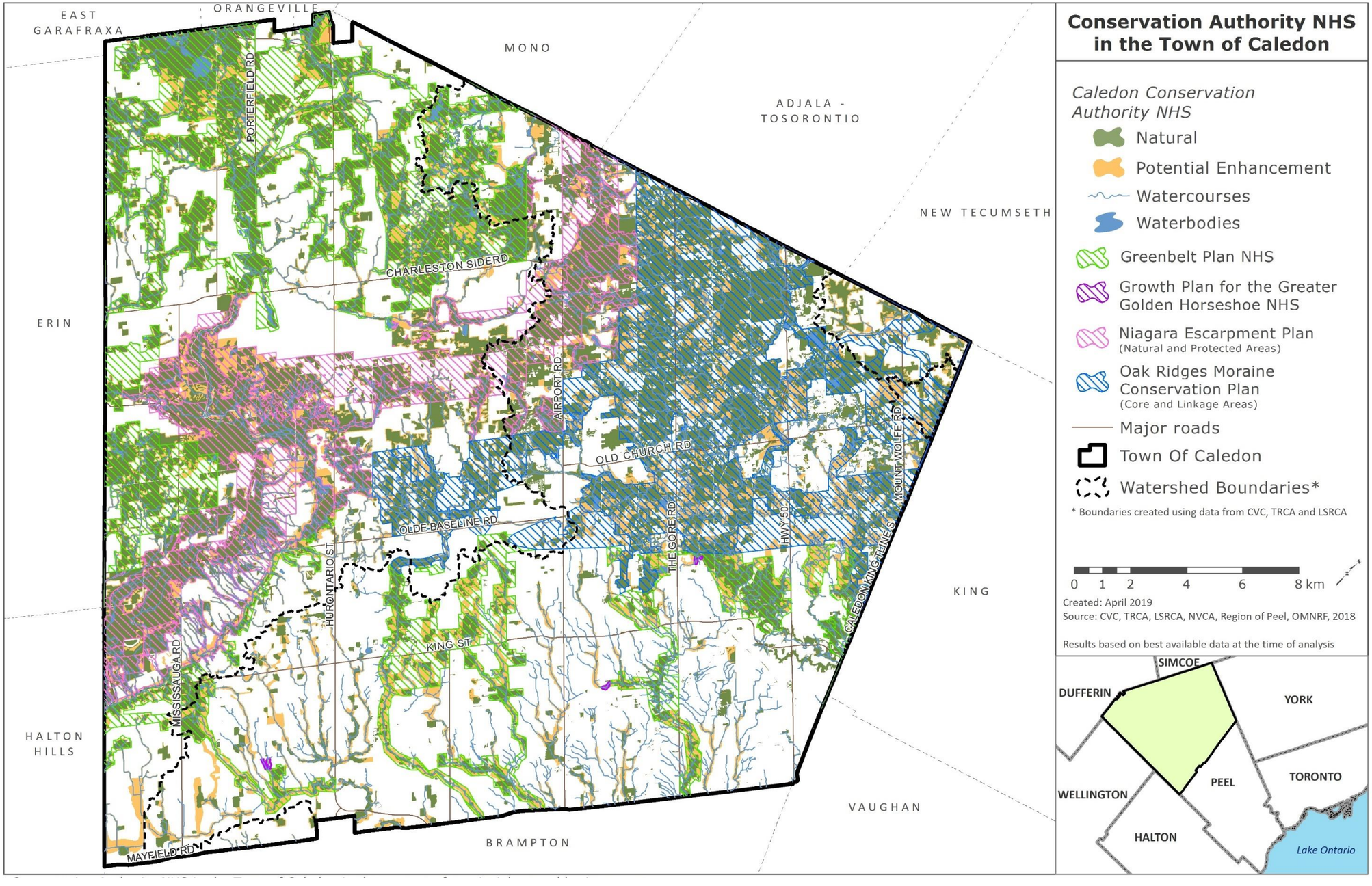

Figure A9. Caledon Conservation Authority Natural Heritage System in the context of provincial natural heritage systems.

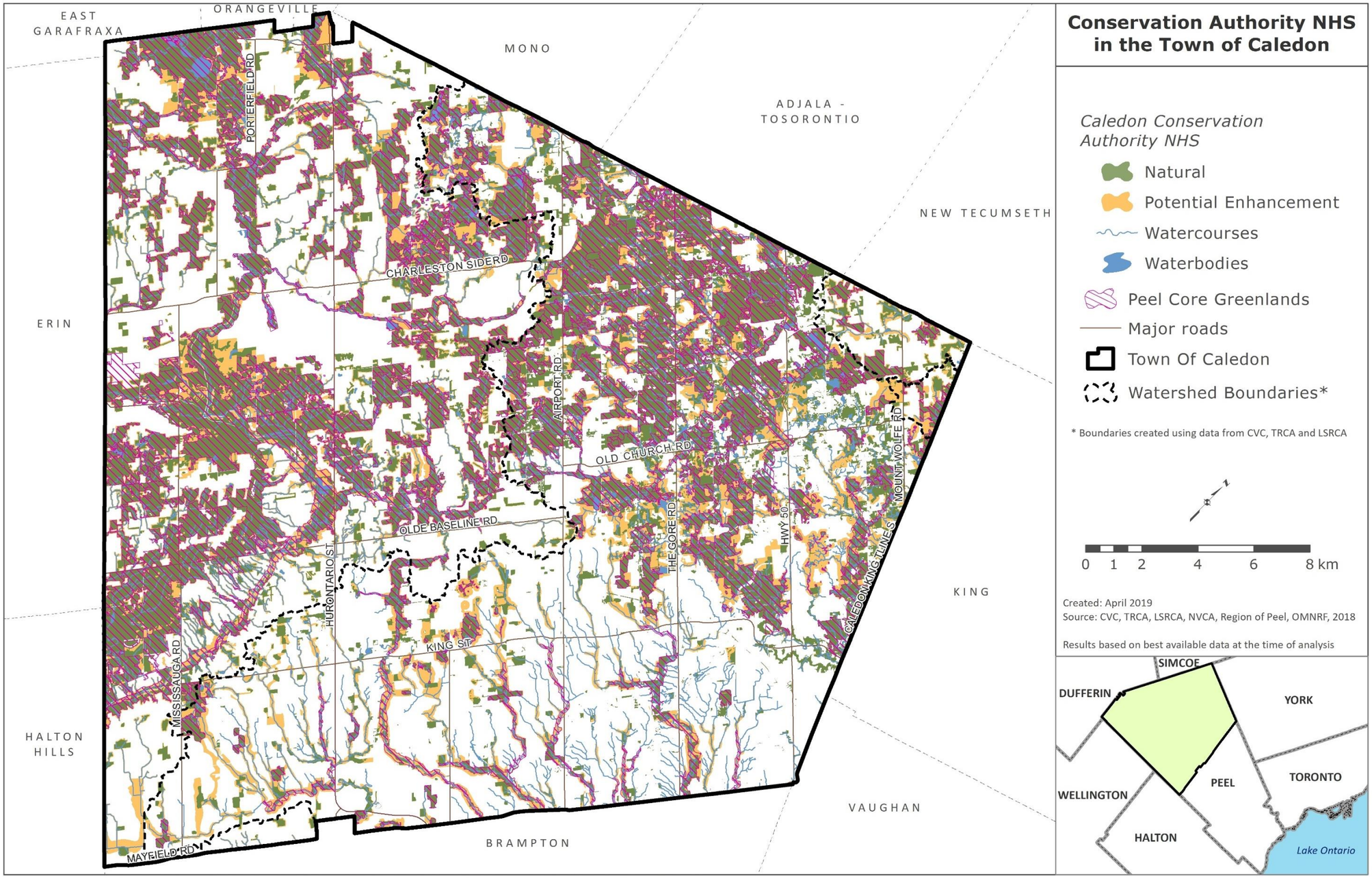

Figure A10. Caledon Conservation Authority Natural Heritage System with the Region of Peel Greenlands System (Core Areas).

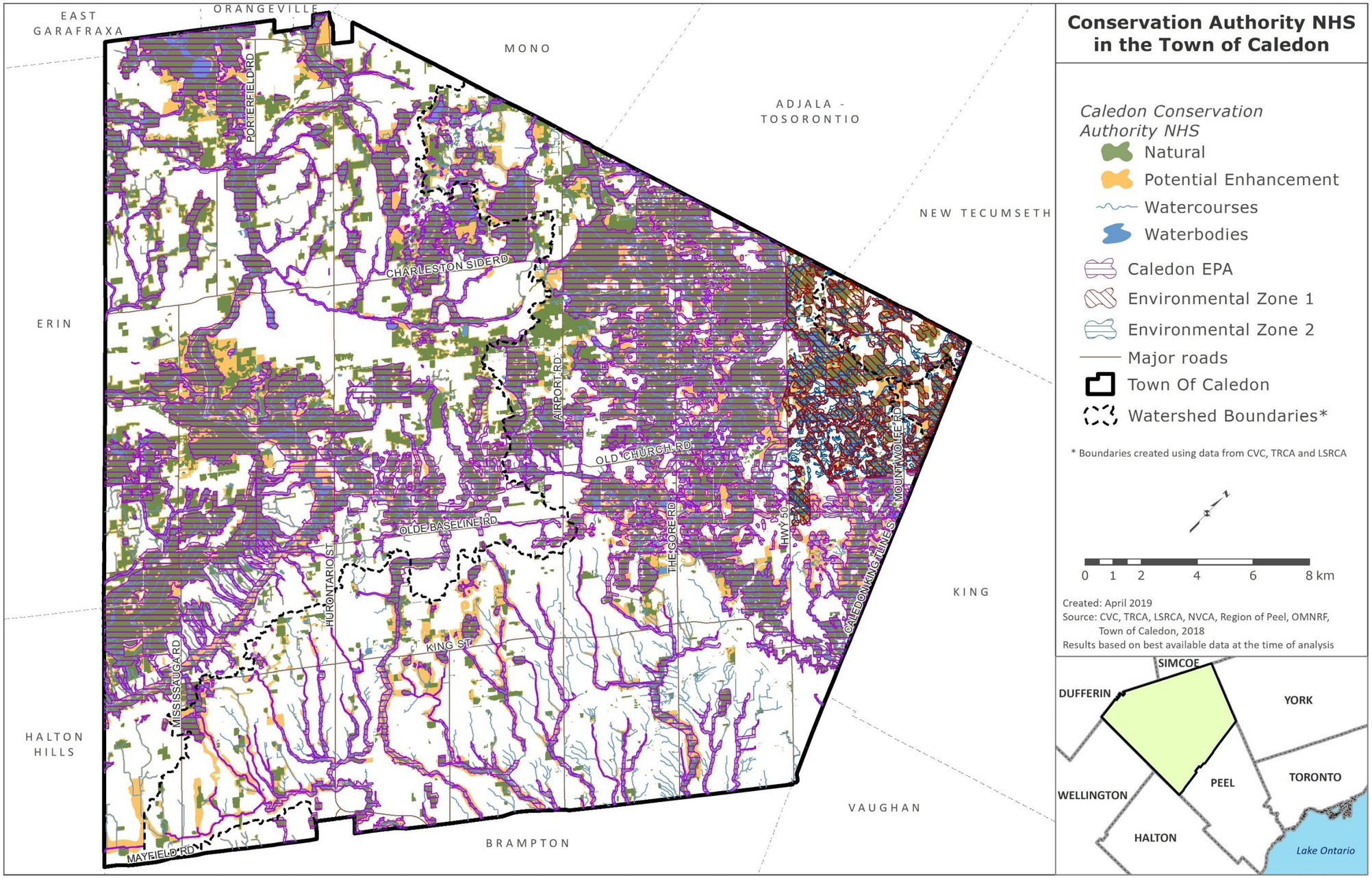

Figure A11. Caledon Conservation Authority Natural Heritage System with Caledon Environmental Policy Areas, and Environmental Zones 1 and 2 for Palgrave Estate Residential Community.

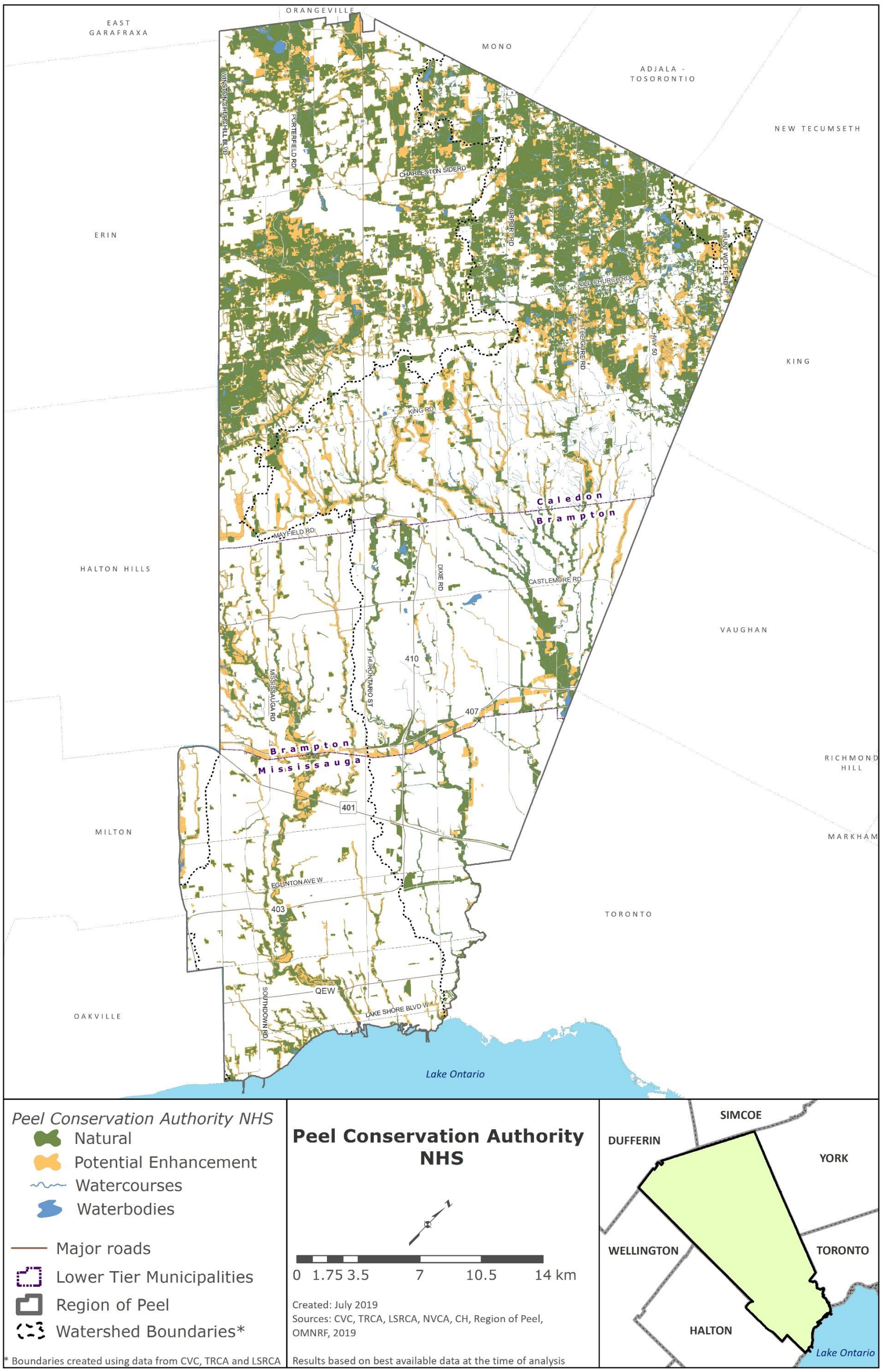

Figure A12. Peel Conservation Authority Natural Heritage System.

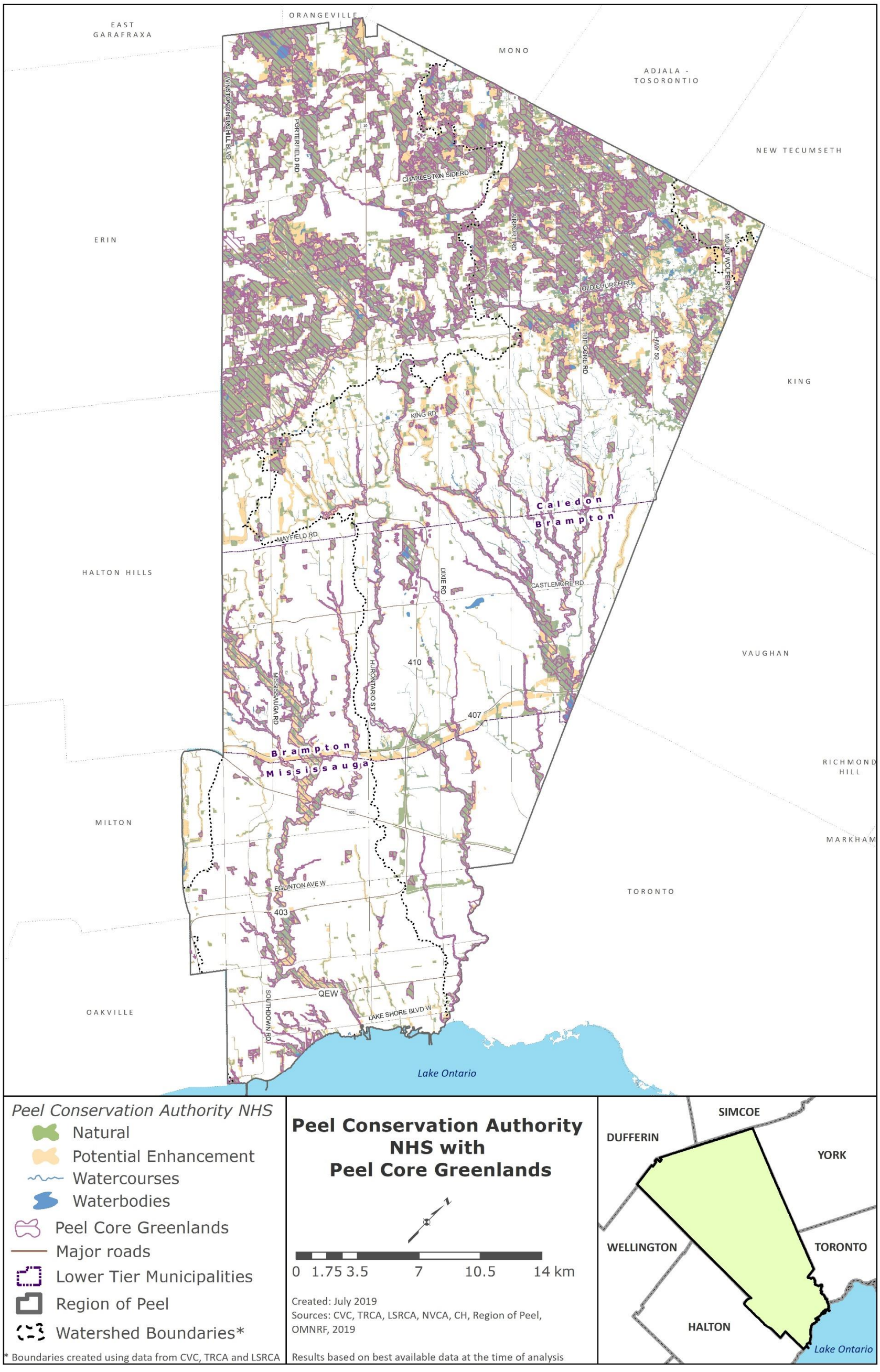

Figure A13. Peel Conservation Authority Natural Heritage System with the Region of Peel Greenlands System Core Areas.

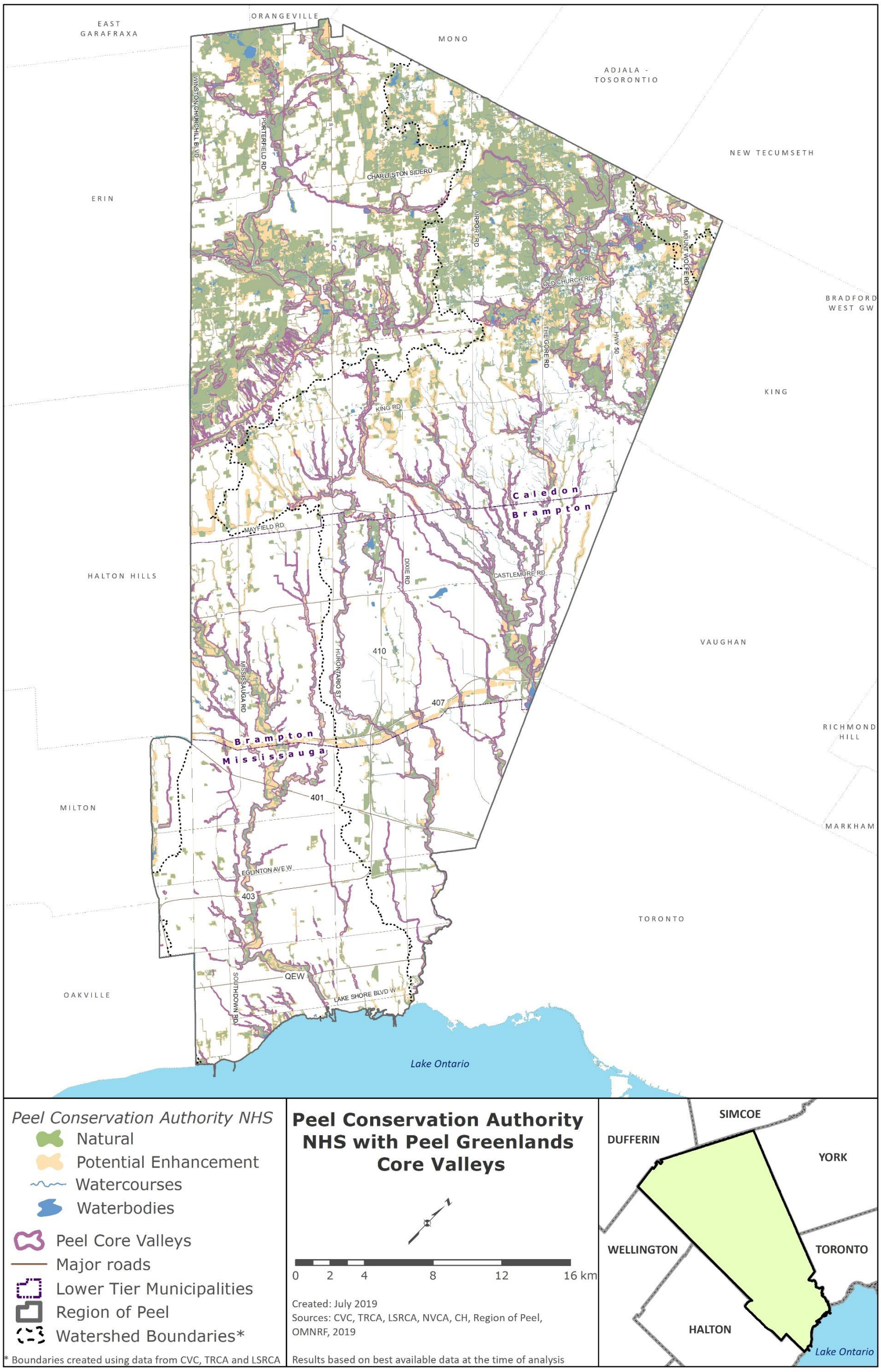

Figure A14. Peel Conservation Authority Natural Heritage System with the Region of Peel Greenlands System Core Valleys.

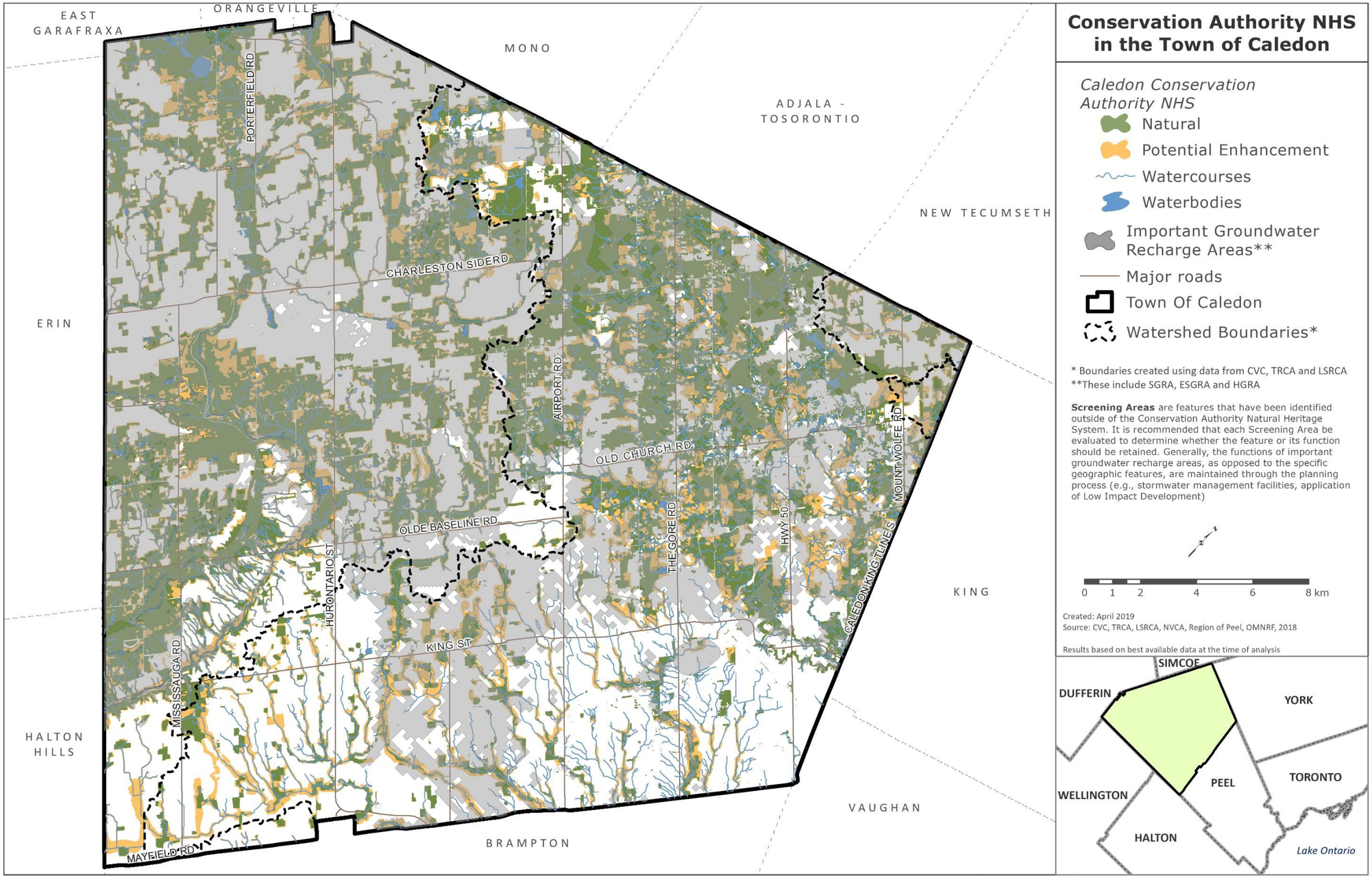

Figure A15. Caledon Conservation Authority Natural Heritage System with Important Groundwater Recharge screening areas. These include Significant Groundwater Recharge Areas, Ecologically Significant Groundwater Recharge Areas and High Volume Recharge Areas.

APPENDIX B: Conservation Authority Natural Heritage System Methods

Table B1. Components of Credit River Watershed Natural Heritage System with criteria, thresholds and categories (See CVC 2015a for fulsome methodology).

	NHS criteria and thresholds	Category
Natural heritage features		
1. Valleylands	**1a) Credit River and its major tributaries, and major watercourses draining to Lake Ontario** *Northern and Southern zone*: i) Valleylands of the Credit River and major tributaries, namely those having direct confluence with the Credit River; and ii) Valleylands of major watercourses (Sheridan Creek and Cooksville Creek) having direct drainage to Lake Ontario, from their outlet to the farthest upstream extent of their defined valley landform	High Functioning High Functioning
	1b) Valleylands supporting surface water functions (conveyance, attenuation, storage and release), productivity, and linkage functions *Northern zone and Southern zone*: All other valleylands associated with watercourses	Supporting
2. Wetlands	**2a) Size** *Northern and Southern zone:* i) All wetlands >2 ha ii) All wetlands >0.5 ha and <2 ha	High Functioning Supporting
	2b) Proximity *Northern and Southern zone*: All wetlands >0.5 ha and <2 ha within 30 m of a High Functioning woodland, High Functioning wetland, or High Functioning valleyland	Supporting
	2c) Surface water quality and quantity, multifunctional linkage *Northern and Southern zone*: All wetlands >0.1 ha and <2 ha located within or adjoining a valleyland	Supporting

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	NHS criteria and thresholds	Category
3. Woodlands	**3a) Size** *i) Northern zone:* All woodlands >16 ha *ii) Southern zone:* All woodlands >4 ha *iii) Northern zone:* All woodlands >4 ha and <16 ha *iv) Southern zone:* All woodlands >2 ha and <4 ha	High Functioning High Functioning Supporting Supporting
	3b) Interior *i) Northern zone:* All woodlands <16 ha containing >0.5 ha interior habitat (100 m from woodland edge) *ii) Southern zone:* n/a (no woodlands <4 ha have interior)	Supporting Supporting
	3c) Proximity *i) Northern zone*: All woodlands >2 ha and <16 ha within 30 m of a High Functioning woodland, High Functioning wetland, or High Functioning valleyland *ii) Southern zone*: All woodlands >0.5 ha and <4 ha within 30 m of a High Functioning woodland, High Functioning wetland, or High Functioning valleyland	Supporting Supporting
	3d) Surface water quality and quantity, multifunctional linkage i) Northern zone: All woodlands >0.5 ha and <16 ha within or adjoining a valleyland *ii) Southern zone*: All woodlands >0.5 ha and <4 ha within or adjoining a valleyland	Supporting Supporting
4. Aquatic habitat	**4a) Watercourses** *Northern and Southern zone:* i) All watercourses containing or linking habitat for top predators associated with the following aquatic communities: a) Coldwater Brook Trout Fish Community; b) Coldwater Brown Trout/Rainbow Trout/Atlantic Salmon Fish Community; c) Large Warmwater and Migratory Coolwater Fish Community; and d) Estuarine Fish Community	High Functioning

	NHS criteria and thresholds	Category
	ii) All other watercourses	Supporting
	4b) Water bodies *Northern and Southern zone:* i) Lake Ontario within CVC jurisdiction	High Functioning A
	ii) All lakes that a) are not created and maintained by human infrastructure such as a dam; and b) are of aggregate origin whose aggregate license has been surrendered and show evidence of naturalization	High Functioning A
	iii) All lakes that are created and maintained by human infrastructure such as a dam	High Functioning B
	iv) All water bodies >2 ha of aggregate origin whose aggregate license has recently been surrendered (text criterion)[1]	Supporting
	v) All water bodies >0.5 ha and <2 ha within 30 m of a High Functioning valleyland, High Functioning wetland, or High Functioning woodland	Supporting
5. Lake Ontario shoreline	All areas within Lake Ontario shoreline defined by Lake Ontario Flood Hazard, Lake Ontario Erosion Hazard, and Lake Ontario Dynamic Beach Hazard	High Functioning
6. Significant wildlife habitat	*Northern and Southern zone:* All habitat identified as significant wildlife habitat (text criterion)	High Functioning
7. Habitat of endangered species and threatened species	*Northern and Southern zone:* All habitat identified for protection as habitat of endangered species and threatened species (text criterion)	High Functioning
Buffers		
8. Buffers on natural heritage features	High Functioning valleylands: Crest of slope or meander belt - minimum 30 m plus evaluation High Functioning wetlands: Minimum 30 m plus evaluation High Functioning woodlands: Minimum 30 m plus evaluation	n/a

	NHS criteria and thresholds	Category
	High Functioning aquatic habitat (water bodies): Minimum 30 m plus evaluation Supporting aquatic habitat (water bodies): minimum 30 m if it adjoins a High Functioning wetland plus evaluation Supporting wetlands: Minimum 10 m plus evaluation Supporting woodlands: Minimum 10 m plus evaluation Supporting aquatic habitat (water bodies): Minimum 10 m unless it adjoins a High Functioning wetland plus evaluation All other natural heritage features: To be evaluated	
Natural heritage areas		
9. Centres for Biodiversity	Landscapes with a concentration of natural heritage features, encompassing the top 5% of habitat patches by area within Northern and Southern zones, representative of the eight major watershed physiographic regions, an inland lake and an estuarine area, that collectively represent important ecological features and functions capable of supporting native biodiversity in the long term	n/a

[1]*Text criterion: means the feature is not mapped as such but if it meets this criterion it is included in the NHS.*

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Table B2. TRCA Natural Heritage System criteria, thresholds and categories (See TRCA 2007a for fulsome methodology).

CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
ECOLOGICAL CRITERIA			
Patch Quality – Total Scores	This criterion makes use of the quality or total scores assigned to every patch in the region (the weighted addition of the individual patch scores for size, shape and matrix influence). Total scores are translated from the raw vector score (scored on a scale of 1-15) to a raw raster shape score (on a scale of 1-10). This criterion assumes that the higher the total score is for a particular habitat patch, the more valuable it is for the target system. The maximum value of 10 points is associated with the highest total score values.	**Raw Score — Total Score** 0-1.5 — 1 1.5-3 — 2 3-4.5 — 3 4.5-6 — 4 6-7.5 — 5 7.5-9 — 6 9-10.5 — 7 10.5-12 — 8 12-13.5 — 9 13.5-15 — 10	**No** Addresses existing conditions only. Will value existing patches with higher total (size, shape, matrix influence) scores.
Distance from urban areas	This criterion is related to "matrix influence" in that it assumes that the further away a natural area is from an existing urban area, the better. The maximum value of 10 points is associated with distances of 2 km or more, this number being the distance considered in the landscape measure for matrix influence, which in turn was based on a rough estimate of how far certain negative impacts (i.e. urban faunal predators, human visitors, and their pets) can move in a landscape. The benefit of having additional natural cover within 2 km of an existing patch for biodiversity, and how far most visitors are likely to go in order to use a local natural area on a frequent basis, e.g. daily.	**Distance — Score** 0-10 — 1 10-30 — 2 30-60 — 3 60-120 — 4 120-200 — 5 200-300 — 6 300-500 — 7 500-1000 — 8 1000-2000 — 9 2000 + — 10	**Yes** Show preference for areas that are in close proximity to or connected to other natural patches; This criterion will mainly serve at improving the matrix influence of a patch, and potentially the size, shape and connectivity of patches may also be improved. This criterion will also affect the distribution of natural cover by encouraging more habitat to be built up in areas where existing cover is high, in the northern, more rural portions of the Region.

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CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
Proximity to natural areas	This measures the proximity of natural habitat patches, up to a distance of 2 km. Like the former layer, this is also essentially a matrix measure, although this one assumes that nearby natural areas are beneficial to a habitat patch. The ways in which they can be beneficial are numerous, including support of a breeding pair or a population because of close access to additional resources, provision of pollination services and seed sources, etc. (Austen et al., 2001; Norris & Stutchbury, 2001; Askins et al., 1987; Robbins et al., 1989). Natural areas within the study area which are very close to each other (0 to 10 m) score the maximum of 10, while areas more than 2 km away from each other receive a score of 0.	**Distance** / **Score** 0-10 / 10 10-30 / 9 30-60 / 8 60-120 / 7 120-200 / 6 200-300 / 5 300-500 / 4 500-1000 / 3 1000-2000 / 2 2000 + / 1	**Yes** Shows preference for areas that are in close proximity to or connected to other natural patches; this criterion will mainly serve at improving the matrix influence of a patch, and potentially the size, shape and connectivity of patches may also be improved. This criterion will also affect the distribution of natural cover by encouraging more habitat to be built up in areas here existing natural cover is high, in the northern, more rural portions of the Region.
Distance from roads	Roads pose a negative influence on terrestrial natural heritage as a result of pollutant run-off, noise, etc., as well as acting as barriers to the movement of many species for example, those which refuse to cross open areas due to the threat of exposure to desiccation, predation, etc. (Fahrig et al. 1995). Areas that are 1 km or more away from a road receive a score of 10 for this layer. For the TRCA jurisdiction, a layer with all major roads was utilized.	**Distance** / **Score** 0-100 / 1 100-200 / 2 200-300 / 3 300-400 / 4 400-500 / 5 500-600 / 6 600-700 / 7 700-800 / 8 800-900 / 9 1000 + / 10	**Yes** Values areas far from roads; will improve the distribution of natural cover in TRCA region due to the grid network of roads. The shape of habitat patches will also be improved through rounding out or squaring of patches farther from network of roads.

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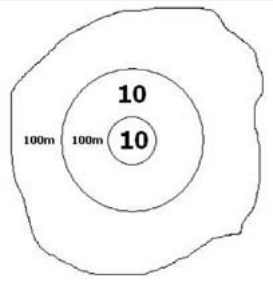
CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
Interior Forest	Core habitats or interior forest habitat (defined as areas greater than 100 m from the forest edge) are important, as many species will find difficulties in areas that are near the edge, due to the effects listed above. For this reason, existing interior forest is highly valued and it is given a maximum score of ten points. Also, all forest 100 m moving back out from the interior forest boundary is given maximum points. The reasoning for this is because interior forest would not exist if the surrounding 100 m 'buffer' of forest is not maintained. This will promote better patch shapes (for patches with interior forest) by not valuing linear convolutions or appendages that do not contribute to interior forest on larger patches.	**Distance from edge** / **Score** 100 + / 10 **Distance back out from 100 m forest interior line** / **Score** 100-0 / 10 	**No** Addresses existing interior forest only. Will protect existing cover only.
Proximity of a wetland to a forest	This layer takes into consideration the need for species to have close proximity of wetlands to forests to provide summer, spring and winter habitat. Wetland habitat that is in close proximity to forest habitat is given a maximum score of ten points. The value breakdown goes from immediate adjacency (given a maximum score of 10) to a distance greater than 2 km (score of 0). This distance of 2 km is both the distance used for the matrix influence, and the approximate width of concessions, where roads break connectivity for these species. Species requiring or benefiting from the close proximity of wetlands and forests include: amphibians such as spring peepers, wood frogs, grey treefrogs, eastern newts, spotted and blue-spotted salamanders; reptiles such as garter and ribbon snakes; birds such as wood ducks, hooded mergansers, broad-winged hawks, barred	**Distance** / **Score** 0-10 / 10 10-30 / 9 30-60 / 8 60-120 / 7 120-200 / 6 200-300 / 5 300-500 / 4 500-1000 / 3 1000-2000 / 2 2000 + / 1	**No** Addressing existing forest and wetland cover only. Will value existing cover only

<table>
<tr><th>CRITERIA</th><th>RATIONALE</th><th>VALUE RANGE (DISTANCE IN M)</th><th>POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER</th></tr>
<tr><td></td><td>owls, screech owls, Acadian flycatchers, Eastern phoebes, and mourning warblers; mammals such as beavers, raccoons, white-tailed deer, and eastern chipmunks.</td><td></td><td></td></tr>
<tr><td>Proximity of a forest to a wetland</td><td>This layer is the inverse of the previous, valuing forest immediately adjacent to wetlands (and out 10 m) with a maximum score of ten. The value breakdown is the same as the above layer (Gibbs 1998a, 1998b; Pope et al. 2000; Lamoureux et al. 1999; Guerry and Hunter 2002; Lehtinen et al. 1999).</td><td>Distance — Score
0-10 — 10
10-30 — 9
30-60 — 8
60-120 — 7
120-200 — 6
200-300 — 5
300-500 — 4
500-1000 — 3
1000-2000 — 2
2000 + — 1</td><td>No
Addresses existing forest and wetland cover only. Will value existing cover only</td></tr>
<tr><td>Proximity to a watercourse (with a fill line)</td><td>There is value in being in close proximity to a watercourse or water body. Water bodies include lakes and ponds of all sizes, and any open water or wetland system, not including swamp forests (see below). Some positive influences of riparian or water features on terrestrial are nutrient exchange, source of drinking water, breeding areas, and the connectivity function provided by valleys, and the influence extends beyond the riparian, and on to tablelands. The nature of this influence changes within this area, but at the scale we are working at, it is difficult to be more precise, and to tease out the different positive influences of riparian on terrestrial. Therefore, all areas that were determined to be within or in proximity to water features were given maximum points.</td><td>Distance to Fill Line — Score
Within Fill Line — 10
0 to 30 — 10
30 to 200 — 9, 8, 7, 6, 5, 4, 3, 2, 1 (even breaks)
>=200 — 0</td><td>Yes
Shows preference for areas within fill line and 30 m beyond fill line, but also values areas up to 200 m beyond fill line. Will affect natural cover distribution in a negative way due to the greater abundance of watercourses in the headwater areas to the north in the TRCA region. This criterion will also improve the matrix influence, patch size and connectivity around watercourses.</td></tr>
</table>

CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
	Proximity to a watercourse was based on distance to those lands regulated by TRCA under Ontario Regulation 158 (defined by the 'fill line').		
Proximity to a watercourse or water body (without a fill line)	In those areas where a 'fill line' does not exist (not regulated by TRCA under Ontario Regulation 158), areas that were determined to be within or in proximity (up to 120 m) to a watercourse or water body were given maximum points. With regards to the interface between aquatic and terrestrial ecosystems, it is assumed that the most ecologically beneficial placement of new natural cover would be within 200 m from a water feature.	**Distance to WC/WB** — **Score** 0 to 120 — 10 120 to 200 — 9, 8, 7, 6, 5, 4, 3, 2, 1 (even breaks) >=200 — 0	**Yes** Values areas 120 m out from a watercourse or water body where there is no existing fill line. Will affect natural cover distribution in a negative way due to the greater abundance of watercourses and water bodies in the headwater areas to the north of the TRCA region. This criterion will also improve the matrix influence, patch size and connectivity around water courses and bodies.
FEASIBILITY CRITERIA			
PSW	This layer addresses the opportunities where expansion of the existing TNH System can and might be possible due to the presence of a Provincially Significant Wetland (PSW). A PSW provides some means of protection to the landscape due to current policies, and this 'protection' currently extends beyond the PSW feature out to 120 m. According to Section 2.1 of the *Provincial Policy Statement* (PPS), development or site alterations will not be allowed within a significant wetland. Development applications within 120 m of a PSW must show through an Environmental Impact Statement (EIS) that there will be no negative impact on the feature or its function.	**Distance** — **Score** Within Feature — 10 0 to 120 — 8 120+ — 0	**Yes** Awards value for existing PSWs and shows preference for lands within 120 m of the feature to build up on existing cover. This criterion will affect distribution in a negative way due to the more northerly location of the majority of PSWs in the TRCA region. Matrix influence in the vicinity of PSWs will be improved.

CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
ANSI	This layer addresses the opportunities where expansion of the existing TNH System might be possible due to the presence of an Area of Natural and Scientific Interest (ANSI). An ANSI provides some means of protection to the landscape due to current policies and this 'protection' currently extends beyond the feature. According to NH Reference Manual for Section 2.3 of the PPS, development applications within an ANSI will not be allowed. Development applications within 10 m of an ANSI must show through an EIS that there will be no negative impact on the feature or its function.	**Distance** / **Score** Within Feature: 10 0 to 10: 8 10+: 0	**Yes** Awards value for existing ANSIs and shows preference for lands within 10 m of the feature to build up on existing cover. This criterion will affect distribution in a negative way due to the more northerly location of the majority of ANSI sites in the TRCA region. Size and shape of patches as well as matrix influence in the vicinity of ANSIs will be improved.
ESA	This layer addresses the opportunities where expansion of the existing TNH System can and might be possible due to the presence of an Environmentally Significant Area (ESA). An ESA provides some means of protection to the landscape due to current policies, and this 'protection' currently extends beyond the feature. According to Section 2.3 of the PPS, development applications within an ESA will not be allowed. Development applications within 10 m of an ESA must show through an EIS that there will be no negative impact on the feature or its function.	**Distance** / **Score** Within Feature: 10 0 to 10: 8 10+: 0	**Yes** Awards value for existing ESAs and shows preference for lands within 10 m of the feature to build up on existing cover. This criterion will affect distribution in a negative way due to the more northerly location of the majority of ESAs in the TRCA region. Size and shape of patches as well as matrix influence in the vicinity of ESAs will be improved.
Fill/Fill Extension	This layer addresses the opportunities where expansion of the existing TNH System might be possible due to the influence that the TRCA has in this area.	**Distance** / **Score** Within Feature: 10 Outside Feature: 0	**Yes** Shows preference for lands within 10 m of the fill/fill extension line feature to build up on existing cover. This criterion will weakly affect distribution in a negative way due to the greater abundance of watercourses associated with fill/fill extension lines in the headwater areas (along ORM) to the north in the TRCA region. Size of patches as well as matrix influence in the vicinity will be improved. Shape is

CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
			affected in a negative way because most fill lines form long, linear boundaries around valley systems (unfavourable shape).
TRCA property	This layer addresses the opportunities where expansion of the existing TNH might be possible due to the mandate that the TRCA has to manage its own lands according to conservation principles.	**Distance** — **Score** Within Feature — 10 Outside Feature — 0	**Yes** Shows preference for lands within 10 m of TRCA-owned lands to build up on existing cover. This criterion will affect distribution in a negative way due to the more northerly location of the majority of TRCA properties in the TRCA region. Size of patches and matrix influence in the vicinity of TRCA property will be improved.
Greenbelt Plan	This layer addresses the opportunities where expansion of the existing TNH System can and might be possible due to the influence of being contained within the natural heritage system in lands identified in the Ontario Greenbelt Plan (MMAH, 2005b)	**Designation** — **Score** Greenbelt NHS — 10 Outside Feature — 0	**Yes** Shows preference for lands classified as natural heritage system in the Greenbelt Plan to build up on existing cover. This criterion will affect distribution in a negative way due to geographical location of the Greenbelt in the TRCA region. Size and shape of patches as well as matrix influence on and in the vicinity will be improved.
ORM	This layer addresses the opportunities where expansion of the existing TNH System might be possible due to the influence of the Oak Ridges Moraine (ORM) Conservation Plan (MMAH, 2002)	**Designation** — **Score** Core — 10 Corridor — 0 Countryside Area — 7 Settlement Area — 3	**Yes** Shows preference for lands classified as Core and Corridor Areas in the ORM CP to build up on existing cover. This criterion will affect distribution in a negative way due to geographical location of the ORM in the TRCA region. Size and shape of patches as well as matrix influence on and in the vicinity will be improved.

CRITERIA	RATIONALE	VALUE RANGE (DISTANCE IN M)	POTENTIAL TO EXPAND QUANTITY OF NATURAL COVER
Niagara Escarpment	This layer addresses the opportunities where expansion of the existing TNH System might be possible due to the influence of the Niagara Escarpment Plan (NEC, 2005)	**Designation** — **Score** Natural Area — 10 Protection Area — 8 Rural Area — 8	**Yes** Shows preference for lands classified as Natural and Protection Areas in the Niagara Escarpment Plan to build up on existing cover. This criterion will affect distribution in a negative way due to geographical location of the Niagara Escarpment in the TRCA region. Size and shape of patches as well as matrix influence in and in the vicinity will be improved.
Rouge Park (South of Steeles)	This layer addresses the opportunities where expansion of the existing TNH System might be possible due to the influence of the Rouge Park. *Note: Although ecological criteria have been developed (Schollen, 2003) to define the comprehensive of Rouge Park North, detailed field data is required- beyond the scope of this analysis.	**Designation** — **Score** Within Park Boundary — 10 Outside Park — 0	**Yes** Shows preference for lands classified as within the Rouge Park boundary to build up on existing cover. This criterion will affect distribution in a more positive way due to geographical location of Rouge Park in the TRCA region. Size and shape of patches as well as matrix influence on and in the vicinity will be improved.

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Table B3. LSRCA Natural Heritage System feature categories, criteria, and thresholds (See LSRCA 2018 for fulsome methodology).

Feature Category	Feature	Criteria
Core Features	Watercourses and Fish Habitat	All watercourses, fish habitat and their riparian zones (for meandering watercourses, a 30 m riparian zone was identified from the meander belt, for non-meandering watercourses and other waterbodies, a 30 m riparian zone was identified from the high water mark).
	Natural Areas Abutting Lake Simcoe (NAALS)	Land that extends from the Lake Simcoe shoreline with natural self-sustaining vegetation of any plant form or potential natural community. NAALS are areas of continuous vegetation community class that have a minimum size of 1 ha and are wholly or partially within the 30 m buffer zone of the Lake Simcoe shoreline.
	Lake Simcoe shoreline	Land within a 30 m buffer of the Lake Simcoe shoreline
	Wetlands	• All Provincially Significant Wetlands (PSWs) and evaluated non-PSW wetlands; • All unevaluated wetlands > 0.5 ha; and • All wetlands < 0.5 ha located within 30m of a Core Feature
	Woodlands	• In the Oak Ridges Moraine: woodlands > 4 ha in the Countryside or Settlement Areas and > 0.5 ha in the Natural Core and Natural Linkage Areas • In the Greenbelt area and remainder of the watershed: woodlands > 0.5 ha
	Valleylands	All significant valleylands, delineated based on the following criteria: • Streams with well-defined valley morphology (i.e. floodplains, meander belts and valley slopes) with an average width of 25 m or more • All stream and ravines with the presence of flowing or standing water >50 m in length; 25 m in average width and two valley walls of 15% slope or greater with a minimum height of 5 m • Additional features identified by the approval Authority that are consistent with one or more of the functions above

		Only streams and ravines >50 m in length, 25 m in average width and with slopes >15% were mapped; it is acknowledged that the remainder were captured as valleylands in stream corridors.
	Areas of Natural and Scientific Interest (ANSIs)	All ANSIs
	Endangered and Threatened Species Habitat	All habitat of endangered and threatened species (text criterion – not explicitly mapped).
	Significant Wildlife Habitat (SWH)	All SWH (text criterion – SWH was not explicitly mapped, but most SWH is likely captured within other Core Features. Alvars, tallgrass prairies and sand barrens were incorporated as core features; open country breeding bird habitat and animal movement corridors were considered targeted areas to enhance the NHS. Where SWH exist outside of the existing mapped features, it is recommended to be protected as part of the NHS).
Targeted areas to enhance the NHS	Grasslands	Grasslands >50 ha including cultural meadows, tallgrass prairies, alvars and agricultural land uses
	Floodplain Enhancement Opportunities	Areas in the floodplain adjacent to Core Features
	Corridor Restoration Opportunities	Locations where opportunities exist to widen the corridors along the main channel of watercourses to a minimum of 250 m, identified through the Stewardship Priorities and Opportunities Tool (SPOT).
	Local Linkages	Connections between isolated Core Features within 60 m of each other.
	Regional Linkages	Connections in the NHS between subwatersheds with natural cover or the potential for restoration within 300 m.
Buffers	Buffers on Core Features	30 m buffer on all Core Features except watercourses, fish habitat, and shoreline where the 30 m riparian zone was considered a setback to the features.

APPENDIX C: GIS data sources used to map and refine the CA NHS.

Table C1. GIS data sources used to develop an integrated Caledon CA NHS.

Data Use	GIS Data	Date	Updated in 2018 using 2017 Aerial Photography	Source
Base data for Caledon CA NHS mapping	Credit River Watershed Natural Heritage System	2015	Y	CVC
	Etobicoke Refined Target Watershed Natural Heritage System (updated in Caledon)	2007	Y	TRCA
	Humber Refined Target Watershed Natural Heritage System (updated in Caledon)	2006	Y	TRCA
	Natural Heritage System for the Lake Simcoe Watershed	2018	N	LSRCA
	Streams and Rivers	2017	N	TRCA
	Streams and Rivers	2016	N	LSRCA
	Streams and Rivers[1]	Provided 2018	N	NVCA
	Credit River Watershed Natural Heritage System – Contributing Waterbodies	2015	Y	CVC
	Lakes and Ponds	2015	Y	TRCA
	Lakes and Ponds	Provided 2018	N	OMNRF
	Slope Hazard[1]	Provided 2018	N	NVCA
	Flood Hazard[1]	Provided 2018	N	NVCA
	Meander Belt[1]	Provided 2018	N	NVCA
	CVC Ecological Land Classification (ELC) and Land Use[1,2]	2016	Y	CVC
	TRCA Land use (draft)[2]	2017	Y	TRCA
	CVC Boundary	2011	N	CVC
	TRCA Boundary	2017	N	TRCA
	LSRCA Boundary	2002	N	LSRCA
	NVCA Boundary	Provided 2018	N	NVCA
	Town of Caledon Boundary	Provided 2018	N	Region of Peel
Additional data referenced during	TRCA Ecological Land Classification (ELC)	2017	N	TRCA
	LSRCA Ecological Land Classification (ELC) and Land Use[2]	2017	N	LSRCA

Data Use	GIS Data	Date	Updated in 2018 using 2017 Aerial Photography	Source
Caledon CA NHS mapping	NVCA Ecological Land Classification (ELC)	2004	N	NVCA
	NVCA Land Use[1]	2008	N	NVCA
	New Tecumseth ELC[1]	Provided 2018	N	NVCA
	NVCA Unevaluated Wetlands[1]	Provided 2018	N	NVCA
	Lakes and Ponds	2013	Y	CVC
	Storm Water Management Pond features[1]	Provided 2018	N	Town of Caledon
	Storm Water Management Pond features	Provided 2018	N	TRCA
Data overlaid on the Caledon CA NHS for comparison or screening areas	Provincially Significant Wetlands	Provided 2018	N	OMNRF
	Areas of Natural and Scientific Interest	Provided 2018	N	OMNRF
	Greenbelt Plan NHS	Provided 2018	N	OMNRF
	Growth Plan for the Greater Golden Horseshoe NHS	Provided 2018	N	OMNRF
	Niagara Escarpment Plan (Natural and Protected Areas)	Provided 2018	N	OMNRF
	Oak Ridges Moraine Conservation Plan (Core and Linkage Areas)	Provided 2018	N	OMNRF
	Region of Peel Greenland System Core Areas	Provided 2018	N	Region of Peel
	CVC Regulation Limit	2013	N	CVC
	TRCA Regulation Limit (draft)	2018	N	TRCA
	LSRCA Regulation Limit	Provided 2018	N	LSRCA
	NVCA Regulation Limit	Provided 2018	N	NVCA
	Roads	Provided 2018	N	Region of Peel
	High Volume Groundwater Recharge Areas (HGRAs)	2015	N	CVC
	High Volume Groundwater Recharge Areas (HGRAs)	2015	N	TRCA
	Ecologically Significant Groundwater Recharge Areas (ESGRA)	2011	N	CVC
	Ecologically Significant Groundwater Recharge Areas (ESGRA)	2008	N	TRCA
	Ecologically Significant Groundwater Recharge Areas (ESGRA)	2016	N	LSRCA

Data Use	GIS Data	Date	Updated in 2018 using 2017 Aerial Photography	Source
	Significant Groundwater Recharge Areas (SGRA)	2011	N	CVC
	Significant Groundwater Recharge Areas (SGRA)	2015	N	TRCA
	Significant Groundwater Recharge Areas (SGRA) for LSRCA and NVCA jurisdictions in Caledon	2017	N	LSRCA
	CVC Species at Risk	2018	N	CVC
	TRCA Species of Conservation Concern	Provided 2018	N	TRCA
	TRCA Small Successional Natural Heritage Features	2018	Y	TRCA
	Greenbelt Key Hydrological Features (Mapping by EXP Services Inc.)	2018	N	Town of Caledon
	Greenbelt Key Natural Heritage Features (Mapping by EXP Services Inc.)	2018	N	Town of Caledon
	Town-wide Land Use	2015	N	Town of Caledon
	Environmental Zones 1 and 2 - Policy Areas for Palgrave Estate Residential Community	Provided 2018	N	Town of Caledon
Data used for Municipal refinements of the Caledon CA NHS	Town-wide Land Use	2015	N	Town of Caledon
	Caledon Zoning	Provided 2018	N	Town of Caledon
	Settlement Areas	Provided 2018	N	Town of Caledon
	Active Authorized Aggregate sites	Provided 2018	N	OMNRF
Aerial Photography	2017 Aerial Photography	2017	N	Region of Peel

[1] These layers were used to map the NVCA Natural Heritage System in Caledon. An adaptation of the CRWNHS methodology was used to form the system. The full GIS methodology is available upon request (CVC 2020).

[2] These layers were used to map small natural heritage feature screening areas outside of the Caledon CA NHS to act as a screening tool.

Table C2. GIS data sources used to develop an integrated Peel CA NHS.

Data Use	GIS Data	Date	Source
Base data for mapping the Integrated Peel CA NHS	Caledon CA NHS with Municipal Refinements	2018	CVC/TRCA/LSRCA/NVCA
	Brampton CA NHS with Refinements for Schedule D	2016	CVC/TRCA
	Credit River Watershed Natural Heritage System in Mississauga	2015	CVC
	Etobicoke Refined Target Watershed Natural Heritage System in Mississauga	2007	TRCA
	Mimico Refined Target Watershed Natural Heritage System in Mississauga	2007	TRCA
	Humber Refined Target Watershed Natural Heritage System in Mississauga	2006	TRCA
	Streams and Rivers in Mississauga	2017	TRCA
	Streams and Rivers in Mississauga[1]	2002	CH
	Credit River Watershed Natural Heritage System in Mississauga – Contributing Waterbodies	2015	CVC
	Lakes and Ponds in Mississauga	2015	TRCA
	Stable Top of Bank[1]	2012	CH
	Floodplain Hazard[1]	2012	CH
	Meander Belt[1]	2012	CH
	Lake Ontario Flood Hazard[1]	2012	CH
	Lake Ontario Erosion Hazard[1]	2012	CH
	Lake Ontario Dynamic Beach Hazard[1]	2012	CH
	CVC Ecological Land Classification (ELC) and Land Use[1]	2018	CVC
	CVC Boundary	2011	CVC
	TRCA Boundary (for 3 watersheds)	2017	TRCA
	CH Boundary	2007	CH
	Official Local Municipality boundaries	Provided 2018	Region of Peel
Additional data referenced while mapping the Integrated Peel CA NHS	Ecological Land Classification (ELC)	2014	CH
	Ponds	2012	CH
	Regulated Wetlands	2012	CH
	Lakes and Ponds	2013	CVC

Data Use	GIS Data	Date	Source
	Storm Water Management Pond features	Provided 2019	City of Mississauga
Data overlaid on the Peel CA NHS for comparison	Areas of Natural and Scientific Interest	Provided 2018	OMNRF
	Greenbelt Plan NHS	Provided 2018	OMNRF
	Growth Plan for the Greater Golden Horseshoe NHS	Provided 2018	OMNRF
	Niagara Escarpment Plan (Natural and Protected Areas)	Provided 2018	OMNRF
	Oak Ridges Moraine Conservation Plan (Core and Linkage Areas)	Provided 2018	OMNRF
	Provincially Significant Wetlands	Provided 2018	OMNRF
	CVC Regulation Limit	2013	CVC
	TRCA Regulation Limit (draft)	2018	TRCA
	LSRCA Regulation Limit	Provided 2018	LSRCA
	NVCA Regulation Limit	Provided 2018	NVCA
	CH Regulation Limit	2012	CH
	Town-wide Land Use	2015	Town of Caledon
	Environmental Zones 1 and 2 - Policy Areas for Palgrave Estate Residential Community	Provided 2018	Town of Caledon
	Region of Peel Greenland System Core Areas	Provided 2018	Region of Peel
	Region of Peel Core Valleys	Provided 2018	Region of Peel
	Mississauga Official Plan NHS	Provided 2019	City of Mississauga
	DRAFT Brampton Official Plan update Schedule D1 NHS (Core Areas)	Provided 2019	City of Brampton

[1] These layers were used to map the Conservation Halton (CH) Natural Heritage System in Mississauga. An adaptation of the CRWNHS methodology was used to form the system. The full GIS methodology is available upon request (CVC 2020).

APPENDIX D: Classification of land use and land cover in Caledon.

Table D1. Classification of land use and land cover communities in the Caledon CA NHS. Ecological Land Classification (ELC) Community Series form the basis for classification of the natural communities, and CA-defined land use categories for the basis for classification of the urban, agricultural and open space communities.

Land Cover Type	ELC Community Series / Land Use Category
Forest	Coniferous Forest (FOC) Deciduous Forest (FOD) Mixed Forest (FOM)
Wetland	Marsh (MA) Coniferous Swamp (SWC) Deciduous Swamp (SWD) Mixed Swamp (SWM) Thicket Swamp (SWT) Bog (BO) Fen (FE)
Cultural Woodland	Cultural Woodland (CUW)
Plantation	Plantation (CUP)
Successional	Cultural Meadow (CUM) Cultural Savannah (CUS) Cultural Thicket (CUT)
Aquatic	Open Aquatic (OAO) Floating-leaved Shallow Aquatic (SAF) Mixed Shallow Aquatic (SAM) Submerged Shallow Aquatic (SAS)
Other Natural (i.e. ELC communities not captured above)	Beach/Bar (BB) Bluff (BL) Cliff (CL) Rock Barren (RB)
Agriculture	Inactive Aggregate (AI) Intensive Agriculture (AGI) Non-intensive Agriculture (AGN) Wet meadow (WET)
Open Space	Commercial / Industrial Open Space (MOC) Institutional / Educational Open Space (MOI) Other Open Space (MOO) Private Open Space (MOP) Recreational Open Space (MOR) Manicured Open Space (MOS)
Urban	Active Aggregate (AA) Commercial / Industrial (CIC) Institutional / Educational (CII) Construction (CON) Landfill (LF) Major Trail (MT) Rural Development (RD) Collector (TPC) Highway (TPH) Regional Road (TPR) Railway (TPX) General Urban (URB) Residential Estate (URE) High Density Residential (URB) Low Density Residential (URL) Medium Density Residential (URM) High Rise Residential (URR) Mixed Residential (URX)

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